

**INSTRUCTION, RESEARCH, AND STUDENT AFFAIRS
DECEMBER 20, 2018**

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SUBJECT

Standing Committee Report – Higher Education Task Force Update

REFEFENCE

October 2017	Board assigned each of the 12 Higher Education Task Force recommendations to one or more of the Board's standing committees.
December 2017	Board prioritizes Higher Education Task Force recommendations.
February 2018	Board received update on all Higher Education Task Force recommendations.
April 2018	The Board received an update on progress regarding the Higher Education Task Force recommendations assigned to each of the Board's standing committees.
October 2018	The Board received an update on progress regarding the Higher Education Task Force recommendations assigned to each of the Board's standing committees

APPLICABLE STATUTE, RULE OR POLICY

Idaho State Board of Education (Board) Governing Policies & Procedures, Bylaws Section I.F.2

ALIGNMENT WITH STRATEGIC PLAN

Goal 1: Educational System Alignment; Objective A: Access and Transparency

BACKGROUND/ DISCUSSION

The Instruction, Research and Student Affairs (IRSA) committee Chair will provide a summary of several key initiatives that are in progress, in cooperation with staff from the eight public higher education institutions and other educational state agencies. IRSA projects include:

- Development continues for Board Policy III.E., Certificates and Degrees, regarding the definition of a microcredential.
- Inventory has been collected from institutions that utilize Open Education Resources for the delivery of courses on the state common course list.
- Finalized the system-wide common course list for Board approval.
- Exploring options whereby the Board office provides dual credit transcripts to institutions on behalf of graduating high school seniors who submit an admissions application through Apply Idaho.

IMPACT

The Chairman's overview will update Board members on efforts underway on projects within the IRSA Committee's area of responsibility.

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STAFF COMMENTS AND RECOMMENDATIONS

Staff will be available to provide additional details on current IRSA initiatives, if requested.

BOARD ACTION

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SUBJECT

Northwest Commission on Colleges and Universities (NWCCU)

REFEFENCE

August 2013	The Board was provided with an update of the accreditation process and the status of where each institution is in the process.
August 2014	The Board was provided with an overview of the accreditation process and the status of where each institution is in the process.
October 2016	The Board was provided with an update of the accreditation process with NWCCU President, Dr. Elman.

APPLICABLE STATUTE, RULE OR POLICY

Idaho State Board of Education (Board) Governing Policies & Procedures, Public Postsecondary Accreditation Section III.M

ALIGNMENT WITH THE STRATEGIC PLAN

Goal 1: Educational System Alignment, Ensure that all components of the educational system are integrated and coordinated to maximize opportunities for all students.

BACKGROUND/ DISCUSSION

NWCCU is one of seven federally recognized regional accrediting bodies serving six geographical regions in the United States and its territories. Idaho public colleges and universities seek accreditation through NWCCU. Accreditation is a process used by higher education to evaluate colleges, universities, and educational programs for quality and to assess their efforts toward continuous quality improvement. Regional accreditation ensures that an institution's academic program meets acceptable levels of quality. Institutions must be accredited by a federally recognized accrediting agency to qualify for participation in federal financial aid programs that provide low cost loans to students. The NWCCU accreditation cycle maintains a review process every seven years for institutions. During this seven-year timeframe an intense self-study is carried out and conducted in progressive stages of institutional self-reflection and peer evaluation, which includes a mid-cycle review.

Attending a regionally accredited institution is an important consideration for students if they seek to transfer credits to another institution or will want to pursue admission to graduate programs. Regionally accredited colleges and universities typically accept credits from other regionally accredited institutions.

In July 2018, Dr. Sonny Ramaswamy began his appointment as president of NWCCU. Previously he served six years as director of the National Institute of Food and Agriculture in the U.S. Department of Agriculture. Prior to his service in

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Federal government he served in administrative and faculty roles at several land grant universities, most recent at Oregon State University.

Before beginning her role as NWCCU Vice President in 2015, Valerie Martinez served as a NWCCU Commissioner, evaluation committee chair, evaluator, and Accreditation Liaison Officer. With experience across the Northwest region as a faculty member and administrator at several institutions, Ms. Martinez shares expertise with evaluation, substantive change processes, and NWCCU policy.

IMPACT

With evolving expectations in the regional and national landscape regarding the delivery of postsecondary education, NWCCU is seeking feedback as to how the agency can best serve member states and institutions. As part of its ongoing process of self-reflection, and in accordance with U.S. Department of Education regulations and Commission Bylaws, NWCCU has undertaken a cycle of review for its Eligibility Requirements, Policies, and the Standards of Accreditation. The process of revision includes the opportunity for feedback from key postsecondary constituents as well as the public. This self-reflective exercise provides all stakeholders the opportunity to assess the processes around NWCCU's accreditation activities (including the cycle of evaluation and the methods of evaluation).

The input gathered from meetings and constituents in NWCCU states will be used by the Commission to create a set of draft revised Standards, Policies, and Eligibility Requirements. Following an initial period of review and public comment, a second review period and call for comment will be made available in Summer 2019, for further revision. The final, revised Standards, Policies, and Eligibility Requirements will be adopted for implementation beginning in January 2020.

The overview provided by NWCCU President Ramaswamy and Vice-President Martinez will offer the Board added insight on the accreditation process, including quality assurance matters and the role of governing boards within this process. This information will also include the trends and issues associated with accreditation standards and policies.

STAFF COMMENTS AND RECOMMENDATIONS

Board members are encouraged to share feedback with NWCCU leadership that will help inform the development of NWCCU accrediting standards, policies, and eligibility requirements to be implemented in 2020. Board and institutional staff will also be available to address questions regarding quality assurance processes for academic programs and service delivery.

BOARD ACTION

This item is for informational purposes only.

BOISE STATE UNIVERSITY

SUBJECT

Ph.D. in Biomedical Engineering

APPLICABLE STATUTE, RULE, OR POLICY

Idaho State Board of Education Governing Policies & Procedures, Section III.G.

ALIGNMENT WITH STRATEGIC PLAN

The proposed program aligns with:

SBOE Strategic Plan GOAL 1: A Well-educated Citizenry; Objective C: Higher Level of Educational Attainment – Increase successful progression through Idaho’s educational system. The proposed program will provide local professionals with the opportunity to advance professionally and will provide local industry with appropriately trained workers.

SBOE Strategic Plan GOAL 2: Innovation and Economic Development; Objective B: Innovation and Creativity – Increase creation and development of new ideas and solutions that benefit society. The proposed program will focus on research that addresses transdisciplinary problems in biomedical engineering.

BACKGROUND/DISCUSSION

Boise State University (BSU) proposes to create a new interdisciplinary program that will award a Ph.D. in Biomedical Engineering. The proposed program will be offered face-to-face in BSU’s regional service area.

Biomedical engineering is a discipline that applies engineering concepts to medicine and biology in order to solve biomedical problems that span from whole body and organ systems to molecular interactions. The program will have three emphases:

- The Biomechanics emphasis will focus on analyzing the structural behavior of biological systems and developing technology to treat, diagnose, and prevent diseases that alter mechanical function.
- The Human Performance emphasis will focus on developing state-of-the-art technology to treat and prevent injury and disease, and to optimize athletic performance.
- The Mechanobiology emphasis will focus on identifying the mechanisms by which cells sense, respond and are regulated by physical stimuli, and will use this fundamental knowledge to develop regenerative approaches to improve health.

The program has two broad objectives that will support the career advancement of Idaho residents and stimulate economic growth in the state of Idaho:

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First, it will provide education in biomedical engineering to feed the growing regional and national need, creating biomedical researchers with transdisciplinary technical skills. Career pathways for graduates include regenerative medicine, human performance, injury prevention and rehabilitation, assistive technology, implantable devices, and surgical interventions. As noted by Dr. Christopher Hirose, Director of Research at the St. Alphonsus Regional Medical Center Coughlin Clinic,

“...establishment of a Biomedical Engineering PhD program at Boise State University will ... provide us the qualified local workforce we need to advance clinical, experimental, and computational research to improve patient outcomes.”

And as noted by Andrew Kazanovicz, Research and Development and Quality Manager at MWI Animal Health,

“...a current limitation is a lack of access to a skilled workforce that is able to conduct high-quality biomechanics research. The proposed PhD program can increase access to the people and laboratory resources I need...”

Second, it will increase research output in the field of biomedical engineering, both by Boise State faculty members and by collaborators. Dr. Jeff Brouman, Owner of WestVet Animal Emergency and Specialty Center, noted:

“The surgeons at WestVet, including myself, have been actively involved in developing new surgical instruments and devices for animal health. A PhD program in biomedical engineering would give us an ability to work with laboratories at Boise State on long-term projects and submit proposals to federal agencies. My recent work with Dr. Trevor Lujan at Boise State, in developing and testing the first hip resurfacing device for canines, is a great example of this type of collaborative work.”

Overlap with existing Ph.D. programs is minimal and where it exists will be a benefit to the state of Idaho. Idaho State University (ISU) has a Ph.D. in Biology, but it does not focus on engineering or on mechanobiology concepts. The University of Idaho (UI) has a Ph.D. in Biological Engineering, but the program is focused on environmental applications such as biofuels and wastewater treatment. Any overlap that exists is a basis for collaboration. Dr. Craig McGowan, Associate Professor in the Biological Sciences at the University of Idaho and director of the Comparative Neuromuscular Biomechanics Laboratory welcomes the opportunity for collaboration and states that:

“These collaborations will undoubtedly have a positive effect on the biomedical research aspirations in the State of Idaho and strengthen the potential for obtaining federal research funding at both the University of Idaho and Boise State University.”

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UI also has an Exercise Science PhD, but that program focuses on clinical application of science in measuring performance and managing nutrition and therefore has little overlap with the proposed program.

IMPACT

The proposed program will be initiated using existing resources reallocated within colleges. Once up and rolling, the program is projected to enroll on the order of 11 students at any one time, and to graduate on the order of 4 to 5 per year. All students in the program will be expected to be on funded graduate assistantships. A minimum of five assistantships will be funded by reallocation of funding within two of the participating colleges, Engineering and Health Sciences. The remaining assistantships will be funded by external grants.

The program will rely heavily on coursework already being offered and on faculty mentors already working with master's-level students. In addition, Ph.D. students are in general a more efficient use of faculty time and contribute more to faculty research productivity than do master's level students. One faculty line in the Department of Kinesiology is being reallocated from a program with falling enrollment to be aligned with the proposed program.

ATTACHMENTS

Attachment 1 – Ph.D. in Biomedical Engineering Program Proposal

STAFF COMMENTS AND RECOMMENDATIONS

The investment by BSU in the PhD in Biomedical Engineering seeks to help the institution build the research and educational training capacity of the state, further establishing Idaho's ability to meet state and national workforce demands, contribute to the growth of the state economy, and provide numerous benefits to all of Idaho's institutions of higher education by enhancing opportunities for cross-institutional collaboration.

Consistent with Board Policy III.G., BSU's proposed Ph.D. in Biomedical Engineering was reviewed by an external review panel consisting of Dr. Adam Higgins, Oregon State University and Dr. Mary C. Farach-Carson, University of Texas Health Science Center at Houston. Based on their review, external reviewers "considers it to be realistic based upon the capabilities in place at Boise State, the size of the existing core faculty (12-13), and the commitment to the Program voiced by the University leadership." Reviewers strongly recommended support for the program and offered several observations and recommendations, which BSU will be addressing as provided in their response to reviewer comments.

Similar programs offered by other institutions in nearby states include Montana State University, University of Montana, University of Nevada: Las Vegas and Reno, Oregon State University, Portland State University, Brigham Young University, University of Utah, and Washington State University. The University of

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Idaho currently offers two PhD programs in Biological Engineering and Exercise Science that may be similar; however, per BSU, these programs do not cover the areas of biomedical engineering as proposed. Idaho State University offers a Ph.D in Biology; however, program focus is not on engineering or mechanobiology concepts.

Although there is some overlap with an existing program at UI, staff believes that any drawbacks associated with this overlap do not exceed the benefits of having a Ph.D. in Biomedical Engineering within close proximity to relevant industry in the Treasure Valley and the collaborations that will result.

BSU's proposed Ph.D. in Biomedical Engineering is consistent with their Service Region Program Responsibilities and their current institution plan for Delivery of Academic Programs in Region III. As provided in Board Policy III.Z, no institution has the statewide program responsibility specifically for interdisciplinary engineering programs.

The proposal completed the program review process and was presented to the Council on Academic Affairs and Programs (CAAP) on November 15, 2018; and to the Committee on Instruction, Research, and Student Affairs (IRSA) on November 29, 2018.

Staff raised questions regarding course credits and dissertation credits, impacts to undergraduate and Master's level instruction due to reallocation of faculty effort to support program, and the absence of revenue from tuition and fees to help support the program. Furthermore, Board staff remain uncertain as to the regional and state need for this program. However, the establishment of a doctoral program in Biomedical Engineering will contribute to the research mission and goals BSU is seeking to fulfill. Based on consideration of these items, Board staff is uncommitted to a recommendation at this time.

BOARD ACTION

I move to approve the request by Boise State University to create a new academic program that will award a Ph.D. in Biomedical Engineering as presented.

Moved by _____ Seconded by _____ Carried Yes _____ No _____

Institutional Tracking No. 19-001

Idaho State Board of Education

Proposal for Undergraduate/Graduate Degree Program

Date of Proposal Submission :	<u>October 19, 2018</u>
Institution Submitting Proposal:	Boise State University
Name of College, School, or Division :	College of Engineering; College of Health Sciences
Name of Department(s) or Area(s) :	Dept of Mechanical and Biomedical Engr; Dept of Kinesiology

Program Identification for Proposed New or Modified Program:

Program Title:	PhD in Biomedical Engineering				
Degree:	PhD	Degree Designation	Undergraduate	<input checked="" type="checkbox"/>	Graduate
Indicate if Online Program:	<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>
CIP code (consult IR /Registrar) :	<u>14.0501</u>				
Proposed Starting Date :	Fall 2019				
Geographical Delivery:	Location(s)	Boise	Region(s)	III	
Indicate (X) if the program is/has:	<input type="checkbox"/>	Self-Support	<input type="checkbox"/>	Professional Fee	
Indicate (X) if the program is:	<input checked="" type="checkbox"/>	Regional Responsibility	<input type="checkbox"/>	Statewide Responsibility	

Indicate whether this request is either of the following:

- | | |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| <input checked="" type="checkbox"/> New Degree Program | <input type="checkbox"/> Consolidation of Existing Program |
| <input type="checkbox"/> Undergraduate/Graduate Certificates (30 credits or more) | <input type="checkbox"/> New Off-Campus Instructional Program |
| <input type="checkbox"/> Expansion of Existing Program | <input type="checkbox"/> Other (i.e., Contract Program/Collaborative) |

College of Engineering
College of Health Sciences
JoAnn Solity
College Dean (Institution) _____ Date 10/11/18

[Signature]
Graduate Dean or other official (Institution) as applicable _____ Date 10/11/18

[Signature]
FVP/Chief Fiscal Officer (Institution) _____ Date 10/11/18

[Signature]
Provost/VP for Instruction (Institution) _____ Date 10/15/18

[Signature]
President _____ Date 10/19/18

Vice President for Research (as applicable) _____ Date

Academic Affairs Program Manager, OSBE _____ Date

Chief Academic Officer, OSBE _____ Date

SBOE/Executive Director Approval _____ Date

Rationale for Creation or Modification of the Program

1. **Describe the request and give an overview of the changes that will result.** Will this program be related or tied to other programs on campus? Identify any existing program that this program will replace.

Overview

Boise State proposes the creation of a new interdisciplinary program leading to the degree of **Doctor of Philosophy in Biomedical Engineering**. Faculty members participating in the program will be drawn from the College of Engineering, the College of Health Sciences, and the College of Arts and Sciences. This program will not replace or be tied to other PhD programs on campus.

Biomedical engineering is the application of engineering concepts to medicine and biology for healthcare purposes. The Biomedical Engineering program will integrate knowledge from diverse scientific fields to solve biomedical problems that span from whole body and organ systems to molecular interactions.

Initially, there will be three emphases in the proposed program:

- The Biomechanics emphasis will focus on analyzing the structural behavior of biological systems and developing technology to treat, diagnose, and prevent diseases that alter mechanical function.
- The Human Performance emphasis will focus on developing state-of-the-art technology to treat and prevent injury and disease, and to optimize athletic performance.
- The Mechanobiology emphasis will focus on identifying the mechanisms by which cells sense, respond, and are regulated by physical stimuli, and will use this fundamental knowledge to develop regenerative approaches to improve health.

It is anticipated that one or more additional emphasis areas (e.g., integrative physiology, biomedical device design, biomedical imaging) will be added in the future to reflect areas in which Boise State develops substantial faculty depth.

Objectives

Our vision for this new PhD program in Biomedical Engineering is to create a truly transdisciplinary doctoral program that integrates biomedical researchers across Boise State's campus to provide a comprehensive understanding of movement, mechanics, structure, and physiology of living systems. Graduates may find career pathways across a broad range of industries, including regenerative medicine, human performance, injury prevention and rehabilitation, assistive technology, implantable devices, and surgical interventions.

This program has three broad objectives that will support the career advancement of Idaho residents and stimulate economic growth in the state of Idaho: (i) create biomedical researchers with transdisciplinary technical skills who can work seamlessly across interdisciplinary boundaries, (ii) provide a venue in Idaho for further education in biomedical engineering to feed the growing regional and national need, (iii) increase faculty competitiveness for external funding.

- (i) **Create biomedical researchers with transdisciplinary technical skills who can work seamlessly across interdisciplinary boundaries**

Biomedical engineering is an inherently interdisciplinary field. Engineers must work with biologists and chemists to develop effective drug delivery systems and designers must work with kinesiologists to quantify the effect of their assistive devices on functional performance. This program will reduce the

entry barrier to other biomedical disciplines through 1) core courses that develop a common language across our PhD student cohort, 2) transdisciplinary directed research experience in a laboratory outside of their home research group, 3) graduate seminars that expose students to a broad spectrum of research and industry projects and experiences in the biomedical field, and 4) a dedicated biomedical research space for our PhD students in order to foster interaction and peer learning across the student community. Students will be exposed to ideas and perspectives that cross research laboratory, department, and college-level boundaries. These experiences will enable students to conduct world-class research, compete for senior industry positions, and start independent ventures. As noted by Dr. Christopher Hirose, Director of Research at the St Alphonsus Regional Medical Center Coughlin Clinic,

...establishment of a Biomedical Engineering PhD program at Boise State University will ... provide us the qualified local workforce we need to advance clinical, experimental, and computational research to improve patient outcomes.

(ii) Provide a venue in Idaho for further education in biomedical engineering to feed the growing regional and national need

Biomedical Engineering is one of the fastest growing fields in the United States, with projected growth of 24% by 2024, three times the national average [Bureau of Labor Statistics]. Doctoral degrees are essential for securing positions as biomedical researchers and R&D scientists in medical device, biotechnology, rehabilitation, and medical supply companies. Such companies generate over \$42 billion in annual sales, and experience steady growth because of aging demographics and emerging markets.

The University of Idaho offers two PhD programs (in 'Biological Engineering' and in 'Exercise Science') that help to address this economic need. However, these programs do not cover key branches of biomedical engineering. For example, the Biological Engineering PhD program at UI offers advanced topics in a broad spectrum of biological questions, but a large portion of the program is inherently focused on environmental applications such as biofuels, climate modeling, and waste water treatment and management. The Exercise Science PhD program at UI focuses on clinical application of science in measuring performance and managing nutrition, but do not address the underlying biological questions and engineering mechanics of musculoskeletal movement.

The creation of a new PhD in Biomedical Engineering will create collaborations that will strengthen research at the University of Idaho. As noted by Dr. Nathan Schiele, Assistant Professor of Biological Engineering at the University of Idaho,

This proposed Ph.D. program can also help my own research goals, since it will increase the visibility of biomedical research in Idaho and expand the regional expertise in fields that complement my own work. I am one of a handful of researchers in the Department of Biological Engineering at UI that have a biomedical research focus, and the proposed Ph.D. program can help our state reach a critical mass of researchers and projects in biomedical engineering.

The proposed PhD program in Biomedical Engineering at Boise State University is a unique cross-campus collaboration between all colleges and departments supporting biomedical researchers, including the departments of Kinesiology, Mechanical & Biomedical Engineering, Biological Sciences, and Electrical & Computer Engineering. The program's emphasis areas in biomechanics, human performance, and mechanobiology are currently not offered in any Idaho universities. Importantly, the proposed PhD program is strategically positioned to facilitate growth in research and clinical evaluation in St. Luke's, St. Alphonsus, Idaho College of Osteopathic Medicine, and Boise Veterans Affairs Medical Center. For example, graduates from this program would have necessary expertise for gait analysis and rehabilitation interventions for children and veterans with pathological gait.

(iii) Increase faculty competitiveness for external funding

This program will undoubtedly strengthen external funding applications from researchers involved in

the program. Federal funders, such as the National Institutes of Health (NIH), National Science Foundation (NSF), National Aeronautics and Space Administration (NASA), and Department of Defense (DoD) are actively interested in funding collaborative, transdisciplinary projects that tie together expertise across departments, colleges, and communities. The biomedical faculty at Boise State currently involved in establishing this PhD program have had some initial success with federal funding. Successfully funded awards from researchers involved in this program have included an NSF CAREER award, Idaho Global Entrepreneurial Mission (IGEM) Council awards, Idaho NASA EPSCoR awards, and DoD awards, totaling \$1.95 million in extramural funding. These same researchers applied for \$7.9 million in funding in 2017, and are targeting \$7.3 million in grant submissions for the upcoming year. However, the ability to compete for biomedical funding has been severely hindered by the absence of PhD programs in Kinesiology and Mechanical & Biomedical Engineering. This deficit has been cited as a weakness in comments from prior proposal applications submitted by biomedical faculty in these departments; a reviewer of a recent NIH R15 proposal (requested funding \$410k) stated, as an environment weakness,

“The lack of doctoral programs may be limiting to the efforts to expand the research program”.

In a separate R15 application (requested funding \$400k) another reviewer had similar environmental concerns:

“Since the institution has only a MS program in the department, there will not be many advanced student role models for the undergraduate students”.

This PhD program will address this limitation and stand as a tangible demonstration of collaboration and transdisciplinary engagement across the Boise State campus. This type of transdisciplinary initiative will be critical to success in driving Boise State towards R2 and R1 research status. Additionally, the proposed program will serve recent hires in Mechanical & Biomedical Engineering and Electrical & Computer Engineering who are actively involved in biomedical research as well as an upcoming hire in Kinesiology. This PhD program will strengthen the competitiveness of the research environment at Boise State, and we anticipate it will contribute to the success of future submissions.

Environment

The proposed program will be built on a solid foundation created by recent growth at Boise State in disciplines related to biomedical engineering:

- The number of faculty members directing research projects in biomedical engineering at Boise State has increased by 300% in the past 5 years, with nine recent faculty hires across two colleges (C. Fitzpatrick, D. Estrada, E. Gerard, G. Uzer, T. Brown, S. Phillips, B. Johnson, K. Cantley, S. Hall), one upcoming hire in the College of Health Science, and recent full-time staff hires (K. Seymore, BRC).
- The amount of funding Boise State has received from the National Institutes of Health for biomedical research projects has increased from \$2.5 million in 2012 to \$6.1 million in 2017.
- The biomedical research infrastructure at Boise State University has expanded in the last five years, with over \$13 million in intramural and extramural investments in the Center for Orthopaedic and Biomechanics Research in the College of Health Sciences, the biomedical engineering complex in the College of Engineering, the Biomedical Research Vivarium, and the Biomolecular Research Center in the College of Arts and Sciences.
- The interdisciplinary Biomedical Engineering Minor Program is the sixth largest minor program at the university, with 97 students currently enrolled and 298 students that have earned this minor in the past five years, over 40% were from underrepresented groups in engineering (see **Section 2b** for further detail).

The state of Idaho has recognized the economic potential of the biomedical engineering industry, and has organized strategic initiatives to strengthen biomedical research in Idaho (see **Section 5, Goal 4**, for further detail). The above developments have offered an

unprecedented opportunity for Boise State to create a PhD program in the field of biomedical engineering and establish Boise State as a premier program in the northwest for biomedical research. The National Institutes of Health (NIH) have also noticed Boise’s growth in biomedical research, and in August 2017, Congressman Mike Simpson hosted a director from the NIH at the Boise State campus. After this visit, Congressmen Simpson stated that

“Boise State has great potential to expand its (biomedical) research footprint”.

Former President Bob Kustra stated that,

“Biomedical research is a high priority for Boise State University and the State of Idaho”

2. **Need for the Program.** Describe the student, regional, and statewide needs that will be addressed by this proposal and address the ways in which the proposed program will meet those needs.

- a. **Workforce need:** Provide verification of state workforce needs that will be met by this program.

The proposed program will provide local, place-bound students with access to a program that will advance them professionally. The following table shows the number of job openings in the general field of biomedical engineering at www.ziprecruiter.com on Feb. 11, 2018. The search terms were selected to encompass positions normally filled by biomedical engineering graduates.

Search term	Number of jobs
PhD Biomedical Engineering	677
PhD Bioengineering	186
PhD Biomedical Research	1224

The total number of job openings is 2087, and a 7% increase is expected each year per the 2016 Bureau of Labor Statistics. State need was calculated as 0.67% of the national need to reflect the percent of the nation’s population in Idaho. Local regional need was calculated as 50% of the state need to reflect the percent of Idaho’s population in the local area. The unemployment rates for biomedical scientists with a PhD were 2.3% in 2013 (national average = 7.5%). This is the most recent report from a national Survey of Doctorate Recipients (<https://ncesdata.nsf.gov/doctoratework/2013/>). The typical job titles requiring a PhD in biomedical engineering include professor, biomedical scientist, postdoc, senior scientist, and senior engineer.

	Year 1	Year 2	Year 3
Local (Regional)	7	7	8
State	14	15	16
Nation	2087	2233	2389

The above table is a finer-grained approach to labor data than can be provided by DOL data, and therefore is provided in lieu of DOL data. Furthermore, use of DOL projections are based on the present state of biomedical research and biomedical industry in Idaho. However, the presence of a new PhD in Biomedical Engineering will result in an increase in biomedical industry, which will result

in additional employment opportunities.

	State DOL data	Federal DOL data	Other data source: (describe)
Local (Service Area)	See above table	See above table	See above table
State	See above table	See above table	See above table
Nation	See above table	See above table	See above table

b. Student need. What is the most likely source of students who will be expected to enroll (full-time, part-time, outreach, etc.).

The enthusiasm for biomedical engineering is evident in our undergraduate student population. The undergraduate minor in Biomedical Engineering is the largest minor program (along with Computer Science) in the College of Engineering, and the sixth largest minor program across the entire university. Almost 100 students are currently enrolled in the biomedical minor program, including participants from Mechanical & Biomedical Engineering, Kinesiology, Biology, and Material Science. Top-tier undergraduate students are obtaining undergraduate research positions in the biomedical research labs across the Boise State campus. However, without an advanced degree in biomedical engineering, we are losing these highly qualified potential PhD candidates to doctoral programs outside of Idaho. This new PhD program will have an immediate benefit to undergraduate students seeking further education in the biomedical field in the Intermountain West region. The Biomedical Engineering doctoral program will provide a mechanism to retain highly motivated students currently working as undergraduate research assistants in our biomedical laboratories, as well as incentivizing Boise State as the destination of choice for further education in kinesiology, engineering, medical and performance sciences in Idaho and beyond. Please see the **letters of support** from former Boise State students (*E. Neumann, K. Seymore, T. Simenc, S. D'az*) that have a high level of interest for the proposed PhD program.

This program will also help address the underrepresentation of women in STEM majors. For example, in the department of Mechanical & Biomedical Engineering, female students make up just 14.5% of the undergraduate population. However, women in the Biomedical Engineering minor represent close to 50% of the minor cohort. Hence, we expect that a doctoral program in biomedical engineering will attract greater female representation. In the long-term, increasing the number of women obtaining advanced STEM degrees has huge potential to address gender disparity in both academia and industry.

Finally, graduate students at the PhD level will facilitate hiring of additional undergraduate researchers in our biomedical labs, to work and learn under the guidance of these PhD candidates. Biomedical faculty recently established a Biomedical Internship program, whereby undergraduate students could take a 3-credit internship course which involved working in, and contributing to, a biomedical research lab on campus. Obtaining an internship was a highly competitive process, primarily due to the number of undergraduate students that each PI could accommodate in their lab over a semester. An active biomedical PhD cohort would facilitate a greater number of internships, as an undergraduate student could work directly with a PhD student. This would be a significant boost to the experiential learning component of the undergraduate curriculum.

c. Economic Need: Describe how the proposed program will act to stimulate the state economy by advancing the field, providing research results, etc.

First, the western U.S. has experienced strong growth in the biomedical engineering industry in the past two decades. However, most of this growth has been in California, Utah, and Washington, which have university programs in biomedical engineering. The long-term economic impact of a Biomedical Engineering PhD program is evident in Salt Lake City, where the bioengineering graduate program

was started in 1974, and has supported the growth of a medical technology industry that is now represented by 961 companies and 26,900 high-paying jobs (mean salary = \$62,300).

Idaho has seen modest growth, as biomedical companies, such as St. Theresa Medical Inc., and Securos Surgical, which have looked to expand their operations into the Treasure Valley. A Biomedical Engineering PhD program will give industry leaders confidence that Boise State University is committed to providing an innovative environment and a highly-trained workforce that is critical for the biotechnology sector to flourish in Idaho. Boise is a thriving metropolitan area that can leverage expertise arising from this graduate program to attract medical and biotech companies to the region, and facilitate the growth of biomedical startup companies and clinical facilities. As noted by Dr. Jeff Brouman, Owner of WestVet Animal Emergency and Specialty Center,

The surgeons at WestVet, including myself, have been actively involved in developing new surgical instruments and devices for animal health. A PhD program in biomedical engineering would give us an ability to work with laboratories at Boise State on long-term projects and submit proposals to federal agencies. My recent work with Dr. Trevor Lujan at Boise State, in developing and testing the first hip resurfacing device for canines, is a great example of this type of collaborative work.

And as noted by Andrew Kazanovicz, Research and Development and Quality Manager at MWI Animal Health,

I recently moved from our offices in Massachusetts to initiate R&D operations in Boise. This move has put me in close proximity to clinical consultants and the MWI headquarters, but a current limitation is a lack of access to a skilled workforce that is able to conduct high-quality biomechanics research. The proposed PhD program can increase access to the people and laboratory resources I need to do my job well.

Second, the new PhD program will result in a substantial increase in federal grant funding. The National Institutes of Health is the highest funded federal program for research, with \$30 billion in annual funding. In 2017, the state of Idaho received \$14.7 million in NIH funding, which was considerably less than the neighboring states of Utah (\$198 million), Nevada (\$31.5 million), Montana (\$36 million), Washington (\$998 million), and Oregon (\$312 million)(source: <http://www.unitedformedicalresearch.com/>). A PhD program in Biomedical Engineering will signal to the NIH that Boise State is expanding its biomedical research footprint, and this program will enable principal investigators at Boise State to better compete for large five-year research project grants (R01). We conservatively estimate that the proposed PhD program, once fully established, will result in an increase of \$1.5M in federal funding entering Idaho per year. Finally, the percentage of women in biomedical engineering is around 40%, more than twice the overall engineering average. This PhD program can therefore improve gender diversity in STEM graduate programs at Boise State.

d. Societal Need: Describe additional societal benefits and cultural benefits of the program.

As the prominence of 21st century diseases increase (obesity, aging, cancer), a strong need exists for “bench to bedside” solutions in regenerative and rehabilitative medicine. The PhD in Biomedical Engineering will train students to develop novel approaches to fix persistent problems in healthcare and human performance by exposing students to challenging courses, state-of-the-art laboratory equipment and technology, and impactful research projects. This transdisciplinary program can address traditional limitations of single discipline programs, such as a lack of analytical skills in kinesiology curriculums, and a lack of human movement science in engineering curriculums. Graduates of such a program will not only be pivotal in crossing boundaries between the clinic and laboratory, but the bicameral nature of the transdisciplinary degree will make them adept at integrating within, and even leading, large interdisciplinary teams requiring both skill sets.

e. If Associate’s degree, transferability:

N/A

- 3. Similar Programs.** Identify similar programs offered within Idaho and in the region by other in-state or bordering state colleges/universities.

As shown in the following tables, every research university in Idaho and adjacent states has one or more PhD programs that have similarities with the proposed program.

Similar Programs offered <u>by Idaho public institutions</u> (list the proposed program as well)		
Institution Name	Degree name and Level	Program Name and brief description if warranted
BSU Proposed: PhD in Biomedical Engineering	Doctoral	The proposed program includes the following three fields: biomechanics, human performance, and mechanobiology.
BSU PhD in Biomolecular Sciences	Doctoral	Program curriculum is focused on, Biochemistry, Bioinformatics, Biophysics, Cell Biology, Computational Biology, Molecular Biology
ISU PhD in Biology	Doctoral	The program allows for a broad range of research topics in Microbiology, Ecology, Plant Science, Virology and Neuroscience.
UI PhD in Biology	Doctoral	There are various specialization areas such as biomedicine, cellular and molecular biology, ecology and evolution and neuroscience.
UI PhD in Biological Engineering	Doctoral	There are various specialization areas in Precision Agriculture, Bio Image Processing, Bioprocess Engineering, Medical Pharmacology, Tendon Mechanobiology, Biomechanics of Engineered Tissues, Neural Engineering, Agricultural Processing Systems, Biofuels, Biomass Conversion
UI PhD in Exercise Science	Doctoral	There are various specialization areas in Fitness Assessment, Obesity and Health, Physiology of Exercise, Fitness Assessment & Prescription, Motivation in Sport & Recreation, Character Development, Neuromechanics of Human Movement, Motivation in Sport & Recreation

Similar Programs offered <u>by other Idaho institutions and by institutions in nearby states</u>		
Institution Name	Degree name and Level	Program Name and brief description if warranted
Montana	Montana State University	PhD in Neuroscience Ph.D. in Biological Sciences
	University of Montana	PhD in Neuroscience PhD in Pharmaceutical Sciences and Drug Design PhD in Cellular, Molecular and Microbial Biology

Nevada	University of Nevada Las Vegas	Ph.D. in Biological Sciences PhD in Interdisciplinary Health Sciences
	University of Nevada Reno	PhD in Biomedical Engineering PhD in Cell and Molecular Biology
Oregon	Oregon State University	PhD in Kinesiology PhD in Bioengineering
	Portland State University	PhD in Biology
	University of Oregon	PhD in Biology PhD in Human Physiology
Utah	Brigham Young University	PhD in Biology PhD in Exercise Science PhD in Neuroscience
	University of Utah	PhD in Biology PhD in Bioengineering PhD in Rehabilitation Science PhD in Neurobiology and Anatomy PhD in Kinesiology PhD in Neuroscience
	Utah State University	PhD in Biological engineering PhD in Biology
Washington	University of Washington	PhD in Biology PhD in Neuroscience PhD in Physiology & Biophysics PhD in Bioengineering
	Washington State University	PhD in Biological and Agricultural Engineering PhD in Biology
Wyoming	University of Wyoming	PhD in Biomedical Sciences PhD in Neuroscience

- 4. Justification for Duplication with another institution listed above.** (if applicable). If the proposed program is similar to another program offered by an Idaho public institution, provide a rationale as to why any resulting duplication is a net benefit to the state and its citizens. Describe why it is not feasible for existing programs at other institutions to fulfill the need for the proposed program.

Idaho State University offers a PhD program in Biology, however, ISU's program does not focus on engineering nor on mechanobiology concepts and therefore has little overlap with Boise State's proposed PhD in Biomedical Engineering.

The University of Idaho offers PhD programs in Biological Engineering and Exercise Science:

- The Biological Engineering PhD program at UI offers advanced topics in a broad spectrum of biological questions, but a large portion of the program is inherently focused on environmental applications such as biofuels, climate modeling, and waste water treatment and management. Although there are faculty with research interests aligned with the proposed mechanobiology emphasis, there is no structured mechanobiology curriculum offered at UI. We regard any

overlap in research interests between faculty at UI and Boise State as the basis for collaboration. Three of the faculty members developing this PhD proposal traveled to UI last fall to visit the research labs of faculty in the Biological Engineering PhD program and initiate potential collaborations (see **letters of support** from *Dr. Schiele* and *Dr. McGowan*). As noted by Dr. Craig McGowan, Associate Professor in the Department of Biological Sciences at the University of Idaho,

In my role as Director of the Comparative Neuromuscular Biomechanics Laboratory, my research seeks to understand the relationships between the musculoskeletal morphology and the biomechanics and neural control of locomotor performance. These research interests will be highly complementary to researchers in the Biomedical Engineering PhD program at Boise State University and I look forward to future collaborations with doctoral students and biomedical faculty involved in this program. These collaborations will undoubtedly have a positive effect on the biomedical research aspirations in the State of Idaho and strengthen the potential for obtaining federal research funding at both the University of Idaho and Boise State University.

- The Exercise Science PhD program at UI focuses on clinical application of science in measuring performance and managing nutrition. In this way, these programs do not specifically have any emphasis areas in Biomechanics and Mechanobiology.

The proposed PhD program in Biomedical Engineering at Boise State University is a unique cross-campus collaboration between all colleges and departments supporting biomedical researchers. This encompasses the departments of Kinesiology, Mechanical & Biomedical Engineering, Biological Sciences, and Electrical & Computer Engineering and will enable doctoral students to gain expertise in the mechanics, movement, and functional performance of living systems. In addition, this program has emphasis areas in biomechanics, human performance, and mechanobiology that are currently not offered in any Idaho universities.

Furthermore, BSU's proposed program will have impacts that are not feasible for UI's programs: (i) BSU's is strategically positioned to facilitate growth in research and clinical evaluation at St. Luke's, St. Alphonsus, Boise Veterans Affairs (VA), and the new Idaho College of Osteopathic Medicine (see **letters of support** from *Dr. Roberts*, *Dr. Hirose*, *Dr. Aldape*, *Dr. Stephens*, *Dr. Hasty*), and (ii) BSU's program will have major benefits for undergraduate and master's level students in existing BSU programs. As noted by Dr. Dennis Stevens, Chief, Infectious Disease Section at the Boise Veterans Administration Medical Center,

This new PhD program can help Idaho research groups, such as the group I currently direct at the VA, explore new ideas and funding opportunities. For example, several researchers at Boise State are working to develop treatments for soft tissue disease, which has overlap with research being conducted at the VA related to soft tissue infections. The proposed PhD program would bolster any potential collaboration between the VA and Boise State, and therefore this program can help support VA research. I feel this program would be a smart investment for Boise and for Idaho.

5. Describe how this request supports the institution's vision and/or strategic plan.

Alignment with the SBOE Strategic Plan:

SBOE Strategic Plan	Relevance of proposed program
GOAL 1: A Well-educated Citizenry >Objective C: Higher Level of Educational Attainment – Increase successful progression	The proposed program will provide local professionals with the opportunity to advance professionally.

through Idaho's educational system.	
<p>GOAL 2: Innovation and Economic Development</p> <p>The educational system will provide an environment that facilitates the creation of practical and theoretical knowledge leading to new ideas.</p> <p>>Objective B: Innovation and Creativity – Increase creation and development of new ideas and solutions that benefit society.</p>	<p>The proposed program will focus on research that addresses transdisciplinary problems in biomedical engineering through collaboration and ability to cross traditional departmental boundaries.</p>
<p>GOAL 4: Effective and Efficient Educational System – Ensure educational resources are coordinated throughout the state and used effectively.</p> <p>>Objective D: Productivity and Efficiency – Apply the principles of program prioritization for resource allocation and reallocation.</p>	<p>The proposed program:</p> <p>>leverages existing courses and resources at Boise State to build a new program without requiring development of additional courses</p> <p>>builds on already strong biomedical engineering minor and master's programs</p> <p>>will enhance the quality of undergraduate and master's programs.</p>

Alignment with Boise State University's Mission, Core Themes, and Strategic Plan:

The highlighted portions of Boise State University's mission statement are especially relevant to the proposed program:

*Boise State University is a public, metropolitan research university providing leadership in academics, research, and civic engagement. The university offers an array of **undergraduate degrees and experiences that foster student success**, lifelong learning, community engagement, **innovation, and creativity**. Research, creative activity and **graduate programs, including select doctoral degrees, advance new knowledge and benefit the community, the state and the nation**. The university is an integral part of its metropolitan environment and is engaged in its economic vitality, policy issues, **professional and continuing education programming**, and cultural enrichment.*

BSU Core Themes	Relevance of proposed program
<p>Core Theme One: Undergraduate Education.</p> <p>Our university provides access to high quality undergraduate education that cultivates the personal and professional growth of our students and meets the educational needs of our community, state, and nation. We engage our students and focus on their success.</p>	<p>>The program will create more opportunities for undergraduates to contribute to biomedical research labs through summer research experiences and internships.</p> <p>>The research experience gained by undergraduate students will increase the quality of education for those students.</p>

<p>Core Theme Two: Graduate Education.</p> <p>Our university provides access to graduate education that addresses the needs of our region, is meaningful in a global context, is respected for its high quality, and is delivered within a supportive graduate culture.</p>	<p>>The proposed program will provide advanced degree opportunities in biomedical engineering in Idaho for current undergraduate and master’s students.</p> <p>>The program will train students to develop novel approaches to address persistent problems in neuromuscular and musculoskeletal healthcare.</p> <p>>Graduate students will be exposed to peer learning through establishment of a biomedical graduate student community.</p> <p>>The program will produce graduates which can feed the growing national need for biomedical researchers.</p>
<p>Core Theme Three: Research and Creative Activity.</p> <p>Through our endeavors in basic and applied research and in creative activity, our researchers and students create knowledge and understanding of our world and of ourselves, and transfer that knowledge to provide societal, economic, and cultural benefits. Students are integral to our faculty research and creative activity.</p>	<p>>The proposed program will provide relevant research to our funding agencies (NIH, DoD, NSF) and the greater healthcare community through dissemination of results in journal and conference publications.</p> <p>>Research pursued by graduate students and faculty members will focus on problems of high relevance to musculoskeletal and neurological health.</p> <p>>The program will strengthen ties with local healthcare communities including St. Luke’s Health System, Boise Veterans Affairs, West Vet, Securos Surgical, St Theresa Medical Inc.</p>

Goal 1: Create a signature, high-quality education experience all students

Students will be part of a community of biomedical researchers. They will take a small core of required courses to develop a common language for communication across disciplines. There will be a shared biomedical graduate student workspace where students can interact and grow through peer learning. Graduate seminars will develop a broad base of knowledge in biomedical engineering and potential industry and research careers. A transdisciplinary internship course in a research lab outside of their mentors will enhance understanding of the benefits and challenges to transdisciplinary research. Dissertation work on an area of high relevance to the clinical, surgical, and rehabilitation communities will develop a depth of understanding and expertise in “bench to bedside” translational research. The program will have emphasis areas in biomechanics, human performance, and mechanobiology, which are currently not offered in any Idaho universities.

Goal 2: Facilitate the timely attainment of education goals of our diverse student population

Graduate students at the PhD level will facilitate hiring of additional undergraduate researchers in biomedical labs across campus as undergraduate students may work and learn under the guidance and supervision of these PhD candidates. We expect that engagement in undergraduate research will facilitate the retention of these students as they complete their undergraduate degrees.

The development of a biomedical graduate student research community will facilitate retention of these graduate students as there will be opportunity for peer learning, and a peer support network.

To facilitate timely attainment of the research-based requirements of the PhD program, students will emphasize credit hours spent on experiential learning and research over required coursework.

Goal 3: Gain distinction as a doctoral research university

This program is directly aligned with Boise State's strategies to "*build select doctoral programs with a priority towards transdisciplinary programs in professional and STEM disciplines*" and "*design systems to support and reward interdisciplinary collaboration and transdisciplinary degrees programs*".

In 2016, Boise State reached a significant milestone in obtaining a classification as a doctoral research institution from the Carnegie Classification on Institutions of Higher Education. This program, and its transdisciplinary framework, will contribute to successfully driving Boise State towards R2 research status and beyond. The cross-cutting nature of the program facilitate innovation and creativity, as ideas combine across departments and colleges and are adapted to new areas and applications. Additionally, the research produced by these PhD students will undoubtedly strengthen preliminary data required for external funding applications, and improve extramural funding success from federal funding sources, such as the National Institutes of Health, NSF, NASA, DoD. These agencies are actively interested in funding collaborative, transdisciplinary projects that tie together expertise across departments, colleges, and communities, which is ideally aligned with the vision of this proposed program.

Goal 4: Align university programs and activities with community needs

The state of Idaho has increasingly recognized the economic potential of the biomedical industry, and has organized strategic initiatives to strengthen biomedical research in Idaho. In the past few years, the Idaho Technology Council has hosted a 'Grow Idaho MedTech' event on the Boise State campus, and a venture capital company has held medical technology summits (MedBuild) to coalesce the biomedical community and connect innovators to healthcare entrepreneurs. Last year, Boise State University and St. Luke's Hospital held an inaugural annual research alignment meeting, which drew large participation from both institutions. In August 2017, congressman Mike Simpson hosted a director from the National Institutes of Health, and noted that Boise State has great potential to expand its footprint in biomedical research. The proposed PhD program is strategically positioned to facilitate growth in research and clinical evaluation in both St. Luke's Health System and Boise Veterans Affairs (VA) and strengthen ties with local healthcare communities such as West Vet, Securos Surgical, and St. Theresa Medical Inc. A Biomedical Engineering PhD program will give industry leaders confidence that Boise State University is committed to providing an innovative environment and a highly-trained workforce that is critical for the biotechnology sector to flourish in Idaho.

Goal 5: Transform our operations to serve the contemporary mission of the university

The transdisciplinary nature of the program will facilitate Boise State's strategy to "*break down silos that inhibit communication, collaboration and creativity*". The program will promote and facilitate cross disciplinary communication between research faculty and students. Additionally, the program is designed to leverage existing courses from across departments and colleges so that this new program will be delivered through an efficient, cost-effective framework.

6. **Assurance of Quality.** Describe how the institution will ensure the quality of the program. Describe the institutional process of program review. Where appropriate, describe applicable specialized accreditation and explain why you do or do not plan to seek accreditation.

The following measures will ensure the high quality of the proposed program:

Regional Institutional Accreditation: Boise State University is regionally accredited by the Northwest Commission on Colleges and Universities (NWCCU). Regional accreditation of the university has been continuous since initial accreditation was conferred in 1941. Boise State University is currently accredited at all degree levels (A, B, M, D).

Specialized Accreditation:

Engineering: The Boise State University undergraduate engineering programs (e.g., civil engineering, computer science, electrical and computer engineering, materials science and engineering, and mechanical engineering) have been accredited by ABET, Inc. Engineering disciplines are normally only accredited by ABET at the undergraduate level. The Mechanical Engineering program underwent a successful accreditation in Fall 2016, and was reaccredited until Fall of 2022.

Kinesiology: Only specific kinesiology programs at Boise State University (e.g., Athletic Training and K-12 Physical Education) undergo accreditation. Both programs are at the undergraduate level. The Athletic Training program was reaccredited by CAATE in Spring 2018, while the K-12 Physical Education program underwent a successful reaccreditation by CAEP in 2014.

Program Review: Internal program evaluations will take place every five years as part of the normal departmental review process conducted by the Office of the Provost.

Graduate College: The program will adhere to all policies and procedures of the Graduate College, which is a member of the Council of Graduate Schools (Washington, D.C.), the leading authority on graduate education in the United States. The Graduate College has broad institutional oversight of all graduate degree and certificate programs.

Program Oversight: The proposed new PhD in Biomedical Engineering will build on a significant foundation of experience within two departments (Mechanical and Biomedical Engineering and Kinesiology). Both departments successfully manage MS programs.

The graduate student community within these two departments currently includes approximately 54 MS students. The governance structure, policies and procedures of the PhD program will ensure that students receive the individual mentoring, guidance, and professional development needed to progress through their programs in a timely manner.

Student Mentoring and Program Assessment: On-going program evaluation and assessment at the program level will provide essential information to help ensure the long-term quality of the program. Assessment activities will allow monitoring of individual student progress in the program so challenges can be recognized early and managed effectively. Integrated and evaluated over time, this feedback can also be used to fine-tune and adjust the overall program design, as needed to maintain excellence. Components of the student mentoring and outcomes assessment plan include:

- *Appointment of a Major Advisor who has the primary responsibility for day-to-day mentoring and professional development of their students* – Identification of the advisor will be strongly encouraged for admission to the program.
- *Planning of academic course work* – Students will work with their advisor and Supervisory Committee to complete a Program Development Form (PDF), which identifies the calendar of course work necessary for students to complete their degree requirements. Each student's PDF is up-dated on an annual basis, providing an opportunity for the advisor and

student to review the plan and make corrections, additions, etc., as necessary. Completed PDFs are placed in each student's departmental file.

- *Progress and competency in graded coursework* – How students perform in the classroom will provide a direct metric of progress and achievement – particularly in the early portion of the program when much of the required course work is typically taken by students.
- *Comprehensive examination* - As discussed below (#6), the comprehensive exam represents a significant milestone and an important assessment tool for monitoring how well students have assimilated information from various sources and integrated it into comprehensive knowledge of the biomedical field. It will have both an oral and written component.
- *Dissertation proposal* – As discussed below (#6), the dissertation written and oral proposal assess the suitability of a PhD student to conduct research in the biomedical field in a manner that meets rigorous peer-reviewed standards. Satisfactory completion is required for the student to become a PhD candidate.
- *Dissertation defense* – The culminating activity of the program is the oral presentation and public defense of the dissertation (discussed in more detail below).
- *Program assessment* – The program will undergo an annual assessment that includes exit interviews of graduating students, compilation of student publications, bibliometrics, awards, and special activities (such as internships, workshops, and extended visits to other institutions), monitoring of initial post-graduate employment and ongoing career development, and key metrics of the student pipeline including data for admission, enrollment, degree progress, overall time-to-degree, student financial support, and attrition (including analysis of reasons for attrition). This assessment is the responsibility of the program director assisted by Institutional Research and the Graduate College, and results in a report to the deans of the participating colleges. The report must include a description of previous actions used to improve the program, the results of those actions, and any newly recommended or modified actions to be undertaken by the program in response to the most recent assessment. The deans are responsible for discussing the report with the provost and for administrative actions necessary for implementation of the improvement plan by the program.

Faculty Steering Committee: The Faculty Steering Committee is responsible for curriculum changes, academic policies, student recruitment and admission recommendations, management of program graduate assistants, appointment of Supervisory Committees, monitoring of student progress, resolution of ad hoc student issues, and other responsibilities defined in the graduate handbook for the program.

Supervisory Committee: The Supervisory Committee is charged with general guidance of the doctoral student, including design and approval of the program of study, participation in the comprehensive examination, supervision of the dissertation research, and participation in the dissertation defense. The Supervisory Committee consists of a major advisor who acts as chair, and at least two, but no more than four additional members. Two members of committee must be faculty participating in the Biomedical Engineering program and one member must be external to the Biomedical Engineering faculty. Biomedical Engineering faculty members must be University regular or research faculty and members of the Graduate Faculty. External committee members may be external to Boise State University when such appointments enhance the function of the committee. The committee members are selected by the student and the major advisor and approved by the program director. A change of the major advisor or Supervisory Committee member can be made after initial appointment. The Appointment of Supervisory Committee form should be submitted to and approved by the program director and the graduate college.

Application and Admission Requirements: Applicants to the PhD program in Biomedical Engineering will be required to have a Bachelor's or Master's degree in kinesiology, engineering, or a related discipline from an accredited college or university. Admission will be competitive and will be based on previous experience in the field, transcripts, professional references, scores on the general test of the Graduate Record Examination (GRE), and evaluation of a letter of intent describing previous research experience and the applicant's professional interests and plans for the future.

Milestones and Timeline: The milestones of the PhD study include appointment of a major advisor and Supervisory Committee, formulation of plan of study, completion of course work, completion of the comprehensive examination, dissertation proposal defense, and final dissertation defense. The major advisor is appointed when the student is admitted to the program. An Appointment of Supervisory Committee form must be submitted before sitting for the comprehensive examination. A student will be eligible to sit for comprehensive examination after completing the Engineering Core, Life Sciences Core, and Emphasis Area coursework (15 credits), but the student must take the comprehensive examination prior to completing the dissertation proposal. Once the student has passed the comprehensive examination, the student is eligible to defend their dissertation proposal. The dissertation proposal should be complete within one year of the comprehensive examination. After successful proposal defense, the student is recommended for Advancement to Candidacy.

Appeal Process: Students have the right to file a written appeal regarding the decisions on their comprehensive examination, dissertation proposal defense, and final dissertation defense. The faculty steering committee serves as an appeal mechanism for decisions made by student's supervisory committee. The program director offers an appeal mechanism for decisions and recommendations of the faculty steering committee. The Boise State University Graduate Council and Graduate Dean serves an appeal mechanism for decisions made by the program director.

Master's Degree Option: A doctoral student who has failed the comprehensive exam, the proposal/dissertation defense, or under special circumstances, may petition to the program for approval to transfer to a terminal BME Master's degree or another aligned Master's program (i.e. Mechanical Engineering or Kinesiology).

7. **In accordance with Board Policy III.G., an external peer review is required for any new doctoral program.** Attach the peer review report as **Appendix B**.

See Appendix.

8. **Teacher Education/Certification Programs.** All Educator Preparation programs require review from the Professional Standards Commission (PSC) and approval from the Board. In addition to the proposal form, the Program Approval Matrix (**Appendix C**) is required for any new and modifications to teacher education/certification programs, including endorsements. The matrix must be submitted with the proposal to OSBE and SDE using the online academic program system as one document.

N/A

9. **Five-Year Plan: Is the proposed program on your institution's approved 5-year plan? Indicate below.**

Yes No

Curriculum, Intended Learning Outcomes, and Assessment Plan

10. Curriculum for the proposed program and its delivery.

- a. Summary of requirements.** Provide a summary of program requirements using the following table.

Credit hours required:	63
Credit hours required in support courses:	18
Credit hours in required electives:	12
Credit hours for thesis or dissertation:	33
Total credit hours required for completion:	63

The support courses are comprised of an engineering core (3 cr), a life sciences core (3 cr), a research methods core (3 cr), graduate seminar (2 cr), graduate professional development (1 cr), transdisciplinary experience (3 cr), comprehensive exam (2 cr), and dissertation proposal (1 cr).

- b. Additional requirements.** Describe additional requirements such as comprehensive examination, senior thesis or other capstone experience, practicum, or internship, some of which may carry credit hours included in the list above.

Comprehensive Examination: The objective of the comprehensive examination is to judge depth and breadth of knowledge in the biomedical field. The student must enroll in BME 691 Doctoral Comprehensive Examination for the semester during which they plan to take the comprehensive examination. The comprehensive examination includes a written and oral component. The written component must demonstrate a comprehensive understanding and synthesis of peer-reviewed literature in their emphasis area, identify a gap in knowledge in this area, and design a research study to fill this gap. In the oral component, the student must present their study design to their Supervisory Committee and be able to justify the decisions made in the formulation of their study, demonstrate an understanding of the limitations of their study, and competently address questions from the committee. The Supervisory Committee will determine if the student passes or fails. The student needs to pass both the written and oral components. If a student fails the written component, the student is allowed to revise the written examination one time. If a student fails the oral component, the supervisory committee has the option of allowing a student to repeat the oral exam one time. This must be done within the time period specified by the Supervisory Committee. Failure of the comprehensive examination will result in dismissal from the PhD program.

Dissertation Proposal: The objective of the dissertation proposal and oral defense is to assess the suitability of a PhD student to conduct research in the biomedical field in a manner that meets rigorous peer-reviewed standards. Satisfactory completion is required for the student to become a PhD candidate. The dissertation proposal should be presented within one year of satisfactory completion of the comprehensive examination. The student must submit a written dissertation proposal to the Supervisory Committee two weeks before the oral proposal defense. The proposal should describe in sufficient detail the proposed scope of work, anticipated scientific impact, timeline, and a plan for obtaining and utilizing the resources necessary to complete the research. After the Supervisory Committee reviews the proposal they can give their approval to proceed with scheduling the dissertation proposal defense or they can ask the student to make changes to the proposal and to resubmit it. The dissertation proposal defense consists of the student presenting his or her proposed doctoral research and answering questions about the proposal, related background material and decisions made in the formulation of their proposal. Majority approval of the Supervisory Committee is required to pass the proposal defense. If a student fails the oral defense, he or she may be allowed to reinitiate the dissertation proposal once with the approval of the Supervisory Committee. Students

who fail a second time or do not receive approval to resubmit the proposal will be administratively withdrawn from the program. After the student passes both the written and oral portions of the dissertation proposal, he or she is admitted to candidacy and should work on his or her proposed research. Major deviation from the proposed research requires majority approval of the Supervisory Committee.

Dissertation Requirements: The dissertation must be the result of independent and original research by the student and must constitute a significant contribution to the current knowledge in the biomedical field, equivalent to multiple peer-reviewed publications. The style and format of the dissertation are to conform to the standards of the Graduate College.

Dissertation Defense: A public defense of the dissertation is scheduled after the Supervisory Committee has reviewed a draft that is considered to be a nearly final version. The date of the defense is determined jointly by the Supervisory Committee and the student and must be consistent with any guidelines provided by the Graduate College. The first part of the defense will be a public oral presentation of the dissertation. The second part will be an oral exam administered by the Supervisory Committee who will decide whether the student passes or fails the defense. A student who fails the defense may be permitted to try again but failure a second time will result in dismissal from the PhD program.

Final Approval of the Dissertation: If the defense is completed with a result of pass, the Supervisory Committee prepares a statement describing final requirements such as additions or modifications to the dissertation and any additional requirements such as archival of data. When these requirements have been met to the satisfaction of the Supervisory Committee, the approval page of the dissertation is signed by the members of the committee.

11. Program Intended Learning Outcomes and Connection to Curriculum.

a. Intended Learning Outcomes. List the Intended Learning Outcomes for the proposed program, using learner-centered statements that indicate what will students know, be able to do, and value or appreciate as a result of completing the program.

Program Intended Learning Outcomes and Assessment Plan:

Program Intended Learning Outcomes: <i>Graduates of this program are expected to have the following skills and knowledge:</i>	Direct measures of Achievement of Intended Learning Outcomes	Indirect Measure of Achievement of Intended Learning Outcomes
1. Graduates will be able to formulate relevant hypotheses in their research area and will be able to conduct independent research using scientific methods to answer those hypotheses.	Proposal and comprehensive exam, dissertation research and defense	Exit interview with students, faculty observations and discussions
2. Graduates will be able to effectively communicate their results of scientific research in both written and oral form to scientific and public audiences.	Required proposal and oral presentation, dissertation and defense, publications, participation in seminar course	Exit interview with students, faculty observations and discussions, presentations at professional meetings, publications

3. Graduates will demonstrate proficiency to devise, analyze, and evaluate new methods for solving problems of healthcare importance.	Assignments in research methods coursework, dissertation research and defense, publications	Exit interview with students, faculty observations and discussions
4. Graduates will demonstrate the ability to work effectively on transdisciplinary teams.	Transdisciplinary research internship	Exit interview with students, faculty observations and discussions
5. Graduates will demonstrate mastery of knowledge in their chosen emphasis area.	Assignments in emphasis area coursework, dissertation research and defense	Exit interview with students, faculty observations and discussions
6. Graduates will demonstrate a high level of expertise in their discipline through contributions to the scientific literature.	Dissertation research and defense, publications	Exit interview with students, faculty observations and discussions, publications

12. Assessment plans

a. Assessment Process. Describe the assessment process that will be used to evaluate how well students are achieving the intended learning outcomes of the program.

Assessment Process: On-going program student mentoring and assessment will ensure that students receive the individual mentoring, guidance, and professional development needed to progress through their programs in a timely manner and achieve the program’s intended learning outcomes.

Student Mentoring and Assessment: On-going student mentoring and assessment will provide essential information to help ensure the long-term quality of the program. Assessment activities will allow monitoring of individual student progress in the program so challenges can be recognized early and managed effectively. Integrated and evaluated over time, this feedback can also be used to fine-tune and adjust the overall program design, as needed to maintain excellence. The program director will collect direct and indirect measures to ensure students are achieving the intended learning outcomes. Components of the student mentoring and outcomes assessment plan include:

- *Appointment of a Major Advisor who has the primary responsibility for day-to-day mentoring and professional development of their students* – Identification of the advisor will be strongly encouraged for admission to the program.
- *Planning of academic course work* – Students will work with their advisor and Supervisory Committee to complete a Program Development Form (PDF), which identifies the calendar of course work necessary for students to complete their degree requirements. Each student’s PDF is up-dated on an annual basis, providing an opportunity for the advisor and student to review the plan and make corrections, additions, etc., as necessary. Completed PDFs are placed in each student’s departmental file.
- *Progress and competency in graded coursework* – How students perform in the classroom will provide a direct metric of progress and achievement – particularly in the early portion of the program when much of the required course work is typically taken by students.

- *Comprehensive examination* - As discussed above (#9b), the comprehensive exam represents a significant milestone and an important assessment tool for monitoring how well students have assimilated information from various sources and integrated it into comprehensive knowledge of the biomedical field. It will have both an oral and written component.
- *Dissertation proposal* – As discussed above (#9b), the dissertation proposal and oral defense assess the suitability of a PhD student to conduct research in the biomedical field in a manner that meets rigorous peer-reviewed standards. Satisfactory completion is required for the student to become a PhD candidate.
- *Dissertation defense* – As discussed above (#9b), the culminating activity of the program is the oral presentation and public defense of the dissertation.
- *Exit interview* – Students will work with the program director and faculty steering committee to complete an exit interview. The exit interview will be used to collect student feedback to fine-tune and adjust the overall program design to maintain excellence.

b. Closing the loop. How will you ensure that the assessment findings will be used to improve the program?

Program assessment and review: The program will undergo an annual assessment and internal review every five years (discussed further below). These assessments are the responsibility of the program director and will be used to improve the program by providing recommendation and/or actions to be undertaken by the program to maintain excellence.

c. Measures used. What direct and indirect measures will be used to assess student learning?

Assessment Measures: The program will annually collect direct and indirect measures to evaluate whether students are achieving each of the intended learning outcomes.

Direct Measures: The program director will assess student progress and competency in graded coursework, comprehensive exam, dissertation proposal and defense, compilation of student publications, bibliometrics, awards, and special activities (such as internships, workshops, and extended visits to other institutions). Further, the program will monitor of initial post-graduate employment and ongoing career development, and key metrics of the student pipeline including data for admission, enrollment, degree progress, overall time-to-degree, student financial support, and attrition (including analysis of reasons for attrition).

Indirect Measures: The program will assess the student success indirectly by collecting exit interviews, observations and feedback from faculty, and presentations at professional meetings and conferences.

d. Timing and frequency. When will assessment activities occur and at what frequency?

Assessment activities: The program and student assessment will be conducted annually, while a program-level review will occur every five years.

Program assessment: The program will undergo an annual assessment. This assessment is the responsibility of the program director assisted by Institutional Research and the Graduate College, and results in a report to the deans of the participating colleges. The report will collect and evaluate the direct and indirect measures of student success (as discussed above). The report must include a description of previous actions used to improve

the program, the results of those actions, and any newly recommended or modified actions to be undertaken by the program in response to the most recent assessment. The deans are responsible for discussing the report with the provost and for administrative actions necessary for implementation of the improvement plan by the program.

Program Review: Internal program evaluations will take place every five years as part of the normal departmental review process conducted by the Office of the Provost.

Enrollments and Graduates

13. Existing similar programs at Idaho Public Institutions. Using the chart below, provide enrollments and numbers of graduates for similar existing programs at your institution and other Idaho public institutions.

Existing Similar Programs: Historical enrollments and graduate numbers								
Institution and Program Name	Fall Headcount Enrollment in Program				Number of Graduates From Program (Summer, Fall, Spring)			
	FY15	FY16	FY17	FY18 (most recent)	FY15	FY16	FY17	FY18 (most recent)
BSU PhD Biomolecular Sciences	17	21	25	28 (30 in F18)	-	1	2	4
ISU PhD in Biology	11	7	7	8	3	1	1	1
UI PhD in Biology	8	7	7	9	3	0	2	1
UI PhD in Biological Engineering	0	1	3	6	0	0	0	1
UI PhD in Exercise Science	15	16	16	14	2	3	2	1

- 14. Projections for proposed program:** Using the chart below, provide projected enrollments and number of graduates for the proposed program:

Proposed Program: Projected Enrollments and Graduates First Five Years											
Program Name: PhD in Biomedical Engineering											
Projected Fall Term Headcount Enrollment in Program						Projected Annual Number of Graduates From Program					
FY20 (first year)	FY21	FY22	FY23	FY24	FY25	FY20 (first year)	FY21	FY22	FY23	FY24	FY25
6	7	9	11	11	11	-	-	-	2	4	5

- 15. Describe the methodology for determining enrollment and graduation projections.** Refer to information provided in Question #2 “Need” above. What is the capacity for the program? Describe your recruitment efforts? How did you determine the projected numbers above?

Our estimate is based on that approximately 5% of Boise State Mechanical and Biomedical Engineering (MBE) majors go on to seek MD, PhD or other professional degrees. This will give us access to a ~4-5 students that seek a biomedical engineering PhD per year. Similar student interest from Kinesiology is also expected. At a conservative estimate, we expect to enroll at least 11 students within the program in the first four years. Student funding will be moved onto external funding sources within 1-2 years of starting the program. Our target is a 50:50 internal/external funding ratio for each student over the duration of their PhD studies.

Additionally, similar statistics are available for two other BSU interdisciplinary PhD programs in Biomolecular Sciences and the Materials Science and Engineering. When combined these two PhD programs have 63 graduate students (Biomolecular: 25, Materials Science: 38) with an incoming class of ~10 per year. Both of these programs are larger than the proposed program (15+ affiliated faculty) and thus their enrollment numbers are consistent with faculty count.

Recruitment to the program will be coordinated with the recruiting staff of the graduate college. Recruitment at a local level will occur primarily by informal contact between faculty members and local professionals and their organizations. We anticipate some recruitment of highly qualified Boise State undergraduate and master’s-level students. Because of the interdisciplinary nature of the program, we believe that the program will have broad appeal, enabling us to recruit students nationally and internationally as well. In the fields of kinesiology and mechanical and biomedical engineering, students are motivated to apply to graduate programs because of the strength of faculty research and program reputation.

Our recruitment plan has a 3-pronged approach for attracting high quality applicants:

(1) *Support of faculty travel to recruiting events.* Faculty attendance at recruiting events such as conferences serves several important functions for research, including networking to recruit students into labs. Students attend conferences to meet potential mentors, and conferences provide excellent opportunities for faculty members to meet applicants in-person and to judge the quality of their past research experience by attending oral or poster presentations.

(2) *Create a highly visible and informative web presence.* Potential applicants will likely make use of the internet to search for graduate programs. We intend to have a highly visible web presence. Our web presence will include websites for the PhD program as a whole, but also for each biomedical faculty member and their lab. These sites will include up-to-date information on opportunities, current

students, success stories, and where-are-they-now information about graduates, as well as recent publications, presentations and funded research proposals.

(3) *Support the visits of colleagues from external institutions.* We will host regular visits from colleagues at other research institutions to give seminars and have informal meetings with graduate students and faculty. Such visits are key to publicizing a strong and successful training program. These colleagues facilitate recruiting at their home institutions when they suggest their students apply to Boise State. Further, each biomedical faculty member will be encouraged to travel to other institutions to give seminars and informal meetings to enhance our visibility at external institutions.

- 16. Minimum Enrollments and Graduates.** Have you determined minimums that the program will need to meet in order to be continued? What are those minimums, what is the logical basis for those minimums, what is the time frame, and what is the action that would result?

We have determined minimum enrollment in the program to be eight students. We expect each participating principal investigator to support one to two PhD students on a rolling basis with a 1-2 year overlap. Unless these numbers are met within first four years we will identify the core problems (not enough student enrollment, faculty involvement, etc...) and will increase our recruitment efforts as outlined in the above sections as well as recruiting more core faculty in the program.

Resources Required for Implementation – fiscal impact and budget

17. Physical Resources.

- a. Existing resources.** Describe equipment, space, laboratory instruments, computer(s), or other physical equipment presently available to support the successful implementation of the program.

The Center for Orthopaedic and Biomechanics Research is a 3600 sq. ft. research space where it houses the hardware and software necessary to conduct neuromechanical analysis of human movement. Specific hardware include: a motion capture system, force plates, wireless EMG, and IMUs, musculoskeletal ultrasound and dynamometer. There are 10 desktop and 3 laptop computers which contain the software necessary for analysis of human movement, including: Visual 3D, OpenSim, Matlab, LabVIEW, Osirix, SPSS.

The Computational Biosciences Lab is a 500 sq. ft. dedicated research space for computationally-focused biomedical research. It has workspace and personal computer capacity for eight students in addition to three high-performance Linux workstations, access to a high performance computing cluster, and finite element, visualization, and meshing software including: Abaqus, Amira, Hypermesh, Fortran, Matlab.

The Mechanical adaptation laboratory (MAL) occupies 1200 square feet in room 313 of the Micron Engineering Building and has a dedicated tissue/cell culture facility located at Room 313A, which is equipped with fluorescent inverted and upright microscopes, Flexcell FX5000 bioreactor for bulk strain application (0.1-12%, max 3Hz), Stageflexer system for strain application under microscope, two custom vibration devices (0-10g, 0.1-500Hz) and two simulated microgravity devices. Additionally, MAL has a wet lab space that can handle all routine molecular biology, PCR and immunochemistry methods and tasks related to cell culture or animal tissue processing. Additional desk space available for seven students all equipped with PCs.

The Northwest Tissue Mechanics lab is an 800 sq. ft. research space in the Micron Engineering Building that houses the mechanical test systems and imaging devices needed to characterize the morphology and mechanical function of tissue. Major equipment includes an Instron E10000 Electropulse linear and rotary mechanical test system, a high-speed camera, a 3D structured light

imaging system, a hip simulator for joint replacements, and a bioreactor with biaxial actuators for cell culture. A workbench is equipped with tools, hardware, materials and electronics to develop and build test fixtures, device prototypes, and mechatronic systems. The lab has desk space for eight people, four iMac computers, and four PCs.

Physical space for the program administrative assistant will be provided by the department of Mechanical & Biomedical Engineering.

- b. Impact of new program.** What will be the impact on existing programs of increased use of physical resources by the proposed program? How will the increased use be accommodated?

Currently, the program faculty have a total of 17 Master's students in our research labs. It is expected that some of the resources currently utilized by these Master's students will transition to incoming PhD students during the first two years of the program. It is expected that PhD students will act as mentors to undergraduate students, and this will facilitate additional undergraduates participating in research projects. Program faculty currently have 30 spaces available for graduate students. The Center for Orthopaedic and Biomechanics Research will provide a new dedicated biomedical research space which includes a conference room and graduate research space to accommodate additional growth and foster interaction and peer learning across the student community.

The new program will require office supplies to administer the program and operating expenses to facilitate program growth through hosting local/regional biomedical events, undergraduate research experiences, seed funding for preliminary grant data, invited lectures, scientific conferences.

- c. Needed resources.** List equipment, space, laboratory instruments, etc., that must be obtained to support the proposed program. Enter the costs of those physical resources into the budget sheet.

No additional physical resources are required for the program.

18. Library resources

- a. Existing resources and impact of new program.** Evaluate library resources, including personnel and space. Are they adequate for the operation of the present program? Will there be an impact on existing programs of increased library usage caused by the proposed program? For off-campus programs, clearly indicate how the library resources are to be provided.

No additional library resources are needed. There are no new courses added, so no new textbooks are required. The research areas participating in the program are already active at the Master's level, hence, required resources are already in place.

- b. Needed resources.** What new library resources will be required to ensure successful implementation of the program? Enter the costs of those library resources into the budget sheet.

None.

19. Personnel resources

- a. Overview.** Give an overview of the personnel resources that will be needed to implement the program. How many additional sections of existing courses will be needed? Referring to the list of new courses to be created, what instructional capacity will be needed to offer the necessary number of sections?

No new courses will be created and no additional instructional capacity is required. We anticipate 3-4

incoming students per year. Currently, our graduate courses do not reach maximum capacity and the increase in doctoral students will likely be partially offset by a decrease in master's students; therefore, given the relatively small increase in student numbers, we do not expect the program will put an undue burden on existing instructional capacity. The transdisciplinary nature of the program also means that any additional requirements are dispersed across a number of courses, departments, and colleges.

Additional administrative support is required to maintain the program. A half-time administrative assistant is required.

One month of summer salary is required for both the program director and associate director to support the program.

In the first 2 years of the program, course release is required for the program director and associate director in order to allow these personnel to complete their additional program duties without diminishing research and departmental activities.

The most important new resources required by the program will be new graduate assistant lines, discussed below in section d.

- b. Existing resources.** Describe the existing instructional, support, and administrative resources that can be brought to bear to support the successful implementation of the program.

Existing faculty lines are currently supporting the instructional requirements of the program. Graduate student advising will be provided through existing faculty lines.

Program Faculty:

1. Tyler Brown, Department of Kinesiology, College of Health Sciences
Dr. Tyler Brown is an assistant professor in the Department of Kinesiology and is the director of the Center for Orthopaedic and Biomechanics Research at Boise State University. Dr. Brown's research focuses on understanding the biomechanics of lower limb to prevent musculoskeletal injury, and slow development and progression of musculoskeletal disease.
2. Kurtis Cantley, Department of Electrical and Computer Engineering, College of Engineering
Dr. Kurtis Cantley is an assistant professor in the Department of Electrical and Computer Engineering and is the director of the Cantley Research Group at Boise State University. Dr. Cantley's research interests are in the area of bioelectronics, and specifically materials, devices, and circuits for neural interfaces.
3. David Estrada, Micron School of Materials Science and Engineering, College of Engineering
Dr. David Estrada investigates the intersection of atomically thin materials with biology to develop novel materials and devices for biomedical applications. In particular, he is developing novel materials for tissue engineering and regenerative medicine, biomolecular analysis and next generation DNA sequencing, and wearable bioelectronics for human performance monitoring.
4. Clare Fitzpatrick, Department of Mechanical and Biomedical Engineering, College of Engineering
Dr. Clare Fitzpatrick is an assistant professor and director of the Computational Biosciences Lab in the Department of Mechanical and Biomedical Engineering. Her work focuses on applying computational models to understand the mechanisms of disease, injury, and degeneration, and designing targeted treatment options and surgical interventions to address clinical issues and athletic performance.
5. Stephanie Hall, Department of Kinesiology, College of Health Sciences
Dr. Stephanie Hall is an assistant professor in the Department of Kinesiology at Boise State University. Dr. Hall's research focus is on the effects of exercise and physical activity in the treatment and prevention of disease.

6. Benjamin Johnson, Department of Electrical and Computer Engineering, College of Engineering
Dr. Benjamin Johnson's research group focuses on developing devices for bioelectronic medicine, a technology that reads and modulates the electrical activity of the body's nervous system, enabling real-time, chronic health monitoring and novel treatment options for patients. Our implantable microsystems leverage advanced microelectronic technology to achieve vanishingly small levels of integration.
7. Cheryl Jorcyk, Department of Biological Sciences, College of Arts and Sciences
Dr. Cheryl Jorcyk is a professor in the Department of Biological Sciences and the director of Clinical/Translational Research at Boise State. The Jorcyk lab focuses on the interplay between the tumor microenvironment and inflammatory proteins in the promotion of cancer metastasis, with a strong emphasis on prevention and treatment.
8. Byung Kim, Department of Physics, College of Arts and Sciences
Dr. Byung Kim's research focuses on molecular-scale investigations of biomechanics in biological systems including proteins, nucleic acids, cells and tissues using scanning probe microscopy (SPM). For the investigations, Dr. Kim and his group develops novel SPM techniques such as interfacial force microscopes and high-speed atomic-force microscopes. Dr. Kim and his group also investigate the role of nanoscale water in biomechanical adhesion and lubrication for future biomechanical applications such as artificial cartilage development .
9. Trevor Lujan, Department of Mechanical and Biomedical Engineering, College of Engineering
Dr. Trevor Lujan is an associate professor in the Department of Mechanical and Biomedical Engineering and is the director of the Northwest Tissue Mechanics laboratory at Boise State University. Dr. Lujan investigates the physical mechanisms of injury and repair in soft musculoskeletal tissues, and then works to translate this research into innovative medical solutions that are effective and affordable.
10. Julia Oxford, Department of Biological Sciences, College of Arts and Sciences
Dr. Julie Oxford is a professor in the Department of Biological Sciences and is the director of the Biomolecular Research Center at Boise State University. Dr. Oxford's research is focused on the structure-function relationship of the extracellular matrix molecules, and the role they play during development, disease onset, and progression.
11. Shawn Simonson, Department of Kinesiology, College of Health Sciences
Dr. Shawn Simonson is a Professor and the Director of the Human Performance Laboratory in the Department of Kinesiology at Boise State University. He also serves as a Faculty Associate in the Center for Teaching and Learning. He teaches at both the undergraduate and graduate levels as well as laboratory and performance oriented courses. Simonson conducts research in exercise (novel conditioning programs) and environmental physiology as well as publishing in the scholarship of teaching and learning.
12. Gunes Uzer, Department of Mechanical and Biomedical Engineering, College of Engineering
Dr. Gunes Uzer is an Assistant Professor in the Department of Mechanical and Biomedical Engineering at Boise State University. His research work on stem cell mechanobiology focuses on identifying relevant components of mechanical signals that modulate a wide variety of bone cell functions as well as defining the mechanical control of stem cell structure, function and fate.
13. TBD – Starting Fall 2019, Department of Kinesiology, College of Health Sciences
The Department of Kinesiology will seek applications for a tenure track faculty position (at the Assistant or Associate Professor level), to begin fall 2019. They will seek individuals with research interests in Motor Control, Biomechanics, and/or Neurophysiology that complement existing areas of excellence and can support this proposed transdisciplinary PhD program. It is anticipated the candidate will have broad training and have experience with the mechanical and/or neural principles underlying movement, neurorehabilitation, motor control or other aspects of neuromuscular physiology.

- c. **Impact on existing programs.** What will be the impact on existing programs of increased use of existing personnel resources by the proposed program? How will quality and productivity of existing programs be maintained?

There will be minimal impact on existing programs. Administrative needs will be provided by a half-time administrative assistant. Summer salary/ course release for the administrative faculty (program director, associate director) will ensure that the quality of their other commitments does not decrease.

- d. **Needed resources.** List the new personnel that must be hired to support the proposed program. Enter the costs of those personnel resources into the budget sheet.

The program will require support from a half-time administrative assistant and will have oversight from a program director (1 month summer salary annually, course release in years 1 & 2) and a program associate director (1 month summer salary annually, course release in years 1 & 2). Funding for these positions will be requested using BSU's annual budget process. However, in the event that central funding is not secured, the positions will be funded via reallocation within the colleges.

Investment in new graduate assistant lines will be key. Our plan is to build to seven graduate assistant lines on state funding. Of those, two would be funded by reallocated funds within the College of Engineering and two would be funded by reallocated funds within the College of Health Sciences. The Graduate College would fund two additional assistantships for the first two years. In the third year, ongoing funding for the two Graduate College-funded lines and one additional line will be sought using BSU's annual budgeting process. In the event that central funding is not secured, funds will be reallocated within the College of Health Sciences to cover a minimum of one of those three assistantships. The resulting five assistantships would form a viable base for continuation of the program. The sixth and seventh assistantships, if funded, would further strengthen the program.

Students in the program typically would initially be supported by an appropriated assistantship, and then would move to grant support. We anticipate that by the fourth year of the program, a minimum of four assistantships would be supported by grants.

20. Revenue Sources

- a) **Reallocation of funds:** If funding is to come from the reallocation of existing state appropriated funds, please indicate the sources of the reallocation. What impact will the reallocation of funds in support of the program have on other programs?

Except for the grant-funded graduate assistantships, we anticipate that all funds for the program will derive from reallocation of funds within the university. As noted above, the Colleges of Engineering and Health Sciences will reallocate funds for four graduate assistantships in Year One. The Graduate College will fund two assistantships for the first two years of the program. In the third year, ongoing funding for the two Graduate College-funded lines and one additional line will be sought using BSU's annual budgeting process. In the event that central funding is not secured, funds will be reallocated within the College of Health Sciences to cover a minimum of one of those three assistantships, forming a viable base continuation of the program. The sixth and seventh assistantships, if funded, would further strengthen the program.

- b) **New appropriation.** If an above Maintenance of Current Operations (MCO) appropriation is required to fund the program, indicate when the institution plans to include the program in the legislative budget request.

At this point, we do not anticipate asking for a new appropriation to fund this program. It may be that in the future the university will determine that it would be desirable to submit a line item request for funding for the proposed program.

c) **Non-ongoing sources:**

- i. If the funding is to come from one-time sources such as a donation, indicate the sources of other funding. What are the institution's plans for sustaining the program when that funding ends?
- ii. Describe the federal grant, other grant(s), special fee arrangements, or contract(s) that will be valid to fund the program. What does the institution propose to do with the program upon termination of those funds?

Grant funds will be used for graduate assistantships, as described above. The long-term viability of the program depends on the success of faculty members in securing grants.

d) **Student Fees:**

- i. If the proposed program is intended to levy any institutional local fees, explain how doing so meets the requirements of Board Policy V.R., 3.b.

N/A

- ii. Provide estimated cost to students and total revenue for self-support programs and for professional fees and other fees anticipated to be requested under Board Policy V.R., if applicable.

N/A

21. Using the budget template provided by the Office of the State Board of Education, provide the following information:

- Indicate all resources needed including the planned FTE enrollment, projected revenues, and estimated expenditures for the first **four** fiscal years of the program.
- Include reallocation of existing personnel and resources and anticipated or requested new resources.
- Second and third year estimates should be in constant dollars.
- Amounts should reconcile subsequent pages where budget explanations are provided.
- If the program is contract related, explain the fiscal sources and the year-to-year commitment from the contracting agency(ies) or party(ies).
- Provide an explanation of the fiscal impact of any proposed discontinuance to include impacts to faculty (i.e., salary savings, re-assignments).

**INSTRUCTION, RESEARCH AND STUDENT AFFAIRS
DECEMBER 20, 2018**

I. PLANNED STUDENT ENROLLMENT										
			FY 20		FY 21		FY 22		FY 23	
			FTE	Headcount	FTE	Headcount	FTE	Headcount	FTE	Headcount
A. New enrollments			6	6	7	7	9	9	11	11
B. Shifting enrollments										
II. REVENUE										
			FY 20		FY 21		FY 22		FY 23	
			On-going	One-time	On-going	One-time	On-going	One-time	On-going	One-time
1. New Appropriated Funding Reques			\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2. Institution Funds			\$320,629	\$24,000	\$323,625	\$24,000	\$367,578	\$0	\$371,059	\$0
3. Federal			\$0	\$0	\$40,574	\$0	\$81,733	\$0	\$164,672	\$0
4. New Tuition Revenues from Increased Enrollments			\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5. Student Fees			\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
6. Other (i.e., Gifts)			\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Revenue			\$320,629	\$24,000	\$364,199	\$24,000	\$449,311	\$0	\$535,730	\$0
<i>Ongoing is defined as ongoing operating budget for the program which will become part of the base.</i>										
<i>One-time is defined as one-time funding in a fiscal year and not part of the base.</i>										

**INSTRUCTION, RESEARCH AND STUDENT AFFAIRS
DECEMBER 20, 2018**

Attachment 1

III. EXPENDITURES	FY 20		FY 21		FY 22		FY 23	
A. Personnel Costs	On-going	One-time	On-going	One-time	On-going	One-time	On-going	One-time
1. FTE	0.83	0.22	0.83	0.22	0.83	-	0.83	-
2. Faculty	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0.00
3. Adjunct Faculty	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0.00
4A. Grad Assts: state-funded	\$156,000	\$0	\$156,000	\$0	\$182,000	\$0	\$182,000	\$0.00
4B. Grad Assts: grant funded	\$0	\$0	\$26,000	\$0	\$52,000	\$0	\$104,000	\$0
5. Research Personnel	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0.00
6. Directors/Administrators	\$18,000	\$24,000	\$18,540	\$24,000	\$19,096	\$0	\$19,669	\$0.00
7. Administrative Support Personnel	\$17,500	\$0	\$18,025	\$0	\$18,566	\$0	\$19,123	\$0.00
8A. Fringe Benefits: state funded	\$24,310	\$0	\$24,537	\$0	\$26,591	\$0	\$26,831	\$0.00
8B: Fringe Benefits: grant funded	\$0	\$0	\$1,820	\$0	\$3,640	\$0	\$7,280	\$0
9. Other: Grad Asst Tuition & Insurance								
for state funded Grad Assts	\$74,819	\$0	\$76,523	\$0	\$91,326	\$0	\$93,435	\$0
for grant funded Grad Assts	\$0	\$0	\$12,754	\$0	\$26,093	\$0	\$53,392	\$0.00
Total Personnel and Costs	\$290,629	\$24,000	\$334,199	\$24,000	\$419,311	\$0	\$505,730	\$0.00

**INSTRUCTION, RESEARCH AND STUDENT AFFAIRS
DECEMBER 20, 2018**

Attachment 1

	FY 20		FY 21		FY 22		FY 23	
	On-going	One-time	On-going	One-time	On-going	One-time	On-going	One-time
B. Operating Expenditures								
1. Travel	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2. Professional Services	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3. Other Services	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
4. Communications	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5. Materials and Supplies	\$5,000	\$0	\$5,000	\$0	\$5,000	\$0	\$5,000	\$0
6. Rentals	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7. Materials & Goods for Manufacture & Resale	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8. Miscellaneous	\$25,000	\$0	\$25,000	\$0	\$25,000	\$0	\$25,000	\$0
Total Operating Expenditures	\$30,000	\$0	\$30,000	\$0	\$30,000	\$0	\$30,000	\$0

**INSTRUCTION, RESEARCH AND STUDENT AFFAIRS
DECEMBER 20, 2018**

Attachment 1

		FY 20		FY 21		FY 22		FY 23	
		On-going	One-time	On-going	One-time	On-going	One-time	On-going	One-time
C. Capital Outlay									
1. Library Resources		\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2. Equipment		\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	Total Capital Outlay	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
D. Capital Facilities Construction or Major Renovation									
E. Indirect Costs (overhead)									
	Utilities								
	Maintenance & Repairs								
	Other								
	Total Indirect Costs	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	TOTAL EXPENDITURES:	\$320,629	\$24,000	\$364,199	\$24,000	\$449,311	\$0	\$535,730	\$0
	Net Income (Deficit)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Notes:									
I.A.	Most if not all of the students in the program will be full-time; therefore the FTE count is equal to the headcount								
III.A.1	FTE calculation does not include graduate assistantships								
III.A.8	Fringe benefits calculated as (.2119* salary) for administrators who are already existing employees; (.2119*salary + 11,200) for new support staff; (0.07*salary) for graduate assistants								
III.A.4.,9.	Graduate assistantships @\$26,000 yearly stipend, \$8166 yearly tuition, \$3,000 insurance.								
III.B.5.	"Materials and Supplies" refers to office supplies, etc.								
III.B.8.	Miscellaneous includes hosting local/regional biomedical events, UG research experience, seed funding for preliminary grant data, invited lectures, scientific conferences								

List of Appendixes:

Appendix A: Curriculum

Appendix B: External Review Report

Appendix C: Response to external review report

Appendix D: Letters of Support

Appendix E: Curricula Vitae of Participating Faculty

Appendix A: Curriculum

1. General Curriculum

Doctor of Philosophy in Biomedical Engineering	
<i>Course Number and Title</i>	<i>Credits</i>
Engineering Core Course KINES/ME 520: Advanced Biomechanics (3 cr)	3
Life Sciences Core Course (choose one course from the following, or alternative Life Science Core Course as approved by graduate program coordinator) KINES 510: Physiology of Activity (3 cr) KINES 560: Motor Learning (3 cr) ZOOL 501: Human Physiology (3 cr)	3
Research Methods Courses (choose one course from the following, or alternative Research Methods Course as approved by graduate program coordinator) KINES 551: Research Design in Exercise and Sport (3 cr) KINES 552: Applied Statistical Methods (3 cr) EEB 603: Reproducible Science (3 cr) BIOL 601: Biometry (4 cr)	3
Emphasis Area Courses (choose a minimum of 9 credits in courses approved by the graduate program coordinator in one of the following emphasis areas) Students must select from the following three emphases: Biomechanics Human Performance Mechanobiology	9
Elective Courses Choose a minimum of 3 credits in graduate-level elective courses in engineering or life sciences as approved by the graduate program coordinator.	3
Graduate Professional Development BME 601: Graduate Professional Development (1 cr)	1
Graduate Seminar (take a minimum of two semesters of graduate seminar) BME 598: Graduate Seminar (1 cr)	2
Transdisciplinary Experience (complete a one semester research or industry-related activity outside of the advisor's laboratory) BME 696: Directed Research	3
BME 691: Doctoral Comprehensive Examination	2
BME 689: Dissertation Proposal	1
BME 693: Dissertation	33
<i>Total</i>	63

2. Courses for the Emphasis Areas

Doctor of Philosophy in Biomedical Engineering Emphasis Areas	
<i>Course Number and Title</i>	<i>Credits</i>
Students must select one of the following three emphases, and complete a minimum of 9 credits in this area selecting from the following list, or as approved by the graduate program coordinator.	9
<p>Biomechanics Emphasis</p> <p>ME 510: Continuum Mechanics (3 cr) ME 576: Advanced Dynamics (3 cr) ME 570: Finite Element Methods (3 cr) ME 597: Failure Mechanics (3 cr) KINES/ME 525: Laboratory Techniques in Biomechanics (3 cr)</p>	
<p>Human Performance Emphasis</p> <p>KINES 506: Sports Nutrition (3 cr) KINES 515: Exercise Physiology Lab (3 cr) KINES 540: Applied Principles of Conditioning (2 cr) KINES 545: Clinical Exercise Physiology and Prescription (3 cr) KINES 580: Selected Topics in Hyperbaric Physiology (3 cr) KINES/ME 525: Laboratory Techniques in Biomechanics (3 cr)</p>	
<p>Mechanobiology Emphasis</p> <p>ME 601: Mechanobiology (3 cr) ME 570: Finite Element Methods (3 cr) ME 550 Advanced Mechanics of Materials (3 cr) PHYS 523: Physical Methods of Materials Characterization (3 cr) PHYS 536: Soft Matter (3 cr) PHYS 520: Nanobiotechnology (3 cr)</p>	

**BOISE STATE UNIVERSITY
SITE VISIT REPORT**

Reviewing the proposal for

Doctor of Philosophy (PhD) in Biomedical Engineering

with emphasis in

(Tissue) Biomechanics
Human Performance
Mechanobiology

to be housed in the Graduate College

represented by faculty from

Department of Mechanical and Biomedical Engineering (College of Engineering)
Kinesiology (College of Health Sciences)
Electrical and Computer Engineering (College of Engineering)
Materials Science and Engineering (College of Engineering)
Biological Sciences (College of Arts and Sciences)
Physics (College of Arts and Sciences)

Adam Higgins, PhD, Associate Professor, Oregon State University
Mary C. (Cindy) Farach-Carson, PhD, Professor, University of Texas Health Science Center at Houston

A. Executive Summary

Based upon the proposal, letters, interviews, facility tour, and other information provided by the Boise State group, the review team strongly and enthusiastically recommends the creation of the new transdisciplinary PhD Program in Biomedical Engineering. The goal of the Program is to integrate biomedical researchers across Boise State's campus to provide a comprehensive understanding of movement, mechanics, structure and physiology of living systems. The three broad objectives are to 1) create biomedical researchers with transdisciplinary training who can work seamlessly across interdisciplinary boundaries, 2) provide a venue in Idaho for further education in biomedical engineering to feed the growing regional and national need, and 3) increase faculty competitiveness for external funding. The proposal is to initially provide graduate assistantships (GA) for 6 entering graduate students, expanding to 7 in the third year. The review team agrees with this proposal and considers it to be realistic based upon the capabilities in place at Boise State, the size of the existing core faculty (12-13), and the commitment to the Program voiced by the University leadership.

Three emphasis areas are proposed that include Tissue Biomechanics, Human Performance, and Mechanobiology. These three programs well integrate the existing focus areas of the core faculty in the Departments of Mechanical and Biomedical Engineering, Kinesiology, and other faculty from Electrical and Computer Engineering, Materials Science and Engineering, Biological Sciences, and Physics. The faculty with whom the team met clearly have the expertise, breadth and depth to create and sustain this new Program. The prospective and current students with whom the team met expressed high enthusiasm for the creation of the new program, and it was evident to the review team that a number of these students in existing MS programs would wish to continue in a PhD Program in Biomedical Engineering if it existed.

The proposed curriculum in Biomedical Engineering is built largely upon integration of existing courses and should not require many new courses for implementation of the core curriculum. The three emphasis areas arise from the foci of the existing MS programs, but there currently is no mechanism to integrate these into a cohesive Program. The faculty have thoughtfully proposed an integrated curriculum that provides both a core of foundational knowledge and then builds upon this by offering emphasis-specific electives. One concern of the review team is the alignment of the new PhD curriculum with existing Masters (MS, MENG) program for students who may leave the program before completion of the PhD. The Program leadership should carefully review the requirements of the Masters programs to ensure that a Masters option is seamlessly available for students regardless of emphasis area.

The review team is confident that this Program will be popular, and that it will continue to grow. The Leadership at Boise State should ensure that resources are available to support this growth through new faculty hiring in the emphasis areas and allocation of new GA funding to support the growth of the program. The review team suggests that Leadership explore various funding models to ensure the sustainability of the Program taking advantage of new revenue streams that could include increased F & A from external funding, royalties from licensing of biomedical engineering-related patents, development efforts with potential donors, and other forms of return from Program activities.

Although Boise State does not have a medical school, there are numerous opportunities for Biomedical Engineering faculty and students to partner with regional clinical and allied health enterprises including the two hospital systems, veterinary practices, the new ICOM (Idaho College of Osteopathic Medicine), the VA, and the University of Idaho. Letters from all of these were provided to the reviewers and demonstrate enthusiasm. The creation of a vibrant PhD Program in Biomedical Engineering at Boise State should help to enrich the ecosystem such as to attract new industry and biotech to the Boise region, create new startups based upon discovery, and provide a stable workforce on which such enterprise can rely. The team strongly encourages the Program leadership to work with the Director of Clinical/Translational Research on integration with these outside entities.

In summary, the review team believes that this proposed Program is timely, fills a current void, and can serve as a vehicle for economic, intellectual and clinical activity in Idaho.

B. Review Process

Drs. Adam Higgins (Director of Bioengineering Graduate Program at Oregon State University) and Mary C. (Cindy) Farach-Carson (Director of Clinical and Translational Research at the University of Texas Health Science Center at Houston) met on September 20 and 21 on the Boise State University Campus to review the proposed PhD Program in Biomedical Engineering. Prior to the site visit, the team was provided with the Idaho State Board of Education Proposal for the Graduate Degree Program, vitae of proposed Program faculty, and 17 support letters from a variety of stakeholders. The team also received a memorandum and instructions from Dr. Tammi Vacha-Haase, Dean of the Graduate College.

On September 20, the review team met with Deans Tim Dunnagan (Health Sciences), Leslie Durham (Arts and Sciences), JoAnn Lighty (Engineering), Tammi Vacha-Haase (Graduate College) along with Interim Provost Tony Roark. They then were provided an overview of the proposed transdisciplinary Program by the four core faculty Drs. Tyler Brown (kinesiology), Clare Fitzpatrick (mechanical and biomedical engineering), Trevor Lujan (mechanical and biomedical engineering), and Gunes Uzer (mechanical and biomedical engineering), followed by a meeting with the other interested faculty that included faculty from kinesiology, physics, electrical and computer engineering, materials science and engineering, and biological sciences. A luncheon at the Bronco Zone with the department heads and directors allowed the review team to see the athletic facility, and meet the heads of the core departments Drs. John McChesney (kinesiology), Don Plumlee (mechanical and biomedical engineering), as well as Dr. Bob Wood (Director of the School of Allied Sciences). Dr. Cheryl Jorcyk, Director of Clinical/Translational Research, and Julie Oxford, Director of the COBRE in Matrix Biology, also attended. The team then met with administrative leaders that included Dr. Max Davis-Johnson (CIO/Information technology), Scott Lowe (Associate Dean, Graduate College) and Dr. Harold Blackman (Interim VP Research). A tour of the campus facilities followed to include the BRC, RUCH, and COBR, where the team met with a group of approximately a dozen students from a variety of existing programs. Several of these students indicated that they would be prospective PhD students for the new Program in Biomedical Engineering. At dinner, the review team members were introduced to two clinicians who represent the external stakeholders, Dr. Mark Roberts (External Partner) and Dr. Kirk Lewis (Orthopedist, Sports Medicine).

On September 21, the review team met again with the core faculty to discuss additional related questions arising from the previous day, then conducted an exit interview with the core faculty, Deans, Associate Deans, and the Interim Provost. The review team then was charged with generating this report.

C. Observations and General Recommendations

Boise State is a relatively young University (~50 years as a member of the State system) with a School of Engineering that is approximately 20 years old. Thus, the University is in a unique position to develop innovative programs that serve the rapidly growing region. A graduate educational void currently exists in the rapidly growing transdisciplinary field of Biomedical Engineering in Boise, and no program exists to produce PhD level scientists and engineers with relevant training in this area. The proposed program thus can immediately occupy a niche that will serve local, regional and national need.

The leadership of the proposed PhD program presented the team with a vision to create a new PhD Program that is transdisciplinary, flexible, sustainable and that will complement, rather than compete with, existing programs. The benefits of this program are evident and include fostering cross-campus interactions, increasing interdisciplinary communications, increasing faculty competitiveness for funding, and increasing workforce training and economic development opportunities. Boise is the right place in the State for this effort, offering access to clinical partnerships and a rapidly growing industrial base. While many of the courses presently exist in individual programs, there is presently no integrated program for students interested in pursuing a PhD in Biomedical Engineering. In the team's interview with about a dozen current and potential students, many expressed their desire for such a Program in Boise such that they do not need to leave the State. While both participants and University leadership generally recognized the Program as having tremendous potential to augment the current University programmatic offerings, it is clear that the College of Arts and Sciences needs to be more involved in planning going forward, particularly with the integration of the mechanobiology emphasis that will likely require close workings with the existing programs and resources managed in Biomolecular Sciences.

The proposed Leadership team includes a Director and Associate Director, from different Colleges. The founding Director, Dr. Trevor Lujan, is a tenured Associate Professor in the Department of Mechanical and Biomedical Engineering, and the founding Associate Director is Dr. Tyler Brown, Assistant Professor in the Department of Kinesiology. The proposed leadership plan establishes a succession mechanism by which the Associate Director will become the next Director, and a new Associate Director will be named. The Director and Associate Director will receive summer support (2 months) and reduced effort in teaching for the duration of the administrative appointment. The review team believes this is absolutely essential to guarantee the successful launch of the new PhD Program. The Program will be served by a Steering Committee consisting of one member of each College. The Steering Committee should work with the Program Leaders to establish policies and procedures for governance of the Program that should be clear, transparent, and enforced. The current proposal requests 0.5 FTE for administrative support staff. The review team believes this may underestimate the amount of time that will be needed to launch and sustain a competitive PhD program that will soon include and track over 20 students (3-4 years). Providing a full time (1.0 FTE) should be considered as resources allow. Because the members of the core faculty are relatively early in their careers (one tenured associate professor and three untenured assistant professors), it is imperative that credit for programmatic activities be recognized as valuable contributions to their dossiers as they seek promotions through the University promotion and tenure committees.

The review team considered aspects of the Program that will impact its sustainability. The GA lines are absolutely essential to the recruitment of new students and to the retention of Biomedical Engineering faculty at Boise State. These lines also provide stability to the Program as individual funding sources obtained by faculty from external sources fluctuate. A commitment to an entering student for five years is becoming standard in this discipline, and the top students will expect this guarantee of stipend when choosing among competitive programs. The review team emphasizes the importance of ensuring these lines are continuous and stable. The Graduate College Dean should work with the Program leadership to proactively plan and budget for the availability of these funds. Additionally, as the Program grows, there should be a mechanism in place to add additional lines to the Program. One potential means to do this is to benchmark the current level of funding, with a plan to return a portion of additional revenues from F & A or other directly back to the Program.

The review team understands that there is a new budget model at Boise State. The planning for the growth in the Biomedical Engineering PhD program should be accommodated in the new model, especially if there are dual enrollments in the Graduate College and individual departments.

The review team was able to assess most of the equipment and movement science/kinesiology cores and physical laboratory/computing facilities available to Program faculty and their students for research purposes, with the exception of the reasonably new vivarium which was not part of the tour. The review team felt that while most of the resources appear to be in place (purchased largely through one-time funds from NIH COBRE/INBRE grants awarded to Boise State), there should be continuous planning made in conjunction with other related Programs for continued funds to support service contracts, necessary equipment upgrade and replacement, new equipment, and other resources needed to support the Program as it grows.

In meeting with the student population, the review team learned that the prospective PhD students were uniformly enthusiastic about the Program, and optimistic that the existence of the Program would ensure that the courses would be offered reliably. They felt that the emphasis programs would integrate a curriculum (biology/materials/mechanics/kinesiology) that is presently fragmented. They felt that this continuum of knowledge from the cell level to whole body motion as presented in the Biomedical Engineering curriculum would well prepare them for future employment. They indicated that if jobs were available in Boise, they would prefer to stay. The students noted the "great faculty" in the Program and felt that the University culture was supportive. When asked what they would like to see from the Program in addition to the didactics, the students noted that they would like there to be programmatic enrichment and social activities that brought them together regularly, and that they would like to see the Program have a physical "home". They also wished to make sure that students would have travel funds available to attend and present at national/international research meetings. They expressed some concerns that a stipend of approximately 25K might be low in the near future as the cost of living in Boise is rising rapidly. They expressed concern that the student health insurance did not offer dental or vision care. The Program leadership should work with the Graduate Dean to ensure that these concerns do not negatively impact the recruitment of top students.

D. Key Recommendation Summary

The review team recommends that Program governance be established quickly, that the core faculty create a handbook of policies and procedures that is enforced, that an inclusive steering committee be established that also includes representatives from biological sciences, that Program activities be conducted in a way that is clear and transparent, and that a staff support person be hired/assigned immediately such that the Program can be ready for launch in 2019.

The team recommends that the Program leadership consider establishing prerequisites to the Program such that students entering the Program from diverse backgrounds enter with the necessary background to succeed in the core Program. Recognizing that students will enter this transdisciplinary field with diverse training backgrounds, the Leadership should establish mechanisms for students lacking key training/coursework in areas such as anatomy, cell biology, mathematics, or engineering fundamentals to have access to these courses at Boise State. Online courses offer another option for providing essential backgrounds. The Program leadership also should track student performance aligned with admissions credentials (GPA, GRE scores, etc) to determine if adjustments need to be made.

The plans to support 6-7 GA lines and admit a similar number of new students each year, with students moving to external grant funds for their stipends after the first year, is realistic and standard practice in Biomedical Engineering programs across the country. Given a roughly 5 year time to graduation, the steady state number of students in the Program should grow to be about 25-30. Program faculty must be vigorous in their pursuit of extramural funding to support this number of students. Assuming that 6-7 students should be completing all degree requirements each year, Program faculty also should begin to develop a plan for assisting Biomedical Engineering PhD graduates to move to their next career steps, whether they be immediate employment or postdoctoral work. A small, but growing, medical industry in Boise can employ some of the graduates, but many are expected to leave the State for postdoctoral training. The Program faculty should track their PhD alumni as a means to assess Program effectiveness and assess whether the transdisciplinary Program is producing the expected outcomes as detailed in the Program proposal.

The creation of a PhD program is proposed, but there is no accompanying MS program in Biomedical Engineering. It is common for graduate students who need to leave a PhD program early to receive a Masters if all coursework has been completed. At Boise State, there exist a number of Masters programs in the participating departments with significant course overlap with the emphasis areas of the proposed Program. One strategy for providing students with a Masters option is for dual enrollment into the existing Masters Programs, so long as the program requirements are in alignment. Another option is to create an MS in Biomedical Engineering. The Program leadership should work with the administration to clarify this path for all incoming students.

Appendix C: Response to External Program Reviewers

The observations and recommendations identified by the external reviewers focused on **(1)** resources to fund and grow the program, **(2)** a terminal master's program for students who do not make sufficient progress towards a PhD, **(3)** program governance and policy, **(4)** integration of the College of Arts and Sciences, **(5)** engagement with external entities, **(6)** program pre-requisites, **(7)** tracking post-graduation program outcomes, **(8)** student concerns, and **(9)** faculty credit for programmatic activities. For each of these areas, detailed comments from the reviewers, along with our response are outlined below.

(1) Resources to fund and grow the program

Reviewer Comments:

- (i) *"The review team is confident that this Program will be popular, and that it will continue to grow. The Leadership at Boise State should ensure that resources are available to support this growth through new faculty hiring in the emphasis areas and allocation of new GA funding to support the growth of the program. The review team suggests that Leadership explore various funding models to ensure the sustainability of the Program taking advantage of new revenue streams that could include increased F & A from external funding, royalties from licensing of biomedical engineering-related patents, development efforts with potential donors, and other forms of return from Program activities."*
- (ii) *"The current proposal requests 0.5 FTE for administrative support staff. The review team believes this may underestimate the amount of time that will be needed to launch and sustain a competitive PhD program that will soon include and track over 20 students (3-4 years). Providing a full time (1.0 FTE) should be considered as resources allow."*
- (iii) *"The GA lines are absolutely essential to the recruitment of new students and to the retention of Biomedical Engineering faculty at Boise State. [...] The review team emphasizes the importance of ensuring these lines are continuous and stable. The Graduate College Dean should work with the Program leadership to proactively plan and budget for the availability of these funds. Additionally, as the Program grows, there should be a mechanism in place to add additional lines to the Program. One potential means to do this is to benchmark the current level of funding, with a plan to return a portion of additional revenues from F & A or other directly back to the Program."*
- (iv) *"The review team understands that there is a new budget model at Boise State. The planning for the growth in the Biomedical Engineering PhD program should be accommodated in the new model, especially if there are dual enrollments in the Graduate College and individual departments."*
- (v) *"The review team was able to assess most of the equipment and movement science/kinesiology cores and physical laboratory/computing facilities available to Program faculty and their students for research purposes, with the exception of the reasonably new vivarium which was not part of the tour. The review team felt that while most of the resources appear to be in place (purchased largely through one-time funds from NIH COBRE/INBRE grants awarded to Boise State), there should be continuous planning made in conjunction with other related Programs for continued funds to support service contracts, necessary equipment upgrade and replacement, new equipment, and other resources needed to support the Program as it grows."*

Response:

Plans to support the program through new faculty hiring are already in place. An available tenure-track line in Kinesiology will be used to hire a faculty member aligned with this proposed program, with a proposed start date for this faculty member of fall 2019.

The Dean of the Graduate College will continue to work with program faculty to ensure that the GA line commitments outlined in this application are met.

Funding directly to the program as part of returned F&A (or other mechanisms) is currently under discussion at the University level. This discussion relates to all PhD programs across campus – Boise State currently has 11 PhD programs. Recently established PhD programs across campus (notably, Computing which also sits in the Graduate School) are growing and so have stimulated the need for a mechanism to support additional GA lines, administrative support, and equipment upgrades/service contracts commensurate with program growth. The program faculty of the proposed program will work with program administrators of existing programs and university administration to develop a mechanism to increase the resources available to the program as it grows.

(2) Terminal Master's program

Reviewer Comments:

- (i) *“One concern of the review team is the alignment of the new PhD curriculum with existing Masters (MS, MENG) program for students who may leave the program before completion of the PhD. The Program leadership should carefully review the requirements of the Masters programs to ensure that a Masters option is seamlessly available for students regardless of emphasis area.”*
- (ii) *“The creation of a PhD program is proposed, but there is no accompanying MS program in Biomedical Engineering. It is common for graduate students who need to leave a PhD program early to receive a Masters if all coursework has been completed. At Boise State, there exist a number of Masters programs in the participating departments with significant course overlap with the emphasis areas of the proposed Program. One strategy for providing students with a Masters option is for dual enrollment into the existing Masters Programs, so long as the program requirements are in alignment. Another option is to create an MS in Biomedical Engineering. The Program leadership should work with the administration to clarify this path for all incoming students.”*

Response:

Two options will be available to students who may leave the program before completion of the PhD program. (1) Student's whose coursework is closely aligned with existing Master's programs (specifically, MS Mechanical Engineering and MS Kinesiology) may transfer to these programs and complete their graduate studies under these existing programs. (2) Alternatively, students may complete a terminal Biomedical Engineering Master's program. This second option was specifically created based on the reviewers comments to ensure that students whose coursework is too interdisciplinary to align well with our existing department-specific Master's programs to have a seamless transfer option available.

(3) Program governance and policy

Reviewer Comments:

- (i) *“The Program will be served by a Steering Committee consisting of one member of each College. The Steering Committee should work with the Program Leaders to establish policies and procedures for governance of the Program that should be clear, transparent, and enforced.”*
- (ii) *“The review team recommends that Program governance be established quickly, that the core faculty create a handbook of policies and procedures that is enforced, that an inclusive steering committee be established that also includes representatives from biological sciences, that Program activities be conducted in a way that is clear and transparent, and that a staff support person be hired/assigned immediately such that the Program can be ready for launch in 2019.”*

Response:

Documents of the governance structure, policies and procedures, and student and faculty handbooks are currently in preparation. These documents will be sent to the Deans of the Graduate College, College of Engineering, College of Health Sciences, College of Arts and Sciences, relevant Chairs (Mechanical and Biomedical Engineering, Kinesiology, Electrical and Computer Engineering, Material Science and Engineering, Biological Sciences, Physics, Chemistry and Biochemistry), and prospective program faculty for review and feedback and will be finalized early in Spring 2019. Implementation of the policies, formation of all committees, student recruitment, website launch, and other program functions will occur in Spring 2019.

To facilitate the quick establishment of the PhD program, the program director will use the first year of his course buyout (budgeted at \$12k, and funded through COEN) in Spring 2019. This will allow the program director to dedicate a greater percentage of his time to getting the program operational prior to Fall 2019. In addition, a 1/2 time administrative assistant will be funded starting in January 2019; initial funding will be provided by COEN with permanent funding sought via the budget process. This administrative assistant will support the program director in setting up the new PhD program.

(4) Integration of the College of Arts and Sciences

Reviewer Comments:

- (i) *“While both participants and University leadership generally recognized the Program as having tremendous potential to augment the current University programmatic offerings, it is clear that the College of Arts and Sciences needs to be more involved in planning going forward, particularly with the integration of the mechanobiology emphasis that will likely require close workings with the existing programs and resources managed in Biomolecular Sciences.”*

The program leadership have worked to actively engage COAS in program planning and implementation. In particular, the proposed curriculum has been refined based on input from Biological Sciences, Chemistry and Biochemistry, and Physics Chairs. In collaboration with COAS, areas of potential synergistic collaboration between this and existing PhD programs have been identified, including cross-program quantitative/research methods and science communications courses and we will work to develop generalized graduate courses to build these translational skills and enhance the education of our graduate programs across the university.

To promote engagement of faculty across all colleges, the steering committee will be comprised of at least one faculty member from each college (COEN, COHS, COAS) and the program director and associate director roles will be held by faculty from two different colleges. Additionally, governance and policy documents for the program will be written such that program faculty will have priority for program resources based on their engagement and contribution to the program (including, advising externally-funded students in the program, supervisory committee participation, Director/Associate Director roles, steering/admissions/GA assignment committee participation). Resource allocation decisions will be independent of a faculty member's home department or college.

(5) Engagement with external entities

Reviewer Comments:

- (i) *"The team strongly encourages the Program leadership to work with the Director of Clinical/Translational Research on integration with these outside entities [ICOM, VA, UI]."*

Response:

The core program faculty currently have an excellent working relationship with the Director of Clinical/Translational Research, Cheryl Jorcyk. Dr. Jorcyk has facilitated clinical engagement and support on many of our recent grant submissions and co-organizes research alignment meetings between Boise State faculty and St. Luke's research faculty. We will continue this engagement with the director, and will work to expand our interaction, particularly as Boise and the surrounding region continues to attract more biomedical start-ups.

(6) Program pre-requisites

Reviewer Comments:

- (i) *"The team recommends that the Program leadership consider establishing prerequisites to the Program such that students entering the Program from diverse backgrounds enter with the necessary background to succeed in the core Program. [...] The Program leadership also should track student performance aligned with admissions credentials (GPA, GRE scores, etc) to determine if adjustments need to be made."*

Response:

We will include the following prerequisites for admissions:

"Prerequisites: B.S. or M.S. degree in a field related to the 'emphasis area' of interest. On their application, prospective students must identify their preferred emphasis area and at least one prospective advisor. Students admitted to the program may be required to complete additional coursework to make up deficiencies in their undergraduate preparation."

These prerequisite criteria are similar to those of other schools (Oregon State, University of Minnesota, University of Wisconsin, Washington University, University of Washington) offering similar interdisciplinary programs in biomedical engineering. As the reviewer's recommend, program administrators will track student performance to determine if adjustments need to be made to these criteria.

(7) Tracking post-graduation program outcomes

Reviewer Comments:

- (i) *“Program faculty also should begin to develop a plan for assisting Biomedical Engineering PhD graduates to move to their next career steps, whether they be immediate employment or postdoctoral work. [...] The Program faculty should track their PhD alumni as a means to assess Program effectiveness and assess whether the transdisciplinary Program is producing the expected outcomes as detailed in the Program proposal.”*

Response:

To assist with preparing our graduates for their next career steps, we will incorporate modules of granting-writing, presentation, and critical evaluation skills into our BME Graduate Seminar course to assist with professional development. Based on input from the program reviewers, we have also included a 1 credit Graduate Professional Development course in the BME curriculum. This introductory course will orient new PhD students to the program, with a focus on developing professional skills in project management, ethics, and interpersonal abilities. Additionally, as part of the proposed curriculum (Doctoral Comprehensive Exam), each student must prepare and submit a graduate fellowship proposal application to a NSF or NIH funding mechanism (e.g. NSF GRFP, NIH F31). Regardless of whether our graduates follow an industry or postdoctoral career path, we expect that these writing and oral skills will be useful translational tools in their careers.

Part of the duties of the program administrative staff will include tracking the employment path of our graduates. These data will be incorporated into assessment of the learning objectives of the program.

(8) Student concerns

Reviewer Comments:

- (i) *“... students noted that they would like to see the Program have a physical “home”. They also wished to make sure that students would have travel funds available to attend and present at national/international research meetings. They expressed some concerns that a stipend of approximately 25K might be low in the near future as the cost of living in Boise is rising rapidly. They expressed concern that the student health insurance did not offer dental or vision care. The Program leadership should work with the Graduate Dean to ensure that these concerns do not negatively impact the recruitment of top students.”*

Response:

A dedicated physical space for the students of the Biomedical Engineering PhD program will be housed in the Center of Orthopaedic and Biomechanics Research to allow them to come together as a group. Graduate Seminar courses, journal club, student presentations and social events (e.g. new cohort welcome) will take place in this space with the objective of creating an inclusive culture and common bond across our biomedical engineering graduate student population. In addition, this space will facilitate interactions between research groups, departments, and colleges.

The proposed operating budget for the program will provide some funding for students to attend research meetings. Additionally, a mechanism to return funds to the program as it grows (see topic (1) above) would allow available travel funds to grow with our student enrollment.

Student concerns regarding stipend and health insurance is part of a larger university-wide conversation. The program faculty will work to advocate for our students with university leadership.

(9) Faculty credit for programmatic activities

Reviewer Comments:

- (i) *“Because the members of the core faculty are relatively early in their careers (one tenured associate professor and three untenured assistant professors), it is imperative that credit for programmatic activities be recognized as valuable contributions to their dossiers as they seek promotions through the University promotion and tenure committees.”*

Response:

The program leadership will work with COEN, COHS, and COAS Deans to ensure that contributions to the program (including PhD student advisor, supervisory committee membership, Director/Associate Director roles, steering/admissions/GA assignment committees) are recognized by promotion and tenure committees in alignment with the Tenure and Promotion policy of the faculty member’s respective College and in the same manner as equivalent contributions to any other PhD program.

Appendix D: Letters of Support

1. Jeff Brouman, Owner and Surgeon, WestVet Animal Emergency and Specialty Center, Garden City, ID
2. Andrew Kazanovicz, Research & Development and Quality Manager, MWI Animal Research, Boise.
3. Dennis Stevens, Chief of the Infectious Diseases Section, Boise VA Medical Center
4. Mark Roberts, Medical Director for Research and Medical Education, St. Luke's Health System
5. Christopher Hirose, Director of Research at St. Alphonsus Regional Medical Center, Boise State University
6. Michael Aldape, Research Scientist in the Infectious Disease Section, Boise VA Medical Center.
7. Marc Paul, Associate Athletic Director for Sports Medicine; Boise State University
8. Craig McGowan, Associate Professor of Biological Sciences, University of Idaho
9. Robert Hasty, Dean and Chief Academic Officer, Idaho College of Osteopathic Medicine
10. Nathan Schiele, Assistant Professor of Biological Engineering, University of Idaho.
11. Julia Oxford, Distinguished Professor of Biological Sciences and Director of the Biomolecular Research Center, Boise State University
12. Cheryl Jorcyk, Director of Clinical/Translational Research and Professor of Biological Sciences, Boise State University
13. Kayla Seymore, Research Associate at Center for Orthopaedic and Biomechanics Research, Boise State University; and potential student
14. Samantha D'az, potential student, recent BSU graduate with a BS in Electrical Engr
15. Erica Neumann, Senior Research Engineer, Department of Biomedical Engineering, Lerner Research Institution – Cleveland Clinic Foundation
16. Tom Simenc, potential student; recent BSU graduate with BS in Mechanical Engr



WestVet Animal Emergency & Specialty Center
5019 North Sawyer Avenue
Garden City, ID 83714
(208) 375-1600

April 2nd, 2018

Dear Dr. Munger,

I'm writing to give my full support to the establishment of a PhD program in biomedical engineering at Boise State. I'm the owner of WestVet, the only integrated emergency and veterinary specialty hospital in Idaho with 36 veterinarians on staff. The surgeons at WestVet, including myself, have been actively involved in developing new surgical instruments and devices for animal health. A PhD program in biomedical engineering would give us an ability to work with laboratories at Boise State on long-term projects and submit proposals to federal agencies.

My recent work with Dr. Trevor Lujan at Boise State, in developing and testing the first hip resurfacing device for canines, is a great example of this type of collaborative work. I would love to see this project and others make a significant impact in both animal and human health. However, I know this requires committed PhD students that can support long-term projects, and a PhD program in biomedical engineering would support this need.

Please feel free to contact me if you need anything further, and best wishes on getting this program established!

With warm regards,



Jeff D. Brouman DVM, MS, DACVS
Owner and Surgeon
WestVet Specialty Center



3041 W Pasadena Dr.
Boise, ID 83705

Dear Dr. Munger,

I'm writing this letter to express my enthusiastic support for the proposed PhD program in Biomedical Engineering (BME) at Boise State University. As a manager of R&D at MWI Animal Health in Boise, where I'm responsible for the development and testing of veterinary medical devices and supplies, this program would offer my company an immediate benefit.

I recently moved from our offices in Massachusetts to initiate R&D operations in Boise. This move has put me in close proximity to clinical consultants and the MWI headquarters, but a current limitation is a lack of access to a skilled workforce that is able to conduct high-quality biomechanics research. The proposed PhD program can increase access to the people and laboratory resources I need to do my job well. In particular, I'm excited about working with faculty and PhD students to collaborate on a number of important projects in veterinary medicine.

Based on my time training as a biomedical engineer in the Boston area, I understand the importance of PhD programs in creating an energized and capable workforce in biomedical technology. I'm excited to be part of the growing biomedical engineering community in the Treasure Valley, and I feel this PhD program will bolster this growth and support our company's mission.

Please don't hesitate to contact me if you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "A. J. Kazanovicz".

Andrew J. Kazanovicz, MEng
MWI Animal Health
Research & Development and Quality Manager
Securos Surgical
Work: 800.762.4800 (Ext. 4816)
Mobile: 508.322.1529



DEPARTMENT OF VETERANS AFFAIRS
Medical Center
500 West Fort Street
Boise ID 83702-4598

May 7, 2018

James Munger, PhD
Vice Provost for Academic Planning
Boise State University
Boise, Idaho, 83725

Dear Dr. Munger,

I'm the Chief of Infectious Diseases and long-time Associate Chief of Staff for Research at the Boise VA Medical Center, and I'm writing this letter to express my support for the Biomedical Engineering PhD program being proposed at Boise State. My research for the past 35 years has investigated the role of extracellular toxins in severe infection and has resulted in over 170 publications. Over the past decade, I've been quite pleased with the increasing number of researchers and projects in Boise that explore the extracellular matrix. I feel that the mechanobiology emphasis area in the newly proposed PhD program will further support this growth and help Boise become a recognized leader in matrix biology research.

As the principal investigator of a \$9.5 million NIH center grant, I fully recognize the economic benefit of growing the biomedical research footprint in Idaho. Biomedical research often requires close collaboration between biologists, clinicians, and engineers. This new PhD program can help Idaho research groups, such as the group I currently direct at the VA, explore new ideas and funding opportunities. For example, several researchers at Boise State are working to develop treatments for soft tissue disease, which has overlap with research being conducted at the VA related to soft tissue infections. The proposed PhD program would bolster any potential collaboration between the VA and Boise State, and therefore this program can help support VA research. I feel this program would be a smart investment for Boise and for Idaho.

Respectfully Yours,

A handwritten signature in cursive script that reads "Dennis L. Stevens".

Dennis L. Stevens, M.D., Ph.D.
Chief, Infectious Diseases Section
Boise VA Medical Center
Boise, ID 83712

Professor of Medicine
University of Washington School of Medicine
Seattle, WA 98195

April 23, 2018

James Munger, PhD
Vice Provost for Academic Planning
Boise State University
Boise, Idaho, 83725

Dear Dr. Munger,

As Medical Director for Research and Medical Education at St. Luke's Health System and I would like to express my support for your proposed Ph.D. program in Biomedical Engineering. St. Luke's Health System is very interested in stimulating interaction and engagement between our institution and Boise State University. Over the years, St. Luke's and Boise State have engaged in a number of successful collaborations. These include orthopedic and sports medicine surgeons Dr. Kevin Shea and Dr. Michael Curtin that have worked with Boise State's Center for Orthopaedic and Biomechanics Research, Dr. Kurt Nilsson and Director of Imaging Dr. Drew Taylor have worked with Boise State researchers on concussion and repetitive head impact projects as overseen by our Applied Research Manager, Dr. Hilary Flint. We've held several St. Luke's / Boise State Research Forums promoting additional collaborations.

The Biomedical Engineering Ph.D. program is an ideal vehicle to bring some of these collaborative ideas to fruition. The students in the program would be optimally suited to work with our clinicians and research staff to develop and advance projects of clinical and translational importance. Additionally, graduates of the program would provide a highly trained workforce to enhance the research capability of our institution and others across the state. I am excited by the development of this Ph.D. program and believe it will provide significant potential to advance the volume and caliber of collaborative research projects being performed between our institution and yours. I offer you my full support for the development of this program and I look forward to the collaborative work that will result.

Sincerely,

A handwritten signature in black ink, appearing to read "W. Mark Roberts", is written over a light blue horizontal line.

W. Mark Roberts, MD, MMM
Medical Director for Research and Medical Education
St. Luke's Health System

St. Luke's Research / 701 E. Morrison Knudsen Dr., Suite 100, Boise, Idaho 83712 / 208-381-8914

stlukesonline.org



**Saint Alphonsus
Medical Group**

COUGHLIN FOOT & ANKLE CLINIC

May 8, 2018

Dear Dr. Munger,

I would like to express my support for establishment of a PhD program in Biomedical Engineering at Boise State University.

As a clinician surgeon and director of research at the St. Alphonsus Regional Medical Center Coughlin Clinic, establishment of a Biomedical Engineering PhD program at Boise State University will be a positive development for our mission. Such development will provide us the qualified local workforce we need to advance clinical, experimental, and computational research to improve patient outcomes. Patient outcomes, satisfaction, and well being are what matters the most.

I am looking forward for fruitful collaborations between our clinical faculty and researchers from an interdisciplinary program. Such interactions will undoubtedly lead to new, innovative projects, which will drive the economic growth of the region and further the health of people around the world.

I have recently had some productive discussions with Dr. Clare Fitzpatrick. We have mutual interests in improving outcomes in total ankle arthroplasty and optimizing the current surgical implants. A Biomedical Engineering PhD program would provide an ideal vehicle to foster this collaborative work. As our hospital system is committed



**Saint Alphonius
Medical Group**

COUGHLIN FOOT & ANKLE CLINIC

bring the best healthcare to our patients; I predict that Biomedical PhD program faculty and researchers will greatly contribute to this goal.

Please do not hesitate to contact me if you should have any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "Chris".

Christopher Hirose MD

Email:

hirosecbmd@gmail.com

Cell: 208.890.0900



DEPARTMENT OF VETERANS AFFAIRS
Medical Center
500 West Fort Street
Boise ID 83702-4598

April 9, 2018

Dear Dr. James Munger,

I am writing this letter to provide my strongest support for the conception of a Biomedical Engineering PhD program at Boise State University.

I am a clinically focused infectious diseases research scientist at the Veterans Affairs Medical Center in Boise, ID. Here, my research group focuses on the pathogenesis of *Clostridium sordellii* and *Clostridium difficile* infections, and we are specifically interested in the effects of the exotoxins produced by these organisms on the host innate immune response during infection. During my time at the VA, our group has greatly benefitted from a strong relationship with Boise State University's Biomedical Research Facility (BRF). The BRF has provided the highest quality of services, ranging from sample preparation and analysis to statistical consultation of collected data. In similar fashion, the VA has also helped several NIH-funded investigators from Boise State University by offering space, resources and services from our AAALAC-accredited animal research facility.

Continuing this partnership and increasing the frequency of these interactions between Boise State University's Biomedical Engineering and the Boise, ID VA Research and Development Department is critical to the success to both programs. Increasing the knowledge transfer between our institutions will enhance the number of collaborative projects and increase both research activity and productivity within the region. Further, I predict that the graduates from the proposed program will be very much positioned to work in patient-driven research environments like the VA Hospital and will have meaningful contributions to the workforce needs within the Pacific Northwest.

Please contact me if there is anything else I can provide, or if I may answer any questions, etc., regarding our relationship with the BRF and Boise State University.

Sincerely yours,

A handwritten signature in black ink that reads "Michael J. Aldape". The signature is written in a cursive, flowing style.

Michael J. Aldape, PhD

Research Scientist
Infectious Diseases Section
Veterans Affairs Medical Center
500 W. Fort St.
Boise, ID 83702
(208) 422-1000 x7659
mike.aldape@va.gov



April 7th, 2018

Boise State University
Department of Intercollegiate Athletics
1910 University Drive
Boise, Idaho 83725-1021

Dear Dr. James Munger,

I'm very happy to be writing this letter of support for the new PhD program being proposed at Boise State University in 'Biomedical Engineering'. In my role as Associate Athletic Director for Sports Medicine at Boise State, I'm acutely aware of how biomedical engineering and sports science have helped improve injury rehabilitation and athletic performance. In fact, I've incorporated state-of-the-art equipment into our physical rehabilitation facility to speed recovery after injury. A goal of mine is to become more involved in developing innovative technologies to prevent and treat injury and ultimately help our student-athletes achieve their full potential.

I'm pleased to see that Boise State has prioritized biomedical research and that this newly proposed PhD program has an emphasis in human performance and biomechanics. My team would be highly interested in collaborating on projects with doctoral students and biomedical faculty. I feel this is a great opportunity to integrate aspects of our excellent athletic and research programs.

You have my enthusiastic support! Please don't hesitate to contact me if you need anything further.

Kind regards,



Marc Paul, MS, LAT, ATC
Associate Athletic Director, Sports Medicine
O: (208) 426-1696
C: (208) 484-3860
marcpaul@boisestate.edu

RE: Doctoral Program in Biomedical
Engineering at BSU

May 3, 2018

Dear Dr. Munger,

I am writing this letter to express my strong support for the proposed PhD program in Biomedical Engineering at Boise State University.

As an Associate Professor in the Department of Biological Sciences at the University of Idaho, I understand the important contributions of doctoral students can make to the research aspirations of a university. I am delighted to hear Boise State is dedicated to growing the biomedical presence in the Idaho with this proposed PhD program. A Biomedical Engineering PhD program at Boise State will be instrumental in advancing biomedical research in the State of Idaho and will absolutely have a positive effect across the state.

In my role as Director of the Comparative Neuromuscular Biomechanics Laboratory, my research seeks to understand the relationships between the musculoskeletal morphology and the biomechanics and neural control of locomotor performance. These research interests will be highly complementary to researchers in the Biomedical Engineering PhD program at Boise State University and I look forward to future collaborations with doctoral students and biomedical faculty involved in this program. These collaborations will undoubtedly have a positive effect on the biomedical research aspirations in the State of Idaho and strengthen the potential for obtaining federal research funding at both the University of Idaho and Boise State University.

If you have additional questions or require further information, please do not hesitate to contact me at (208) 885- 6598 or cpmcgowan@uidaho.edu.

Sincerely,



Craig McGowan

Associate Professor

Department of Biological Sciences

WWAMI Medical Education Program

cpmcgowan@uidaho.edu

208.885.6598



May 10, 2018

Dear Dr. James Munger,

As you may be aware, the Idaho College of Osteopathic Medicine (ICOM) will open its doors this fall. This is Idaho's first medical school, and the inaugural class will comprise of 162 students. Our faculty includes over 30 clinical and biomedical faculty with strong interests in collaborative research. Given the proximity of our institutions, and our shared vision in growing biomedical research across the state of Idaho, your proposed PhD program in Biomedical Engineering seems an ideal mechanism to promote and foster biomedical research of mutual interest.

We have an upcoming research meeting scheduled later this month between ICOM research faculty and the Biomedical Engineering PhD faculty from Mechanical & Biomedical and Kinesiology, and I am very enthusiastic to begin developing these collaborative relationships.

I would like to offer my strong support for the program, and wish you every success with its implementation and development. I look forward to our team interacting and collaborating with the biomedical engineers and students engaged in this program and enhancing the depth and breadth of biomedical research across our state.

Sincerely,

A handwritten signature in black ink, appearing to read 'R. Hasty'. To the right of the signature, the text 'D.O. FACOI' is written in a smaller, less legible hand. Below the signature, the name 'HASTY' is printed in a small, black, sans-serif font.

Robert Hasty, DO, FACOI, FACP
Founding Dean & Chief Academic Officer
Idaho College of Osteopathic Medicine

May 10, 2018

James Munger, Ph.D.
Vice Provost for Academic Planning
Boise State University
Boise, Idaho, 83725

Dear Dr. Jim Munger,

I am writing to share my excitement and support for the Biomedical Engineering Ph.D. program being proposed at Boise State University. I am an assistant professor in the Department of Biological Engineering at University of Idaho and I have a research focus in tendon tissue engineering. The proposed program will not only strengthen Idaho's community of biomedical researchers, but can benefit my own research.

Last year, several members of the biomedical engineering faculty from Boise State **visited our Moscow campus** (Dr. Uzer, Dr. Fitzpatrick, and Dr. Lujan) and toured my lab. I appreciated that they took the time to connect with faculty in our department, and since this visit, researchers from our two universities have enjoyed getting together at conferences. I feel that this collegial relationship will continue to grow and lead to productive research collaborations. A Ph.D. program at Boise State in Biomedical Engineering will undoubtedly be a tremendous asset to these collaborations. I know from personal experience that access to the proper Ph.D. students is imperative for getting large NIH proposals funded and staffed. The NIH wants to see that labs can attract engineering students that are passionate about biomedical research, and this new Ph.D. program will give Boise State faculty the ability to recruit these types of students.

This proposed Ph.D. program can also help my own research goals, since it will increase the visibility of biomedical research in Idaho and expand the regional expertise in fields that complement my own work. I am one of a handful of researchers in the Department of Biological Engineering at UI that have a biomedical research focus, and the proposed Ph.D. program can help our state reach a critical mass of researchers and projects in biomedical engineering. I am particularly excited about the new program's biomechanics emphasis area, since the whole-body study of human movement is outside the scope of our curriculum, yet is important for my future goals in developing treatments for joint disease. In summary, I think this initiative is an excellent opportunity to create a Ph.D. program that can benefit numerous people and organizations in Idaho, including my own lab.

Please feel free to contact me if you have any questions. I wish you the best in getting this program approved and established!

Sincerely,



Nathan R. Schiele, Ph.D.
Assistant Professor
Department of Biological Engineering
nrschiele@uidaho.edu

James Munger, PhD
Vice Provost for Academic Planning
Professor of Biological Sciences
Boise State University

April 23, 2018

Dear Dr. Munger,

As a professor in the department of Biological Sciences, program director for the Center of Biomedical Research Excellence (COBRE) in Matrix Biology, and advisor to the Idaho IDeA Network of Biomedical Research Excellence (INBRE) program, I have witnessed the growth in research breadth and depth across the Boise State campus over the last two decades. The increasing quality of research produced by our institution has been stimulated by the development of PhD programs in Biomolecular Sciences, and Ecology, Evolution, and Behavior. The area of Biomedical Engineering at Boise State is primed for similar research advances through recent hires (primarily early career investigators) whose research focuses on biomedical health and innovation, and through cross-campus investment in biomedical research infrastructure.

This new program will complement our existing PhD programs, and facilitate multiscale collaboration between the students across these programs. This will fulfill a growing need in our student body for a biomedical engineering program which is currently not available in any of the Idaho institutions. Additionally, this program will position our research faculty to competitively apply for NIH funding in biomedical applications. When proposals are evaluated for funding, the environment provided by the investigators' institution is an important scoring criteria. This program would demonstrate Boise State's dedication to supporting these research projects, growing our research capability, and investing in the future of our young investigators.

I am pleased to offer my full support and enthusiasm for the development of this PhD program in Biomedical Engineering.

Sincerely,



Julia Thom Oxford, PhD
Distinguished Professor
Department of Biological Sciences
Director, Biomolecular Research Center
PD/PI Center of Biomedical Research Excellence in Matrix Biology



April 11th, 2018

Dear Dr. James Munger:

I would like to express my strong support and enthusiasm for the establishment of a Biomedical Engineering PhD program at Boise State University.

As the Director of Clinical Translational Research, in the Division of Research and Economic Development at Boise State, I can attest to the important contributions of the proposed biomedical engineering faculty and students to the betterment of translational research aspirations of Boise State. A PhD level Biomedical Engineering research program will be highly complementary to the Biomolecular Sciences PhD program and will serve to strengthen the NIH-focused research ties between sciences and engineering that involves both the Colleges of Arts and Sciences and of Engineering.

Attracting highly qualified students to the Boise State University campus will increase the success of both PhD programs, foster research interactions with regional clinicians and hospitals, and ultimately result in an improved local work force. With a growing healthcare presence in the Treasure Valley, including the first Idaho medical school in osteopathic medicine on the horizon, synergistic alignment between our campus and the community will undoubtedly have a positive effect on collaborative ties and economic growth within the region.

If you require additional information or have other questions, please do not hesitate to contact me at (208) 426-4287 or cjorcyk@boisestate.edu.

Sincerely,

Cheryl L. Jorcyk, PhD
Director, Clinical/Translational Research
Professor, Biological Sciences
Biomolecular Sciences Graduate Program
1910 University Drive, SN227
Boise State University
Boise, ID 83725



BOISE STATE UNIVERSITY

COLLEGE OF HEALTH SCIENCES
School of Allied Health Sciences
Department of Kinesiology

May 2, 2018

Dear Dr. Munger:

When Dr. Tyler Brown mentioned the new, interdisciplinary PhD program in Biomedical Engineering at Boise State I was truly enthusiastic. To express this enthusiasm and my strong interest in this program I am writing a letter to you.

I came to Boise State two and a half years ago, after completing my master's degree at East Carolina University, to work as a research assistant at the Center for Orthopaedic and Biomechanics Research (COBR). During my time at COBR, I have been provided an opportunity to expand my research experience and interests by working on military funded projects. Although I have enjoyed this opportunity, I have always envisioned returning to true research interest of tissue biomechanics; using ultrasound imaging technology to quantify parameters of the musculoskeletal system and determine how those parameters can be modulated with exercise. The proposed transdisciplinary PhD program would be ideal for conducting this tissue biomechanics research. The program would be unique in providing me access to engineering classes necessary to expand my technical skills and use of ultrasound technology, and the biomechanics classes necessary to understand how the musculoskeletal parameters, as quantified with the ultrasound images, contribute to musculoskeletal health and human movement.

I would be honored to continue my studies in this unique PhD program and look forward to the opportunity to apply for admission in this new, exciting program.

If you have further questions, please do not hesitate to contact me.

Sincerely,

Kayla Seymore, MS
Center for Orthopaedic and Biomechanics Research (COBR)
College of Health Sciences Office of Research
Boise State University
Phone: 208-426-5614

May 2, 2018

Samantha D'az
1499 E. Pineridge Dr.
Boise, ID 83716
(714)906-2730
samanthadaz@u.boisestate.edu

Dear Dr. James Munger,

I am writing to express my enthusiasm about the opportunity to conduct my doctoral studies in Biomedical Engineering at Boise State University.

I am recent graduate of the Electrical Engineering department at Boise State University, but had the opportunity to partake in a wide variety of educational experiences during my undergraduate studies. During my final year at Boise State, I was lucky enough to conduct a summer research internship with NASA and work on a DoD funded research project in Boise State's Center for Orthopaedic and Biomechanics Research (COBR). I enjoyed my time at COBR so much that I am continuing as Graduate Assistant in the lab this fall and enrolling in the MS program in Kinesiology at Boise State. When Dr. Tyler Brown (Director of COBR) mentioned that he and his Biomedical Engineering colleagues were proposing a new, interdisciplinary PhD program in at Boise State I was truly ecstatic. As Dr. Brown described the program, it sounds like a unique opportunity to further my education by applying the technical engineering skills I learned as an undergraduate with my new-found interest in the human body. This interdisciplinary program is very attractive to me and I genuinely hope I have opportunity to apply for admission in this new exciting program in the near future.

In the meantime, if you have further questions, please do not hesitate to contact me.

Sincerely,

Samantha D'az

May 2, 2018

Boise State Graduate College
1910 University Drive
Boise, Idaho 83725-1110

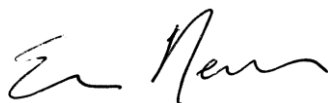
Dear Dr. Jim Munger,

It is my pleasure to write this letter in support of a future PhD program in Biomedical Engineering at Boise State. I am a Boise State Alumni, receiving my Bachelor's in Mechanical Engineering with a Biomedical Minor in May 2014 and my Master's in Mechanical Engineering in June 2016. With a dream of working in the biomedical engineering field, I was fortunate to have Dr. Trevor Lujan as my thesis advisor. His passion and excitement for biomedical research pushed me toward a research-minded career path. In fact, I contemplated pursuing a PhD in biomedical engineering after finishing my Master's degree, but I decided against it due to the lack of a Biomedical Engineering PhD program offered at Boise State.

After graduating with my Master's, I moved to Cleveland to be with my husband, and started working at the Cleveland Clinic as a Senior Research Engineer in the Biomedical Engineering Department. I balance my time working on several projects surrounding musculoskeletal, cardiovascular, and neurological systems. Computational modeling, experiment design/execution, data analysis, and preparation of manuscripts for publication are just a handful of the responsibilities that I am accountable for in my current position. The skills that I learned and developed while at Boise State have played a major role in my success as a research engineer.

As I continue to develop my career as an engineer and look toward future goals, I am excited to hear about the potential of a Biomedical Engineering PhD program starting at Boise State. During my final year as a Bronco, I met two potential Biomedical Engineering staff candidates (Dr. Clare Fitzpatrick and Dr. Gunes Uzer) that shared the same passion and excitement for their research as Trevor. The research foundation of a PhD program is imperative, and I think that the development and variety of Biomedical Engineering experience has progressed appropriately in order to support a PhD program. Moreover, the addition of the PhD program will provide more opportunities and growth in biomedical industries throughout the Treasure Valley. Boise has stolen my heart, and if a Biomedical Engineering PhD program were established at Boise State, I would strongly consider returning to Boise to pursue a PhD in this field.

Sincerely,



Erica Neumann
Senior Research Engineer
Department of Biomedical Engineering
Lerner Research Institute - Cleveland Clinic Foundation

May 2, 2018

Dear Program Reviewers,

I am writing to express my support for the creation of an interdisciplinary PhD program in biomedical engineering at Boise State University. Furthering my education has been a goal of mine for many years, and this program would provide that opportunity. I earned my degree in mechanical engineering and am employed using that degree here in the Treasure Valley where I have made my home. For years, the local options for advanced studies in mechanical engineering have been limited, and the lack of a fitting option has kept me from committing to graduate school. A PhD in biomedical engineering fills that gap and would create an exciting opportunity here in Boise.

As an undergraduate in the Boise State University mechanical engineering program, I focused my extra-curricular time in two areas. One of them was working as a student researcher with BSU's Dr. Gardner at the Center for Advanced Energy Studies, and the other was as an outdoor guide specializing in kayaking and rock climbing. I have followed my experience in energy efficiency in to the early stages of a career working in energy services, refrigeration design, and industrial energy efficiency. However, my real passion has always been in the kinetics of the human body. This has been amplified by personally experiencing multiple traumatic shoulder injuries during those adventure sports, kayaking and climbing. I learned much about the shoulder and various strategies for healing, supporting, and repairing this joint to maximize performance. This interest dovetails with my background in mechanical engineering, love of learning, and desire to be an expert in any field to fuel my interest in biomedical engineering study and research.

As stated earlier, Boise is my home. I have lived in the Treasure Valley for over a decade, and my family has moved and grown here. I love the city, valley, and state, and have set down roots. Although this is a fantastic situation, it also imposes limitations. The opportunities in Boise for work and education are still developing, and a biomedical engineering program at Boise State University would be a great way to continue this process. I fully support this opportunity.

If I can be of any further assistance, or provide additional information, I will gladly do so. Thank you for allowing me to voice my opinion and be part of the process.

Best Regards,

Tom Simenc
117 W. Chamberlin St.
Boise, ID 83706

Appendix E: Faculty CVs

1. Tyler Brown, Department of Kinesiology, College of Health Sciences
2. Kurtis Cantley, Department of Electrical and Computer Engineering, College of Engineering
3. David Estrada, Micron School of Materials Science and Engineering, College of Engineering
4. Clare Fitzpatrick, Department of Mechanical and Biomedical Engineering, College of Engineering
5. Stephanie Hall, Department of Kinesiology, College of Health Sciences
6. Benjamin Johnson, Department of Electrical and Computer Engineering, College of Engineering
7. Cheryl Jorcyk, Department of Biological Sciences, College of Arts and Sciences
8. Byung Kim, Department of Physics, College of Arts and Sciences
9. Trevor Lujan, Department of Mechanical and Biomedical Engineering, College of Engineering
10. Julia Oxford, Department of Biological Sciences, College of Arts and Sciences
11. Shawn Simonson, Department of Kinesiology, College of Health Sciences
12. Gunes Uzer, Department of Mechanical and Biomedical Engineering, College of Engineering

Tyler N. Brown, PhD, CSCS

Current Position and Address

Assistant Professor
Director, Center for Orthopedics and Biomechanics Research
Department of Kinesiology
Boise State University

1910 University Drive
Boise, ID 83725
Office: (208) 426-5613
Email: tynbrown@boisestate.edu

EDUCATION

Ph.D. in Biomechanics, School of Kinesiology 2007 – 2011
University of Michigan, Ann Arbor, MI

M.S. in Biomechanics, Department of Health and Human Development 2003 – 2005
Montana State University, Bozeman, MT

B.S. in Exercise Science, Department of Exercise Science 1999 – 2003
University of Puget Sound, Tacoma, WA

RELEVANT PROFESSIONAL EXPERIENCE

ORISE Fellow 2015 – 2016
Biomechanics Team, Human Science and Engineering, NSRDEC
Natick Soldier Systems Center, Natick, MA

Research Physiologist 2014 – 2015
Biomechanics Team, Human Science and Engineering, NSRDEC
Natick Soldier Systems Center, Natick, MA

Postdoctoral Researcher/ORISE Fellow 2012 – 2014
Biomechanics Team, Human Science and Engineering, NSRDEC
Natick Soldier Systems Center, Natick, MA

Research Technician Lead 2011
Adidas Innovation Team
School of Kinesiology, University of Michigan

PEER REVIEWED PUBLICATIONS

1. **Brown, T. N.**, Kaplan, J. T., Cameron, S. E., Seymore, K. D. and Ramsay, J. W. (2018) Individuals with Varus Thrust do not Increase Knee Adduction when Running with Body Borne Load. *Journal of Biomechanics*, 69: pg. 97-102.
2. Seymore, K. D., Kaplan, J. T., Cameron, S. E., Ramsay, J. W., and **Brown, T. N.** (2017). Dual-Task and anticipation impact lower limb biomechanics during a Single-Leg Cuts with body borne load. *Journal of Biomechanics* 65: pg 131-137.

3. Ramsay, J.W., Hancock, C.L., Schiffman J.M. and **Brown, T.N.**, (2016) *Soldier-relevant body borne loads increase knee joint reaction force during run-to-stop maneuver*. Journal of Biomechanics, 49: pg. 3868-74.
4. **Brown, T.N.**, Loverro, K., Coyne, M.E., and Schiffman J.M., (2016) *The effect of soldier-relevant body borne load and obstacle height on foot clearance*. Applied Ergonomics, 55: pg. 56-62
5. **Brown, T.N.**, O'Donovan, M., Hasselquist. L, Corner, B and Schiffman J.M, (2016) *Lower extremity energy dissipation strategies during drop landings with body borne load*. Applied Ergonomics, 52: pg. 54-61.
6. Cao Q., Thawait G.K., Gang G., Zbijewski W., Riegel T., **Brown T.N.**, Demehri S. and Siewerdsen J.H., (2015) *Characterization of 3D Joint Space Morphology Using an Electrostatic Model (with Application to Osteoarthritis)*. Physics in Medicine and Biology, 60: pg. 947-60.
7. Loverro, K., **Brown, T.N.**, Coyne, M.E., and Schiffman J.M., (2015) *Use of body armor protection with a fighting load carrier impacts performance and biomechanics*. Applied Ergonomics, 46: pg. 168-75.
8. **Brown, T.N.**, O'Donovan, M., Hasselquist. L, Corner, B and Schiffman J.M, (2014) *Load impacts lower limb biomechanics during unanticipated single-leg cutting*. Journal of Biomechanics, 47: pg. 3494-501.
9. **Brown, T.N.**, O'Donovan, M., Hasselquist. L, Corner, B and Schiffman J.M, (2014) *Body borne loads impact Walk-to-Run and Running Biomechanics*. Gait and Posture, 40: pg. 237-42.
10. **Brown, T.N.**, Palmieri-Smith, R.M. and McLean, S.G. (2014) *Comparative adaptations of lower limb biomechanics during uni-lateral and bi-lateral landings after different neuromuscular-based ACL injury prevention protocols*. Journal of Strength and Conditioning Research, 28(10): pg. 2859-71.
11. **Brown, T.N.**, McLean, S.G. and Palmieri-Smith, R.M. (2014) *Quadriceps activation patterns predict sagittal plane knee kinetics during single-leg jump landings*. Journal of Science and Medicine in Sports, 17: pg. 408-13.
12. Kipp K., **Brown, T.N.**, McLean, S.G. and Palmieri-Smith, R.M (2013) *Decision-making and experience level influence frontal plane knee joint biomechanics during a cutting maneuver*. Journal of Applied Biomechanics. 29(6):756-62.
13. **Brown, T.N.**, Palmieri-Smith, R.M. and McLean, S.G. (2009) *Sex and Limb Differences in Hip and Knee Kinematics and Kinetics during Anticipated and Unanticipated Jump Landings: Implications for ACL injury*. British Journal of Sports Medicine, 43(13): pg. 1049-1056.
14. Palmieri-Smith, R.M. Hopkins, J.T. and **Brown, T.N.** (2009) *Peroneal activation deficits in persons with functional ankle instability*. American Journal of Sports Medicine, 37(5): pg. 982-988.
15. Hopkins, J.T., **Brown, T.N.**, Christensen, L. and Palmieri-Smith, R.M. (2009) *Deficits in Peroneal Latency and Electromechanical Delay in Patients with Functional Ankle Instability*. Journal of Orthopedic Research, 27(12): pg. 1541-1546.

Journal Articles (In Review)

1. Fain, A.C., Lobb, N.J., Seymore, K.D and **Brown, T.N.** *Sex and Limb Differences during a Single-Leg Cut with Body Borne Load*, Submitted to Journal of Sports Science.

2. Seymore, K.D., Fain, A.C., Lobb, N.J., and **Brown, T.N.** *Sex and limb impact biomechanics associated with risk of injury during drop landing with body borne load.* Submitted to PLOS One.
3. Lobb, N.J., Fain, A.C., Seymore, K.D and **Brown, T.N.** *Sex and Stride Length Impact Leg Stiffness and Ground Reaction Forces when Running with Body Borne Load,* Submitted to Journal of Biomechanics.
4. Kaplan, J.T., Ramsay, J.W., Cameron, S.E., Seymore, K.D., Brehler, M., Thawait, G.K., Zbijewski, W.B., Siewerdsen J.H., **Brown, T.N.**, *Knee anatomical metrics predict biomechanics when landing with and without load.* Submitted to Clinical Biomechanics.

Journal Articles (In Preparation – Data Analysis Complete)

1. Cardenas, C., Fain, A.C., Lobb, N.J., Seymore, K.D and **Brown, T.N.** *Trunk position increases knee abduction during loaded single-leg cuts.*
2. **Brown, T.N.**, Lobb, N.J., Fain, A.C., Seymore, K.D and Cardenas, C., *Toe position predicts varus thrust when running with body borne load.*
3. **Brown, T.N.**, Lobb, N.J., Fain, A.C., and Seymore, K.D *Body borne load increases torsional knee joint stiffness during running.*
4. Cameron, S.E., Seymore, K.D., Kaplan, J.T., Ramsay, J.W., and **Brown, T.N.** *Individuals increase lower limb stability to successfully accelerate and decelerate from a loaded run.*

Journal Articles (Planned – Data Analysis in Progress)

1. Ihmels, W., Seymore, K.D. and **Brown, T.N.** *A novel ankle prophylactic does not prevent ankle inversion better than existing external lace-up brace or taped ankle.*
2. Seymore, K.D., Ihmels, W. and **Brown, T.N.** *Stiffness of peroneal musculature differs between sexes.*
3. Fain A.C., Lobb, N.J., Seymore, K.D., and **Brown, T.N.** *Lower limb joint power predicts weighted vertical jump height.*
4. Lobb, N.J., Fain A.C., Seymore, K.D., and **Brown, T.N.** *Body borne load compromises medial-lateral postural and gait stability.*

Technical Reports

1. **Brown, T.N.**, Loverro, K. and Schiffman J.M., (2015) *Use of body armor protection levels with squad automatic weapon fighting load impacts soldier performance, mobility, and postural control.* NATICK/TR-15/020, NSRDEC, Natick, MA.

Published Abstracts

1. Seymore, K.D, Fain, A.C., Lobb, N.J., and **Brown, T.N.**, Sex impacts frontal plane grf and knee biomechanics during drop landing with body borne load, *American Society of Biomechanics.* Rochester, MN, 2018
2. Ihmels, W., Seymore, K.D. and **Brown, T.N.** Sex Dimorphism in Peroneal Muscle Parameters with Functional Ankle Instability, *American Society of Biomechanics.* Rochester, MN, 2018
3. Lobb, N.J., Fain, A.C., Seymore, K.D and **Brown, T.N.**, Sex effects leg stiffness when increasing stride length to run with body borne load, *American Society of Biomechanics.* Rochester, MN, 2018

4. Fain, A.C., Lobb, N.J., Seymore, K.D and **Brown, T.N.**, Sex and limb impact lower limb biomechanics during loaded single leg cuts, *American Society of Biomechanics*. Rochester, MN, 2018
5. Cameron, S.E., Kaplan, J.T., **Brown, T.N.** and Ramsay, J.W., Transitional movements with body borne load increases ankle work, *American Society of Biomechanics*. Rochester, MN, 2018
6. **Brown, T.N.**, Kaplan, J.T., Cameron, S., Seymore, K.D., and Ramsay, J.W. Knees presenting varus thrust do not increase knee adduction when running with body borne load, *American Society of Biomechanics*. Boulder, CO, 2017
7. Cameron, S.E., Kaplan, J.T., **Brown, T.N.** and Ramsay, J.W., Changes in knee kinetics are required for deceleration with body borne load, *American Society of Biomechanics*. Boulder, CO, 2017
8. Seymore, K.D., Kaplan, J.T., Cameron, S.E., Ramsay, J.W., and **Brown, T.N.** Knee anatomical metrics predict kinematics during loaded landings, *American Society of Biomechanics*. Boulder, CO, 2017
9. Kaplan, J.T., Ramsay, J.W., **Brown, T.N.** and Pierce, D.M. Both anticipation and dual-task alter lower limb biomechanics during a loaded single-leg cut, *American Society of Biomechanics*. Boulder, CO, 2017
10. Kaplan, J.T., Cameron, S., Zbijewski, W., Thawait, G., Demehri, S., Siewerdsen, J.H., Ramsay, J.W., and **Brown, T.N.** Knee anatomical metrics predict kinematics during loaded landings, *American Society of Biomechanics*. Raleigh, NC, 2016.
11. Zbijewski, W., Brehler, M., Shyr, W., Cao, Q., Punnoose, J., Thawait, G., Demehri, S., Ramsay, J., **Brown, T.N.**, and Siewerdsen, J.H. Three Dimensional Quantitative Analysis of Load-Bearing Knee Using Dedicated Cone Beam CT for Extremity Imaging, *American Society of Biomechanics*. Raleigh, NC, 2016.
12. Ramsay, J.W., Hancock, C.L., O'Donovan, M., and **Brown, T.N.**, Body borne load increases peak knee extensor muscle force during a reactive run-to-stop task. *Proceedings of the American College of Sports Medicine Annual Meeting*. Boston, MA 2016.
13. Hancock, C.L., Ramsay, J.W. and **Brown, T.N.**, Peak Knee Joint Contact Force Increases with Soldier-Relevant Body Borne Load. *American Society of Biomechanics*. Columbus, OH, 2015.
14. Ramsay, J.W. and **Brown, T.N.**, Body-borne Loads Increase Knee Joint Contact Force during Run-to-stop Task. *Proceedings of the American College of Sports Medicine Annual Meeting*. San Diego, 2015.
15. **Brown, T.N.**, O'Donovan, M., Hasselquist, L, Corner, B and Schiffman J.M, Trunk posture impacts lower limb energy absorption during drop landings with body borne load. *3rd International Conference on Soldiers' Physical Performance*. Boston, MA 2014.
16. **Brown, T.N.**, O'Donovan, M., Hasselquist, L, Corner, B and Schiffman J.M, The effect of load on frontal plane hip energy absorption during unanticipated single-leg cutting. *World Congress of Biomechanics*. Boston, MA 2014.
17. O'Donovan, M., Schiffman J.M and **Brown, T.N.**, The effects of load on frontal plane energetics during double-legged drop landings. *World Congress of Biomechanics*. Boston, MA 2014.
18. Loverro, K., **Brown, T.N.** and Schiffman J.M., Body armor configuration impacts minimum foot clearance on obstacle negotiation. *World Congress of Biomechanics*. Boston, MA 2014.

19. **Brown, T.N.**, O'Donovan, M., Hasselquist, L., Corner, B and Schiffman J.M, The effect of load on sagittal plane kinematics during unanticipated cutting maneuvers. *American Society of Biomechanics*. Omaha, NE 2013.
20. **Brown, T.N.**, McLean, S.G. and Palmieri-Smith, R.M, Quadriceps activation predicts knee kinetics during single-leg landings. *American Society of Biomechanics*. Long Beach, CA 2011.
21. **Brown, T.N.**, Palmieri-Smith, R.M. and McLean, S.G. Training-induced hip strength changes predict knee flexion and abduction moments during unilateral landings. *Proceedings of the XXIIth International Society of Biomechanics Congress*, Brussels, Belgium, 2011.
22. **Brown, T.N.**, Palmieri-Smith, R.M. and McLean, S.G. Training-induced hip extensor-flexor strength ratio changes predict knee abduction moment in single-leg landings. *Proceedings of the American College of Sports Medicine Annual Meeting*. Denver, 2011.
23. Kipp K, **Brown T.N.**, McLean S, Palmieri-Smith R. Altered knee muscle reflex activity during a cutting maneuver is influenced by motor learning not neuromuscular training. *American Society of Biomechanics*. Providence, RI. 2010.
24. **Brown, T.N.**, McLean, S.G. and Palmieri-Smith, R.M. Lower extremity activation changes following a standard six-week neuromuscular training program. *Proceedings of the American College of Sports Medicine Annual Meeting*. Baltimore, 2010.
25. Beaulieu, M.L. **Brown, T.N.**, Palmieri-Smith, R.M. and McLean, S.G. Relationship between Knee Mechanics during a Jump Landing Task and Hip Strength Varies across Maturation. *Proceedings of the American College of Sports Medicine Annual Meeting*. Baltimore, 2010.
26. Kipp, K., McLean, S.G., **Brown, T.N.** and Palmieri-Smith, R.M. Frontal-plane knee motion during anticipated and unanticipated cutting in recreational and elite female athletes. *Proceedings of the American College of Sports Medicine Annual Meeting*. Baltimore, 2010.
27. **Brown, T.N.**, Palmieri-Smith, R.M. and McLean, S.G. Knee kinematics during single and double-leg jump landings following six-weeks of neuromuscular training. *Proceedings of Research Retreat V- ACL Injuries*. Greensboro, NC, 2010.
28. **Brown, T.N.**, Palmieri-Smith, R.M. and McLean, S.G. The effects of fatigue and decision-making on lower limb kinematics after neuromuscular training program. *Proceedings of the American College of Sports Medicine Annual Meeting*. Seattle, 2009.
29. **Brown, T.N.**, Palmieri-Smith, R.M. and McLean, S.G. The effects of temporal changes in unanticipated stimuli on lower limb mechanics during jump landings. *Proceedings of the American College of Sports Medicine Annual Meeting*. Indianapolis, 2008.
30. **Brown, T.N.**, Palmieri-Smith, R.M. and McLean, S.G. An unanticipated stimulus alters lower limb mechanics during single-leg landing. *Proceedings of Research Retreat IV- ACL Injuries: The Gender Bias*. Greensboro, NC, 2008.
31. Hahn, M.E., Barry, L.J., **Brown, T.N.**, Eby, S.F. and Miles, M.P. Knee coactivation during the menstrual cycle. *Proceedings of the XXIth International Society of Biomechanics Congress*, Taipei, Taiwan 2007.
32. **Brown, T.** and Hahn, M.E. The EMG/Torque relationship of the knee extensors during acute muscular fatigue. *Proceedings of the XXth International Society of Biomechanics Congress*. Cleveland, 2005.
33. **Brown, T.** and Hahn, M.E. The EMG/Torque relationship of the vastus lateralis during acute muscular fatigue. *Proceedings of the 1st Annual Northwest Biomechanics Symposium*. Seattle, 2005.

Presentations

1. Body Borne Load – a Heavy Burden on Soldier Performance. MedBuild Summit. Boise, ID 2016.
2. Quadriceps activation predicts knee kinetics during single-leg landings. *American Society of Biomechanics*. Long Beach, CA 2011.
3. Knee kinematics during single and double-leg jump landings following six-weeks of neuromuscular training. *Proceedings of Research Retreat V- ACL Injuries*. Greensboro, NC, 2010.
4. An unanticipated stimulus alters lower limb mechanics during single-leg landing. *Proceedings of Research Retreat IV- ACL Injuries: The Gender Bias*. Greensboro, NC, 2008.

Honors and Awards

Presidential Scholar Award (Faculty Mentor: Fain) - Grad Stud Showcase - Boise State - 2018
2nd Place (Faculty Mentor: Fain) - 3 Min Thesis Competition - Boise State - 2018
COHS Award (Faculty Mentor: Lobb) - Grad Stud Showcase - Boise State - 2018
Poster Competition Award (Faculty Mentor: Lobb) - Grad Stud Showcase - Boise State - 2017
Dissertation Research Award - International Society of Biomechanics - 2011
Student Research Award - Biomechanics Interest Group - ACSM - 2011
Rackham Graduate Student Research Award (Candidate) - U. Michigan - 2010
Student Research Award - Biomechanics Interest Group - ACSM - 2010
Rackham Graduate Student Research Award (Pre-Candidate) - U. Michigan - 2009
Student Travel Award - Biomechanics Interest Group - ACSM – 2009

Journal Reviewer

American Journal of Sports Medicine
Applied Ergonomics
Clinical Biomechanics
Gait and Posture
Journal of Applied Biomechanics
Journal of Biomechanics
Journal of Neuroengineering and Rehabilitation
Journal of Sports Sciences
Journal of Strength and Conditioning Research
Medicine in Science and Sports and Exercise
Orthopedic Journal of Sports Medicine
PLOS One
Scandinavian Journal of Medicine and Science in Sports
Sports Biomechanics
Sports Medicine

CURRENT GRANTS

NIH MW CTR-IN, 2018-2019, Analysis of Knee Motion to Prevent and Treat the Increasing Incidence of Premature Knee OA, \$65,944, Role: PI

Boise State - COHS: Intramural Pilot Project, 2018-2019, Biomechanical Analysis to Prevent and Treat the Increasing Incidence of Knee OA, \$20,000, Role: PI

Batelle - INL/ Natick Soldier RD&E Center, 2016-2018, Assessing Operational War Fighter Performance with Emerging IMU Technology, \$769,704, Role: PI

Idaho Global Entrepreneurial Mission (IGEM) Council, 2017-2018, Evaluation of the Ankle Roll Guard's Effectiveness to Improve Clinical Benefit, \$249,285 (\$148,927 Funded), Role: PI

PENDING GRANTS

R01, National Institutes of Health, 2019-2023, Musculoskeletal adaptation mechanisms as a result of knee joint instability in total knee replacement patients, \$1,127,620, Role: Co-PI

R01, National Institutes of Health, 2019-2024, Musculoskeletal adaptation of young and older adults in response to environmental, physical, and cognitive conditions, \$1,399,348, Role: Co-PI

COMPLETED GRANTS

6.1AH52 Research, 2013-2015, Natick Soldier RD&E Center, Anatomical Determinants of Hazardous Lower Limb Biomechanical Profiles during Load Carriage, \$446,272, Role: PI

6.1 Research DA ILIR, 2012-2014, Natick Soldier RD&E Center, Dynamic Postural Determinants For Enhanced Soldier Load Performance, \$1,653,692, Role: Co-PI

Lecturer Professional Development Grant, 2006, Center for Research on Learning and Teaching, University of Michigan. \$1500, Role: PI

TEACHING EXPERIENCE

Boise State University, Department of Kinesiology, Boise, ID

Advanced Biomechanics, Fall 2016 and 2018

Applied Principles of Biomechanics, Fall 2017

Biomechanics, Fall 2015 – Spring 2016

Laboratory Techniques in Biomechanics, Spring 2017

University of Michigan, School of Kinesiology, Ann Arbor, MI

Applied Human Anatomy and Physiology, Winter 2009 – 2011

Biomechanics of Sports, Fall 2006 – 2011

Human Musculoskeletal Anatomy, Winter 2007 – 2008

Montana State University, Health and Human Development, Bozeman, MT

Anatomical Kinesiology, Lab Instructor, Fall 2003 – Fall 2004

Biomechanics, Lab Instructor, Spring 2004 – Spring 2005

Health Anatomy and Physiology, Fall 2005

GRADUATE COMMITTEES

PhD

Xian Wei (Bernard) Liew (Committee Member, Curtin University, Australia)

Masters

Micah Drew (Committee Chair, Boise State University)

Jeff Wilkins (Committee Chair, Boise State University)

Samantha D'az (Committee Chair, Boise State University)
Derek Maddy (Committee Member, Boise State University)
Wyatt Ihmels (Committee Chair, Boise State University)
AuraLea Fain (Committee Chair, Boise State University)
Nick Lobb (Committee Chair, Boise State University)
Jeremy Creechley (Committee Member, Boise State University)
Tyler Dobbs (Committee Member, Boise State University)

MENTORING EXPERIENCE

Post-Doctoral Researcher

John Ramsay (ORISE Fellow, NSRDEC)

Research Assistants

Kayla Seymore (Kinesiology, Boise State University)
Sarah Cameron (Biomechanics Team, NSRDEC)
Kari Loverro (ORISE Fellow, NSRDEC)
Meghan O'Donovan (Biomechanics Team, NSRDEC)
C. Lee Hancock (Biomechanics Team, NSRDEC)
Jon Kaplan (Biomechanics Team, NSRDEC)

Graduate Students

Micah Drew (Kinesiology, Boise State University)
Jeff Wilkins (Kinesiology, Boise State University)
Samantha D'az (Kinesiology, Boise State University)
Kari Depalo (Kinesiology, Boise State University)
Fatimah Alkathiri (Kinesiology, Boise State University)
Gracie McConnochie (Biomedical Engineering, Boise State University)
Cailin Wilson (Biomedical Engineering, Boise State University)
Justin Graff (Kinesiology, Boise State University)
AuraLea Fain (Kinesiology, Boise State University)
Nick Lobb (Kinesiology, Boise State University)
Elijah Rooney (Kinesiology, Boise State University)

Undergraduate Students

Caden Robertson (Kinesiology, Boise State University)
Fred Christensen (Mechanical Engineering, Boise State University)
Eli Walker (Kinesiology, Boise State University)
Haley Floen (Kinesiology, Boise State University)
Alexis Flock (Kinesiology, Boise State University)
Tracey Huddleston (Kinesiology, Boise State University)
Zach Seltzer (Kinesiology, Boise State University)
Kari Johnson (Kinesiology, Boise State University)
Samantha D'az (Electrical Engineering, Boise State University)
Brad Foote (Kinesiology, Boise State University)
Caylee Tyacke (Kinesiology, Boise State University)
Sheldon Burgess (Kinesiology, Boise State University)
Courtney Radley (Kinesiology, Boise State University)
Jeff Wilkins (Kinesiology, Boise State University)

Ashley Judd (Kinesiology, Boise State University)
Wyatt Ihmels (Kinesiology, Boise State University)
Rylie Weldon (Kinesiology, Boise State University)
Matthew Myers (Kinesiology, Boise State University)
Genna Waldman (Kinesiology, University of Michigan)
Catherine Munaco (Kinesiology, University of Michigan)
Monica Silvian (Kinesiology, University of Michigan)
Katie LaValley (Kinesiology, University of Michigan)
Nancy Murphy (Kinesiology, University of Michigan)
Ellie Toutant (Kinesiology, University of Michigan)
Patrick Ouzts (Kinesiology, University of Michigan)
Brian Kopicko (Kinesiology, University of Michigan)
Lauren Rothstein (Kinesiology, University of Michigan)
Kara Goodrich (Kinesiology, University of Michigan)
Lacey Berger (Kinesiology, University of Michigan)
Ashley Brower (Kinesiology, University of Michigan)
Kirk Leonard (Mechanical Engineering, University of Michigan)
Caitlin Williams (Undergraduate Research Opportunity Program, University of Michigan)

COMMITTEES

Biomedical IRB (member), Boise State University
Strategic Planning Committee, College of Health Sciences, Boise State University
Strategic Planning Committee, Department of Kinesiology, Boise State University

CERTIFICATIONS

Principal Investigator (Biomechanics), NSRDEC, Natick Soldier Systems Center, U.S. Army
Certified Strength and Conditioning Specialist, National Strength and Conditioning Association

PROFESSIONAL AFFILIATIONS

American Society of Biomechanics
American College of Sports Medicine
International Society of Biomechanics
National Strength and Conditioning Association

Kurtis D. Cantley

Assistant Professor
Department of Electrical and Computer Engineering
Boise State University

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Kurtis D. Cantley, PhD

Assistant Professor, Department of Electrical and Computer Engineering
Affiliate Faculty, Micron School of Materials Science and Engineering
Boise State University
1910 University Drive, MS-2075
Boise, ID, 83725-2075

Professional Preparation

Education

Ph.D. Electrical Engineering The University of Texas at Dallas , Richardson, Texas Dissertation: Artificial Neural Systems Using Memristive Synapses and Nano-Crystalline Silicon Thin-Film Transistors	December 2011 Advisor: Eric M. Vogel
M.S. Electrical and Computer Engineering Purdue University , West Lafayette, Indiana Thesis: Performance Potential of III-V Materials in Nanoscale Transistors – A Device Simulation Perspective	August 2007 Advisor: Mark S. Lundstrom
B.S. Electrical Engineering Washington State University Honors College, Pullman, Washington Minors: Math, Physics, Music	May 2005

Professional Experience

July 2013 – Present	Assistant Professor, Electrical and Computer Engineering and Affiliate Faculty, Micron School of Materials Science and Engineering, Boise State University	Boise, ID
January 2012 – June 2013	Postdoctoral Research Associate, Department of Materials Science and Engineering, University of Texas at Dallas	Richardson, TX
August 2007 – December 2011	Graduate Research Assistant, Department of Electrical Engineering, University of Texas at Dallas	Richardson, TX
August 2005 – August 2007	Graduate Research Assistant, Department of Electrical and Computer Engineering, Purdue University	West Lafayette, IN
May – August 2004, 2005	National Security Internship Program, Pacific Northwest National Laboratory	Richland, WA

Honors and Awards

- National Science Foundation Faculty Early Career Development (CAREER) Award, 2018
- Defense Threat Reduction Agency (DTRA) Young Investigator Award, 2017
- Air Force Office of Scientific Research (AFOSR) Young Investigator Award, 2014
- National Defense Science and Engineering Graduate (NDSEG) Fellowship, 2007 – 2010
- UT Dallas Excellence in Education Award, 2009

Kurtis D. Cantley

Assistant Professor

Department of Electrical and Computer Engineering

Boise State University

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Research and Scholarly Activities

External Research Funding: Approximately \$2.75M external funding to date as PI

Funding Period	Project Title	Funding Source	Role	Total Funding	Share of Funding
TBD (Rec. for Funding)	Layout, Analysis, and Characterization of CMOS Circuits Designed with Evolutionary Algorithms	US Army Research Laboratory (Sciences for Maneuver Campaign)	PI	\$56,000	\$56,000
7/1/2018 – 6/30/2023	CAREER: Spiking Neural Circuits and Networks with Temporally Dynamic Learning	National Science Foundation (CISE Directorate)	PI	\$548,882	\$548,882
4/10/2017 – 4/9/2020	Impact of Radiation on Pattern Recognition in Memristor-Based Neuromorphic Circuits	Defense Threat Reduction Agency (PerF-YIP-Topic 4: Radiation Effects in Non-Conventional Computing Approaches)	PI	\$322,866	\$322,866
7/1/2015 – 6/30/2018	Enhancing Capabilities in Nanotechnology and Microfabrication at Boise State	Idaho Higher Education Research Council (HERC), Idaho Global Entrepreneurial Mission (IGEM)	PI	\$1,500,000	\$1,500,000
8/1/2014 – 7/30/2017	Spike Timing-Dependent Learning Circuits for Temporal Pattern Recognition and Classification	Air Force Office of Scientific Research (Computational Cognition and Machine Intelligence)	PI	\$359,429	\$359,429

Other Research Funding

Funding Period	Project Title	Funding Source	Role	Total Funding	Share of Funding
Fall 2014	Advanced Electrophysiological and Neural Interface Measurement System	ECE Department Internal Proposal 2015	PI	\$22,759	\$22,759
1/1/2014 – 12/31/2014	2-D Crystals as an Extracellular Matrix for Cell/Neuron Growth and Differentiation	Boise State Center of Biomedical Research Excellent (COBRE) Pilot Grant	Co-PI	\$49,991	~\$20,000
Spring 2013	Enabling Infrastructure for Advanced Plasma-Enhanced Chemical Vapor Deposition	ECE Department Internal Capital Investment	PI	\$19,495	\$19,495

Journal Articles: h-index=11

1. S. Rastegar, J. Stadlbauer, T. Pandhi, L. Karriem, K. Fujimoto, K. Kramer, D. Estrada, and K. D. Cantley, "Signal-to-Noise Ratio Enhancement In Graphene-Based Passive Microelectrode Arrays," *Submitted to IEEE Transactions on Biomedical Engineering (draft available upon request)*.
2. R. Ivans and K. D. Cantley, "Spike-Timing Dependent Learning in Memristor-Based Neural Networks Using Dynamic Resistance Elements," *Under Review at IEEE Transactions on Neural Networks and Learning Systems (draft available upon request)*.
3. E. Krueger, A. Chang, D. Brown, J. Eixenberger, R. Brown, S. Rastegar, K. D. Cantley, and D. Estrada, "Graphene Foam as a 3-Dimensional Platform for Myotube Growth," *ACS Biomaterials Science and Engineering*, vol. 2, pp. 1234-1241, 2016.
4. J. W. Murphy, L. Smith, J. Calkins, G. R. Kunnen, I. Mejia, K. D. Cantley, R. A. Chapman, J. Sastra-Hernandez, R. Mendoza-Perez, G. Contreres-Puente, D. R. Alee, M. A. Quevedo-Lopez, and B. E. Gnade, "Thin film cadmium telluride charged particle sensors for large area neutron detectors," *Applied Physics Letters*, vol. 105, no. 112107, 2014.
5. Subramaniam, K. D. Cantley, and E. M. Vogel, "Logic Gates and Ring Oscillators based on Ambipolar Nanocrystalline-Silicon TFTs," *Active and Passive Electronic Components*, vol. 2013, no. 525017, 2013.
6. Subramaniam, K. D. Cantley, G. Bersuker, D. Gilmer, and E. M. Vogel, "Spike-Timing-Dependent Plasticity using Biologically Realistic Action Potentials and Low-Temperature Materials," *IEEE Transactions on Nanotechnology*, vol. 12, no. 3, pp. 450-459, 2013.
7. Subramaniam, K. D. Cantley, H. J. Stiegler, R. A. Chapman, and E. M. Vogel, "Low Temperature Fabrication of Spiking Soma Circuits Using Nanocrystalline-Silicon TFTs," *IEEE Transactions on Neural Networks and Learning Systems*, vol. 24, no. 9, pp. 1466-1472, 2013.
8. K. D. Cantley, A. Subramaniam, H. J. Stiegler, R. A. Chapman, and E. M. Vogel, "Neural Learning Circuits Utilizing Nano-Crystalline Silicon Transistors and Memristors," *IEEE Transactions on Neural Networks and Learning Systems*, vol. 23, no. 4, pp. 565-573, 2012.
9. P. G. Fernandes, H. J. Stiegler, M. Zhao, K. D. Cantley, B. Obradovic, R. A. Chapman, H.-C. Wen, G. Mahmud, and E. M. Vogel, "SPICE Macromodel of Silicon-on-Insulator-Field-Effect-Transistor-Based Biological Sensors," *Sensors and Actuators B: Chemical*, vol. 161, no. 1, pp. 163-170, 2012.
10. Chakrabarti, H. Kang, B. Brennan, T. J. Park, K. D. Cantley, A. Pirkle, S. McDonnell, J. Kim, R. M. Wallace, and E. M. Vogel, "Investigation of Tunneling Current in SiO₂/HfO₂ gate stacks for flash memory applications," *IEEE Transactions on Electron Devices*, vol. 58, no. 12, pp. 4189-4195, 2011.
11. K. D. Cantley, A. Subramaniam, H. J. Stiegler, R. A. Chapman, and E. M. Vogel, "Hebbian Learning in Spiking Neural Networks with Nano-Crystalline Silicon TFTs and Memristive Synapses," *IEEE Transactions on Nanotechnology*, vol. 10, pp. 1066-1073, 2011.
12. Subramaniam, K. D. Cantley, H. J. Stiegler, R. A. Chapman, and E. M. Vogel, "Submicron Ambipolar Nanocrystalline Silicon Thin-Film Transistors and Inverters," *IEEE Transactions on Electron Devices*, vol. 59, no. 2, pp. 359-366, 2011.
13. K. D. Cantley, A. Subramaniam, R. R. Pratiwadi, H. C. Floresca, J. Wang, H. J. Stiegler, R. A. Chapman, M. J. Kim, and E. M. Vogel, "Hydrogenated Amorphous Silicon Nanowire Transistors with Schottky Barrier Source/Drain Junctions," *Applied Physics Letters*, vol. 97, no. 14, 2010.
14. H. S. Pal, K. D. Cantley, S. S. Ahmed, and M. S. Lundstrom, "Influence of Bandstructure and Channel Structure on the Inversion Layer Capacitance of Silicon and GaAs MOSFETs." *IEEE Transactions on Electron Devices*, vol. 55, no. 3, pp. 904-908, 2008.

Conference Proceedings

1. S. Gandharava Dahl, R. Ivans, and K. D. Cantley, "Modeling Memristor Radiation Interaction Events and the Effect on Neuromorphic Learning Circuits," *International Conference on Neuromorphic Systems (ICONS)*, Knoxville, TN, July 2018.
2. S. Gandharava Dahl and K. D. Cantley, "Behavioral Modeling of Memristor Radiation Interaction Events," *IEEE Workshop on Microelectronic Devices (WMED) Invited Contribution*, Boise, ID, April 2018.
3. R. C. Ivans, J. M. Shumaker, and K. D. Cantley, "A CMOS Synapse Design Implementing Tunable Asymmetric Spike Timing-Dependent Plasticity," in *60th International Midwest Symposium on Circuits and Systems (MWSCAS)*, Boston, MA, August 2017.
4. S. Rastegar, J. Stadlbauer, K. Fujimoto, K. McLaughlin, D. Estrada, and K. D. Cantley, "Signal-to-Noise Ratio Enhancement Using Graphene- Based Passive Microelectrode Arrays," in *60th International Midwest Symposium on Circuits and Systems (MWSCAS)*, Boston, MA, August 2017.
5. S. Rastegar, J. Stadlbauer, K. McLaughlin, K. Fujimoto, D. Estrada, and K. D. Cantley, "Enhanced Signal-to-Noise Ratio Using Nanomaterial-Based Passive Neural Electrodes," in *59th Electronic Materials Conference*, 2017.
6. K. D. Cantley, R. C. Ivans, A. Subramaniam, and E. M. Vogel, "Spatio-Temporal Pattern Recognition in Neural Circuits with Memory-Transistor-Driven Memristive Synapses," accepted to *International Joint Conference on Neural Networks (IJCNN)*, Anchorage, AK, May 2017.
7. S. Gandharava, C. A. Walker, and K. D. Cantley, "Electrical Characteristics of Nanocrystalline Silicon Resistive Memory Devices," in *Workshop on Microelectronic Devices (WMED)*, Boise, ID, April 2017.
8. J. W. Murphy, A. Eddy, G. R. Kunnen, I. Mejia, K. D. Cantley, D. R. Allee, M. A. Quevedo-Lopez, and B. E. Gnade, "Sol gel ZnO films doped with Mg and Li evaluated for charged particle detectors," *SPIE Defense, Security, and Sensing Conference*, paper 8730-17, Baltimore, MD, May 2013.
9. Mejia, A. L. Salas-Villasenor, J. W. Murphy, G. R. Kunnen, K. D. Cantley, D. R. Allee, B. E. Gnade, and M. A. Quevedo-Lopez, "High-performance logic circuits using solution-based, low-temperature semiconductors for flexible electronics," *SPIE Defense, Security, and Sensing Conference*, paper 8730-2, Baltimore, MD, May 2013.
10. K. D. Cantley, P. G. Fernandes, M. Zhao, H. J. Stiegler, R. A. Chapman, and E. M. Vogel, "Noise Effects in Field-Effect Transistor Biological Sensor Detection Circuits," *IEEE International Midwest Symposium on Circuits and Systems (MWSCAS)*, Boise, ID, August 2012.
11. Subramaniam, K. D. Cantley, R. A. Chapman, H. J. Stiegler, and E. M. Vogel, "Submicron Ambipolar Nanocrystalline-silicon TFTs with High- κ Gate Dielectrics," *International Semiconductor Device Research Symposium (ISDRS)*, College Park, MD, 2011.
12. K. D. Cantley, A. Subramaniam, H. J. Stiegler, R. A. Chapman, and E. M. Vogel, "Spike Timing-Dependent Synaptic Plasticity Using Memristors and Nano-Crystalline Silicon TFT Memories," *11th International Conference on Nanotechnology (IEEE Nano)*, Portland, OR, August 2011.
13. Subramaniam, K. D. Cantley, R. A. Chapman, B. Chakrabarti, and E. M. Vogel, "Ambipolar Nano-crystalline-silicon TFTs with Submicron Dimensions and Reduced Threshold Voltage Shift," in *69th Annual Device Research Conference (DRC) Digest*, Santa Barbara, CA, June 2011.
14. K. D. Cantley, A. Subramaniam, H. J. Stiegler, R. A. Chapman, and E. M. Vogel, "SPICE Simulation of Nanoscale Non-Crystalline Silicon TFTs in Spiking Neuron Circuits," *International Midwest Symposium on Circuits and Systems (MWSCAS)*, Seattle, WA, August 2010.
15. K. D. Cantley, Y. Liu, H. S. Pal, T. Low, S. S. Ahmed, and M. S. Lundstrom, "Performance Analysis of III-V Materials in a Double-Gate nano-MOSFET," *IEDM Technical Digest*, Washington, D.C., December 2007.

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16. M. S. Lundstrom, K. D. Cantley, and H. S. Pal, "Nanoscale Transistors: Physics and Materials," *Materials Research Society Fall Proceedings, Symposium L*. Boston, MA, November 2006.

Book Chapters

1. K. D. Cantley, A. Subramaniam, and E. M. Vogel, "Spike Timing-Dependent Plasticity Using Memristors and Nano-Crystalline Silicon TFT Memories," Chapter 26 in *Nanoelectronic Device Applications Handbook*, Ed. by J. Morris and K. Iniewski: CRC Press, 2013.

Invited Talks (**Bold**=presenter)

1. **Sumedha Gandharava** and Kurtis D. Cantley, "Behavioral Modeling of Memristor Radiation Interaction Events." Workshop on Microelectronics and Electron Devices (WMED), Boise, ID, April 2018.
2. **Kurtis D. Cantley**, "Neural Systems and Interfaces: Building Circuits That Emulate and Communicate With the Brain." Northwest Nazarene University Engineering and Physics Seminar Series, Nampa, ID, February 2, 2017.
3. **Kurtis D. Cantley**, "Artificial Neural Networks with Rate and Timing-Dependent Learning." US Army Research Laboratory, Aberdeen Proving Ground, MD, June 2015.
4. **Kurtis D. Cantley**, "Neuro-Inspired Architectures: A New Paradigm in Computing." Gonzaga University School of Engineering and Applied Science Distinguished Lecture Series, Spokane, WA, November 19, 2014.
5. **Kurtis D. Cantley**, "Electronic Materials and Devices for Biologically Realistic Neural Systems." Lehigh University Department of Materials Science and Engineering Seminar, Bethlehem, PA, October 28, 2014.
6. **Eric M. Vogel**, Kurtis D. Cantley, and Anand Subramaniam, "Nanocrystalline Silicon Thin-Film Transistors for Neuromorphic Applications," *ECI ULSIC vs. TFT Conference*, Grenoble, France, July 2013.
7. Kurtis D. Cantley, Anand Subramaniam, and **Eric M. Vogel**, "Neuromorphic Electronics Using Nanoscale Non-crystalline Silicon Devices," *SRC/NRI Teleseminar*, July 2010.
8. **Eric M. Vogel** and Kurtis Cantley, "Neuromorphic Electronics Using Nanoscale Non-crystalline Silicon Devices," *TechConnect World Nanotech Conference and Expo*, Anaheim, CA, June 2010.
9. **Kurtis D. Cantley**, Ramapriyan Pratiwadi, and Eric M. Vogel, "Electronic Materials and Devices for Artificial Neural Systems," *SRC/NRI SWAN Teleseminar*, July 2008.

Oral Presentations and Posters (**Bold**=presenter)

1. **Sumedha Gandharava Dahl**, Robert Ivans, and Kurtis D. Cantley, "Modeling Memristor Radiation Interaction Events and the Effect on Neuromorphic Learning Circuits." *International Conference on Neuromorphic Systems (ICONS)*, Knoxville, TN, July 2018. Oral presentation, **poster contest winner**.
2. **Sepideh Rastegar**, Justin Stadlbauer, Kari McLaughlin, Kiyo Fujimoto, David Estrada, and Kurtis D. Cantley, "Enhanced Signal-to-Noise Ratio Using Nanomaterial-Based Passive Neural Electrodes." *Workshop on Microelectronics and Electron Devices (WMED)*, Boise, ID, April 2018. **Won Best Poster Award**.
3. **Sumedha Gandharava Dahl**, Robert Ivans, and Kurtis D. Cantley, "Behavioral Modeling of Memristor Radiation Interaction Events." Boise State Graduate Student Showcase, April 2018.
4. **Sepideh Rastegar**, Justin Stadlbauer, Twinkle Pandhi, Lynn Karriem, Kiyo Fujimoto, Kyle Kramer, David Estrada, and Kurtis D. Cantley, "Signal-to-Noise Ratio Enhancement In Graphene-Based Passive Microelectrode Arrays." Boise State Graduate Student Showcase, April 2018.
5. **Sepideh Rastegar**, Justin Stadlbauer, Kari McLaughlin, Kiyo Fujimoto, David Estrada, and Kurtis D. Cantley, "Enhanced Signal-to-Noise Ratio Using Nanomaterial-Based Passive Neural Electrodes." *59th Electronic Materials Conference*, South Bend, IN, June 2017.

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6. **Sumedha Gandharava**, Catherine Walker, and Kurtis D. Cantley, "Electrical Characterization of Nanocrystalline Silicon Resistive Memory Devices." *Workshop on Microelectronic Devices (WMED)*, Boise, ID, April 21, 2017.
7. **Kurtis D. Cantley**, Robert C. Ivans, Anand Subramaniam, and Eric M. Vogel, "Spatio-Temporal Pattern Recognition in Neural Circuits with Memory-Transistor-Driven Memristive Synapses." *International Joint Conference on Neural Networks (IJCNN)*, Anchorage, AK, May 18, 2017.
8. **Robert Ivans** and Kurtis D. Cantley, "Hardware-Based Spatio-Temporal Pattern Recognition." *Boise State Graduate Student Showcase*, Boise, ID, April 3, 2017.
9. **Kyle Kramer**, Sepideh Rastegar, David Estrada, and Kurtis D. Cantley, "Determining Electrical Signal Integrity of Passive Microelectrode Arrays." *Idaho Conference on Undergraduate Research (ICUR)*, Boise, ID, July 26-27, 2017.
10. **Susy Camargo-Reyes**, Robert Ivans, and Kurtis D. Cantley, "Characterization and Testing of Neuromorphic Electronic Circuits." *Idaho Conference on Undergraduate Research (ICUR)*, Boise, ID, July 26-27, 2017.
11. **Susy Camargo-Reyes**, Robert Ivans, and Kurtis D. Cantley, "Characterization and Validation of CMOS Spiking Neuron Circuits." *Idaho Conference on Undergraduate Research (ICUR)*, Boise, ID, July 2016.
12. **Conor S. Perry** and Kurtis D. Cantley, "Processing and Characterization of Inkjet-Printed Silver and Carbon Nanotube Features." *Idaho Conference on Undergraduate Research (ICUR)*, Boise, ID, July 2016.
13. **Justin W. Stadlbauer**, Sepideh Rastegar, and Kurtis D. Cantley, "Measurement of Signal-to-Noise Ratio in Neural Microelectrodes." *Idaho Conference on Undergraduate Research (ICUR)*, Boise, ID, July 2016.
14. **Catherine A. Walker**, Sumedha Gandharava, and Kurtis D. Cantley, "Characterization of Nanocrystalline Silicon Thin Films from Plasma-Enhanced Chemical Vapor Deposition." *Boise State Conference on Undergraduate Research*, Boise, ID, April 2016.
15. **Justin W. Stadlbauer**, Sepideh Rastegar, A. Nicole Chang, Kari Pribble, Eric Krueger, David Estrada, and Kurtis D. Cantley, "Signal-to-Noise Characteristics of Graphene-Based Cellular Electrodes." *5th Biennial NIH IDEa Western Regional Conference*, Coeur d' Alene, ID, October 2015.
16. **Kurtis D. Cantley**, "Temporal Pattern Recognition Using Spike Timing-Dependent Learning Circuits." *AFOSR Young Investigator Program Annual Meeting*, Arlington, VA, June 2015.
17. **Samantha M. D'az**, Justin Stadlbauer, and Kurtis D. Cantley, "Electrically Controlling the Environmental Interactions of Neurons Cultured on Graphene." *Idaho Conference on Undergraduate Research (ICUR)*, Boise, ID, July 29-30, 2015.
18. **Catherine A. Walker** and Kurtis D. Cantley, "Investigating the Piezoelectric Response of p(VDF-TrFE) Copolymer Strands." *Idaho Conference on Undergraduate Research (ICUR)*, Boise, ID, July 30-31, 2014.
19. **John W. Murphy**, Alexander Eddy, George R. Kunnen, Israel Mejia, Kurtis D. Cantley, David R. Allee, Manuel A. Quevedo-Lopez, and Bruce E. Gnade, "Sol gel ZnO films doped with Mg and Li evaluated for charged particle detectors," *SPIE Defense, Security, and Sensing Conference*, paper 8730-17, Baltimore, MD, May 2013.
20. **Israel Mejia**, Ana L. Salas-Villasenor, John W. Murphy, George R. Kunnen, Kurtis D. Cantley, David R. Allee, Bruce E. Gnade, and Manuel A. Quevedo-Lopez, "High-performance logic circuits using solution-based, low-temperature semiconductors for flexible electronics," *SPIE Defense, Security, and Sensing Conference*, paper 8730-2, Baltimore, MD, May 2013.
21. **John W. Murphy**, George R. Kunnen, Kevin Larosa, Kurtis D. Cantley, Israel Mejia, David R. Allee, Manuel A. Quevedo-Lopez, Bruce E. Gnade, "Polycrystalline zinc oxide as a material for radiation detectors," *Materials Research Society Spring Meeting*, *Materials Research Society (MRS) Spring Meeting*, Symposium WW, San Francisco, CA, April 2013.

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22. **Kurtis D. Cantley**, Poornika G. Fernandes, Mingyue Zhao, Harvey J. Stiegler, Richard A. Chapman, and Eric M. Vogel, "Noise Effects in Field-Effect Transistor Biological Sensor Detection Circuits," *IEEE International Midwest Symposium on Circuits and Systems (MWSCAS)*, Boise, ID, August 2012.
23. **Eric M. Vogel**, Anand Subramaniam, and Kurtis D. Cantley, "A Low-temperature Approach to Spiking Neural Circuits," *4th International Conference on Smart Materials, Structures, and Systems (CIMTEC)*, Tuscany, Italy, June 2012.
24. **Mingyue Zhao**, Kurtis D. Cantley, Harvey J. Stiegler, Poornika G. Fernandes, Richard A. Chapman, Huang-Chun Wen, Gazi A. Mahmud, and Eric M. Vogel, "Models for Nanoscale Silicon Chemical and Biological Sensors," *TxACE Analog Symposium*, Richardson, TX, October 2011.
25. **Kurtis D. Cantley**, Anand Subramaniam, Harvey J. Stiegler, Richard A. Chapman, and Eric M. Vogel, "Spike Timing-Dependent Plasticity Using Memristors and Nano-Crystalline Silicon TFT Memories," *7th International Conference on Nanotechnology*, Portland, OR, August 2011.
26. **Anand Subramaniam**, Kurtis D. Cantley, Richard A. Chapman, Bhaswar Chakrabarti, and Eric M. Vogel, "Ambipolar Nano-crystalline-silicon TFTs with Submicron Dimensions and Reduced Threshold Voltage Shift," *69th Annual Device Research Conference (DRC)*, Santa Barbara, CA, June 2011.
27. **Kurtis D. Cantley**, Anand Subramaniam, and Eric M. Vogel, "Design of Spiking Artificial Neural Networks with Learning Capability using SPICE," *TxACE Analog Symposium*, Richardson, TX, November 2010.
28. **Kurtis D. Cantley**, Anand Subramaniam, Harvey J. Stiegler, Richard A. Chapman, and Eric M. Vogel, "SPICE Simulation of Nanoscale Non-Crystalline Silicon TFTs in Spiking Neuron Circuits," *International Midwest Symposium on Circuits and Systems (MWSCAS)*, Seattle, WA, August 2010.
29. **Kurtis D. Cantley**, Harvey J. Stiegler, Richard A. Chapman, and Eric M. Vogel, "Fabrication and SPICE Modeling of Hydrogenated Amorphous Silicon Nanowire Transistors for Artificial Neural Systems," *SRC/NRI SWAN Site Review*, Austin, TX, September 2009.
30. **Kurtis D. Cantley**, Harvey J. Stiegler, Richard A. Chapman, and Eric M. Vogel, "Fabrication and SPICE Modeling of Hydrogenated Amorphous Silicon Nanowire Transistors for Artificial Neural Systems," *The Fifth International Nanotechnology Conference (INC5)*, Los Angeles, CA, May 2009.
31. **Kurtis D. Cantley**, Ramapriyan Pratiwadi, and Eric Vogel, "Nanoelectronic Devices for Artificial Neural Systems," *SRC/NRI SWAN Site Review*, Austin, TX, September 2008.
32. **Ramapriyan Pratiwadi**, Kurtis D. Cantley, and Eric M. Vogel, "Nano-scale Amorphous Silicon Materials and Devices for a Neuro-inspired Architecture." *Materials Research Society Spring Meeting, Symposium B*, San Francisco, CA, March 2008.
33. **Kurtis Cantley**, Ram Pratiwadi, and Eric Vogel, "Nanoelectronic Devices for Neuromorphic Systems," *UT Metroplex Day*, Dallas, TX, February 2008.
34. **Kurtis D. Cantley**, Yang Liu, Himadri S. Pal, Tony Low, Shaikh S. Ahmed, and Mark S. Lundstrom, "Performance Analysis of III-V Materials in a Double-Gate nano-MOSFET," *IEEE International Electron Devices Meeting (IEDM)*, December 2007.

Other Research Activities

- Intel Neuromorphic Research Community, July 2018 – present.
- DARPA PolyPlexus, July 2018 – present.

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Teaching

Courses Taught

Course #	Title	Term	Credits	Enrollment
ECE 210	Introduction to Electric Circuits	Fall 2018	3	39
ECE 520	Advanced Device Design and Simulation	Spring 2018	3	10
ECE 493	Internship	Spring 2018	1	1
ECE 210	Introduction to Electric Circuits	Fall 2017	3	43
ECE 590	Practicum/Internship	Fall 2017	1	1
ECE 590	Practicum/Internship	Summer 2017	1	1
ECE 420/520	Advanced Device Design and Simulation	Spring 2017	3	7
ECE 697	Electrical Characterization of Semiconductor Materials and Devices	Fall 2016	3	9
ECE 420/520	Advanced Device Design and Simulation	Spring 2016	3	14
ECE 212	Circuit Analysis and Design	Fall 2015	3	23
ECE 420/520	Advanced Device Design and Simulation	Spring 2015	3	9
ECE 212	Circuit Analysis and Design	Fall 2014	3	23
ECE 420/520	Advanced Device Design and Simulation	Spring 2014	3	9
ECE 212	Circuit Analysis and Design	Fall 2013	3	29
ECE 212L	Circuit Analysis and Design Lab	Fall 2013	1	26

Other Teaching Experience

- “Neural Interface Technology.” Guest Lectures in *Introduction to Biomedical Engineering* (ME 112), March 29, 2016, April 4, 2017, and March 12, 2018.
- Teaching assistant, *Introduction to Nanotechnology* (UT Dallas CHEM 4V01, EE 4V95, PHYS 4V10, BIOL 4V00), spring 2009.
- Substitute course lectures at UT Dallas:
 - “Lithography and Process Integration Issues for Nanoscale TFTs” in *Lithography and Nanofabrication* (EE/MSEN 6348), spring 2013.
 - “Chapter 7: Carrier Lifetimes” and “Chapter 9: Charge-Based and Probe Characterization” in *Semiconductor Material and Device Characterization* (MSEN 7V80), spring 2013.
 - “Introduction to Quantum Mechanics I and II” and “Introduction to Statistical Mechanics I and II” in *Introduction to Nanoscience and Nanotechnology* (NANO 3301), spring 2013.
 - “Elementary Quantum Physics,” in *Electronic, Optic and Magnetic Materials* (MSEN 6324), fall 2012.
 - “Time-Independent Schrodinger Equation Solutions,” in *Modern Physics I* (PHYS 3352), spring 2012.
 - “Nanothermodynamics,” and “Engine Cycles,” in *Thermodynamics of Materials* (MSEN 5310), fall 2011 and fall 2012.
 - “Applying Quantum Mechanics to Atoms and Molecules,” “The 1-D Bloch Theorem and the 1-D Kronig-Penney Model,” and “The Shockley Semiconductor Equations,” in *Fundamentals of Semiconductor Devices* (EE/MSEN 6320), spring 2010.

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Teaching Development

- WIDER PERSIST Capstone Catalyst Grant, “Re-structuring ECE 210 with Mastery-Based Learning.” \$4,322 to support improving the learning experience in the Introduction to Electric Circuits class in Fall 2018 and beyond. Organized and facilitated a one-day workshop with seven total faculty, worked on course organization and assessment problem development.
- iClicker Faculty Learning Community Member, Fall 2017 (\$300 stipend). Participated in multiple discussion sessions with other faculty from across the university interested in educational technology and utilizing the iClicker app to facilitate learning. Gave final presentation open to all faculty on my iClicker techniques.
- Boise State Center for Teaching and Learning (CTL) Course Design Institute, Boise, ID, May 19-23, 2014. Focused on developing new interactive learning activities for ECE 212 course.
- ABET Fundamentals of Program Assessment Workshop, Seattle, WA, October 18, 2014.

Mentorship

Graduate Advisees

- Sepideh Rastegar (Boise State PhD expected 2019). August 2014 – present. Passed comprehensive exam Spring 2016. Passed dissertation proposal Fall 2017. **Awards Received:** 2018 Boise State Graduate College 3-Minute Thesis Winner (1st place), 2018 Workshop on Microelectronics and Electron Devices (WMED) Best Poster Award.
- Sumedha Gandharava (Boise State PhD expected 2019), January 2015 – present. Passed comprehensive exam Summer 2016. **Awards Received:** International Conference on Neuromorphic Systems (ICONS) 2018 Student Poster Contest Winner.
- Robert Ivans (Boise State PhD expected 2020), May 2016 – present. Passed comprehensive exam Fall 2017.

Undergraduate Researchers and Interns

- Kyle Kramer (Boise State ECE), Summer 2017. Electrophysiology measurements on microelectrode arrays.
- Susy Camargo-Reyes (Boise State ECE), May – December 2016. Electrical characterization of neuromorphic circuits.
- Kameron Sellers (Boise State ECE), July 2016 – August 2017. Development of hardware artificial neural network stimulator.
- Catherine Walker (Boise State MSE), September 2013 – May 2018. Various projects including piezoelectric polymers, nanoparticle attachment, and materials characterization.
- Conor S. Perry (Cal Poly MSE), Summer 2016. Inkjet printing of silver and carbon nanotubes patterns.
- Justin Stadlbauer (Boise State ECE), January 2015 – September 2016. Electrophysiology and neural interfaces.
- Samantha D’az (Boise State ECE), Summer 2015. Development of electrophysiology test setup.
- Vlad Calugaru (Boise State ECE), September 2014 – December 2015. Artificial neural network interface development.
- Sierra Bush (Meridian Technical Charter High School), September 2015 – May 2016. Electrical characterization of resistive memory devices.

Thesis and Dissertation Committees

- Md Kamrul Hassan Majumdar, ECE Comprehensive Exam, Fall 2018.
- Ashita Chandnani, “Printed and Flexible Electronics.” ECE Comprehensive Exam, Spring 2018.
- Al-Amin Ahmed Simon, “Phase Change Temperature Sensor for High Radiation Environment.” ECE Comprehensive Exam, Fall 2017.
- Nikki Chang, “Graphene Foam as a 3D Biocompatible Scaffolding for Myotube Growth and Differentiation.” MSMSE, Spring 2016.
- Shaun Stickel, “Dual-Input DC-to-DC Converter Topologies and Control Schemes.” MSEE, Fall 2015.

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- Dale Brown, "An Open Source, Automated Chemical Vapor Deposition System for the Production of 2D Materials." MSMSE, Fall 2015.
- Kolton T. Drake, "Biomimetic Application of Ion-Conducting-Based Memristive Devices in Spike-Timing-Dependent-Plasticity." MSEE, Summer 2015.

Other Mentorship Activities

- Boise State SAGE Program faculty mentor. Fall 2018 – Spring 2019. Meet each of two students approximately monthly to discuss goals and academic progress.
- Boise State SAGE Program faculty mentor. Fall 2017 – Spring 2018. Meet each of three students approximately once per month to discuss goals and academic progress.
- ECE Senior Design Team Sponsor: Hardware Artificial Neural Network Stimulator II (HANNS II). September 2016-April 2017.
- Idaho Diversity Network Mentoring Conference: Strategies for Student and Faculty Mentors, February 8-9, 2017.
- ECE Senior Design Team Sponsor: Hardware Artificial Neural Network Stimulator (HANNS). September 2015 – April 2016.
- ECE Senior Design Team Sponsor: Artificial Neural Network Interface (ANNi). September 2014 – April 2015.

Service

Departmental Service

- ECE Department Graduate Committee, August 2015 – present. Review graduate applications and implement new policies to help graduate students succeed in the program.
- ECE Circuits Area Faculty Search Committee, Spring 2017. Successful search resulted in the hiring of Dr. Benjamin C. Johnson.
- ECE Microfabrication Faculty Search Committee (Chair), Spring 2016. Successful search resulted in the hiring of Dr. Harish Subbaraman.
- ECE Outreach and Recruiting Committee, August 2014 – July 2015. Helped organize and execute numerous outreach activities. Also worked to increase visibility of the ECE graduate program and recruit top-quality students to Boise State from around the Pacific Northwest and the nation.
- ECE Continuous Improvement (ABET) Committee, 2014.

Service to College of Engineering

- Idaho Microfabrication Laboratory Faculty Committee, 2014 – present. The objective of this group is to assist the IML director in determining budgetary and equipment needs and priorities for the primary users of the IML.
- IML Technical Support Engineer Search Committee Chair, Spring 2016. Successful search resulted in the hiring of Travis Gabel.

Service to Boise State University

- Institutional Biosafety Committee, June 2016 – present. This is the University's main administrative compliance committee overseeing research and academic activities involving biohazardous materials and procedures.

Professional Service

- National Science Foundation (NSF) Graduate Research Fellowship Program (GRFP) Evaluation Panel, 2015 and 2016. Evaluated and scored ~30 applications at the undergraduate and graduate level based on

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transcripts, test scores, a three page personal statement, two page research statement, and three letters of recommendation per applicant.

- American Society for Engineering Education (ASEE) SMART Scholarship Evaluation Panel, 2014. Evaluated and scored 27 total application packages at the bachelor's, master's, and Ph.D. level in terms of transcripts and test scores, extracurricular and volunteer activities, leadership and teamwork experiences, personal narratives outlining research and DoD career goals, and three letters of recommendation per applicant.
- Session Chair, "Flexible Electronics IV" (Conference 8730), SPIE Defense, Security, and Sensing 2013, Baltimore, MD. Introduced five presenters and led question and answer sessions.
- Publication Review for: *VLSI (1)*, *Sensors (1)*, *Journal of Vacuum Science and Technology B (1)*, *Advanced Functional Materials (1)*, *Journal of Applied Physics (3)*, *Applied Physics Letters (1)*
- IEEE member, 2001 – Present
 - Chair, 2017 Workshop on Microelectronic Devices (WMED) session on Circuits and Systems
 - Chair, 2016 Workshop on Microelectronic Devices (WMED) session on Circuits and Systems
 - Chair, 2012 IEEE International Midwest Symposium on Circuits and Systems (MWSCAS) Poster Session C1P-K, "Image Processing Applications".
 - **Reviewer** for *Transactions on Nanotechnology (7)*, *Transactions on Fuzzy Systems (2)*, *Transactions on Neural Networks and Learning Systems (5)*, *Electron Device Letters (4)*, *Transactions on Circuits and Systems (1)*, *Journal of the Electron Device Society (1)*, *International Midwest Symposium on Circuits and Systems (MWSCAS) 2018*

Community Service and Outreach

- Boise State e-Camp: Build an electric motor project. June 5, 2018 (~100 students).
- Idaho Science Olympiad, Judge and Volunteer for "Experimental Design, B Division." April 7th, 2018.
- Caldwell Public Library Teen Science Café. March 15th, 2018 (8 students).
- Mary McPherson Elementary School STEM Night: Little Bits Electric Circuits. February 1st, 2018 (~200 students).
- Boise Downtown Library Teen Science and Engineering Café. January 18th, 2018 (10 students).
- Boise State Summer Research Community: Ten Talks. June 30, 2016.
- Evening with a faculty. Boise State University Engineering Residential College, April 4th, 2016 (~30 students).
- Boise State Engineering and Science Festival (STEM Exploration Day): SnapCircuits. February 7th, 2015, February 6th, 2016, February 4th, 2017, and February 3rd, 2018 (~100 students each event).
- Boise State University e-Day: Build an electric motor project. April 5, 2014 (~50 students).

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Education

University of Illinois at Urbana-Champaign Electrical Engineering Ph.D., 2013
Dates attended: 8/15/2009 – 5/15/2013
Dissertation Title: *Reliability, power dissipation, sensing, and thermal transport in carbon nanomaterials and devices.*
Advisor: Prof. Eric Pop

University of Illinois at Urbana-Champaign Electrical Engineering M.S., 2009
Dates attended: 8/15/2007 – 8/14/2009
Thesis Title: *Electrical and thermal characterization techniques for carbon nanotube transistors and networks.*
Advisor: Prof. Eric Pop

Boise State University Electrical Engineering B.S., 2007
Dates attended: 1/15/2004 – 5/15/2007

University of Phoenix Electronics Technology A.A., 2003
Dates attended: 1/15/2003 – 8/15/2003

Relevant Career Experience

2013 - Present Assistant Professor, Micron School of Materials Science and Engineering, Boise State University
2017 – Present Graduate Adjunct Faculty, Department of Mechanical Engineering, University of Idaho
2014 - 2017 Graduate Program Coordinator, Micron School of Materials Science and Engineering, Boise State University
2013 Postdoctoral Research Associate in Bioengineering, University of Illinois at Urbana-Champaign. Advisor: Prof. Rashid Bashir
2009 – 2013 National Defense Science and Engineering Graduate (NDSEG) Fellow & National Science Foundation Graduate Research Fellow, University of Illinois at Urbana-Champaign
2007 –2009 Graduate Research Assistant, University of Illinois at Urbana-Champaign
2004 – 2007 Undergraduate Research Assistant, Boise State University and University of California at Berkeley

1998 - 2004 Electronics Warfare Technician, United States Navy, USS Curtis Wilbur, Yokosuka, Japan – *Veteran of Operation Enduring Freedom* (SECRET Clearance)

Selected Honors

Friends of NAEOP TRIO Achiever Award	2018
NSF Travel Award to World Congress of Biosensors for T. Pandhi	2018
2 nd Place Poster Award, Flex Conference	2017
Best Poster Award, International Conference on Thermoelectrics	2017
Selected to the AAC&U PKAL Leadership Institute	2017
International Association of Advanced Materials Medal	2016
Faculty Choice 1 st Place Award, Idaho INBRE Statewide Conference	2016
Selected as AFOSR Summer Faculty Fellow (RYDD)	2016
Best Poster Award, IEEE Workshop for Microelectronics and Electron Devices (WMED)	2015
Best Poster Award, Idaho Academy of Science and Engineering Annual Meeting	2015
Education Committee Award, Annual Biophysical Society Meeting	2015
Society of Hispanic Professional Engineers Innovator of the Year	2015
Idaho Business Review's Accomplished Under 40	2015
Selected as AFOSR Summer Faculty Fellow (RYDD)	2015
Selected to the Boise State Mobile Learning Scholars Cohort	2014
Gregory Stillman Semiconductor Graduate Research Award	2012
John Bardeen Graduate Research Award	2011
Lt. General Thomas M. Rienzi Graduate Research Award	2011
Best Paper Award, Society of Hispanic Professional Engineers National Conference	2010
Best Poster Award, Hispanic Engineering National Achievement and Awards Conference (HENAAC)	2010
Best Poster Award, Society of Hispanic Professional Engineers National Conference	2010
University of Illinois at Urbana-Champaign SURGE Graduate Fellow	2007-2013
Micron Technology Foundation Graduate Fellow	2007-2010
Boise State University Founders Leadership Society (FLS)	2007
Boise State University, College of Engineering, Undergraduate Student Award for Excellence	2007
Associated Students of Boise State University Hall of Fame Award	2007
Best Poster Award, IEEE Workshop for Microelectronics and Electron Devices (WMED)	2007
Boise State University Ronald E. McNair Scholar	2004-2007
NASA Idaho Space Grant Consortium Scholar	2005-2007
Micron Technology Foundation Scholar	2006-2007
Naval Achievement Medal (awarded twice)	2003

Summary of Scholarly Activity

- H-index 18; ~ 1900 total citations (Google Scholar)
- 39 peer-reviewed journal publications
- 98 refereed conference proceedings and abstracts
- 45 invited talks and panels
- \$7.43 Million in external funding as PI, Co-PI and Senior Personnel

Professional Memberships

- IEEE Member, 2006 – Present

- APS Member, 2007 – Present
- ACS Member, 2007 – Present
- MRS Member, 2007 – Present
- BPS Member, 2014 - Present
- Tau Beta Pi Charter Member, Idaho Gamma Chapter, 2010 – Present
- Society of Hispanic Professional Engineers Member, 2005 – Present
- IAAM Member, 2016 – Present

Service

Conferences Chaired or Organized

- SHPE National Conference, Faculty Development Institute 2017
- Materials Research Society, Electronic Materials Conference 2017
- American Advanced Materials Congress,
Optical, Electronic, and Magnetic Materials Session 2016
- SHPE National Conference, Faculty Development Institute 2016
- IEEE International Integrated Reliability Workshop 2016
 - Technical Poster Chair
- Materials Research Society, Electronic Materials Conference 2016
- SHPE National Conference, Hispanic Faculty Congress 2015
- 57th Annual Idaho Academy of Sciences and Engineering Symposium 2015
 - Materials for Energy and Sustainability Session Organizer
- IEEE Workshop on Microelectronics and Electron Devices 2015
 - Session Chair
- Society of Hispanic Professional Engineers National Conference 2014
 - Energy and Sustainability Symposium, Co-Organizer
- IEEE Workshop on Microelectronics and Electron Devices 2014
 - Session Chair
- Illinois Summer Research Symposium 2012
 - Session Chair

Peer Review

Panels and Fellowships

- National Science Foundation Division of Undergraduate Education 2018
- Air Force Summer Faculty Fellowship Program 2018
- National Science Foundation – Chemical, Bioengineering, Environmental, and
Transport Systems 2017
- National Science Foundation Graduate Research Fellowship 2017
- Air Force Summer Faculty Fellowship Program 2016
- National Science Foundation – Chemical, Bioengineering, Environmental, and
Transport Systems 2016
- Louisiana Board of Reagents – EPSCOR 2015
- Department of Energy, Basic Energy Sciences 2015
- Air Force Summer Faculty Fellowship Program 2015
- National Science Foundation Division of Undergraduate Education 2014
- National Science Foundation Division of Electrical, Communications, and Cyber
Systems 2014
- National Defense Science and Engineering Graduate Fellowship Program 2013, 2014

Journals - Year indicates initial year of request to review

▪ 2D Materials	2017
▪ Materials Today Communications	2016
▪ Soft Matter	2016
▪ Nanoscale	2016
▪ Advanced Materials	2015
▪ Advanced Functional Materials	2018
▪ Applied Physics Letters	2015
▪ Carbon	2014
▪ IEEE Transactions on Electron Devices	2014
▪ Journal of Applied Physics	2014
▪ Journal of Physics D	2011
▪ Journal of Physical Chemistry	2016
▪ Journal of Physical Chemistry C	2013
▪ Journal of Solid State Electronics	2010
▪ Measurement Science and Technology	2015
▪ MRS Communications	2015
▪ New Journal of Physics	2010
▪ Nanotechnology	2012
▪ Physica Status Solidi	2011
▪ PLOS One	2015
▪ Scientific Reports	2015

Conferences

▪ Society for Advancement of Chicanos and Native Americans in Science (SACNAS) National Conference	2013
▪ Institute for Electrical and Electronics Engineers 14 th annual International Conference on Nanotechnology	2014

Congressional Visits

▪ Northwest Association of Education Opportunity Programs	2014
▪ Materials Research Society	2014

Departmental Committees and Service

▪ Materials Science and Engineering Graduate Program Coordinator	2015 – 2017
▪ Materials Science and Engineering PhD Program Admissions, Recruitment, and Retention	2014 – 2017
▪ Materials Science and Engineering PhD Program Curriculum and Comprehensive Exam Committee	2015 – 2017
▪ Materials Science and Engineering Undergraduate Curriculum Committee	2014

College Committees and Service

▪ Graduate Committee	2015 – 2017
▪ Club Advisor – Society of Hispanic Professional Engineers	2013 – 2016
▪ Idaho Microfabrication Laboratory Committee	2014 – 2015

Teaching and Educational Initiatives

- MSE 280 – “Introduction to Materials Science Lab Practices,” (1 credit hour)
 - Spring 2018 (Secs. 001, 002, 003) – 28 students enrolled
- MSE 602 – “Survey of Materials Science and Engineering,” (3 credit hours)

- Fall 2017 – 12 students enrolled
- MSE 497/597 – “Nanoscale Transport,” (3 credit hours)
 - Spring 2017 – 8 students enrolled
- MSE 601 – “Graduate Orientation,” (1 credit hour)
 - Fall 2016 – 9 students enrolled
- MSE 690 – “Masters Comprehensive Exam,” (1 credit hours)
 - Fall 2016 – 2 students enrolled
- MSE 691 – “Doctoral Comprehensive Exam,” (1 credit hours)
 - Fall 2016 – 2 students enrolled
- MSE 310/ECE 340 – “Electronic Properties of Materials,” (4 credit hours)
 - Fall 2015 – 27 students enrolled
- MSE 496 – Independent Study in Materials Science and Engineering
 - Fall 2015: Electrochemical Delamination of 2D Materials, 1 student enrolled, (3 credit hours)
 - Spring 2016: Structure-Property-Processing Correlations of Graphene, 1 student enrolled, (3 credit hours)
- MSE 596 – Independent Study in Materials Science and Engineering
 - Spring 2016: Transport in Low Dimensional Materials and Devices, 1 student enrolled, (3 credit hours)
 - Spring 2016: Thermal Properties of Materials, 1 student enrolled, (3 credit hours)
- MSE 590 – Practicum/Internship in Materials Science and Engineering
 - Fall 2015: Internship at Naval Research Laboratory, 1 student enrolled, (3 credit hours)
 - Summer 2016: Internship at Micron Technology 1 student enrolled, (3 credit hours)
 - Fall 2016: Internship at SpaceX, 1 student enrolled, (3 credit hours)
- ENGR 245 – “Introduction to Materials Science and Engineering,” (3 credit hours)
 - Spring 2014 – 107 students enrolled
 - Fall 2014 – 122 students enrolled
 - Spring 2015 – 153 students enrolled
 - Spring 2016 – 116 students enrolled
- ENGR 245L – “Introduction to Materials Science and Engineering Laboratory,” (1 credit hour)
 - Spring 2015 – 10 students enrolled
- ENGR 197 – “Peer Led Team Learning in MSE”, Course Director.
 - Fall 2014 – 24 students enrolled
 - Spring 2015 – 22 students enrolled
- Teaching Assistant, ECE 441 – “Physics and Modeling of Semiconductor Devices”, 2012
- Teaching Assistant and Course Grader, ECE 598 – “Hot Chips: Atoms to Heat Sinks,” 2008, 2009
- Production and Characterization of Graphene and Other 2-dimensional Nanomaterials: An AP high school chemistry guided inquiry laboratory developed with an AP high school chemistry teacher as part of a National Science Foundation Research Experience for Teachers program. Details to be presented at the ASEE 2015 National Meeting.

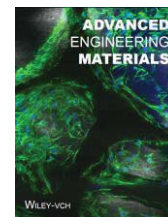
- Computer Guts: A lesson plan designed to meet State and National education standards in science and technology while enabling middle-school students to discover the basic components and operational theory of a desktop personal computer (PC). The lesson plan was made freely available to K-12 educators on the Illinois Researchers in Partnership with K-12 Science Educators website (iRISE), 2011.
- Web-Enabled Remote Lab: An interface for measuring electronic devices through the Internet. Devices connected in the lab can be measured on any web browser (even on an iPhone), anywhere in the world. Developed with undergraduates S. Dutta and S. Prakash. First tested in course ECE 440, Spring 2010. Source code at <http://remotelab.sourceforge.net>. Details in IEEE Trans Educ. (2011)

Peer Reviewed Journal Publications

in preparation, submitted, and in review: blue; *denotes undergraduate author

39. J. C. Reeck, C. Scott, S. Tuft, K. M. Yocham, A. Frederiksen, K. Fujimoto, R. Brown, I. A. Solov'yov, T. J. Lujan, D. Estrada, J. T. Oxford, "Prechondrogenic ATDC5 Cell Differentiation on Graphene Foam: Modulation by Surface Functionalization with Fibronectin," in preparation. (Draft available on request).
 38. C. Hollar, Z. Lin, M. Kongara, X. Duan, Y. Zhang, D. Estrada, "High-Performance Flexible Bismuth Telluride Thin Film from Solution Processed Colloidal Nanoplates," in preparation. (Draft available on request).
 37. T. Varghese, J. Richardson, N. Kempf, C. Hollar, D. Plumlee, D. Estrada, Y. Zhang, "High Performance Screen-printed Flexible Thermoelectric films by Liquid Phase Sintering", in preparation. (Draft available on request).
 36. H. Kabir, H. Zhu, J. May, K. Hamal, Y. Kan, T. Williams, E. Echeverria, D.N. McIlroy, D. Estrada, P.H. Davis, T. Pandhi, A. Clearfield, I.F. Cheng, "The sp^2 - sp^3 Carbon Hybridization Content of the Pseudo-Graphite GUITAR, Comparison of Electrochemistry and Physical Properties with Other Carbon Forms and Allotropes," *Carbon*, in review.
 35. P. M. Wojcik, N. Rajabi, H. Zhu, D. Estrada, P. Davis, K. Higginbotham, K. M. Yocham, T. Pandhi, I. F. Cheng, D. N. McIlroy, "The Negative Temperature Coefficient, Electrical Resistivity, and Surface Morphology of Single, Carbon Coated Silica Nanospring", *Journal of Applied Physics*, in review.
 34. L. Godwin[†], D. Brown[†], R. Livingston*, T. Webb*, L. Karriem*, E. Graugnard, D. Estrada, "Open Source, Automated Chemical Vapor Deposition System for Production of Two-Dimensional Nanomaterials" *PLOS One*, in review.
- [†]*Denotes equal contribution*
33. D. Estrada, Z. Li, G.-M. Choi, S.N. Dunham, A. Serov, J. Lee, Y. Meng, F. Lian, N.C. Wang, A. Perez*, R.T. Haasch, J.-M. Zuo, W.P. King, J.A. Rogers, E. Pop, "Thermal Anisotropy in Layer-by-Layer Assembled Polycrystalline Graphene Films", *2D Materials and Applications*, in review.
 32. S. Rastegar, J. Stadlbauer, K. Fujimoto, K. McLaughlin, L. Karriem, T. Pandhi, D. Estrada, K.D. Cantley, "Signal-to-Noise Ratio Enhancement Using Graphene-Based Passive Microelectrode Arrays", *IEEE Transactions on Biomedical Circuits and Systems*, in review.

31. T. Pandhi, E. Kreit, R. Aga, K. Fujimoto, S. Mohammad, S. Khademi, A.N. Chang, F. Xiong, J. Koehne, E.M. Heckman, D. Estrada, “Electrical Transport and Power Dissipation in Aerosol-Jet-Printed Graphene Interconnects”, *Scientific Reports*, **8**, 10842 (2018).
30. K.M. Yocham, C. Scott, K. Fujimoto, R. Brown, E. Tanasse*, J.T. Oxford, T.J. Lujan, D. Estrada, “Mechanical Properties of Graphene Foam and Graphene Foam – Tissue Composites”, *Advanced Engineering Materials*, DOI:10.1002/adem.201800166.

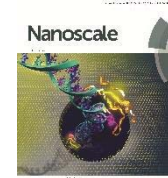


Selected as cover article of Advanced Engineering Materials.

Featured in R&D Magazine, the American Ceramic Society, Orthopedic Design & Technology Magazine, American Society of Engineering Education First Bell, and more.

29. J. Shim, S. Banerjee, H. Qiu, K. Smithe, D. Estrada, J. Bello, E. Pop, K. Schulten, R. Bashir, “Detection of Biomolecules using Nanopores in CVD grown MoS₂ Membrane”, *Nanoscale*, **9**, 14836 (2017).

Selected as cover article of Nanoscale October 21st, 2017 issue



28. T. Varghese, C. Hollar, N. Kempf, C. Han, D. Estrada, R. Mehta, Y. Zhang, “High-efficiency and flexible nanostructured thermoelectric materials by low-cost printing of solution-processed nanoplate crystals”, *Scientific Reports*, 33135 (2016).

Featured on ScienceDaily.com (<https://www.sciencedaily.com/releases/2016>)

27. E. Krueger, J. Shim, A. Fathizadeh, A.N. Chang, B. Subei, K.M. Yocham, P.H. Davis, E. Graugnard, F. Khalili-Araghi, R. Bashir, D. Estrada, D. Fologea, “Modeling and Analysis of Intercalant Effects on Circular DNA Topology”, *ACS Nano*, **10**, 8910 (2016).

Featured on ScienceDaily.com (<https://www.sciencedaily.com/releases/2016>)

26. E. Krueger, A.N. Chang, D. Brown, J. Eixenberg, R. Brown, S. Rastegar, K.M. Yocham K. Cantley, D. Estrada, “Graphene as a 3-Dimensional Platform for Myotube Growth”, *ACS Biomaterials Science and Engineering*, **2**, 1234 (2016).

Featured on ScienceDaily.com (<https://www.sciencedaily.com/releases/2016>)

25. F. Lian, J. Llinas, Z. Li, D. Estrada, E. Pop, “Thermal Conductivity of Chirality-Sorted Carbon Nanotube Networks”, *Applied Physics Letters*, **108**, 103101 (2016).

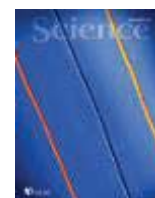
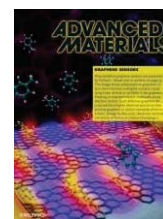
24. P. Yasaei, A. Fathizadeh, R. Hantehzadeh, A.K. Majee, A. El-Ghandour, D. Estrada, C. Foster, Z. Aksamija, F. Khalili-Araghi, A. Salehi-Khojin, “Bimodal Phonon Scattering in Graphene Grain Boundaries”, *Nano Letters*, **15**, 4532 (2015).

Featured on ScienceDaily.com (<https://www.sciencedaily.com/releases/2015>)

23. H. Hu, S. Banerjee, D. Estrada, R. Bashir, W.P. King, “Tip-Based Nanofabrication of Arbitrary Shapes of Graphene Nanostructures for Device Applications”, *RSC Advances*, **5**, 37006, (2015).

21. J.-W. Do, N. Chang, D. Estrada, H. Cha, J. Duan, E. Pop, G.S. Girolami, J.W. Lyding, “Solution-Mediated Self-Aligned and Self-Limiting Nanometer Scale Metal Deposition at Carbon Nanotube Junctions for Improved Device Performance”, *ACS Nano*, **9**, 4806 (2015).
Featured in R&D Magazine (<https://www.rdmag.com/news/2015/>)
20. K. L. Grosse, V. E. Dorgan, D. Estrada, J.D. Wood, I. Vlassiuk, G. Eres, W.P. King, E. Pop, “Direct Observation of Resistive Heating at Graphene Wrinkles and Grain Boundaries”, *Applied Physics Letters*, **105**, 143109 (2014).
19. J.-W. Do, D. Estrada, X. Xie, N. Chang, G.S. Girolami, J.A. Rogers, E. Pop, J.W. Lyding, “Nanosoldering Carbon Nanotube Junctions with Metal via Local Chemical Vapor Deposition for Improved Device Performance”, *Nano Letters*, **13**, 5844 (2013)
Featured on ScienceDaily.com (<http://www.sciencedaily.com/releases/2013>)
18. B. E. Walling, Z. Kuang, Y. Hao, D. Estrada, J. D. Wood, F. Lian, R. T. Haasch, J. W. Lyding, A. B. Shah, J. L. Jeffries, E. Pop, G. W. Lau, “Helical Carbon Nanotubes Inhibit Macrophage-Mediated Phagocytosis of *Pseudomonas aeruginosa*”, *PLOS ONE*, **8**, e80283 (2013)
17. M.P. Gupta, A. Behnam, F. Lian, D. Estrada, E. Pop, S. Kumar, “Effect of Channel Geometry and Network Morphology on Breakdown Characteristics of Carbon Nanotube Thin Film Transistors”, *Nanotechnology*, **24**, 405204 (2013)
16. K.-M. Min, B. Kumar, M. Bashirzadeh, A. Brati-Farimani, M.-H. Bae, D. Estrada, E. Pop, N. Aluru, A. Salehi-Khojin, “External Defects and Gate Effects in Graphene Chem-FETs”, *Nano Letters*, **13**, 1962 (2013)
Featured on ScienceDaily.com (<http://www.sciencedaily.com/releases/2013>)
15. S. Banerjee, J. Shim, J. Rivera, X. Jin, D. Estrada, V. Solovyeva, X. You, J. Pak, E. Pop, N. Aluru, R. Bashir, “Electrochemistry at the Edge of a Single Graphene Layer in a Nanopore”, *ACS Nano* **7**, 834 (2013)
14. A. Behnam, V. Sangwan, X. Zhong*, F. Lian, D. Estrada, D. Jariwala, A.J. Hoag*, L.J. Lauhon, T.J. Marks, M.C. Hersam, E. Pop, “High-field transport, thermal dissipation, and breakdown of electronic type-enriched carbon nanotube network transistors,” *ACS Nano* **7**, 482 (2013)
13. J. Koepke, J.D. Wood, D. Estrada, E. Pop, J.W. Lyding, “Scanning Tunneling Microscopy and Spectroscopy of Grain Boundaries in Graphene Grown by Chemical Vapor Deposition on Copper Foil”, *ACS Nano* **7**, 75 (2013)
Featured on ScienceDaily.com (<http://www.sciencedaily.com/releases/2013>)
12. M. P. Gupta, L. Chen, D. Estrada, A. Behnam, E. Pop, S. Kumar, “Impact of Thermal Boundary Conductance on Power Dissipation and Electrical Breakdown of Carbon Nanotube Network Transistors”, *Journal of Applied Physics* **112**, 124506 (2012)
11. M.Y. Timmermans, D. Estrada, A.G. Nasibulin, J.D. Wood, A. Behnam, D.-M. Sun, Y. Ohno, J.W. Lyding, A. Hassanien, E. Pop, and E.I. Kauppinen, “Effect of Carbon Nanotube Network Morphology on Thin-Film Transistor Performance”, *Nano Research* **5**, 307 (2012)

10. A. Salehi-Khojin, D. Estrada[†] / K.Y. Lin[†], K. Ran, R.T. Haasch, J.-M. Zuo, E. Pop, and R. I. Masel, “Randomly Stacked Oxide-free Graphene Film as a Chemiresistor”, *Applied Physics Letters* **100**, 033111 (2012)
[†]**Denotes equal contribution**
Featured on ScienceDaily.com (<http://www.sciencedaily.com/releases/2012>)
Selected for republication in the *Virtual Journal of Nanoscale Science & Technology* **25**, no. 5 (2011)
9. B. M. Venkatesan, D. Estrada, S. Banerjee, X. Jin, V.E. Dorgan, J. Oliver, N. Aluru, E. Pop, and R. Bashir, “Stacked Graphene-Al₂O₃ Nanopore Sensors For Sensitive Detection of DNA and DNA – Protein Complexes”, *ACS Nano* **6**, 441 (2012)
8. A. Salehi-Khojin[†] / D. Estrada[†], K. Y. Lin, M.-H. Bae, F. Xiong, E. Pop, R. I. Masel, “Polycrystalline Graphene Ribbons as Chemiresistors”, *Advanced Materials* **24**, 53 (2011).
[†]**Denotes equal contribution**
Selected as Communications Frontispiece
Featured on ScienceDaily.com (<http://www.sciencedaily.com/releases/2011>)
7. R.-H. Kim, M.-H. Bae, D.G. Kim, H. Cheng, B.H. Kim, D.-H. Kim, M. Li, J. Wu, F. Du, H.-S. Kim, S. Kim, D. Estrada, S.W. Hong, Y. Huang, E. Pop, and J.A. Rogers, “Stretchable, Transparent Graphene Interconnects for Arrays of Microscale Inorganic Light Emitting Diodes on Rubber Substrates”, *Nano Letters* **11**, 3881 (2011)
Selected for *Nature Research Highlights* Vol. **477**, 373 (2011)
6. F. Xiong, A. Liao, D. Estrada, E. Pop, “Low Power Switching of Phase-Change Materials with Carbon Nanotube Electrodes”, *Science* **332**, 568 (2011)
Selected for *Nature Nanotechnology Research Highlights* Vol. **6**, 194 (2011)
Selected as cover article of *Science* April 29th, 2011 issue
Highlighted for perspective by Salinga & Wuttig, *Science* 332, 543 (2011).
Selected for republication in the *Virtual Journal of Nanoscale Science & Technology* **23**, no. 18 (2011)
5. D. Estrada and E. Pop, “Infrared Imaging of Power Dissipation of Carbon Nanotube Thin-Film Transistors”, *Applied Physics Letters* **98**, 073102 (2011)
Selected for republication in the *Virtual Journal of Nanoscale Science & Technology* **23**, no. 8 (2011)
4. S. Dutta*, S. Prakash*, D. Estrada, E. Pop, “A Web Service and Interface for Electronic Device Characterization”, *IEEE Trans. on Education* **54**, 646 (2011)
3. D. Estrada, S. Dutta*, A. Liao, E. Pop, “Reduction of Hysteresis for Carbon Nanotube Mobility Measurements Using Pulsed Characterization”, *Nanotechnology*, **21**, 085702 (2010)
Featured on nanotechweb.org (<http://nanotechweb.org/cws/article/tech/41941>)



2. M.-H. Bae, Z.-Y. Ong, D. Estrada, E. Pop, “Imaging, Simulation, and Electrostatic Control of Power Dissipation in Graphene Devices”, *Nano Letters*, **10**, 4787 (2010)
Selected as cover article of Nano Letters December 2010 issue
1. D. Estrada, M. L. Ogas, R. G. Southwick III, P. M. Price, , R. J. Baker, W. B. Knowlton, “Impact of Single pMOSFET Dielectric Degradation on NAND Circuit Performance”, *Microelectronics Reliability* **48**, 3 (2008)



Peer Reviewed Conference Publications and Presentations

in preparation, submitted, and in review: blue; *denotes undergraduate author

98. A. Crawford and D. Estrada, “Advanced Sensors and Measurement Technologies”, *11th International Conference on Nuclear Plant Instrumentation, Control & Human–Machine Interface Technologies (NPIC & HMIT 2019)*, (Orlando, FL; Feb. 2019)
97. M.D. McMurtrey, D. Estrada, E. Jankowski, L. Li, H. Subbaraman, “Advanced Manufacturing of In-Pile Sensors for Test Reactors”, *11th International Conference on Nuclear Plant Instrumentation, Control & Human–Machine Interface Technologies (NPIC & HMIT 2019)*, (Orlando, FL; Feb. 2019)
96. T. Unruh, K. Fujimoto, D. Estrada, “Advanced Manufactured Sensors for Nuclear Applications”, *11th International Conference on Nuclear Plant Instrumentation, Control & Human–Machine Interface Technologies (NPIC & HMIT 2019)*, (Orlando, FL; Feb. 2019)
95. T. Pandhi, E. Kreit, R. Aga, K. Fujimoto, S. Mohammad, S. Khademi, A.N. Chang, F. Xiong, J. Koehne, E.M. Heckman, D. Estrada, “Emerging 2D Nanomaterials for Additive Manufacturing of Space-Grade Flexible Electronics”, *69th International Aeronautics Congress (IAC)*, (Bremen, Germany; Oct. 2018)
94. C. Hollar, Z. Lin, X. Duan, Y. Zhang, D. Estrada, “Thermoelectric Properties of High-Performance and Flexible Cu₂Se and Bi₂Te₃ Thin Films Fabricated by Wet-Deposition Methods”, *Energy Policy Research Conference (EPRC)*, (Boise, ID; Sep. 2018).
93. T. Varghese, R. J. Mehta, D. Estrada, Y. Zhang, “Ultrafast Additive Manufacturing of Flexible Thermoelectric Films by Aerosol Jet Printing and Photonic Curing”, *37th International Conference on Thermoelectrics (ICT)*, (Normandy, France; Jul. 2018)
92. T. Pandhi, D. Estrada, J. Koehne, “Fully inkjet printed graphene-based biosensor for flexible and wearable electronics”, *28th World Congress on Biosensors*, (Miami, FL; Jun. 2018).
[NSF Travel Award]
91. T. Pandhi, D. Estrada, J. Koehne, “Inkjet Printing of Graphene for Wearable and Flexible Electrochemical Sensors”, *233rd Electrochemical Society Meeting*, (Seattle, WA; May 2018)
90. C. Hollar, T. Varghese, M. Kongara, Z. Lin, X. Duan, D. Estrada, and Y. Zhang, “High-Performance Flexible Thermoelectric Thin Films from Solution Processed Colloidal Nanoplates”, *NASA In-Space Manufacturing and Printed Electronics Workshop*, (Huntsville, AL; Apr. 2018)
89. K. Fujimoto, T. Unruh, J. Watkins, H. Subbaraman, and D. Estrada, “Additive Manufacturing of In – Pile Nuclear Sensors”, *NASA In-Space Manufacturing and Printed Electronics Workshop*, (Huntsville, AL; Apr. 2018)

88. T. Pandhi, E. B. Kreit, R.S. Aga, K. Fujimoto, M. Sharbati, S. Khademi, A.N. Chang, H. Subbaraman, F. Xiong, J. Koehne, E.M. Heckman, and D. Estrada, “Emerging 1-D and 2-D Materials for Printed and Flexible Electronics”, *NASA In-Space Manufacturing and Printed Electronics Workshop*, (Huntsville, AL; Apr. 2018)
87. M. Hondros, S. Tuft, L. Karriem*, T. Pandhi, A. Chandnani, D. Convertino, C. Coletti, H. Subbaraman, J. T. Oxford, D. Estrada, “Differential Gene Expression in C2C12 Cells Due to Scaffold Structure-Property-Processing Correlations”, *Materials Research Society Spring Meeting*, (Phoenix, AZ; Apr. 2018)
86. J. Bello, Y. Kim, S. Banerjee, K. Smithe, D. Estrada, S. Myong, A. Nardulli, E. Pop, R. Bahsir, J. Shim, “Detection of Methylation on dsDNA at Single-Molecule Level using SolidState Nanopores”, *Biophysical Society National Meeting*, (San Francisco, CA; Feb., 2018)
Published in the Biophysical Journal 114 (3), 216a.
85. J. Cox*, A. Chandnani, D. Wilson, D. Estrada, H. Subbaraman, “Inkjet Printing of Dense Interconnect Arrays for Flexible Silicon Circuit Integration on Flexible Substrates”, *Flex Conference*, (Monterrey, CA; Feb. 2018)
84. A. Rodriguez*, H. Subbaraman, D. Wilson, D. Estrada, “Anisotropic Conductive Adhesives for Flexible Hybrid Electronics”, *Flex Conference*, (Monterrey, CA; Feb. 2018)
83. T. Pandhi and D. Estrada, “Emerging 2D Materials for Aerosol Jet Printing of Flexible Electronics”, *9th Annual International Optomec Users Meeting*, (Santa Clara, Ca; Nov. 2017)
82. K. Fujimoto, K. Davis, K. Tsai, J. Watkins, T. Unruh, D. Estrada, “Aerosol Jet Printing of In-Pile Nuclear Sensors”, *9th Annual International Optomec Users Meeting*, (Santa Clara, Ca; Nov. 2017)
81. K. Lewandowska, * M. Seas, T. Pandhi, A. Chandnani, H. Subbaraman, P. Johnson, D. Estrada, “Powder River Basin Graphene Inks” *Society of Hispanic Professional Engineers (SHPE) National Conference*, (Kansas City, Mo; Nov., 2017)
80. A. Perez*, S. Letourneau, E. Graugnard, D. Estrada, “An Electrical Thermometry Platform for Thermal Conductivity Measurements of 2D Materials” *Society of Hispanic Professional Engineers (SHPE) National Conference*, (Kansas City, Mo; Nov., 2017)
79. J. Shim, S. Banerjee, Q. Hu, K. Smithe, D. Estrada, J. Bellow, E. Pop, R. Bashir, “Detection of Methylation in DNA using Nanopores in MoS₂ Membrane”, *Biomedical Engineering Society Annual Meeting*, (Phoenix, AZ; Oct. 2017)
78. K. Yocham, C. Scott, K. Fujimoto, E. Tanasse*, J. Oxford, T. Lujan, D. Estrada, “Three-Dimensional Graphene Foam for Musculoskeletal Tissue”, *Biomedical Engineering Society Annual Meeting*, (Phoenix, AZ; Oct. 2017)
77. K. Yocham, E. Krueger, J. Shim, C. Scott, R. Brown, K. Fujimoto, E. Tanasse*, M. Hondros, R. Bashir, T. Lujan, J.T. Oxford, D. Estrada, “Applications of Atomically Thin Materials from Biomolecules to Engineered Tissue”, *European Advanced Materials Congress*, (Stockholm, SE; Aug. 2017)

76. S. Rastegar, J. Stadlbauer*, K. Fujimoto, K. McLaughlin*, D. Estrada, K. Cantley, "Signal-to-Noise Ratio Enhancement Using Graphene-Based Passive Microelectrode Arrays", *IEEE International Midwest Symposium on Circuits and Systems*, (Boston, Ma; Aug. 2017)
75. T. Varghese, C. Han, J. Richardson, N. Kempf, C. Hollar, R. Danaei, R. Panat, R. J. Mehta, Z. Ren, D. Estrada, Y. Zhang, "High-Performance and Low-Cost Printed Flexible Thermoelectric Devices", *36th International Conference on Thermoelectrics (ICT)*, (Pasadena, Ca; Jul. 2017) [**Best Poster Award**]
74. K. Fujimoto, K. Davis, T. Unruh, D. Estrada, "Additive Manufacturing of In-Pile Nuclear Sensors", *6th International School for Materials for Energy and Sustainability*, (Pasadena, Ca; Jul. 2017)
73. T. Pandhi, E. Kreit, R. Aga, K. Fujimoto, S. Mohammad, S. Khademi, F. Xiong, J. Koehne, E.M. Heckman, D. Estrada, "Emerging Materials for Aerosol Jet Printing of Flexible Electronics", *International Society for Optics and Photonics (SPIE) International Workshop on Thin-films for Electronics, Electro-Optics, Energy and Sensors (TFE3S)*, (Dayton, OH; Jun 2017)
72. S. Rastegar, J. Stadlbauer*, K. McLaughlin*, K. Fujimoto, D. Estrada, K. Cantley, "Enhanced Signal-to-Noise Ratio Using Nanomaterial-Based Passive Neural Electrodes", *Materials Research Society Electronic Materials Conference*, (South Bend, IN; Jun 2017)
71. T. Pandhi, E. Kreit, R. Aga, K. Fujimoto, S. Mohammad, S. Khademi, F. Xiong, J. Koehne, E.M. Heckman, D. Estrada, "Electrical Transport and Power Dissipation in Aerosol-Jet-Printed Graphene Interconnects", *Materials Research Society Electronic Materials Conference*, (South Bend, IN; Jun 2017)
70. T. Pandhi, E. Kreit, R. Aga, K. Fujimoto, S. Mohammad, S. Khademi, F. Xiong, J. Koehne, E.M. Heckman, D. Estrada, "Aerosol-Jet Printing of Graphene and MoS₂ Based Devices for Flexible Electronics", *FLEX Conference*, (Monterrey, CA; Jun 2017) [**2nd Place Poster Award**]
69. R. Torsi*, A. Chandnani, B. Joshi, D. Estrada, and H. Subbaraman, "Inkjet Printed Carbon Nanotube Thin Film Transistors," *IEEE Workshop on Microelectronics and Electron Devices (WMED)*, (Boise, ID; Apr. 2017)
68. I. Cheng, D. Estrada, P. Davis, A. Clearfield, J. Foutch, K. Livingston, K. M. Yocham, T. Pandhi, C. Nwamba, Y. Kan, A. Blumenfeld, H. Kabir, "Graphene From the University of Idaho Thermolyzed Asphalt Reaction (GUITAR): Is it an Amorphous Carbon, Graphite or a New Carbon Allotrope?," *American Chemical Society (ACS) 253rd National Meeting & Expo*, (San Francisco, CA; Apr., 2017)
67. L. Steiner, A. Christy, J. Harris, D. Estrada, "Nanostructured Lithography Through Self Assembly of Diblock Copolymers," *American Chemical Society (ACS) 253rd National Meeting & Expo*, (San Francisco, CA; Apr., 2017)
66. K. Yocham, C. Scott, K. Fujimoto, E. Tanasse*, J. Oxford, T. Lujan, D. Estrada, "Three-Dimensional Graphene Foam for Musculoskeletal Tissue", *Orthopaedic Research Society (ORS) Annual Meeting*, (San Diego, CA; Mar. 2017)

65. K. Yocham*, C. Scott, K. Fujimoto, T. Lujan, D. Estrada, “Cartilage Tissue Grown within a Three-Dimensional Graphene Foam Scaffold”, *Idaho INBRE Statewide Research Conference*, (Moscow, ID; Aug. 2016) [**1st Place Faculty Choice Award**]
64. J.W. Stadlbauer*, S. Rastegar, D. Estrada, K.D. Cantley, “Measurement of Signal-to-Noise Ratio in Neural Microelectrodes”, *Idaho INBRE Statewide Research Conference*, (Moscow, ID; Aug. 2016)
63. R. Brown, C. Scott, A.N. Chang, E. Tanasse*, K. Fujimoto, K. Yocham*, E. Krueger, T. Lujan, J.T. Oxford, D. Estrada, “Graphene Foam as a Bioscaffold for Musculoskeletal Tissue Engineering”, *American Advanced Materials Congress*, (Miami, FL; Dec 2016) - Invited
62. A.N. Chang, Eric Krueger, D. Brown, J. Eixenberg, R. Brown, S. Rastegar, K. Cantley, D. Estrada, “Growth and Differentiation of Myoblasts on Graphene Foam Bioscaffolds”, *Biomedical Engineering Society Annual Meeting*, (Minneapolis, MN; Oct 2016)
61. C. Scott, R. Brown, E. Tanasse*, K. Fujimoto, K. Yocham*, A.N. Chang, E. Krueger, T. Lujan, D. Estrada, J.T. Oxford “Three-Dimensional Graphene Scaffolds for Engineering Musculoskeletal Tissue”, *Orthopaedic Research Society (ORS) 46th International Sun Valley Workshop: Musculoskeletal Biology*, (Sun Valley, ID; Aug. 2016)
60. E. Krueger, A.N. Chang, D. Brown, J. Eixenberg, R. Brown, S. Rastegar, K. Cantley, D. Estrada, “Graphene as a 3-Dimensional Platform for Myotube Growth”, *Materials Research Society Electronic Materials Conference*, (Newark, DE; Jun 2016)
59. J.W. Stadlbauer*, S. Rastegar, A.N. Chang, K. McLaughlin*, E. Krueger, D. Estrada, K. Cantley, “Signal-to-Noise Characteristics of Graphene-Based Cellular Electrodes”, *NIH IDEa Western Regional Conference*, (Coeur d’Alene, ID; Oct. 2015)
58. A.J. Christy*, N.L. McKibben*, D. Estrada, J.D Harris, “Nanostructured Polymer Lithography for Photovoltaic Applications”, *IEEE Workshop for Microelectronics and Electron Devices (WMED)*, (Boise, ID; Mar., 2015) [**Best Poster Award**]
57. N.A. La Combe*, B. Ward, P. Davis, D. Estrada, E. Graugnard, “Correlated Optical and Atomic Force Microscopy Characterization of 2-Dimensional Atomic-Layered Materials”, *Idaho Academy of Science and Engineering 57th Annual Meeting*, (Boise, ID; Mar., 2015)
56. A.N. Chang, D. Brown, E. Krueger, K. McLaughlin*, D. Estrada, “Emerging biomedical applications of graphene and graphene foam”, *Idaho Academy of Science and Engineering 57th Annual Meeting*, (Boise, ID; Mar., 2015) [**Best Poster Award**]
55. D. Brown, A. N. Chang, R. Livingston*, D. Estrada, “Toward Controlled In-Solution Stacking of Solvent Exfoliated 2-Dimensional Nanoflakes and Heterostructures”, *American Physical Society Meeting*, (San Antonio, TX; Mar., 2015)
54. E. Krueger, J. Shim, A. N. Chang, B. Subei, A. Fathizadeh, K. Livingston*, P. Davis, E. Graugnard, F. Khalili-Araghi, R. Bashir, D. Estrada, D. Folega, “Nanopore Sensors for Analysis of Circular DNA Topology”, *Biophysical Society National Meeting*, (Baltimore, MD; Feb., 2015) [**Education Travel Award**]
Published in the Biophysical Journal 108 (2), 351a - 352a.

53. A. Fielding, D. Brown, R. Livingston*, C. Heishman*, L. Nadelson, D. Estrada, "Production and Characterization of Graphene and Other 2-dimensional Nanomaterials: An AP High School Inquiry Lab", *American Society for Engineering Education Annual Conference*, (Seattle, WA; June, 2015)
52. N. McKibben*, A.J. Christy*, J.D. Harris, D. Estrada, J. McNatt, "Nanostructured Polymer Lithography for Photovoltaic Applications", *23rd Space Photovoltaic Research and Technology Conference* (Cleveland, OH; Oct., 2014).
51. R. Livingston*, D. Brown, A. N. Chang, C. Kezerle*, Y. Zhang, D. Estrada, "Optical, Electrical, and Thermal Properties of 2-Dimensional Nanoflake Composites", *American Chemical Society (ACS) Northwest Regional Meeting*, (Missoula, MT; June, 2014)
50. B. Ward, D. Brown, R. Livingston*, A.N. Chang, D. Estrada, E. Graugnard, "Structure-Property-Processing Correlation of 2D TMDCs via Multiprobe SPM", *International Conference on Nanoscience + Technology*, (Vail, CO; July, 2014)
49. J.-W. Do, D. Estrada, X. Xie, N.N. Chang, J. Mallek, G.S. Girolami, J.A. Rogers, E. Pop, J.W. Lyding, "Self-Limiting and Selective Nanosoldering of Carbon Nanotube Junctions for Improved Device Performance", *International Conference on Nanoscience + Technology*, (Vail, CO; July, 2014)
48. F. Lian, J.P. Llinas*, Z. Li, D. Estrada, E. Pop, "Thermal Transport in Chirality-Sorted Carbon Nanotube Networks", *Materials Research Society (MRS) Spring Meeting*, (San Francisco, CA; April, 2014)
47. J.-W. Do, D. Estrada, X. Xie, N.N. Chang, J. Mallek, G.S. Girolami, J.A. Rogers, E. Pop, J.W. Lyding, "Self-Limiting and Selective Nanosoldering of Carbon Nanotube Junctions for Improved Device Performance", *Materials Research Society (MRS) Spring Meeting*, (San Francisco, CA; April, 2014)
46. M.P. Gupta, D. Estrada, A. Behnam, E. Pop and S. Kumar, "Impact of Network Morphology on Electrical Breakdown of Carbon Nanotube Thin-Film Transistors", *ASME International Technical Conference and Exhibition on Packaging and Integration of Electronic and Photonic Microsystems (InterPACK)*, (Burlingame, CA; July, 2013)
45. M.P. Gupta, D. Estrada, A. Behnam, E. Pop and S. Kumar, "Size effects on Heat Dissipation and Thermal Reliability of Carbon Nanotube Thin-Film Transistors", *Materials Research Society (MRS) Spring Meeting*, San Francisco, CA; April, 2013)
44. D. Estrada, Z. Li, S.N. Dunham, G.-M. Choi, N. Wang, Y. Meng, F. Lian, J. Lee, J.-M. Zuo, W.P. King, J.A. Rogers, D.G. Cahill, E. Pop, "Thermal Anisotropy of Layer-by-Layer Assembled Graphene Films", *Materials Research Society (MRS) Spring Meeting* (San Francisco, CA; April, 2013)
43. F. Lian, D. Estrada, H. Tian, A.J. Hoag, J. P. Llinas, M.Y. Timmermans, A.G. Nasibulin, E.I. Kauppinen, S. Sinha, E. Pop, "Thermal Imaging and Analysis of Carbon Nanotube Composites", *Materials Research Society (MRS) Spring Meeting*, (San Francisco, CA; April, 2013)
42. S. Banerjee, J. Shim, J. Rivera, X. Jin, D. Estrada, V. Solovyeva, X. You, J. Pak, E. Pop, N. Aluru, R. Bashir, "Electrochemistry of Graphene Edge Embedded Nanopores", *American Physical Society (APS) March Meeting*, (Baltimore, MD; March, 2013)

41. S. Banerjee, J. Shim, J. Rivera, X. Jin, D. Estrada, E. Pop, N.R. Aluru, and R. Bashir, "Stacked Graphene-Al₂O₃ Architecture for DNA Detection", *IEEE-EBMS Micro and Nanotechnology in Medicine Conference (MNMC)*, (Ka'anapali, HI; Dec. 2012)
40. M. P. Gupta, L. Chen, D. Estrada, A. Behnam, E. Pop, S. Kumar, "Impact of Thermal Boundary Conductance on Power Dissipation and Electrical Breakdown of Carbon Nanotube Network Transistors", *Intl. Mechanical Engineering Congress and Expo (IMECE)*, (Houston, TX; Nov. 2012)
39. J.-W. Do, D. Estrada, X. Xie, N. Chang, G. Girolami, J. Rogers, E. Pop, and J. W. Lyding, "Nanosoldering Carbon Nanotube Junctions with Metal via Local Chemical Vapor Deposition for Improved Device Performance", *IEEE International Conference on Nanotechnology*, (Birmingham, UK; July 2012)
38. J. Shim, V. Solovyeva, D. Estrada, S. Banerjee, J. Rivera, E. Pop, and R. Bashir, "Graphene Nanopores for Nucleic Acid Analysis", *IEEE International Conference on Nanotechnology*, (Birmingham, UK; July 2012)
37. J. C. Koepke, J. D. Wood, D. Estrada, Z.-Y. Ong, E. Pop, and J.W. Lyding, "Atomic-Scale Study of Scattering and Electronic Properties of CVD Graphene Grain Boundaries", *IEEE International Conference on Nanotechnology*, (Birmingham, UK; July 2012)
36. A.Y. Serov, Z. Li, K.L. Grosse, A.D. Liao, D. Estrada, M.-H. Bae, F. Xiong, W.P. King, and E. Pop, "Nanoscale Power and Heat Management in Electronics", *IEEE International Conference on IC Design and Technology (ICICDT)*, (Austin, TX; May 2012)
35. A. Behnam, D. Estrada, V. Sangwan, X. Zhong*, D. Jariwala, L. Lauhon, T.J. Marks, M. Hersam, and E. Pop, "Performance Limits and Degradation of Carbon Nanotube Network Transistors", *Materials Research Society (MRS) Spring Meeting*, (San Francisco, CA; April, 2012)
34. W. Ye, P. A. Pena Martin, N. Kumar, D. Estrada, S. R. Daly, A. A. Rockett, J. R. Abelson, E. Pop, and G. S. Girolami, J.W. Lyding, "Nanometalization of Single-Wall Carbon Nanotubes and Graphene Quantum Dots", *American Chemical Society (ACS) 243rd National Meeting & Expo*, (San Diego, CA; March, 2012)
33. M. Prakash, D. Estrada, E. Pop, and S. Kumar, "Impact of Contact Resistances on Electrical and Thermal Transport in Carbon Nanotube Network Transistors", *ASME 2012 3rd Micro/Nanoscale Heat & Mass Transfer International Conference*, (Atlanta, GA; March, 2012)
32. S. Banerjee, B. M. Venkatesan, D. Estrada, X. Jin, V.E. Dorgan, V. Solovyeva, M.-H. Bae, N. Aluru, E. Pop, and R. Bashir, "A Stacked Graphene-Al₂O₃ Nanopore Architecture for DNA Detection", *Biophysical Society 56th Annual Meeting*, (San Diego, CA; February, 2012)
Published in the Biophysical Journal **102** (3), 730a.
31. V. Solovyeva, E. Chow, M.-H Bae, D. Estrada, S. Banerjee, A. Behnam, V.E. Dorgan, W.-J. Chang, E. Pop, and R. Bashir, "New Technique of DNA Sensing: Nanoribbon Transverse Electrodes", *Biophysical Society 56th Annual Meeting*, (San Diego, Ca; February, 2012)
Published in the Biophysical Journal **102** (3), 428a.

30. D. Estrada[†] / A. Salehi-Khojin[†], K. Y. Lin, M.-H. Bae, F. Xiong, E. Pop, R. I. Masel, "Polycrystalline Graphene Ribbons as Chemiresistors", *Society of Hispanic Professional Engineers (SHPE) National Conference*, (Anaheim, CA; October, 2011)
[†]Denotes equal contribution
29. B.M. Venkatesan, D. Estrada, B. Dorvel, S. Banerjee, G. Humphreys, V. Dorgan, A. Nardulli, E. Pop, R. Bashir, "Nano-Fabricated Graphene-Al₂O₃ Nanopores and Nanopore Arrays for the Sensitive Detection of DNA and DNA-Protein Complexes", *Technologies for Future Micro and Nano Manufacturing 2011 (MFG11)* (Napa, Ca; August 2011)
28. M. Timmermans, D. Estrada, A. G. Nasibulin, E. Pop, Esko I. Kauppinen "Optimizing Carbon Nanotube Network Morphology for Thin Film Transistors", *International Conference on the Science and Application of Nanotubes 2011 (NT11)* (Cambridge, UK; July 2011)
27. D. Estrada, C.-M. Chin*, D. Ortigara*, E. Pop, "Dissipation and Breakdown in Carbon Nanotube Network Transistors", *International Conference on the Science and Application of Nanotubes 2011 (NT11)* (Cambridge, UK; July 2011)
26. J. Koepke, J. Wood, D. Estrada, E. Pop, J.W. Lyding, "Atomic Scale Electronic Characterization of Grain Boundaries in Graphene Grown by Chemical Vapor Deposition on Copper Foil", *Graphene 2011*, (Bilbao, Spain; April 2011)
25. J. Koepke, D. Estrada, J. Wood, E. Pop, J. Lyding, "The Electronic Structure of Grain Boundaries in Polycrystalline Graphene Grown by Chemical Vapor Deposition", *American Physical Society (APS) March Meeting*, (Dallas, TX; March 2011)
24. J. Koepke, D. Estrada, J. Wood, E. Pop, J. Lyding, "Scanning Tunneling Microscopy Study of Grain Boundaries in Graphene Grown by Chemical Vapor Deposition on Copper Foil", *Materials Research Society (MRS) Spring Meeting*, (San Francisco, CA; April 2011)
23. F. Xiong, A. Liao, M.-H. Bae, D. Estrada, E. Pop, "Integrating Carbon-Based Nanoelectronics with Chalcogenide Phase Change Memory", *IEEE Electron Devices and Solid-State Circuits (EDSSC)*, (Hong Kong; December, 2010)
22. D. Estrada and E. Pop, "Infrared Imaging of Power Dissipation in Carbon Nanotube Network Thin-Film-Transistors", *Society of Hispanic Professional Engineers (SHPE) National Conference*, (Cincinnati, OH; October, 2010) **[Best Paper Award]**
21. D. Estrada and E. Pop, "Infrared Imaging and Thermal Modeling of Carbon Nanotube Network Thin-Film-Transistors", *Hispanic Engineering National Achievement and Awards Conference (HENAAC)* (Orlando, FL; October, 2010) **[Best Poster Award]**
20. D. Estrada, S. Dutta*, A. Liao, E. Pop, "Pulsed characterization for hysteresis-free carbon nanotube mobility measurements", *International Conference on the Science and Application of Nanotubes (NT10)*, (Montreal, CA; June 2010)
19. F. Xiong, A. Liao, D. Estrada, E. Pop, "Ultra-Low Power Phase Change Memory with Carbon Nanotube Interconnects", *IEEE Device Research Conference (DRC)* (Notre Dame, IN; June 2010)

18. S. Dutta*, S. Prakash*, D. Estrada, E. Pop, "A Web Service and Interface for Electronic Device Characterization", *American Society of Engineering Education (ASEE) Annual Conference & Expo*, (Louisville, KY; June 2010)
17. V. Dorgan, M.-H. Bae, Z.-Y. Ong, D. Estrada, E. Pop, "High Field Effects in Graphene: Power Dissipation and Velocity Saturation", *6th Intl. Nanotechnology Conference on Communication and Cooperation (INC)*, (Grenoble, FR; May 2010)
16. M.-H. Bae, Z.-Y. Ong, D. Estrada, E. Pop, "Infrared images of heat dissipation in graphene ambipolar transistors", *Electrochemical Society (ECS) Meeting*, (Vancouver, BC; April 2010) - Invited
15. E. Pop, A. Liao, D. Estrada, Z. Ong and S. Dutta* "Avalanche, Hysteresis, and Energy Dissipation in Carbon Nanotube Devices", *Electrochemical Society (ECS) Meeting*, (Vancouver, BC; April 2010) - Invited
14. M.-H. Bae, Z.-Y. Ong, D. Estrada, E. Pop, "Infrared imaging of power dissipation in graphene field effect transistors", *American Physical Society (APS) March Meeting*, (Portland, OR; Mar 2010)
13. D. Estrada, A. San Miguel*, R. Pecora*, E. Pop, "Tailored ION/IOFF Ratio of Nanotube Network Transistors by Pulsed Breakdown", *IEEE International Semiconductor Device Research Symposium (ISDRS)*, (Washington, DC; December, 2009)
12. D. Estrada, A. San Miguel*, R. Pecora*, E. Pop, "Enhancement of the ION/IOFF Ratio of Carbon Nanotube Network Thin-Film-Transistors", *Society of Hispanic Professional Engineers (SHPE) National Conference*, (Washington, DC; October, 2009) **[Best Poster Award]**
11. E. Pop, M.-H. Bae, D. Estrada, A. Liao, Z.-Y. Ong, F. Xiong, "Energy Efficiency in Nanoscale Electronic Devices", *Nanoelectronics Devices for Defense & Security (NANO-DDS)*, (Ft Lauderdale, FL; October, 2009)
10. M.-H. Bae, Z.-Y. Ong, D. Estrada, E. Pop, "Infrared Microscopy of Joule Heating in Graphene Field Effect Transistors", *IEEE International Conference on Nanotechnology*, (Genoa, Italy; July 2009)
9. D. Estrada, S. Dutta*, A. Liao, E. Pop, "Hysteresis-Free Mobility Measurements of Carbon Nanotube Transistors by Pulsed I-V Characterization", *IEEE Device Research Conference (DRC)*, (State College, PA; June, 2009)
8. E. Pop, S. Dutta*, D. Estrada, A. Liao, "Avalanche, Joule Breakdown and Hysteresis in Carbon Nanotube Transistors", *IEEE International Reliability Physics Symposium (IRPS)*, (Montreal, Canada; April 2009) - Invited
7. D. Estrada, A. Liao, Z.Y. Ong, E. Pop, "Power Dissipation and Heat Transport in Low-Dimensional Materials and Devices", *Center for Nanoscale Science and Technology (CNST) Annual Nanotechnology Workshop*, (Champaign, IL; August 2008)
6. D. Estrada, A. Liao, Z.Y. Ong, E. Pop, "Power Dissipation and Heat Transport in Dimensionally Mismatched Materials and Devices", *6th U.S and Japan Seminar on Nanoscale Transport Phenomena*, (Boston, MA; July 2008)

5. D. Araujo, P. Price, J. Brotherton, D. Estrada, et al, "Self-Assembled Collagen Fibrils as Novel Biomolecular Nanowires for Sensor Applications", *Environmental Sensing Symposium (ESS)*, (Boise, ID; October 2007)
4. D. Estrada*, A. Oblea*, C. Perkins*, D. Araujo, P. Price*, J. Brotherton*, J. Oxford, A.J. Moll, W.B. Knowlton, "Preliminary Investigation of Electrical Characterization Techniques for Biological Nanowire Contacts", *IEEE Workshop for Microelectronics and Electron Devices (WMED)*, (Boise, ID; April 2007) [**Best Poster Award**]
3. D. Estrada*, M. Ogas, T. Gorseth*, W. B. Knowlton, "Investigation of the Effects of Single pMOSFET ultra-Thin Oxide Degradation on NOR Logic Circuit Operability", *IEEE International Integrated Reliability Workshop (IIRW)*, (Lake Tahoe, CA; October 2006)
2. T. L. Gorseth*, D. Estrada*, J. Kiepert*, M. L. Ogas, B. J. Cheek, P.M. Price*, R. J. Baker, G. Bersuker, W.B. Knowlton, "Preliminary Study of NOR Digital Response to Single pMOSFET Dielectric Degradation", *IEEE Workshop for Microelectronics and Electron Devices (WMED)*, (Boise, Idaho; April 2006)
1. D. Estrada*, A. Der Minassians, S.R. Sanders, "Design of a Variable Frequency Control System for a Multiple-Phase Free-Piston Stirling Engine", *Society of Hispanic Professional Engineers (SHPE) National Conference*, (Orlando, FL; January 2006)

Invited Talks and Panels

45. D. Estrada, Additive Manufacturing for Energy Applications, The Minerals, Metals & Materials Society (TMS), San Antonio, TX 2019.
44. D. Estrada, Optical science technologies for advanced security and defence systems, SPIE International Security and Defence Meeting, Berlin, German, Sep. 2018.
43. D. Estrada, American International Meeting on Electrochemistry and Solid State Science, ECS and SMEQ International Meeting, Cancun, MX, Sep. 2018.
42. D. Estrada, In – Space Manufacturing Workshop, Marshal Space Flight Center, Huntsville, AL, Mar. 2018.
41. D. Estrada, InspireME Seminar, Boise State University, Feb. 2018.
40. K. Yocham and D. Estrada, European Advanced Materials Congress, Stockholm, Sweden, Aug. 2017
39. D. Estrada, CAES Materials Science Initiative Working Meeting, Boise, ID, Aug. 2017
38. T. Pandhi and D. Estrada, International Workshop on Thin Films for Electronics, Electro-Optics, Energy and Sensors (TFE3S), Dayton, OH, Jun. 2017
37. D. Estrada, American Advanced Materials Congress, International Association of Advanced Materials (IAAM), Miami, FL, Dec. 2016
36. D. Estrada, Physics Seminar, Boise State University, Boise, ID, Apr. 2016
35. D. Estrada, Organic Electronics Association Meeting, Boise State University, Boise, ID, Feb. 2016
34. D. Estrada, Aerospace Day, Boise State University, Boise, ID, Feb. 2016

33. D. Estrada, Clackamas Community College, NIH Build EXITO Seminar, Clackamas, OR Jan. 2016
32. D. Estrada, Center for Nanotechnology, NASA Ames, Mountain View, CA, Dec. 2015
31. D. Estrada, RISE Symposium, Society of Hispanic Professional Engineers Conference, Baltimore, MD, Nov. 2015
30. D. Estrada, Chemistry Seminar, University of Idaho, Moscow, ID, Oct. 2015.
29. D. Estrada, IEEE International Integrated Reliability Workshop, Fallen Leaf Lake, CA, Oct. 2015.
28. D. Estrada, Sensors Directorate, Air Force Research Laboratory, Wright-Patterson Air Force Base, OH, July 2015.
27. D. Estrada, Keynote Speech, Hispanic Healthcare plus Manufacturing Conference – Northwest Nazarene University, Nampa, ID, April 2015
26. D. Estrada, Chemistry Seminar, Boise State University, Boise, ID, February 2015
25. D. Estrada and M. Gonzalez, STEM Innovations Conference - University of Idaho, Boise, ID, May 2014
24. D. Estrada, University of Illinois at Urbana-Champaign, Nov. 2013
23. D. Estrada, Graduate Institute, Society of Hispanic Professional Engineers Conference, Indianapolis, IN, Oct. 2013
22. D. Estrada, Northwest Nazarene University, Nampa, ID, Oct. 2013
21. D. Estrada, Louis Stokes Alliance for Minority Participation (LSAMP) Leadership Retreat, Boise State University, Boise, ID, Aug. 2013
20. D. Estrada, STEM Station Summer Research Community – Applying to Graduate School, Boise State University, Boise, ID, Jul. 2013
19. D. Estrada, Workshop on Ethnic Diversity in Materials Science and Engineering, Arlington, VA, Dec. 2012
18. D. Estrada, Engineering Research Symposium, Society of Hispanic Professional Engineers Conference, Dallas, TX, Nov. 2012
17. D. Estrada, Morrill Engineering Program System of Success Retreat, University of Illinois at Urbana-Champaign, Bloomington, IL, Sep. 2012
16. J.-W. Do, D. Estrada, X. Xie, N. Chang, G. Girolami, J. Rogers, E. Pop, J. W. Lyding, IEEE International Conference on Nanotechnology, Birmingham, UK, July 2012
15. J. C. Koepke, J. D. Wood, D. Estrada, Z.-Y. Ong, E. Pop, and J.W. Lyding, IEEE International Conference on Nanotechnology, Birmingham, UK, July 2012
14. J. Shim, V. Solovyeva, D. Estrada, S. Banerjee, J. Rivera, E. Pop, and R. Bashir, IEEE International Conference on Nanotechnology, Birmingham, UK, July 2012
13. D. Estrada, Materials Science and Engineering Seminar, Boise State University, Boise, ID, May 2012

12. D. Estrada, Tomorrow's Scientists, Technicians and Managers & Project Ready Conference, Quad County Urban League, Chicago, IL, June 2012
11. A.Y. Serov, Z. Li, K.L. Grosse, A.D. Liao, D. Estrada, M.-H. Bae, F. Xiong, W.P. King, 11. E. Pop, IEEE International Conference on IC Design and Technology (ICICDT), Austin, TX, May 2012
10. D. Estrada, Nanohours Seminar, Beckman Institute for Advanced Science and Technology, University of Illinois at Urbana-Champaign, Urbana, IL, Nov. 2011
9. D. Estrada, Nanoscale Materials and Device Group, Boise State University, Boise, ID, Aug. 2011
8. D. Estrada, Region 6 Leadership Development Conference, Society of Hispanic Professional Engineers, Chicago, IL, April 2011
7. D. Estrada and E. Pop, Raman Characterization Workshop, Argonne Nat'l Labs, Argonne, IL, Oct. 2010
6. D. Estrada, Nanoscale Energy Transport Seminar, University of Illinois, Urbana, IL, Oct. 2010
5. M.-H. Bae, Z.-Y. Ong, D. Estrada, E. Pop, 217th ECS Meeting, Vancouver BC, Canada, Apr 2010
4. E. Pop, A. Liao, D. Estrada, Z.-Y. Ong, S. Dutta, 217th ECS Meeting, Vancouver BC, Canada, Apr 2010
3. E. Pop, S. Dutta, D. Estrada, and A. Liao, IEEE Intl. Reliability Physics Symp. (IRPS), Montreal CA, Apr 2009
2. D. Estrada, Materials Science and Engineering Seminar, Boise State University, Boise, ID, Sep. 2006
1. D. Estrada, Mexican American Studies Conference, Boise State University, Boise, ID, Mar. 2006

Intellectual Property

- T. Pandhi, D. Estrada, J. Koehne, "Fully Inkjet Printed Graphene-Based Biosensor for Flexible and Wearable Electronics" U.S. Patent Application Serial. No. 62/672,730.
- J. Watkins, A. Elquist, C. Warren, P. Riggs, D. Estrada, K. Fujimoto, H. Subbaraman, "Systems and Methods for Strain Sensing Using Aerosol Jet Printing of Flexible Capacitive Strain Gauges," U.S. Patent Application Serial. No. 15/970,380
- D. Brown, and D. Estrada, "Methods for the production of nanostructured coatings, films, and powders and for the production of nanostructured bulk materials", Provisional Patent Application 19975.046US00
- R. I. Masel, A. Salehi-Khojin, and D. Estrada, "Graphene-Based Sensors", United States Patent Application 20120212242

Students and Post-Docs Supervised

- *Postdoctoral Researchers*
Eric Krueger 2014 – 2015

- *Graduate Students*

**indicates completion of comprehensive exam and dissertation proposal*

Florent Muramatsa	Ph.D. MSE, expected graduation 2022
Kiyo Fujimoto	Ph.D. MSE, expected graduation 2021
*Courtney Hollar	Ph.D. ME, expected graduation 2019
*Twinkle Pandhi	Ph.D. MSE, expected graduation 2019
*Tony Varghese (co-advised)	Ph.D. MSE, expected graduation 2018
Roxanne Stone	M.S. Interdisc. Studies – BME, expected graduation 2020
Naqsh-e-Mansoor	M.S. MSE, expected graduation 2019
Katie Yocham	M.S. MBE, Dec. 2017
Nikki Chang	M.S. MSE, Aug. 2016
Dale Brown	M.S. MSE, Dec. 2015

- *Undergraduate Students*

Angel Rodriguez	B.S. MBE, expected graduation 2019
Lynn Karriem	B.S. MSE, expected graduation 2019
Brady Garringer	B.S. MSE, expected graduation 2019
Alondra Perez	B.S. MBE, May 2018
Riccardo Torsi	B.S. MSE, May 2018
Emily Tanasse	B.S. MBE, May 2017
Kari McLaughlin	B.S. MSE, May 2016
Noelia Caloca	B.S. MBE, Dec. 2015
Hanna Meinikheim	B.S. CHEM, Dec. 2014
Richard Livingston	B.S. MBE, Dec. 2014

Summer Students

Jason Ward	NIH B2B, Summer 2018
Casey Cornwell	MSE REU, Summer 2018
Nate Ortiz	INBRE, Summer 2017
Katarzyna A Lewandowska	MSE REU, Summer 2017
Conor Perry	MSE REU, Summer 2016
Benjamin Knipfer	MSE REU, Summer 2015
Curtis Heishman	MSE REU, Summer 2014

- *STEM Educators*

James Presnell	MSE RET, Summer 2018
Jim Verity	MSE RET, Summer 2015
Alison Fielding	MSE RET, Summer 2014

- *Master's Supervisory Committees*

Courtney Hollar	MBE, Aug. 2016
Rici Morrill	MBE, Aug. 2016

- *Doctoral Supervisory Committees*

Ashita Chandnani	ECE, expected graduation 2020
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Sepideh Rastegar	ECE, expected graduation 2020
Christopher Schuck	MSE, expected graduation 2019
Changjian Deng	MSE, expected graduation 2019
Steve Letourneau	MSE, May 2018
Izaak Williamson	MSE, May 2017

Former Advisors

M.S. Thesis: Eric Pop, University of Illinois at Urbana-Champaign

Ph.D. Dissertation: Eric Pop, University of Illinois at Urbana-Champaign;

Postdoctoral Sponsor: Rashid Bashir, University of Illinois at Urbana-Champaign

CURRICULUM VITAE

Name: Matthew L. Ferguson

Citizenship: United States

Education:

1997 B.S. (Physics & Mathematics), Texas Christian University, Fort Worth, Texas
2002 M.S. (Physics), University of Maryland, College Park, Maryland
2007 Ph.D.(Physics), University of Maryland, College Park, Maryland

Brief Chronology of Employment:

1994-1997 Undergraduate Research Assistant, Department of Physics & Astronomy, Texas Christian University
1997-1999 Operations Research Analyst, Aeronautical Engineering, Lockheed Martin Tactical Aircraft Systems
1999-2000 Graduate Teaching Assistant, Department of Physics, University of Maryland College Park
2001-2003 Graduate Research Assistant, Institute for Research in Electronics and Applied Physics, University of Maryland College Park
2003-2007 Predoctoral IRTA, Laboratory of Integrative and Medical Biophysics, National Institute of Child Health and Human Development, NIH, Bethesda, MD
2007-2011 Postdoctoral Fellow, Centre de Biochimie Structurale, Centre National de Recherche Scientifique, Montpellier, France
2011-2013 Postdoctoral CRTA, Laboratory of Receptor Biology and Gene Expression, National Cancer Institute, NIH, Bethesda, MD
2013-present Assistant Professor of Physics, Boise State University, Boise, ID

Societies:

American Physical Society
Biophysical Society
American Chemical Society
American Society for Cell Biology

Honors and Other Special Scientific Recognition:

- Best Score on National Math Exam, Southwest High School, 1993
- Magna Cum Laude, Texas Christian University, 1997
- Senior Scholar in Physics, Texas Christian University, 1997
- Phi Beta Kappa, 1997
- Pi Mu Epsilon (National Mathematics Honors Society), 1997
- Golden Key, 1997
- Teaching Assistant of the Year, 2nd place, Department of Physics, University of Maryland, 2000
- Best Poster, Burgers Symposium, University of Maryland, College Park, MD, 2005
- NSF International Research Fellowship, The Physical Basis of Transcription in Bacilli. (OISE-0710816, \$92k), 2007
- Long Term Fellowship, (660-2008, €28k), EMBO 2009
- Marie Curie - Incoming International Fellowship (237835, InVivoTrnsReg, €166k), European Commission, 2010
- Trio Achiever Award, McNair Program, Texas Christian University, March 2013.
- Keystone Symposia Early Career Investigator Travel Award, January 2014.
- Biophysical Society Bridge Funding Travel Award, March 2016.

- Scialog - Molecules Come to Life, Invited to Participate by Research Corporation, March 2016.
- Reviewer for Analytical Biochemistry, CRC press, Physical Biology, Biophysical Journal
- Session Chair for APS March Meeting, 2013 and Biophysical Society Meetings, 2011 and 2014
- Panel reviewer for National Science Foundation since 2017 and Ad-Hoc for Human Science Frontiers Program in 2017

Research Interests:

The application of quantitative time resolved, live cell fluorescence microscopy to the study of genome biology in Eukaryotes.

Non-academic Training

- 2001 NSF [Summer School on Nonequilibrium Statistical Physics](#), Boulder CO
- 2003-2007 Graduate Partnership Program, [National Institutes of Child Health and Human Development](#), Bethesda, MD (w/ Ralph J. Nossal)
- 2007 BIOSAS: [Course on Biomacromolecules in Solution Studied by Small-Angle Scattering](#), Copenhagen DK
- 2007-20011 NSF/EMBO/Marie Currie Postdoctoral Fellow, [Centre de Biochimie Structurale](#), Montpellier, FR (w/ Catherine A. Royer)
- 2011-2013 National Cancer Institute Postdoctoral Fellow, [Systems Biology of Gene Expression](#), Bethesda, MD (w/ Daniel R. Larson)
- 2012 GENEX 2012: [Course on Eukaryotic Gene Expression](#), Cold Spring Harbor Laboratory, NY
- 2017 12th LFD Workshop: [Laboratory for Fluorescence Dynamics](#), Irvine, CA

Patents Issued:

US Patent, 1997 - Porous sol-gel glass: Application in slow drug delivery

BIBLIOGRAPHY

1. Sieminska, L., Ferguson, M., Zerda, T. W., and Couch, E. (1997) [Diffusion of steroids in porous sol-gel glass: Application in slow drug delivery](#), Journal of Sol-Gel Science and Technology 8, 1105-1109.
2. Ferguson, M. L., Miller, B. N., and Thompson, M. A. (1999) [Dynamics of a gravitational billiard with a hyperbolic lower boundary](#), Chaos 9, 841-848.
3. Pomerance, A., Matthews, J., Ferguson, M., Urbach, J. S., and Losert, W. (2005) [Actin polymerization in a thermal gradient](#), Macromolecular Symposia 227, 231-242.
4. Ferguson, M. L., Prasad, K., Sackett, D. L., Boukari, H., Lafer, E. M., and Nossal, R. (2006) [Conformation of a Clathrin Triskelion in Solution](#), Biochemistry 45, 5916-5922.
5. Ferguson, M. L., Prasad, K., Boukari, H., Sackett, D. L., Krueger, S., Lafer, E. M., and Nossal, R. (2008) [Clathrin Triskelia Show Evidence of Molecular Flexibility](#), Biophysical Journal, 95(4), 1945-1955.
6. Savatier, J., S. Jalaguier, M. L. Ferguson, V. Cavailles, and C. A. Royer. (2010) [Estrogen Receptor Interactions and Dynamics Monitored in Live Cells by FCCS](#). Biochemistry 49(4), 772-781
7. Chaix, D., M. L. Ferguson, N. Declerck, C. A. Royer. (2010) [Physical basis of the inducer-dependent cooperativity of the CggR protein/DNA complex](#), Nucleic Acids Research, 38(17) 5944-5957
8. Ferguson, M. L., D. Le Coq, M. Jules, N. Declerck, C. A. Royer. (2011) [Absolute quantification of gene expression in individual bacterial cells using two-photon fluctuation microscopy](#), Analytical Biochemistry, 419(2), 250-259
9. Ferguson, M. L., D. Le Coq, M. Jules, B. Chun, S. Aymerich, O. Radulescu, N. Declerck, C. A. Royer. (2011) [Reconciling molecular regulatory mechanisms with](#)

- [*noise patterns of bacterial metabolic promoters in induced and repressed states*](#), PNAS, 109(1), 155-160
10. Ferguson, M. L., and D. R. Larson. (2013) “Measuring Transcription Dynamics in Living Cells Using Fluctuation Analysis.” In *Imaging Gene Expression: Methods and Protocols*, edited by Y. ShavTal, 1042, 47–60.
 11. Coulon* A, Ferguson* ML, de Turrís V, Palangat M, Chow CC, Larson DR. (2014) [*Kinetic competition during the transcription cycle results in stochastic RNA processing*](#). eLife, 3. doi:10.7554/eLife.03939. (*authors contributed equally)
 12. Moutin E, Compan V, Raynaud F, ClerTE C, Bouquier N, Labesse G, Ferguson ML, Fagni L, Royer CA, Perroy J. (2014) [*The stoichiometry of scaffold complexes in living neurons-DLC2 functions as a dimerization engine for GKAP*](#). Journal of Cell Science, 127: 3451–62.
 13. Panchapakesan SSS, Ferguson ML, Hayden EJ, Chen X, Hoskins AA, Unrau PJ. [*Ribonucleoprotein Purification and Characterization using RNA Mango*](#). RNA. 2017

Talks

1. Department of Cellular and Molecular Biology, University of Texas Southwestern Medical Center, Dallas, TX, Spring 2018
2. Laboratory of Receptor Biology and Gene Expression, National Cancer Institute, Bethesda, MD, Fall 2017
3. Simon Fraser University, Burnaby BC, Fall 2017
4. Colorado State University, Fort Collins, CO, Spring, 2017
5. J. R. Simplot, October 2016, Boise, ID, Quantifying Gene Expression and Regulation in Living Cells by Fluorescence Fluctuation Imaging.
6. Physics Seminar, Brigham Young University, March 2016, Provo, UT, Quantifying Gene Expression and Regulation in Living Cells by Fluorescence Fluctuation Imaging.
7. Chemistry Seminar, Boise State University, February 2016, Boise, ID, Characterizing Transcription and Splicing Kinetics by 3D Orbital Tracking.
8. Physics Seminar, Boise State University, December 2015, Boise, ID, Characterizing Transcription and Splicing Kinetics by 3D Orbital Tracking.
9. Biomedical and Pharmaceutical Sciences Seminar, Idaho State University, October 2015, Meridian, ID, Quantifying Gene Expression and Regulation in Living Cells by Fluorescence Fluctuation Imaging.
10. Biomolecular Sciences Seminar, Boise State University, October 2015, Boise, ID, Quantifying Gene Expression and Regulation in Living Cells by Fluorescence Fluctuation Imaging.
11. NICHD Program in Physical Biology Seminar, National Institutes of Health, June 2015, Bethesda, MD, Characterization of Transcription and Splicing by 3D Orbital Tracking.
12. Physics Seminar, Idaho State University, April 2015, Pocatello, ID, Quantifying Gene Expression and Regulation in Living Cells by Fluorescence Fluctuation Imaging.
13. Physics Seminar, University of Idaho, October 2014, Moscow, ID, Quantifying Gene Expression and Regulation in Living Cells by Fluorescence Fluctuation Imaging.
14. Biophysical Society 58th Annual Meeting (session chair), February 2014, San Francisco, CA, In vivo RNA imaging of co- and post-transcriptional splicing dynamics.
15. Physics Seminar, Boise, State University, Boise, ID, March 2013, Quantifying Gene Expression and Regulation in Living Cells by Fluorescence Fluctuation Imaging
16. Physics Seminar, University of Arkansas, Fayetteville, AK, February 2013, Quantifying Gene Expression and Regulation in Living Cells by Fluorescence Fluctuation Imaging
17. EMBO Fellows Meeting, Heidelberg, Germany, June 2011, Two Types of Transcriptional Repression in Living Cells of Bacillus Subtilis Characterized by Number and Brightness Analysis.
18. Biophysical Society 55th Annual Meeting (session chair), March 2011, Baltimore, MD, Two Types of Transcriptional Repression in Living Cells of Bacillus Subtilis Characterized by Number and Brightness Analysis.

19. Methods and Applications in Fluorescence Spectroscopy 11, Sept. 2009, Budapest, Hungary, Fluorescence Correlation Spectroscopy In Live *Bacillus Subtilis* Cells: An In Vivo Study Of Transcriptional Regulation.
20. BioSAS 2007: Copenhagen Symposium on Biomacromolecules in Solution Studied by Small-Angle Scattering, November 2007, Copenhagen, DK, Biophysical Studies of Clathrin: Utilizing Light Scattering, Neutron Scattering and Structure Based Computer Modeling.
21. Membrane Biophysics of Fusion, Fission, and Rafts in Health and Disease, September 2007, Wood's Hole, MA, Biophysical Studies of Clathrin: Utilizing Light Scattering, Neutron Scattering and Structure Based Computer Modeling.
22. Centre de Biochimie Structurale, May 2007, Montpellier, FR, Biophysical Studies of Clathrin: Utilizing Light Scattering, Neutron Scattering and Structure Based Computer Modeling.
23. The Scripps Research Institute, April 2007, La Jolla, CA, Biophysical Studies of Clathrin: Utilizing Light Scattering, Neutron Scattering and Structure Based Computer Modeling.
24. Texas Christian University, March 2007, Fort Worth, TX, Biophysical Studies of Clathrin: Utilizing Light Scattering, Neutron Scattering and Structure Based Computer Modeling.
25. UT Southwest Medical Center, March 2007, Dallas, TX, Biophysical Studies of Clathrin: Utilizing Light Scattering, Neutron Scattering and Structure Based Computer Modeling.
26. PhD Dissertation Defense, February 2007, University of Maryland, College Park, MD, Biophysical Studies of Clathrin: Utilizing Light Scattering, Neutron Scattering and Structure Based Computer Modeling.
27. Graduate Student Seminar, February 2007, Institute for Research in Electronics and Applied Physics, University of Maryland, College Park, MD, Biophysical Studies of Clathrin: Utilizing Light Scattering, Neutron Scattering and Structure Based Computer Modeling.
28. American Physical Society March Meeting, March 2006, Baltimore, MD, The Conformation of a Clathrin Triskelion.
29. American Physical Society, March 2005, Los Angeles, CA, The effect of solution conditions on the conformation of clathrin triskelion.
30. Applied Dynamics Seminar, Aug. 2004, IREAP, University of Maryland College Park, MD, Solution Conformations of Clathrin Triskelions. (Dissertation Research Proposal)
31. American Physical Society, March 2002, Indianapolis, IN, Pattern Formation in Polymer Blend Thin Films.

Posters

1. Scialog – Molecules Come to Life, March 2017, Tucson, AZ, In vitro Binding of 6S RNA Mango to RNA Polymerase by two photon Fluorescence Cross Correlation Spectroscopy.
2. Biophysical Society 61st Annual Meeting, March 2017, New Orleans, LA, In vitro Binding of 6S RNA Mango to RNA Polymerase by two photon Fluorescence Cross Correlation Spectroscopy.
3. Scialog – Molecules Come to Life, March 2016, Tucson, AZ, Characterizing Transcription and Splicing Kinetics by 3D Orbital Tracking.
4. Biophysical Society 60th Annual Meeting, March 2016, Los Angeles, CA, Characterizing Transcription and Splicing Kinetics by 3D Orbital Tracking.
5. Keystone Symposium on Nuclear Receptors: Biological Networks, Genome Dynamics and Disease, Taos, NM, January 2014, Determining the oligomerization state and cofactor binding of fluorescently labeled nuclear receptors in living cells.
6. UMD-NCI Partnership for Cancer Technology Workshop, November 2011, Bethesda, MD Gene Expression and Regulation in single *Bacillus subtilis* cells Characterized by Number and Brightness analysis (N&B) and Raster Image Correlation Spectroscopy (RICS).

7. UMD-NCI Partnership for Cancer Technology Workshop, March 2011, College Park, MD, Counting up the Molecules in Live *Bacillus Subtilis* by Fluctuation Imaging and Analysis: an in vivo study of transcriptional regulation.
8. Biophysical Society Meeting, Feb. 2010, San Fransisco, CA, Counting up the Molecules in Live *Bacillus Subtilis* by Fluctuation Imaging and Analysis: an in vivo study of transcriptional regulation.
9. European Biophysical Society Meeting, 2009, Genoa, Italy, Fluorescence Correlation Spectroscopy In Live *Bacillus Subtilis* Cells: An In Vivo Study Of Transcriptional Regulation.
10. The Biophysical Society Meeting, Feb. 2009, Boston, MA, Fluorescence Correlation Spectroscopy In Live *Bacillus Subtilis* Cells: An In Vivo Study Of Transcriptional Regulation.
11. Societie Francais Biophysique, Sept. 2008, Figeac, France, Fluorescence correlation spectroscopy in *Bacillus subtilis*.
12. Optical Microscopy in Good Shape, June 2008, Paris, France, FCS in live *Bacillus subtilis* cells.
13. Biophysical Society Meeting, Feb. 2007, Baltimore, MD, Small Angle Neutron Scattering studies of clathrin triskelia in solution show evidence of molecular flexibility.
14. NICHD Lab of Integrative and Medical Biophysics/Lab of Physical and Structural Biology Retreat, March 2006, Harpers Ferry, WV, The Conformation of a Clathrin Triskelion.
15. NICHD Fellows Retreat, March 2006, College Park, MD, The Conformation of a Clathrin Triskelion.
16. American Society for Cell Biology, December 2005, San Francisco, CA, The Conformation of a Clathrin Triskelion.
17. Burgers Symposium, Nov. 2005, University of Maryland College Park, MD, The Conformation of a Clathrin Triskelion. (Best Poster Award \$)
18. Lab of Integrative and Medical Biophysics/Lab of Physical and Structural Biology Retreat, March 2005, Harpers Ferry, WV, The effect of solution conditions on the conformation of clathrin triskelion.
19. Biophysical Society, Feb. 2005, Long Beach, CA, The effect of solution conditions on the conformation of clathrin triskelion.
20. Burgers Symposium on Hydrodynamics, Nov. 2004, University of Maryland College Park, MD, Solution Conformations of Clathrin Triskelions.
21. NIH Research Festival, Oct. 2004, Bethesda, MD, Solution Conformations of Clathrin Triskelions.
22. NIH Graduate Student Retreat, Sept. 2004, Coolfont, WV, Solution Conformations of Clathrin Triskelions.
23. Lab of Integrative and Medical Biophysics/Lab of Physical and Structural Biology Retreat, March 2004, Harpers Ferry, WV, Solution Conformations of Clathrin Triskelions.
24. Biophysical Society Meeting, Feb. 2004, Baltimore, MD, Solution Conformations of Clathrin Triskelions.
25. Bioscience Day, Dec. 2003, University of Maryland College Park, MD, Solution Conformations of Clathrin Triskelions.
26. Dynamics Days, Jan. 2002, Baltimore, MD, Pattern Formation in Polymer Blend Thin Films.
27. Boulder Summer NSF School in Condensed Matter Physics: Nonequilibrium Statistical Mechanics, June 2001, Boulder, CO, Pattern Formation in Polymer Blend Thin Films.

Clare K. Fitzpatrick, PhD

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Education

2008	Ph.D.	Mechanical Engineering, University College Dublin, Ireland
2003	BE	Mechanical Engineering, University College Dublin, Ireland

Professional Appointments / Experience

2016 –	Assistant Professor, Mechanical & Biomedical Engineering, Boise State University, Boise, ID
2015 –	Orthopaedic Residency Faculty, Mount Carmel Health System, Columbus, OH
2011 – 2016	Senior Research Engineer, University of Denver, Denver, CO
2009 – 2011	Post-doctoral Research Fellow, University of Denver, Denver, CO
2008 – 2009	Post-doctoral Research Fellow, University College Dublin, Dublin, Ireland
2003 – 2007	Graduate Research Assistant, University College Dublin, Dublin, Ireland

Professional Associations / Societies / Honors and Awards

Member, Orthopaedic Research Society (ORS)

Member, European Society of Biomechanics (ESB)

GCMAS Best Paper Award Nominee (2018): Erika Ramirez (MS student) was awarded Best Podium Presentation at the Gait & Clinical Movement Analysis Society (GCMAS) annual meeting and nominated for Best Paper (Role: Thesis Advisor).

Graduate Student Showcase (2018): Victoria Volk (PhD student) was awarded a Division of Research and Economic Development Award at Boise State’s Graduate Student Showcase (Role: Dissertation Advisor).

Idaho INBRE Research Conference (2017): Colton Brodock (UG student) was awarded 1st Place in the Scholars/STEM Transition Trainees poster competition (Role: Project Mentor).

“Best of the ORS” (2016): Abstract submitted to the Orthopaedic Research Society Annual Meeting titled “Relationship between Patella Alta, MPFL Elongation, and Patellar Dislocation” was the top scored ORS abstract in the Knee category and an invited presentation at the American Academy of Orthopaedic Surgeons (AAOS) Annual Meeting.

“Best of the ORS” (2015): Abstract submitted to the Orthopaedic Research Society Annual Meeting titled “Factors influencing TKR joint mechanics in the varus knee” was the top scored ORS abstract in the Knee category and an invited presentation at the American Academy of Orthopaedic Surgeons (AAOS) Annual Meeting.

Flinders International Visiting Fellowship Award (2013): Awarded funding from Flinders University

(Adelaide, Australia) for collaborative research

JOR Featured Article (2013): Article titled “Mechanics of post-cam engagement during simulated dynamic activity” was the Journal of Orthopaedic Research (JOR) featured article in the July 2013 issue of ORS Connect.

University College Dublin Funding Award (2008): Young researchers with potential for research excellence

Scholarly Activity

Peer-Reviewed Journal Articles

1. Ramirez EB, Rhodes J, Tagawa A, and **Fitzpatrick CK**, “The impact of surgery on patellar bone strain in patients with crouch gait”. *Gait & Posture*, in review.
2. Myers CA, **Fitzpatrick CK**, Huff DN, Laz PJ, and Rullkoetter PJ, “Development and calibration of a probabilistic finite element hip capsule representation”. *Computer Methods and Biomechanics and Biomedical Engineering*, in review.
3. VanSickle D, Volk V, Freeman P, Henry J, Baldwin M, and **Fitzpatrick CK**, “Electrode placement accuracy in robot-assisted asleep deep brain stimulation”. *Annals of Biomedical Engineering*, in review.
4. Smoger LM, **Fitzpatrick CK**, and Laz PJ, “Prediction of knee articular cartilage from bone geometry using a statistical shape model”. *Journal of Biomechanics*, in review.
5. Sintini I, **Fitzpatrick CK**, Clary CW, Castelli VP, and Rullkoetter PJ, 2018. “Computational evaluation of TKR stability using feedback-controlled compressive loading”. *Journal of Orthopaedic Research*, 36, 1901-1909.
6. Rullkoetter PJ, **Fitzpatrick CK**, and Clary CW, 2017. “How can we use computational modeling to improve TKA? Modeling stability and mobility in the implanted knee”. *Journal of American Academy of Orthopaedic Surgeons*, 25, S33-S39.
7. **Fitzpatrick CK**, Maag C, Clary CW, Metcalfe A, Langhorn J, and Rullkoetter PJ, 2016. “Validation of a new computational 6-DOF knee simulator during dynamic activities”. *Journal of Biomechanics*, 49, 3177-3184.
8. Harris MD, Cyr AJ, Ali AA, **Fitzpatrick CK**, Rullkoetter PJ, Maletsky LP, and Shelburne KB, 2016. “A combined experimental and computational approach to subject-specific analysis of knee joint laxity”. *Journal of Biomechanical Engineering*, 138, 081004-1-081004-8.
9. Navacchia A, Rullkoetter PJ, Schutz P, List R, **Fitzpatrick CK**, and Shelburne KB, 2016. “Subject-specific multiscale modeling of muscle force and knee contact in total knee arthroplasty”. *Journal of Orthopaedic Research*, 34, 1576-1587.
10. Ali AA, Shalhoub S, Cyr A, **Fitzpatrick CK**, Maletsky L, Rullkoetter PJ, and Shelburne KB, 2016. “Validation of predicted patellofemoral mechanics in a finite element model of the healthy and cruciate-deficient knee”. *Journal of Biomechanics*, 49, 302-309.
11. Berahmani S, Janssen D, Wolfson D, de Waal Malefijt M, **Fitzpatrick CK**, Rullkoetter PJ, and Verdonschot N, 2016. “An FE analysis of the effects of simplifications in experimental testing on micromotions of uncemented femoral knee implants”. *Journal of Orthopaedic Research*, 34, 812-819.
12. **Fitzpatrick CK**, Steensen RN, Tumuluri A, Trinh T, Bentley J, and Rullkoetter PJ, 2016. “Computational analysis of factors contributing to patellar dislocation”. *Journal of Orthopaedic Research*, 34, 444-453.
13. Smoger LM, **Fitzpatrick CK**, Clary CW, Cyr AJ, Maletsky LP, Rullkoetter PJ, and Laz PJ, 2015. “Statistical modeling to characterize relationships between knee anatomy and kinematics”. *Journal of Orthopaedic Research* 33, 1620-1630.

14. **Fitzpatrick CK**, and Rullkoetter PJ, 2014. "Estimating total knee replacement joint load ratios from kinematics". *Journal of Biomechanics* 47, 3003-3011.
15. **Fitzpatrick CK**, Komistek RD, and Rullkoetter PJ, 2014. "Developing simulations to reproduce in vivo fluoroscopy kinematics in total knee replacement patients". *Journal of Biomechanics* 47, 2398-2405.
16. **Fitzpatrick CK**, Hemelaar P, and Taylor M, 2014. "Computationally efficient prediction of bone-implant interface micromotion of a cementless tibial tray during gait". *Journal of Biomechanics* 47, 1718-1726.
17. Abo-Alhol TR, **Fitzpatrick CK**, Clary CW, Cyr AJ, Maletsky LP, Laz PJ, and Rullkoetter PJ, 2014. "Patellar mechanics during simulated kneeling in the natural and implanted knee". *Journal of Biomechanics* 47, 1045-1051.
18. **Fitzpatrick CK**, Baldwin MA, Clary CW, Maletsky LP, and Rullkoetter PJ, 2014. "Evaluating knee replacement mechanics during ADL with PID-controlled dynamic finite element analysis". *Computer Methods in Biomechanics and Biomedical Engineering* 17, 360-369.
19. Rao C, **Fitzpatrick CK**, Rullkoetter PJ, Maletsky LP, Kim R, and Laz PJ, 2013. "A statistical finite element model of the knee accounting for shape and alignment variability". *Medical Engineering and Physics* 35, 1450-1456.
20. **Fitzpatrick CK**, Clary CW, Cyr A, Maletsky LP, and Rullkoetter PJ, 2013. "Mechanics of post-cam engagement during simulated dynamic activity". *Journal of Orthopaedic Research* 31, 1438-1446.
21. **Fitzpatrick CK**, Kim R, Ali AA, Smoger LM, and Rullkoetter PJ, 2013. "Effects of resection thickness on mechanics of resurfaced patellae". *Journal of Biomechanics* 46, 1568-1575.
22. Clary CW, **Fitzpatrick CK**, Maletsky LP, and Rullkoetter PJ, 2013. "The influence of total knee arthroplasty geometry on mid-flexion stability: An experimental and finite element study". *Journal of Biomechanics* 46, 1351-1357.
23. **Fitzpatrick CK**, Clary CW, Laz PJ, and Rullkoetter PJ, 2012. "Relative contributions of design, alignment and loading variability in knee replacement mechanics". *Journal of Orthopaedic Research* 30, 2015-2024.
24. **Fitzpatrick CK**, Clary CW, and Rullkoetter PJ, 2012. "The role of patient, surgical, and implant design variation in total knee replacement performance". *Journal of Biomechanics* 45, 2092-2102.
25. **Fitzpatrick CK**, and Rullkoetter PJ, 2012. "Influence of patellofemoral articular geometry and material on mechanics of the unresurfaced patella". *Journal of Biomechanics* 45, 1909-1915.
26. Hoops HE, Johnson D, Kim R, Dennis DA, Baldwin MA, **Fitzpatrick CK**, Laz PJ, and Rullkoetter PJ, 2012. "Control-matched computational evaluation of tendo-femoral contact in patients with PS TKA". *Journal of Orthopaedic Research* 30, 1355-1361.
27. **Fitzpatrick CK**, Baldwin MA, Clary CW, Wright A, Laz PJ, and Rullkoetter PJ, 2012. "Identifying alignment parameters affecting implanted patellofemoral mechanics". *Journal of Orthopaedic Research* 30, 1167-1175.
28. Baldwin MA, Clary C, **Fitzpatrick CK**, Deacy JS, Maletsky LP, and Rullkoetter PJ, 2012. "Dynamic finite element knee simulation for evaluation of knee replacement mechanics". *Journal of Biomechanics* 45, 474-483.
29. **Fitzpatrick CK**, Baldwin MA, Laz PJ, FitzPatrick DP, Lerner AL, and Rullkoetter PJ, 2011. "Development of a statistical shape model of the patellofemoral joint for investigating relationships between shape and function". *Journal of Biomechanics* 44, 2446-2452.
30. **Fitzpatrick CK**, Baldwin MA, Ali AA, Laz PJ, and Rullkoetter PJ, 2011. "Comparison of patellar bone strain in the natural and implanted knee during simulated deep flexion". *Journal of Orthopaedic Research* 29, 232-239.

31. **Fitzpatrick CK**, Baldwin MA, Rullkoetter PJ, and Laz PJ, 2011. “Combined probabilistic and principal component analysis approach for multivariate sensitivity evaluation and application to TKR patellofemoral mechanics”. *Journal of Biomechanics* 44, 13-21.
32. Green CJ, Flavin R, **Fitzpatrick CK**, FitzPatrick D, Stephens M, and Quinlan W, 2011. “Definition of coordinate system for three-dimensional data analysis in the foot and ankle”. *Foot and Ankle International*, 32, 193-199.
33. **Fitzpatrick CK**, Baldwin MA, and Rullkoetter PJ, 2010. “Computationally efficient finite element evaluation of natural patellofemoral mechanics”. *Journal of Biomechanical Engineering* 132:121013-1-121013-8.
34. Green C, Molony D, **Fitzpatrick CK**, O’Rourke K, 2010. “Age-specific incidence of hip fracture in the elderly: a healthy decline”. *Surgeon* 8, 310-313.
35. Daruwalla ZJ, Courtis P, **Fitzpatrick CK**, FitzPatrick D, and Mullett H, 2010. “An application of principal component analysis to the clavicle and clavicle fixation devices”. *Journal of Orthopaedic Surgery and Research* 26, 5-21.
36. Daruwalla ZJ, Courtis P, **Fitzpatrick CK**, FitzPatrick D, and Mullett H, 2010. “Anatomic variation of the clavicle: A novel three-dimensional study”. *Clinical Anatomy* 23, 199-209.
37. **Fitzpatrick CK**, FitzPatrick DP, and Auger DD, 2008. “Size and shape of the resection surface geometry of the osteoarthritic knee in relation to total knee replacement design”. *Proceedings from the Institute of Mechanical Engineers Part H* 222, 923-932.
38. **Fitzpatrick CK**, FitzPatrick D, Lee J, and Auger D, 2007. “Statistical design of unicompartmental tibial implants and comparison with current devices”. *Knee* 14, 138-144.
39. **Fitzpatrick CK**, FitzPatrick D, Auger D, and Lee J, 2007. “A tibial-based coordinate system for three-dimensional data”. *Knee* 14, 133-137.

Book Chapters

1. **Fitzpatrick CK**, Harman M, Baldwin MA, Clary CW, Maletsky LP, Laz PJ, and Rullkoetter PJ, 2015. “Toward Predicting the Performance of Joint Arthroplasty”, *Computational Bioengineering*, CRC Press, Taylor & Francis Group. (ISBN 978-1-4665-1756-1).
2. **Fitzpatrick CK**, Baldwin MA, Ali AA, Laz PJ, and Rullkoetter PJ, 2011. “Does Strain in the Patella Change After TKA? A Finite Element Investigation of Natural and Implanted Patellae”, *Insall-Scott Surgery of the Knee*, 5th edition. (ISBN 978-1-4377-1503-3).

Peer-Reviewed Conference Publications (most recent 30 publications from a total of 81)

1. Rullkoetter PJ (Invited Keynote Speaker), Clary CW, and **Fitzpatrick CK**, 2018. “Do pre-clinical tools for evaluation of TKR mechanics predict in vivo performance?”, 8th World Congress of Biomechanics, Dublin, Ireland, July 2018.
2. Milholland A, Ramirez E, Rhodes J, Tagawa A, and **Fitzpatrick CK**, 2018. “Effect of corrective surgery on lower limb mechanics in patients with crouch gait”. 8th World Congress of Biomechanics, Dublin, Ireland, July 2018.
3. Ramirez EB, Rhodes J, Tagawa A, and **Fitzpatrick CK**, 2018. “Factors affecting patellar bone strain in patients with crouch gait”. *Gait & Clinical Movement Analysis Society Annual Conference*, Indianapolis, IN, May 2018.

4. Ramirez EB, Rhodes J, Tagawa A, Coca O, and **Fitzpatrick CK**, 2018. "The impact of surgery on patellar bone strain in patients with crouch gait". *64rd Annual Meeting of the Orthopaedic Research Society*, New Orleans, LA, March 2018.
5. Snethen K, Harman MK, Lutzner J, Yao H, and **Fitzpatrick CK**, 2018. "Sensitivity of calculated ligament tensions to differences in intraoperative knee kinematics: A FE computational study". *64rd Annual Meeting of the Orthopaedic Research Society*, New Orleans, LA, March 2018.
6. **Fitzpatrick CK**, and Rullkoetter PJ, 2017. "Impact of anatomic alignment on TKA joint mechanics", *63rd Annual Meeting of the Orthopaedic Research Society*, San Diego, CA, March 2017.
7. Myers CA, **Fitzpatrick CK**, Laz PJ, and Rullkoetter PJ, 2017. "Development and calibration of a population-based hip capsule representation", *63rd Annual Meeting of the Orthopaedic Research Society*, San Diego, CA, March 2017.
8. Smoger LM, **Fitzpatrick CK**, Rullkoetter PJ, and Laz PJ, 2017. "Prediction of knee articular cartilage from 3D bone geometry using a statistical shape model", *63rd Annual Meeting of the Orthopaedic Research Society*, San Diego, CA, March 2017.
9. **Fitzpatrick CK**, Clary C, and Rullkoetter PJ, 2016. "Tendofemoral contact in TKR posterior-stabilized designs during deep flexion", *International Society for Technology in Arthroplasty Annual Congress*, Boston, MA, October 2016.
10. Rullkoetter PJ, **Fitzpatrick CK**, and Clary CW, 2016. "Impact of design on potential for tendofemoral contact and crepitus in PS TKA", *ICJR 3rd Annual Pan Pacific Orthopaedic Congress*, Kona, HI, August 2016.
11. Rullkoetter PJ and **Fitzpatrick CK**, 2016. "Potential changes in TKA mechanics with anatomic alignment: How far can we go?", *ICJR 3rd Annual Pan Pacific Orthopaedic Congress*, Kona, HI, August 2016.
12. **Fitzpatrick CK**, Steensen RN, and Rullkoetter PJ, 2016. "Relationship between patella alta, MPFL elongation, and patellar dislocation", *62st Annual Meeting of the Orthopaedic Research Society*, Orlando, FL, March 2016.
13. **Fitzpatrick CK**, Navacchia A, Shelburne KB, and Rullkoetter PJ, 2016. "Analysis of muscle loading requirements for TKR stability: Comparison of current implants", *62st Annual Meeting of the Orthopaedic Research Society*, Orlando, FL, March 2016.
14. **Fitzpatrick CK**, Maag C, Clary CW, Metcalfe A, and Rullkoetter PJ, 2016. "Computational representation of a 6-DOF knee simulator during dynamic activities", *62st Annual Meeting of the Orthopaedic Research Society*, Orlando, FL, March 2016.
15. Huff D, **Fitzpatrick CK**, Rullkoetter PJ, Laz PJ, and Leopold J, 2016. "The effect of implant positioning on location of peak liner contact stress in THA", *62st Annual Meeting of the Orthopaedic Research Society*, Orlando, FL, March 2016.
16. **Fitzpatrick CK**, Navacchia A, Shelburne KB, and Rullkoetter PJ, 2015. "Dynamic stability in current total knee arthroplasty", *ICJR 2nd Annual Pan Pacific Orthopaedic Congress*, Kona, HI, July 2015.
17. Sintini I, **Fitzpatrick CK**, and Rullkoetter PJ, 2015. "Compressive loading for current TKA to reproduce natural knee stability", *ICJR 2nd Annual Pan Pacific Orthopaedic Congress*, Kona, HI, July 2015.
18. **Fitzpatrick CK**, Tumuluri A, Steensen RN, Trinh TQ, Bentley JC, and Rullkoetter PJ, 2015. "Computational analysis of factors contributing to patellar dislocation", *61st Annual Meeting of the Orthopaedic Research Society*, Las Vegas, NV, March 2015.
19. **Fitzpatrick CK**, Woods S, and Rullkoetter PJ, 2015. "Factors influencing TKR joint mechanics in the varus knee", *61st Annual Meeting of the Orthopaedic Research Society*, Las Vegas, NV, March 2015.
20. Harris MD, Cyr AJ, Ali A, **Fitzpatrick CK**, Rullkoetter PJ, and Shelburne KB, 2015. "A combined experimental and computational approach to subject-specific analysis of human knee joint laxity", *61st Annual Meeting of the Orthopaedic Research Society*, Las Vegas, NV, March 2015.

21. Hollenbeck JFM, Cain CM, Fattor J, **Fitzpatrick CK**, Rullkoetter PJ, and Laz PJ, 2015. "Variation in lumbar anatomy for healthy and disc degenerated populations", *61st Annual Meeting of the Orthopaedic Research Society*, Las Vegas, NV, March 2015.
22. Ali AA, Clary CW, Smoger LM, **Fitzpatrick CK**, Rullkoetter PJ, and Laz PJ, 2015. "Efficient computational framework for population based evaluation of TKR-implanted joint mechanics", *61st Annual Meeting of the Orthopaedic Research Society*, Las Vegas, NV, March 2015.
23. Ali AA, Cyr AJ, Harris M, Shalhoub S, **Fitzpatrick CK**, Rullkoetter PJ, and Shelburne KB, 2015. "Specimen-specific validation of patellofemoral joint mechanics in a finite element model of the knee", *61st Annual Meeting of the Orthopaedic Research Society*, Las Vegas, NV, March 2015.
24. **Fitzpatrick CK**, Nakamura T, Niki Y, and Rullkoetter PJ, 2014. "Influence of TKA geometry on extensor mechanics in patients with excessive external tibial torsion", *International Society for Technology in Arthroplasty Annual Congress*, Kyoto, Japan, September 2014.
25. **Fitzpatrick CK**, Clary CW, Nakamura T, and Rullkoetter PJ, 2014. "The effect of component and lower limb alignment on TKA joint mechanics", *International Society for Technology in Arthroplasty Annual Congress*, Kyoto, Japan, September 2014.
26. Rullkoetter PJ, Kim RH, Dennis DA, and **Fitzpatrick CK**, 2014. "Computational evaluation of tendo-femoral contact in PS TKA", *ICJR Pan Pacific Orthopaedic Congress*, Kona, HI, July 2014.
27. Rullkoetter PJ, **Fitzpatrick CK**, and Laz PJ, 2014. "Mechanics of anatomic and dome patellae", *ICJR Pan Pacific Orthopaedic Congress*, Kona, HI, July 2014.
28. **Fitzpatrick CK**, Fitzwater F, Maletsky LP, and Rullkoetter PJ, 2014. "Estimating total knee replacement joint load ratios from kinematics", *7th World Congress of Biomechanics*, Boston, MA, July 2014.
29. Hollenbeck JFM, Cain C, Fattor J, **Fitzpatrick CK**, Rullkoetter PJ, and Laz PJ, 2014. "Statistical shape and alignment modeling to characterize disc degeneration in the lumbar spine", *7th World Congress of Biomechanics*, Boston, MA, July 2014.
30. Ali AA, **Fitzpatrick CK**, Clary CW, Smoger LM, Rullkoetter PJ, and Laz PJ, 2014. "Statistical shape modeling for population-based evaluation of total knee replacement implants", *7th World Congress of Biomechanics*, Boston, MA, July 2014.

Invited Presentations

1. Invited Keynote Speaker: **Fitzpatrick CK**, Alvarez O, Gibbons K, Laz P, and Rullkoetter PJ, "Integration of statistical shape models of the knee with finite element simulations", *8th World Congress of Biomechanics*, Dublin, Ireland, July 2018.
2. Rullkoetter PJ, Laz PJ, **Fitzpatrick CK**, "Probabilistic FE Modeling for Evaluation of Implant Mechanics," *Regulatory Review of Computational Modeling Workgroup, Food and Drug Administration*, March 1, 2013.
3. **Fitzpatrick CK**, Hoops HE, Johnson D, Kim R, Dennis DA, Baldwin MA, Laz PJ, Rullkoetter PJ, "Control-Matched Computational Evaluation of Tendo-Femoral Contact in Patients with PS TKA," *Insall Traveling Fellows Conference*, University of Colorado, October, 2010.

Current Graduate Students

Adelle Milholland	2016 –	(MS, Mechanical Engineering, Boise State, EGD 2019)
Victoria Volk	2017 –	(PhD, Material Science, Boise State, EGD 2021)

Erika Ramirez	2017 –	(MS, Mechanical Engineering, Boise State, EGD 2019)
Oliver Alvarez	2017 –	(MS, Mechanical Engineering, Boise State, EGD 2018)
Grace McConnochie	2017 –	(MS, Mechanical Engineering, Boise State, EGD 2019)
Kalin Gibbons	2017 –	(MS, Mechanical Engineering, Boise State, EGD 2019)
Cailin Wilson	2017 –	(MS, Mechanical Engineering, Boise State, EGD 2019)

Current Undergraduate Students

Hayden Golay	2018 –	(BS, Mechanical Engineering, Boise State)
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Current Funding at Boise State

- Alliance for Regenerative Rehabilitation Research and Training (AR³T) - **\$134,000**. “Replicating Marrow Mechanics of Stem Cells Ex vivo”. Role: Co-I.

Completed Funding at Boise State

- Clinical Translational Research Infrastructure Network (CTR-IN) Pilot Grant - **\$68,120**. “Optimizing Surgical Treatment of Crouch Gait on a Patient-Specific Basis”. Role: PI.
- Institute of Translational Health Sciences (ITHS) Translational Research Scholars Program (TRSP) - **\$10,000**. “Musculoskeletal Adaptation Mechanisms in Healthy and Pathological Subjects”. Role: PI.
- Higher Education Research Council (HERC) fellowship provided by the Institute for STEM & Diversity Initiatives to fund one undergraduate student (Jessica Carlson) to engage in research in the Computational Biosciences Laboratory for the spring 2018 semester.
- Higher Education Research Council (HERC) fellowships provided by the Institute for STEM & Diversity Initiatives to fund two undergraduate students (Carlee Miller, Nardos Ashenafi) to engage in research in the Computational Biosciences Laboratory for the Spring 2017 semester.
- INBRE & WWAMI Fellowship to fund one undergraduate student (Carlee Miller) to engage in research in the CBL during summer 2017.
- Idaho STEM Transition Trainee funding for one student (Colton Brodock) to participate in research during their transition summer from high school to freshman year during summer 2017.
- Louis Stokes Alliance for Minority Participation (LSAMP) funding for one undergraduate student (Olivia Coca) to participate in a Summer Research Experience during summer 2017.

Teaching Activity

Teaching Experience

Instructor, ME 356, Intro to Solid Biomechanics, Boise State University, Spring 2017, Spring 2018.

Developed and taught a 3-credit (3-0-3) undergraduate 300-level biomechanics course. This course can be broadly divided into three areas: human motion, tissue mechanics, and artificial devices. The objectives of the course focused on providing students with fundamental knowledge and skills to apply the principles of engineering mechanics to the human body. The course culminated in a design project which students presented both orally and through an in-depth written report.

Instructor, ME470 / ME 570, Finite Element Methods, Boise State University, Fall 2016, Fall 2017, Fall 2018.

Developed and taught a 3-credit (3-0-3) graduate/undergraduate level finite element methods course. This course focused on three areas: understanding the theory of finite element formulation for truss, 2D continuum and 3D continuum elements; implementation of theoretical knowledge for students to develop their own finite element solver (Matlab); solve engineering problems using commercial software (Abaqus) and compare predictions from the commercial solver with in-house developed Matlab solutions.

Internship Advisor, ME 493, Biomedical Research Internship, Boise State University, Fall 2017, Fall 2018.

Advisor to undergraduate students engaged in a 3-credit internship in the Computational Biosciences Lab. Students perform a research study on a biomedical research project and present her/his work to the MBE biomedical faculty and research students, and compile a written report of her/his work.

Teaching Professional Development

Enrolled in Boise State's Center for Teaching and Learning (CTL) "Ten Before Tenure" program and have completed the following workshops:

Just-in-Time Teaching (attended 2/21/2018)

On the Job Training: Successful Student Mentoring (attended 1/25/2018)

Designing Effective Lectures (attended 10/18/2017)

Efficient and Effective Assessment Techniques (attended 10/14/2017)

"Managing" Time to Benefit Your Scholarship, Your Students, and Your Sanity (attended 08/31/2017)

An Introduction to Effective Course Design (attended 11/4/2016)

In spring 2018, the CTL staff performed a mid-term assessment (MAP) in my Solid Biomechanics course (ME356)

Professional, Community and University Service

Reviewing and Moderating

Reviewer for *Journal of Biomechanics*
Journal of Orthopaedic Research
Journal of Applied Biomechanics

Medical Engineering & Physics
Computer Methods in Biomechanics and Biomedical Engineering
Clinical Biomechanics
Proceedings of the IMechE Part H: Journal of Engineering in Medicine
ASME Journal of Biomechanical Engineering
Computers in Biology and Medicine
Annals of Biomedical Engineering
Knee Surgery, Sports Traumatology, Arthroscopy
PLOS ONE
The Knee
Journal of Experimental Orthopaedics

Session Moderator for the Orthopaedic Research Society Annual Meeting, New Orleans, LA, March 2018

Session Moderator for the Orthopaedic Research Society Annual Meeting, San Diego, CA, March 2017

Session Moderator for the Orthopaedic Research Society Annual Meeting, Orlando, FL, March 2016

Reviewer of conference abstracts for the Orthopaedic Research Society Annual Meeting 2019, 2018, 2017, 2016, 2015

Ad-hoc reviewer for National Science Foundation (Research Initiation Awards track), February 2015

Reviewer on National Institutes of Health R15 panel, November 2013

University Committees

MBE Department Graduate Committee, *Interim Chair*, spring 2018 – current

This committee is responsible for program operations, policy, and student affairs associated with the Graduate Program.

Computing PhD Admissions Committee, *Member*, fall 2017 – current

This committee evaluates applications submitted for admission to the Computing PhD program.

MBE Department Graduate Committee, *Member*, fall 2016 – current

This committee is responsible for program operations, policy, and student affairs associated with the Graduate Program.

MBE Department Biomedical Committee, *Member*, fall 2016 – current

This committee is responsible for the fostering the growth of biomedical community, and specifically the Biomedical Minor program, within the MBE department. This included organizing an annual informational evening on biomedical engineering in fall 2016 and fall 2017 (**Biomedical Engineering: Getting Involved**) presented by the MBE biomedical faculty and hosted by the Engineering and Innovation Living Learning Community.

Thesis Committees

Advisor and thesis committee chair for Oliver Alvarez

- MS ME, expected graduation fall 2018

Thesis committee member for Derek Nesbitt (Advisor: Trevor Lujan)

- MS ME, expected graduation fall 2018

Thesis committee member for Maddie Krentz (Advisor: Trevor Lujan)

- MS ME, graduated summer 2018

Thesis committee member for Nicolas Lobb (Advisor: Tyler Brown)

- MS Kinesiology, graduated spring 2018

Thesis committee member for AuraLea Fain (Advisor: Tyler Brown)

- MS Kinesiology, graduated spring 2018

Thesis committee member for Katie Yocham (Advisor: David Estrada)

- MS ME, graduated fall 2017

Thesis committee member for Micah Sandusky (Advisor: Inanc Senocak)

- MS ME, graduated summer 2017

Community Outreach

Spring 2018, National Biomechanics Day

Hosted 10 high school students from the Treasure Valley region at Boise State's Center for Orthopaedic and Biomechanics Research to learn about biomechanics through interactive lab experiences.

Spring 2017, National Biomechanics Day

Hosted 30 high school students from the Treasure Valley region at Boise State's Center for Orthopaedic and Biomechanics Research to learn about biomechanics through interactive lab experiences.

Stephanie E. Greufe-Hall, PhD

Assistant Professor
Department of Kinesiology
Boise State University
Boise, ID
sehall@boisestate.edu

EDUCATION

2009-2013 University of Northern Colorado, Greeley, CO
Exercise Physiology, PhD.
Applied Statistics and Research Methods, Doctoral Minor
2004-2009 University of Northern Colorado, Greeley, CO
Exercise Physiology, MS
2000-2004 University of Iowa, Iowa City, IA
Health Promotion, BA

ACADEMIC EXPERIENCE

2018-Present
Assistant Professor
Kinesiology
Boise State University
2015-2018
Clinical Assistant Professor
Kinesiology
Boise State University
2009-2013
Instructor of Record/Teaching Assistant
Exercise Science
University of Northern Colorado
2012-2013
Graduate Assistant
McNair Scholars Program
University of Northern Colorado
2005-2006
Graduate Assistant – Internship Program
Exercise Science
University of Northern Colorado

RESEARCH EXPERIENCE	<p>2013-2015 Postdoctoral Associate Applied Physiology and Kinesiology University of Florida</p> <p>2009-2013 Research Laboratory Member Rocky Mountain Cancer Rehabilitation Institute Animal Laboratory University of Northern Colorado</p> <p>2005-2006 Graduate Assistant Rocky Mountain Cancer Rehabilitation Institute University of Northern Colorado</p>
GRADUATE EXPERIENCE	<p>2013-2015 Doctoral Student Mentor University of Florida</p> <p>2014 Graduate Student Research Symposium Judge University of Florida</p> <p>2010-2013 Graduate Course Instructor University of Northern Colorado</p>
TEACHING EXPERIENCE	<p>Cardiac Rehabilitation – Graduate and Undergraduate Level Anatomical Kinesiology Anatomical Kinesiology Laboratory Exercise Physiology I & II Exercise Testing and Prescription Laboratory Activities for Stress Management</p>
COURSES DEVELOPED	<p>Inquiry-based Exercise Physiology II Laboratory</p>

**PUBLISHED
MANUSCRIPTS**

Kavazis, A. N., Morton, A. B., **Hall, S. E.**, & Smuder, A. J. (2017). Effects of doxorubicin on cardiac muscle subsarcolemmal and intermyofibrillar mitochondria. *Mitochondrion*, 34, 9-19.

Kwon, O. S., Smuder, A. J., Wiggs, M. P., **Hall, S. E.**, Sollanek, K. J., Morton, A. B., ... & Powers, S. K. (2015). AT 1 receptor blocker losartan protects against mechanical ventilation-induced diaphragmatic dysfunction. *Journal of Applied Physiology*, 119(10), 1033-1041.

Gibson, N. M., **Greufe, S. E.**, Hydock, D. S., and Hayward, R. (2013). Doxorubicin-induced vascular dysfunction and its attenuation by exercise preconditioning. *Journal of Cardiovascular Pharmacology*, 62, 355-360.

Hayward, R., Hydock, D., Gibson, N., **Greufe, S.**, Bredahl, E., and Parry, T. (2013). Tissue retention of doxorubicin and its effects on cardiac, smooth, and skeletal muscle function. *Journal of Physiology and Biochemistry*, 69, 177-187.

Wonders, K., Hydock, D., **Greufe, S.**, Schneider, C., Hayward, R. (2009) Endurance Exercise Training Preserves Cardiac Function in Rats Receiving Doxorubicin and the HER-2 Inhibitor GW2974. *Cancer Chemotherapy and Pharmacology*, 64, 1105-1113.

**MANUSCRIPTS IN
REVIEW**

Hall, S. E., Ahn, B., Smuder, A. J., Morton, A. B., Hinkley, J. M, Wiggs, M. P., Sollanek, K. J., and Powers, S. K. (2018) The Renin-angiotensin System Contributes to Ventilator-Induced Diaphragm Dysfunction.

**MANUSCRIPTS IN
PREPARATION**

Hall, S. E. and Hayward, R. Effect of endurance exercise on the combination of streptozotocin-induced diabetes and doxorubicin.

Hall, S. E. and Hayward, R. Effects of calorie restriction and voluntary exercise on doxorubicin-induced cardiac dysfunction.

**PROFESSIONAL
PRESENTATIONS**

Hall, S.E. Stretch Activation of Angiotensin II Type 1 receptor Contributes to Ventilation-induced Diaphragm Dysfunction. Experimental Biology, 2015, Boston.

Hall, S. E. Potential Therapeutic Targets to Prevent Skeletal Muscle Atrophy. Symposium title: Targeting Angiotensin II to Prevent Skeletal Muscle Atrophy. Southeast American College of Sports Medicine Annual Meeting, 2015, Jacksonville.

Hall, S. E. Cardiovascular Adaptations to Endurance Exercise. University of Florida, 2014, Gainesville.

Greufe, S., Gibson, N., Hydock, D., Schneider, C., and Hayward, R. Combined Effects of Streptozotocin and Doxorubicin on Cardiac Function in Rats. Experimental Biology Meeting, 2013, Boston.

Greufe, S., Gibson, N., Frank, A., Hydock, D., Schneider, C., and Hayward, R. Calorie Restriction and Voluntary Exercise Extend Life Span of Rats Treated with Doxorubicin. American College of Sports Medicine Annual Meeting, 2013, Indianapolis.

Greufe, S., Gibson, N., Parry, T., Hydock, D., Schneider, C., and Hayward, R. Effects of Calorie Restriction and Voluntary Exercise on Doxorubicin-induced Cardiac Dysfunction. Thematic poster presentation, National American College of Sports Medicine Annual Meeting, San Francisco, 2012.

Greufe, S., Gibson, N., Parry, T., Hydock, D., Schneider, C., and Hayward, R. Effects of Calorie Restriction and Voluntary Exercise on Doxorubicin-induced Cardiac Dysfunction. Slide presentation, Rocky Mountain American College of Sports Medicine Annual Meeting, Colorado Springs, 2012.

Greufe, S., Cheng, H., Repka, C., Hayward, R., and Schneider, C. The Effect of Cancer Stage on Physiological and Psychological Parameters Following Supervised Exercise training. Poster presentation, American College of Sports Medicine Annual Meeting, Denver, 2011.

Greufe, S., Cheng, H., Repka, C., Hayward, R., and Schneider, C. The Effect of Cancer Stage on Physiological and Psychological Parameters Following Supervised Exercise training. Slide presentation, University of Northern Colorado Annual Research Day, Greeley, 2011.

Greufe, S., Wonders, K., Hydock, D., Schneider, C., and Hayward, R. Effects of Exercise training on Cardiac Caspase Expression in Rats Receiving Doxorubicin and GW2974. Poster presentation, American College of Sports Medicine Annual Meeting, Baltimore, 2010.

GRANTS

2018, NIH R03 Grant, \$281,000, Protective Effects of Exercise in a Transgenic Rat Model of Alzheimer's Disease, *Under Review*.

2018, NIH R15 Grant, \$297,760, Project title: Role of Renin-Angiotensin System in Aging. *Not Awarded*

2018, NIH P20 Grant, Program title: Proteostasis in Aging, \$1,026,541 (my project total), Project title: Role of Renin-Angiotensin System in Aging. *Not Awarded*

2018, Intramural Pilot Project Program, \$20,000, Protective Effects of Exercise in a Transgenic Rat Model of Alzheimer's Disease, *Awarded*.

2017, Institute of Translational Health Sciences, KL2 Career Award, \$342,000, 2018 Cohort, *Not Awarded*

2017, Institute of Translational Health Sciences, Collaboration Grant, \$50,000, Effect of Exercise in a Transgenic Rat Model of Alzheimer's Disease. *Not Awarded*

2017, Institute of Translational Health Sciences, Catalyst Grant, \$5,000, Skeletal Muscle Mitochondrial Function and the Effect of Exercise in Alzheimer's Disease. *Not Awarded*

2017, Idaho Network of Biomedical Research Excellence, Pilot Project Grant, \$50,000, Skeletal muscle mitochondrial function and the effect of exercise in Alzheimer's disease. *Not Awarded*

2017, Institute of Translational Health Sciences, Scholars Grant, \$10,000, Role of BDNF in the Exercise-induced Improvements in Brain Function. *Not Awarded*

2016, Institute of Translational Health Sciences, Collaboration Grant, \$50,000. Ventilator Induce Diaphragmatic Dysfunction Study. *Not Awarded*

2012, Research Grant, \$2,000, Frontiers of Science, University of Northern Colorado. The effects of endurance exercise on the combination of STZ-induced diabetes and doxorubicin. *Funded*

2010, Research Grant, \$600, Graduate Student Association, University of Northern Colorado. Effects of voluntary exercise and calorie restriction on chronic doxorubicin treatment. *Funded*

2010, Research Grant, \$523, Graduate Student Association, University of Northern Colorado. The cardiac effects of voluntary exercise and calorie restriction on doxorubicin-induced cardiotoxicity. *Funded*

2009, Research Grant, \$529, Graduate Student Association, University of Northern Colorado. The effects of calorie restriction on cardiac function in older animals following treatment with doxorubicin. *Funded*

SERVICE	2018-2021, Treasurer American College of Sports Medicine Northwest Executive Board
	2017-2018, Committee Chair Department Strategic Planning Committee
	2017- , Ad hoc reviewer Journal of Kinesiology and Wellness
	2016- , Ad hoc reviewer Research Quarterly for Exercise and Sport
	2014, Research Judge Graduate Student Research Symposium Health and Human Performance University of Florida
	2013, Research Judge Longs Peak Science and Engineering Fair Mathematics and Science Teaching Institute College of Natural and Health Sciences University of Northern Colorado
	2012, Research Mentor Frontiers of Science Institute Mathematics and Science Teaching Institute College of Natural and Health Sciences University of Northern Colorado

Benjamin C. Johnson

1910 University Dr., Boise, ID 83725

☎ (208) 867-7748 | ✉ bcjohnson@boisestate.edu | 🌐 Ben Johnson

Research Interests

- **MIXED-SIGNAL IC DESIGN:** ULTRA-LOW-POWER DESIGN, SENSOR INTERFACES, IMAGERS
- **NEUROSCIENCE INSTRUMENTATION:** MICROELECTRODE ARRAYS, LAB-ON-A-CHIP
- **MEDICAL DEVICES:** NEUROMODULATION, DEEP BRAIN STIMULATION
- **BIOELECTRONIC MEDICINE:** IMPLANTABLE MICROSYSTEMS, PERIPHERAL NERVE STIMULATORS

Education

Cornell University

PH.D. IN ELECTRICAL ENGINEERING

Ithaca, NY

Dec. 2013

- Thesis Committee: Alyosha Molnar (Advisor), Thomas A. Cleland, and Amit Lal
- Dissertation: *Optimized Circuitry for Sensor Interfaces in CMOS and in Brains*

Cornell University

M.ENG. IN ELECTRICAL ENGINEERING

Ithaca, NY

May 2008

Oklahoma Christian University

B.S. IN ELECTRICAL ENGINEERING WITH HONORS

Oklahoma City, OK

May 2007

Research & Professional Experience

Boise State University

ASSISTANT PROFESSOR

Boise, ID

January 2018 - Present

Cortera Neurotechnologies, Inc.

DIRECTOR OF TECHNOLOGY

Berkeley, CA

March 2016 - Present

University of California, Berkeley

RESEARCH SCIENTIST

Berkeley, CA

April 2016 - December 2017

Cortera Neurotechnologies, Inc.

SENIOR HARDWARE ENGINEER

Berkeley, CA

June 2014 - Feb. 2016

Cornell University

POSTDOCTORAL RESEARCHER

Ithaca, NY

Jan. 2014 - May 2014

Cornell University

GRADUATE RESEARCHER

Ithaca, NY

May 2008 - Dec. 2013

Analog Circuit Works

DESIGN ENGINEER INTERN

Sudbury, MA

Jan. 2011 - May 2011

Martin Bionics/Orthocare Innovations

HARDWARE ENGINEER

Oklahoma City, OK

May 2006 - Aug. 2008

Teaching Experience

Boise State University

ECE 497/597 BIOMEDICAL INSTRUMENTATION

Boise, ID

Fall 2018

ECE 411/511 CMOS ANALOG IC DESIGN

Spring 2018

Cornell University

ECE 4740 DIGITAL VLSI DESIGN

Ithaca, NY

Spring 2013

Publications

JOURNAL PUBLICATIONS

- 2018 A. Zhou¹, **B. C. Johnson**¹, R. Muller, "Toward true closed-loop neuromodulation: artifact-free recording during stimulation," *Current Opinion in Neurobiology*, Vol. 50, June 2018, pp. 119-127.
¹Joint authorship.
- D. Piech¹, **B. C. Johnson**¹, K. Shen, M. M. Ghanbari, K. Y. Li, R. M. Neely, J. E. Kay, J. M. Carmena, M. M. Maharbiz, R. Muller, "StimDust: A 2.2mm³, precision wireless neural stimulator with ultrasonic power and communication," arXiv preprint arXiv:1807.07590, July 2018. ¹Joint authorship.
- A. Zhou¹, S. R. Santacruz¹, **B. C. Johnson**¹, G. Alexandrov, A. Moin, F. L. Burghardt, J. M. Rabaey, J. M. Carmena, R. Muller, "WAND: A 128-channel, closed-loop, wireless artifact-free neuromodulation device," accepted for publication in *Nature Biomedical Engineering* July 2017. ¹Joint authorship.
- 2017 S.T. Peace, **B.C. Johnson**, G. Li, M.E. Kaiser, I. Fukunaga, A.T. Schaefer, A.C. Molnar, T.A. Cleland, "Coherent olfactory bulb gamma oscillations arise from coupling independent columnar oscillators," bioRxiv 213827, Nov. 2017.
- A. Zhou¹, S. R. Santacruz¹, **B. C. Johnson**¹, G. Alexandrov, A. Moin, F. L. Burghardt, J. M. Rabaey, J. M. Carmena, R. Muller, "WAND: A 128-channel, closed-loop, wireless artifact-free neuromodulation device," arXiv preprint arXiv:1708.00556, Aug. 2017. ¹Joint authorship.
- 2016 S. Sivaramakrishnan¹, C. Lee¹, **B. Johnson**¹, A. Molnar, "A Polar Symmetric CMOS Image Sensor for Rotation Invariant Measurement," *Sensors Journal, IEEE*, vol. 16, no. 5, pp. 1190-1199, Mar. 2016. ¹Joint authorship. **Sensors Journal Best Paper Award for 2017**
- C. Lee, **B. Johnson**, T. Jung, A. Molnar, "A 72 x 60 Angle-Sensitive SPAD Imaging Array for Lens-less FLIM," *Sensors* vol. 16, no. 9, pp. 1422, Sept. 2016.
- 2015 C. Lee, **B. Johnson**, A. Molnar, "Angle Sensitive Single Photon Avalanche Diode," *Appl. Phys. Lett.* 106, June 2015.
- 2013 **B. Johnson**, S. T. Peace, A. Wang, T. A. Cleland, A. Molnar, "A 768-Channel CMOS Microelectrode Array with Angle Sensitive Pixels for Neuronal Recording," *Sensors Journal, IEEE*, vol. 13, no. 9, pp. 3211-3218, Sept. 2013.
- B. Johnson**, A. Molnar, "An Orthogonal Current-Reuse Amplifier for Multi-Channel Sensing," *IEEE J. Solid-State Circuits*, vol. 48, no. 6, pp. 1487-1496, June 2013.
- C. Andrews, L. Diamente, D. Yang, **B. Johnson**, A. Molnar, "A Wideband Receiver With Resonant Multi-Phase LO and Current Reuse Harmonic Rejection Baseband," *IEEE J. Solid-State Circuits*, vol. 48, no. 5, pp. 1188-1198, May 2013.

PEER-REVIEWED CONFERENCE PUBLICATIONS

- 2018 **B. C. Johnson**, K. Shen, D. Piech, M. M. Ghanbari, K. Y. Liu, R. Neely, J. M. Carmena, M. M. Maharbiz, R. Muller, "A 6.5mm³ wireless ultrasonic implantable peripheral nerve stimulator with 82% peak efficiency," *2018 IEEE Custom Integrated Circuits Conference (CICC)*, Apr. 2018.
- 2017 **B. C. Johnson**, S. Gambini, I. Izyumin, A. Moin, A. Zhou, S. Santacruz, J. Rabaey, J. Carmena, R. Muller, "An Implantable 700uW 64-channel Neuromodulation IC for Simultaneous 70nV/rtHz Recording, 5mA Stimulation, and Rapid Artifact Recovery," *2017 Symposium on VLSI Circuits*, June 2017.
- 2016 A. Moin, G. Alexandrov, **B. C. Johnson**, I. Izyumin, F. Burghardt, S. Pannu, E. Alon, R. Muller, J. Rabaey, "Powering and Communication for OMNI: A Distributed and Modular Closed-Loop Neuromodulation Device," *2016 IEEE Engineering in Medicine and Biology Society Conference (EMBC)*, Aug. 2016.
- 2014 C. Lee, **B. Johnson**, A. Molnar, "An On-chip 72x60 Angle-Sensitive Single Photon Image Sensor Array for Lens-less Time-resolved 3-D Fluorescence Lifetime Imaging," *2014 Symposium on VLSI Circuits*, pp. 1-2, June 2014.
- 2013 **B. Johnson**, S. T. Peace, T. A. Cleland, A. Molnar, "A 50µm Pitch, 1120-Channel, 20kHz Frame Rate Microelectrode Array for Slice Recording," *IEEE Biomedical Circuits and Systems Conference (BioCAS)*, pp. 109-112, Nov. 2013.
- C. Lee, **B. Johnson**, A. Molnar, "A Sub-threshold Voltage Ladder Rectifier for Orthogonal Current-reuse Neural Amplifier," *IEEE Biomedical Circuits and Systems Conference (BioCAS)*, pp. 358-361, Nov. 2013.
- B. Johnson**¹, C. Lee¹, S. Sivaramakrishnan¹, A. Molnar, "A High-Speed Polar-Symmetric Imager for Contact-less, Real-time Readout and Calibration of Rotational Inertial Sensors," *Sensors, 2013 IEEE*, pp. 1-4, Nov. 2013. ¹Joint authorship.
- 2012 C. Andrews, L. Diamente, **B. Johnson**, A. Molnar, "A <12mW, 0.7-3.2GHz Receiver With Resonant Multi-Phase LO and Current Reuse Harmonic Rejection Baseband," *Radio Frequency Integrated Circuits Symposium (RFIC), 2012 IEEE*, pp. 43-46, June 2012.
- 2011 **B. Johnson**, S. T. Peace, T. A. Cleland, A. Molnar, "A Scalable CMOS Sensory Array for Neuronal Recording and Imaging," *Sensors, 2011 IEEE*, pp. 924-927, Oct. 2011.
- 2010 **B. Johnson**, D. DeTomaso, A. Molnar, "A Low-Power Orthogonal Current-Reuse Amplifier for Parallel Sensing Applications," *IEEE European Solid-State Circuits Conference (ESSCIRC)*, pp. 318-321, Sept. 2010.

Talks & Posters

DBS: Placement & Neuromonitoring

INVITED TALK, HOPE CONFERENCE, NORTHWEST PARKINSON'S FOUNDATION

*Boise, ID
June 2018*

Bioelectronic Medicine and StimDust: A Miniaturized Wireless Peripheral Nerve Stimulator

INVITED TALK, MECHANICAL ENGINEERING SEMINAR, BOISE STATE UNIVERSITY

*Boise, ID
Feb. 2018*

StimDust: An Ultrasonically Powered Neural Stimulator with Temporally Precise Waveform Control

POSTER, SOCIETY FOR NEUROSCIENCE

*Washington, D.C.
Nov. 2017*

OMNI: A Wireless, 128-channel Closed-Loop Neuromodulation Device

POSTER, SOCIETY FOR NEUROSCIENCE

Washington, D.C.

Nov. 2017

Advances in Bioelectronic Medicine

INVITED TALK, ELECTRICAL AND COMPUTER ENGINEERING SEMINAR, BOISE STATE UNIVERSITY

Boise, ID

Feb. 2017

OMNI: A Distributed and Modular Device for Wireless Neural Recording and Closed-Loop Neuromodulation

POSTER, SOCIETY FOR NEUROSCIENCE

San Diego, CA

Nov. 2016

StimDust: An Ultrasound-powered Wireless Peripheral Nerve Stimulator

POSTER, BERKELEY WIRELESS RESEARCH CENTER RETREAT

Berkeley, CA

Nov. 2016

OMNI: A Distributed, Modular, Closed-Loop Neuromodulation Device for the Treatment of Neuropsychiatric Disorders

POSTER, BERKELEY WIRELESS RESEARCH CENTER RETREAT

Berkeley, CA

Nov. 2016

GABA(a) receptor independent gamma oscillations in olfactory bulb slices

POSTER, SOCIETY FOR NEUROSCIENCE

San Diego, CA

Nov. 2013

Integrated Circuits for Neural Interfaces

INVITED TALK TO ELECTRON DEVICE SOCIETY, CORNELL UNIVERSITY

Ithaca, NY

Oct. 2012

Persistent gamma oscillations in olfactory bulb slices

POSTER, SOCIETY FOR NEUROSCIENCE

Washington, D.C.

Nov. 2011

Peer Reviewing

- IEEE Journal of Solid State Circuits
- IEEE Sensors Journal
- Transactions on Circuits and Systems-I
- Transactions on Biomedical Circuits and Systems
- Journal of Emerging and Selected Topics in Circuits and Systems
- International Symposium on Circuits and Systems
- Custom Integrated Circuits Conference
- Symposium on VLSI Circuits

Service & Outreach

- Boise State SAGE Scholars Program faculty mentor, Fall 2018 - Spring 2019.
- Hope Conference, Northwest Parkinson's Foundation, June 22nd, 2018.
- Boise State Engineering and Science Festival (STEM Exploration Day), Feb. 3rd, 2018.

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Education:

1984-1991 Doctor of Philosophy (Biology), The Johns Hopkins University, Baltimore, MD
1979-1983 Bachelor of Science (Biology), Pennsylvania State University, State College, PA

Awards and Societies:

2014-present Associate Director of Sigma Xi Pacific Division
2014-present Board Member of Expedition Inspiration (Breast Cancer Research Foundation)
2014-present Executive Council of the American Association for the Advancement of Science (AAAS) Pacific Division
2014 present Conference Organizer for the Idaho Academy of Sciences and Engineering (IASE) Annual Symposium, March 19-21, 2015, Boise, ID.
2013-present Executive Council of the Idaho Academy of Sciences and Engineering
2013-present International Cytokine Society, Member
2012 Golden Apple Award, Boise State University
2011 Women of the Year Honoree, Idaho Business Review
2011-present Metastasis Research Society, Member
2008 Educator Award, Health Care Heroes
1998-present American Association for Cancer Research, Active Member
1998-present American Association for the Advancement of Science, Member
1998-2009 Sigma Xi Scientific Research Society, Boise State University Chapter, Full Member
1998-present Idaho Academy of Science, Member
1995-1997 American Association for Cancer Research, Associate Member
1992-1997 Intramural Research Training Award, Postdoctoral Fellowship, NIH
1982-1983 The Hammond Biological Scholarship and Award

Grant Review Panels:

2018 NIH R21/R03 NCI Clinical and Translational Exploratory/Developmental Studies (R21)/ NCI Small Grants Program for Cancer Research (NCI Omnibus R03 Special Emphasis Panel)
2018 NIH P01 Program Project Review III ZCA1 RPRB-6 (01) Panel
2016 Nevada NIH INBRE DRP Review Panel
2015-present NIH/F09B Oncological Sciences Review Panel
2014 Department of Defense (DoD), Tobacco-Related Disease Research Program (TRDRP), Career Development: Biological Systems Study Section

2013-present	California Breast Cancer Research Program (CBCRP), Clinical, Prevention, & Biological Sciences Study Section
2011-present	Department of Defense (DoD), Congressionally Directed Medical Research Program (CDMRP) Breast Cancer Pathobiology-2 Panel.
2011	California Tobacco-Related Disease Research Program (TRDRP), Cancer Study Section.
2010-2011	Department of Defense (DoD), Congressionally Directed Medical Research Program (CDMRP) Breast Cancer Immunology/Endocrinology Panel.
2009	NIH, CSR, Challenge Grant Program, Bioengineering Sciences and Technologies Panel.
2008	Department of Defense (DoD), Congressionally Directed Medical Research Program (CDMRP) Prostate Cancer Immunology Panel.
2008	Department of Defense (DoD), Congressionally Directed Medical Research Program (CDMRP) Prostate Cancer Pathology Panel. Ad-hoc Reviewer.
2007-2010	California Breast Cancer Research Program (CBCRP), Pathology Study Section.
2006-2007	Cancer Research UK. Ad-hoc Reviewer.
2006	Veterans Administration (VA) Merit Grant Program. Ad-hoc Reviewer.

Patents and Patent Disclosures:

2014	Boise State University Patent Application “Oncostatin M (OSM) antagonists for preventing cancer metastasis and IL-6 related disorders”. 14478175 9/5/14.
2013	Boise State University Provisional Patent Application “Inhibition of oncostatin M (OSM) with small molecule inhibitors for breast cancer intervention”. 083956-0025 12/12/2013.
2013	Boise State University Provisional Patent Application “Inhibition of oncostatin M (OSM) with small molecule inhibitors for prostate cancer intervention”. 083956-0033 12/12/2013.
2009	Boise State University Invention Disclosure “Simple Agarose Gel for Analyzing RNA Quality”. BSTU.006P 10/14/2009.

Professional Experience:

2016-present	<u>Director</u> , Clinical/Translational Research, Boise State University, Boise, ID. This position is situation in the Office of Research and Economic Development and was announced 3-28-16.
2011-present	<u>Full Professor</u> , Department of Biological Sciences, Boise State University, Boise, ID. Determination of the role of the cytokine oncostatin M in tumor progression and metastasis.
2010-present	<u>Affiliate Associate Professor</u> , Department of Microbiology, Molecular Biology, and Biochemistry (currently being reorganized), College of Agriculture and Life Sciences, University of Idaho, Moscow, ID.
2007-2010	<u>Director of Undergraduate Studies</u> , Department of Biological Sciences, Boise State University, Boise, ID.
2003-2011	<u>Associate Professor</u> , Department of Biological Sciences, Boise State University, Boise, ID. Determination of the role of the cytokine oncostatin M in tumor progression and metastasis.
2001-2009	<u>Affiliate Member</u> , Chronic Illness Research Center (formally called the Cancer Prevention and Research Center, Washington State University, Pullman, WA.
1998-present	<u>Affiliate Member</u> , Cancer Research Section, Mountain States Tumor and Medical Research Institute (MSTMRI), Boise, ID.

- 1999-2003 Project Director, J.A. & Kathryn Albertson Foundation grant. Student Research Fellowships and Hands-On Science Education Reform for Vallivue and Kuna School Districts.
- 1997-2003 Assistant Professor, Department of Biology, Boise State University, Boise, ID. Elucidation of molecular mechanisms involved in tumor progression utilizing mouse prostate and mammary cell lines.
- 1995 Instructor, Frederick Community College, Frederick, MD. Lecturer for a Nutrition class; involved the complete organization and teaching of this course.
- 1994 Instructor, Frederick Community College, Frederick, MD. Lecturer and Laboratory Instructor for Introductory Biology; consisted of two 75-minute lectures and one three-hour lab section per week.
- 1992-1997 Postdoctoral Fellow with Dr. Jeffrey E. Green, Laboratory of Molecular Oncology, NCI, NIH, Frederick, MD. Studying prostate cancer and tumor progression by the establishment of cell lines from transgenic mice expressing SV40 large T-antigen. Utilizing the transgenic mice as a model for immunotherapy treatment of prostate and mammary cancers. Studying the function of the cellular oncogene, Ets-1, by utilizing 1) homologous recombination in ES cells to produce mice lacking a functional Ets-1 protein; 2) mice producing transgenic ETS proteins.
- 1985-1991 Doctoral Student with Dr. Takis Papas, mentored by Dr. Denise Watson at NCI-Frederick, The Johns Hopkins University, Baltimore, MD. Doctoral Dissertation: "The Human *Ets1* Gene: Genomic Structure, Promoter Characterization and Alternative Splicing."

Publications: (Over 55 publications total)

1. Lautenberger, J. A., Seth, A., Jorcyk, C. and Papas, T. S.: Useful modifications of the Escherichia coli expression plasmid pJL6. *Gene Anal. Tech.* 1: 63-66, 1984.
2. Samuel, K. P., Lautenberger, J. A., Jorcyk, C. L., Josephs, S., Wong-Staal, F. and Papas, T. S.: Diagnostic potential for human malignancies of bacterially produced HTLV-I envelope protein. *Science* 226: 1094-1097, 1984.
3. Sisk, W. P., Chirikjian, J. G., Lautenberger, J. A., Jorcyk, C., Papas, T. S., Berman, M. L., Zagursky, R. and Court, D. L.: A plasmid vector for cloning and expression of gene segments: expression of an HTLV-I envelope gene segment. *Gene* 48: 183-193, 1986.
4. Schweinfest, C. W., Jorcyk, C. L., Fujiwara, S. and Papas, T. S.: A heat shock inducible eukaryotic expression vector. *Gene* 71: 207-210, 1988.
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- Whelan, W.J. (Eds.): *Advances in Gene Technology: The Molecular Biology of Immune Diseases and the Immune Response*, Oxford, IRL Press, 1990, p. 31.
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 8. Papas, T. S., Watson, D. K., Sacchi, N., Fujiwara, S., Seth, A. K., Fisher, R. J., Bhat, N. K., Mavrothalassitis, G., Koizumi, S., Jorcyk, C. L., Schweinfest, C. W., Kottaridis, S. D. and Ascione, R.: The ETS family of genes in leukemia and Down syndrome. *Am. J. Med. Genet. (Suppl.)* 7: 251-261, 1990.
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46. Cannon B, Hiremath M, Jorcyk C, and Joshi A. CoVE: Colony visualization system for animal pedigrees. *VINCI '14*, 9-18, ACM, New York, NY, USA, 2014. ISBN: 978-1-4503-2765-7.
47. Ryan, R, Mellor, L, Martin, B, Jacob, R, McDougal, O, Oxford, JT, and Jorcyk, CL. Oncostatin M binds to extracellular matrix in a bioactive conformation: implications for inflammation and metastasis. *Cytokine*, 72(1), 71-85, 2015. PMID: 25622278.
48. Goltry S, Hallstrom N, Clark T, Kuang W, Lee J, Jorcyk C, Knowlton WB, Yurke B, Hughes WL, and Graugnard E. DNA Topology increases molecular machine lifetime in human serum. *Nanoscale*, 7(23), 10382-90, 2015. PMID: 25959862.
49. Goyden J, Tawara K, Hedeem, D, Willey JS, Oxford JT, Jorcyk CL. The effect of OSM on MC3T3-E1 osteoblastic cells in simulated microgravity with radiation. *PLOS ONE*, 10(6), e0127230, 2015. PMID: 26030441.
50. Chandra D, Jahangir A, Cornelis F, Rombauts K, Meheus L, Jorcyk CL, and Gravekamp, C. Cryoablation and Meriva has strong therapeutic effect on triple negative breast cancer. *OncImmunology*. 5(1), 2016. PMID: 26942057.
51. Oxford AE, Jorcyk CL, Oxford JT. Neuropathies of Stüve-Wiedemann Syndrome due to mutations in leukemia inhibitory factor receptor (LIFR) gene. *J Neurol Neuromed.* 2016, 1(7): 37-44. PMID: 28058407.
52. Hughes A, Oxford, AE, Tawara K, Jorcyk CL, Oxford JT. Endoplasmic reticulum stress and unfolded protein response in cartilage pathophysiology: contributing factors to apoptosis and osteoarthritis. *Int J Mole Sci.* 2017. 18(3): E665. PMID: 28335520.
53. Robertson JC, Jorcyk CL, and Oxford JT. DICER1 syndrome: *DICER1* mutations in rare cancers. *Cancers.* 2018, 10(5): E143. PMID: 29762508.
54. Tawara K, Bolin C, Koncinsky J, Kadaba S, Covert H, Sutherland C, Bond L, Kronz J, Garbow JR, and Jorcyk CL. OSM potentiates preinvasation events, increases CTC counts, and promotes breast cancer metastasis to lung. *Breast Cancer Research.* 2018, 20(1): 53. PMID: 29898744.
55. Nadelson, L, Jorcyk, C, Yang, D, Smith, J, Matson, S, Cornell, K, and Husting, V. What good is it for me? The Development and Validation of the Individual Science Usefulness Survey. *The Journal of Higher Education Theory and Practice.* In press.
56. Tawara K, Scott H, Emathingier J, Ide A, Fox R, LaJoie D, Hedeem D, Nandakumar M, Oler AJ, Holzer R, and Jorcyk CL. Mechanistically distinct regulation of VEGF expression by IL-6 family cytokines in HER2- breast cancer. *Journal of Pathology.* Submitted.

Current Research Support:

NSF/BSF (Jorcyk, PI) United States-Israel Binational Science Foundation OSM-LOXL2 axis in the switch from tumor dormancy to metastatic growth.	09-01-2018—08-31-2022
NIH/NIGMS (Jorcyk, PI) R25 The Southwest Idaho Bridges to the Baccalaureate	09-01-2017—08-31-2022
METAvivor (Jorcyk, PI) The Quinn-Davis Northwest Arkansas METSquerade Fund Research Award High impact therapeutic for the elimination of breast cancer metastasis to bone.	04-01-2018—03-31-2020
NIH/NIGMS (Bohach, PI; Jorcyk, Investigator) Idaho INBRE Pilot Project High-impact anti-inflammatory therapeutic for the treatment and possible prevention of metastatic breast cancer.	05-01-2017—04-30-2019
M.J. Murdock Charitable Trust (Jorcyk, PI) Partners in Science Program Inflammation-induced chemokines in prostate cancer metastasis	05-01-2018—04-30-2021
NIH/NIGMS (Oxford, PI; Jorcyk, Grantee) COBRE—Center of Excellence in Matrix Biology OSM promotes breast tumor cell-ECM disruption resulting in invasion and metastasis	06-1-2014-05/31/2019

Research Recently Completed (last five years):

M.J. Murdock Charitable Trust (Jorcyk, PI) Partners in Science Program Investigating prostate tumor cell migration	02/25/2016—02/24/2018
Osher Lifelong Learning Institute (Jorcyk, PI) Osher Faculty Grant Program Are inflammatory proteins associated with breast cancer metastasis?	05/01/2016-04/30/2017
M.J. Murdock Charitable Trust (Jorcyk, PI) Partners in Science Program. Is there a role for oncostatin M in prostate cancer? The main goal of the grant is to develop preliminary data addressing a function for OSM in prostate cancer <i>in vitro</i> .	06/01/2014—01/31/2017
HERC Idaho State Board of Education (Jorcyk, PI) Business Incubation Fund Small Molecule Inhibitors for the Reduction of Cancer Metastasis The main goal of this project is to develop and test OSM-SMIs <i>in vitro</i> .	7/1/2014 –6/30/2015
NASA, EPSCoR (Jorcyk, PI) Idaho NASA EPSCoR Research Initiation Grant Molecular mechanisms of inflammatory cytokines in bone health. The main goal of this pilot study is to determine the effects of inflammatory cytokines on bone health under conditions of radiation and microgravity.	9/1/2013 – 8/31/2015

- NIH/ITHS (Jorcyk, PI) 8/1/2013-7/20/2015
Pilot Grant (through U. of Washington)
Development of breast cancer therapeutics to inhibit OSM-mediated metastasis.
- W.M. Keck Foundation (Hughes, PI; Jorcyk, Co-PI) 8/1/2011 – 7/31/2015
Medical Research/Science and Engineering Research Programs
Synthetic DNA reactions for low-cost diagnosis and treatment of disease.
- NIH/NIGMS (Jorcyk, PI) 1/1/2014—6/30/15
Clinical Translation Research CTR-IN Pilot Grant
Correlating serum OSM levels with metastatic breast cancer and therapeutic options.
The main goal of this pilot study is to determine if oncostatin M serum levels are elevated in patients with breast cancer.
- MSTMRI Small Project Grant (Jorcyk, PI) 7/1/2013 – 6/30/2015
MSTMRI Seed Grant Program
Oncostatin M synergizes with general inflammation to increase breast cancer metastasis.
The main goal of this grant is to perform a pilot *in vivo* study to address synergy between OSM and chronic systemic inflammation during breast cancer progression.
- American Cancer Society RSG-09-276-01-CSM (Jorcyk, PI) 7/1/2009 – 12/30/2014
American Cancer Society Research Scholar Grant
Breast cancer metastasis to the bone: the role of oncostatin M.
- Susan G. Komen for the Cure KG100513 (Jorcyk, PI) 6/21/2010 – 6/20/2014
Susan G. Komen Breast Cancer Research Program
Analysis of oncostatin M in breast cancer metastasis to bone for the purpose of inhibiting disease progression.
- NASA NNX10AN29A (Jorcyk, Oxford, Rohn, Mitchell, Co-PIs) 10/01/2010 – 9/30/2013
Molecular mechanisms of cellular mechanoreception in bone.
- NIH NCI R15CA137510 (Jorcyk, PI) 4/1/2009 – 3/30/2013
Oncostatin M-induced VEGF in human breast cancer is HIF1 α -mediated.
- NIH NCRR P20RR016454 (Bohach, PI; Jorcyk, Team Member) 4/1/2009 – 3/31/2014
Idaho IDeA Network for Biomedical Research Excellence.
Col11a1 function during development, structure and signaling is to address osteoblast-osteoclast cell signaling.
- M.J. Murdock Charitable Trust (Jorcyk, PI) 06/01/2012—01/31/2014
Partners in Science Program.
Regulation of oncostatin M by the extracellular matrix protein Col11a1: potential effects on breast cancer metastasis.

Curriculum Vitae

Trevor J. Lujan, Ph.D.

*Associate Professor
Mechanical & Biomedical Engineering
Boise State University
Cell: (208) 283-3811 • Office: (208) 426.2857
trevorlujan@boisestate.edu*

PERSONAL

Date of Birth: May 22, 1975. Minneapolis, Minnesota.
Spouse: Tenneal E. Lujan, married June 22, 2002
Children: Cecilia M. Lujan, born Feb. 25, 2009
Atticus S. Lujan, born Nov. 21, 2012

EDUCATION

Dec. 2007 Ph.D., Bioengineering
University of Utah, Salt Lake City
May 1998 B.S., Mechanical Engineering
University of Wisconsin, Madison
May 1998 Technical Communications Certificate
University of Wisconsin, Madison

PROFESSIONAL / ACADEMIC / TEACHING

8/2017 – present Associate Professor
Mechanical and Biomedical Engineering
Boise State University, Idaho
1/2012 – 07/2017 Assistant Professor
Mechanical and Biomedical Engineering
Boise State University, Idaho
5/2012 – present Director
Northwest Tissue Mechanics Laboratory
Boise State University, Idaho

11/2010 – 12/2011	Assistant Scientist Biomechanics Laboratory Legacy Research, Oregon
8/2010 – 12/2011	Adjunct Assistant Professor Mechanical Engineering University of Portland, Oregon
10/2007 – 10/2010	Research Associate Biomechanics Laboratory Legacy Research, Oregon
8/2002 – 9/2007	Research Assistant Bioengineering University of Utah, Utah
11/2001 – 4/2002	Research Assistant Mechanical Engineering University of Canterbury, New Zealand
9/1998 – 7/2000	Technical Analyst Accenture (formerly Andersen Consulting) San Francisco, CA
5/1997 – 9/1997	Engineering Intern St. Jude Medical St. Paul, MN
5/1996 – 8/1996	Engineering Intern VA Hospital, Bioengineering Madison, WI
Teaching (past 3 years)	
Fall 2018	Instructor, Continuum Mechanics (ME 510, 12 students, 3 cr) Mechanical and Biomedical Engineering, Boise State.
Spring 2018	Instructor, Failure Mechanics (ME 597, 8 students, 3 cr) Mechanical and Biomedical Engineering, Boise State.
Fall 2017	Instructor, Machine Design (ME 352, 44 students, 3 cr) Mechanical and Biomedical Engineering, Boise State.
Spring 2017	Instructor, Intro to Biomed Eng (ME 112, 29 students, 1 cr)

	Mechanical and Biomedical Engineering, Boise State.
Spring 2017	Instructor, Continuum Mechanics (ME 510, 17 students, 3 cr) Mechanical and Biomedical Engineering, Boise State.
Fall 2016	Instructor, Machine Design (ME 352, 58 students, 3 cr) Mechanical and Biomedical Engineering, Boise State.
Spring 2016	Instructor, Continuum Mechanics (ME 510, 18 students, 3 cr) Mechanical and Biomedical Engineering, Boise State.
Fall 2015	Instructor, Machine Design (ME 352, 52 students, 3 cr) Mechanical and Biomedical Engineering, Boise State.
Spring 2015	Instructor, Intro to Biomed Eng (ME 112, 12 students, 1 cr) Mechanical and Biomedical Engineering, Boise State.

Staff

Stephanie Frahs 2015- (Technician, Part-time, Molecular Biology)

Graduate Students – Current

Edgar Rios Soltero 2017- (Ph.D., Material Science, Boise State, EGD 2021).
Katie Hollar 2017- (Ph.D., Material Science., Boise State, EGD 2021)
Derek Nisbett 2017- (M.S., Mechanical Eng., Boise State, EGD 2018)

Undergraduate Students – Current

Bradley Henderson 2017- (B.S., Mechanical Eng., Boise State, EGD 2019)
Sean Nelson 2017- (B.S., Mechanical Eng., Boise State, EGD 2018)
Danielle Siegel 2018- (B.S., Mechanical Eng., Boise State, EGD 2020)
Katie Cudworth 2018- (B.S., Mechanical Eng., Boise State, EGD 2020)
Kate Benfield 2018- (B.S., Mechanical Eng., Boise State, EGD 2019)

Graduate Students – Alumni

Maddie Krentz 2017-2018 (M.S., Mechanical Eng., Boise State)
John Everingham 2015-2017 (M.S., Mechanical Eng., Boise State)
Rici Morrill 2014-2016 (M.S., Mechanical Eng., Boise State)
Jeremy Creechley 2013-2016 (M.S., Material Science, Boise State)
Christina Sundgren 2012-2014 (M.S., Mechanical Eng., Boise State)

Undergraduate Students – Alumni

Alvaro Morfin 2018 (B.S., Mechanical Eng., Boise State, EGD 2020)
Abdullah Ahmad 2017-18 (B.S., Mechanical Eng., Boise State, 2018)
Pete Martin* 2016-17 (B.S., Mechanical Eng., Boise State, 2017)
Derek Nisbett* 2016-17 (B.S., Mechanical Eng., Boise State, 2017)
Katie Hollar 2015-17 (B.S., Mechanical Eng., Boise State, 2017)
Maddie Krentz* 2015-17 (B.S., Mechanical Eng., Boise State, 2017)

Katie Yocham	2016-17	(B.S., Mechanical Eng., Boise State, 2017)
Carly Frank	2016-17	(B.S., Mechanical Eng., Boise State, EGD 2018)
Aza Tulepbergenov	2015-16	(B.S., Computer Science, Boise State, EGD 2017)
Jillian Helms	2015-16	(B.S., Mechanical Eng., Boise State, 2016)
John Everingham	2015-16	(B.S., Mechanical Eng., Boise State, 2015)
German Martinez	2014-15	(B.S., Mechanical Eng., Boise State, EGD 2017)
John Cashin	2014-15	(B.S., Material Science, Univ. of Wash., EGD 2017)
Kevin Warburton	2014-15	(B.S., Mechanical Eng., Boise State, 2015)
Roshani Lamichane	2014	(B.S., Computer Science, Boise State, EGD 2017)
Evan Rust	2012-2014	(B.S., Mechanical Eng., Boise State, 2014)
Stephen Porter	2013-2014	(B.S., Computer Science, Boise State, 2014)
Matt Smull	2013-2014	(B.S., Mechanical Eng., Boise State, EGD 2017)
Noelia Caloca	2013	(B.S., Mechanical Eng., Boise State, 2015)
Ashley Madsen	2012-2013	(B.S., Mechanical Eng., Boise State, 2015)
Susanna Cai	2011	(B.S., Mechanical Eng., Duke Univ., 2015)
Kevin Burfeind	2009-2011	(B.S., Exercise Science, Willamette Univ., 2011)
Kyle Wirtz	2008-2010	(B.S., Mechanical Eng, Portland State Univ, 2009)
Josiah Brown	2010	(B.S., Mechanical Eng., Duke Univ., 2013)
Meghan O'Donovan	2008	(B.S., Mechanical Eng., U. of Rochester, 2009)
Nathan Jacobs	2006-2007	(B.S., Biomedical Eng., U. of Utah, 2007)
Brent Thompson	2003-2006	(B.S., Biomedical Eng., U. of Utah, 2006)
Tim Plazier	2003-2004	(B.S., Electrical Eng., U. of Utah, 2006)
Spencer Lake	2002-2003	(B.S., Biomedical Eng., U. of Utah, 2006)
Michael Small	2001-2003	(B.S., Chemistry, U. of Utah, 2006)

Academic Advising

2015-present	Specialty advisor for biomedical minor (100 undergraduates)
2014-2015	30 Undergraduates (Juniors to Seniors)
2013-2014	30 Undergraduates (Juniors to Seniors)
2013-2014	40 Undergraduates (Freshman to Seniors)
2012-2013	30 Undergraduates (Seniors)

HONORS AND AWARDS

- 1st Place – M.S. Student Paper Competition – WCB – 2018 (Senior Author)
- 2nd Place – B.S. Student Paper Competition – SB3c – 2017 (Senior Author)
- 3rd Place – B.S. Student Paper Competition – SB3c – 2017 (Senior Author)
- Honored Faculty Member - Top Ten Scholar (Katie Hollar) – Boise State – 2017
- 1st Place – Poster Competition – Idaho INBRE Conference – 2016 (Senior Author)
- Honored Faculty Member - Top Ten Scholar (John Everingham) – Boise State – 2016
- 1st Place – B.S. Student Paper Competition – SB3c – 2015 (Senior Author)
- 1st Place – M.S. Student Paper Competition – SB3c – 2015 (Senior Author)
- Honored Faculty Member - Top Ten Scholar (Kate Jette) – Boise State – 2015
- Honored Faculty Member - Top Ten Scholar (Kevin Warburton) – Boise State – 2015
- Honored Faculty Member - Top Ten Scholar (Evan Rust) – Boise State – 2014
- New Investigator Recognition Award - Othopaedic Research Society – 2013 (Co-Author)

Award of Excellence - Academy of Orthopaedic Surgeons – 2010 (Co-Author)
Mid America Award – Best Paper – 2010 (Co-Author)
Provost’s Honor list at U. of Utah – All semesters enrolled, Fall 2002 to Spring 2007
Provost’s Honor list at U. of Wisconsin – All semesters enrolled, Fall 1993 to Spring 1998
Runner-up, Bioengineering graduate student poster competition – 2004, U. of Utah
Team member on national champion hybrid car team – 1997/98, U. of Wisconsin
Team lead on award winning engineering EXPO exhibit – 1996/97, U. of Wisconsin
Rogers Design Scholarship – 1996/97 Academic Year, U. of Wisconsin
Elliot Scholarship – 1995/96 Academic Year, U. of Wisconsin

INVITED SPEAKER

NIH IDeA Western Regional Conference, “Experimental and Computational Models to Study Matrix Remodeling in Injured Ligament”, Jackson Hole WY, Oct. 2017.

InspireME Seminar, “How to Start a Career in Biomedical Engineering”, Boise State University, Boise, Nov. 2017.

InspireME Seminar, “The Application of Biomechanics and Mechanobiology to Enhance Ligament Healing”, Boise State University, Boise, Feb. 2016.

COBRE/INBRE Treasure Valley Research Meeting, “Software Development for Orthopaedic Healthcare”, Hampton Inn, Boise ID, Nov. 2015.

COBRE/INBRE Treasure Valley Research Meeting, “Mechanobiology of Ligament Repair”, Hampton Inn, Boise ID, Jan. 2015.

Idaho Department of Commerce, Committee Meeting for Idaho Global Entrepreneurial Mission (IGEM), “Preclinical Testing for Hip Resurfacing Technology”, Idaho Commerce Building, Jan. 2014.

Material Science and Engineering Seminar, “A Novel Mechatronic System to Advance Cartilage Tissue Engineering”, Boise State University, Boise, Sept. 2012.

Osteosynthesis & Trauma Care Foundation Workshop. “Periosteal Callus Quantification from Plain Radiographs”, Barcelona, Spain, Oct. 2011.

Legacy Research Institute Seminar, “Advancing Orthopaedic Surgery using Principles of Mechanobiology”, Portland, OR, Sept. 2011.

SERVICE

Grant Review

Panelist, NSF BMMB Program, Arlington VA (4 proposals, 2 as primary, Jun. 2018)

Reviewer, OREF, Warren Soft Tissue Grants (6 proposals, 3 as primary, Jul. 2016)

Journal Review

Reviewer, Journal of Biomechanics
Reviewer, Journal of Bone and Joint Surgery
Reviewer, Journal of Mechanical Behavior of Biomedical Materials
Reviewer, Connective Tissue Research
Reviewer, Injury
Reviewer, Journal of Applied Biomechanics
Reviewer, Tissue Engineering
Reviewer, Medical & Biological Engineering & Computing
Reviewer, Biomechanics and Modeling in Mechanobiology
Reviewer, Annals of Biomedical Engineering

Organization and Chairing at Scientific Meetings

Session Co-Chair, SB3c, Tucson (Extracellular Matrix Biomechanics, Jun. 2017)
Session Co-Chair, SB3c, National Harbor (Signaling and Mechanotransduction, Jun. 2016)
Judge, SB3c, National Harbor (Student Competition, Jun. 2016)
Session Co-Chair, SB3c, Salt Lake City (Soft Tissue Biomechanics, Jun. 2015)
Judge, SB3c, Salt Lake City (Student Competition, Jun. 2015)
Reviewer, SB3c, Salt Lake City (Student Competition, Jun. 2015)
Judge, World Congress of Biomechanics, Boston (Student Competition, Jun. 2014)
Reviewer, World Congress of Biomechanics, Boston (Student Competition, Jun. 2014)
Session Chair, ASME SBC (Soft Tissue Biomechanics, Jun. 2013)
Reviewer, ASME SBC (Student Paper Competition, Jun. 2013)
Reviewer, ASME SBC (Student Paper Competition, Jun. 2011)
Reviewer, ASME SBC (Student Paper Competition, Jun. 2012)

University Committee Membership

Member, College of Engineering, Tenure/Promotion Committee, Boise State, '18-present'
Chair, MBE Dpt., Biomedical Minor Committee, Boise State, '14-present'
Member, MBE Dpt., Solid Mech. Curriculum Alignment Team, Boise State, '15-present'
Member, MBE Dpt., ABET Committee, Boise State, '17-present'
Member, MSE Department, Graduate Curriculum Committee, '13-17'
Member, MBE Department, MBE Faculty Search Committee, Boise State '14-15'
Member, College of Engineering, Tenure and Promotion, Boise State, '13'
Member, College of Engineering, Safety Committee, Boise State, '12-14'
Member, College of Engineering, Scholarship Committee, Boise State '14-15'
Member, MBE Department, Biomedical Minor Committee, Boise State '12-14'
Member, MBE Department, Graduate Committee, Boise State, '12-present'
Member, MBE Department, MBE Faculty Search Committee, Boise State '12-13'
Chair, Graduate Student Advisory Committee, Bioengineering, U. Utah, '06-07'
Member, Graduate Student Advisory Committee, Bioengineering, U. Utah, '02-06'

Community Service and Outreach

Presenter, Boise River Montessori, Boise, May 2018

Presenter, Sage Element School, Boise, May 2017
Presenter, Idaho Research at the Capitol Rotunda, Boise, Jan. 2016
Speaker, Evening with Faculty, Boise State, Oct. 2015.
Presenter, Idaho Technology Reception, Boise, Mar. 2015
Speaker, Critical Paths Event for Undergraduate Engineers, Boise State, Oct. 2013
Speaker, Critical Paths Event for Undergraduate Engineers, Boise State, Oct. 2013

SOCIETIES

American Society of Mechanical Engineers, since 2013
American Society of Engineering Education, since 2012
Orthopaedic Research Society, since 2008
Biomedical Engineering Society, since 2005

SOFTWARE DEVELOPMENT

OrthoRead 1.0. Launch Date: Aug. 2014. Development Team: **Lujan TJ** and Porter SM (lead programmer). Summary: This software application automates the measurement of fracture callus in plain radiographs. The software was developed in Dr. Lujan's lab and was validated in a publication in JOR. Free Download: <http://coen.boisestate.edu/ntm/orthoread/>

FiberFit 1.0. Launch Date: Sep. 2015. Development Team: **Lujan TJ**, Morrill EE, and Tulebergenov AN (lead developer). Summary: This software application automates the quantification of average orientation and dispersion in two-dimensional images of fiber networks. This software was developed in Dr. Lujan's lab and was validated in a publication in BMMB. Free Download: <http://coen.boisestate.edu/ntm/fiberfit/>

FiberFit 2.0. Launch Date: Jul. 2016. Development Team: **Lujan TJ**, Morrill EE, and Tulebergenov AN (lead developer). Summary: This software update included additional features to improve the graphic user interface and enhance the generation of reports after measurement. Free Download: <http://coen.boisestate.edu/ntm/fiberfit/>

PUBLICATIONS

Thesis/Dissertation

Lujan TJ: Multiscale Relationships in Ligament Mechanics. PhD Dissertation, University of Utah, Dec. 2007. (http://mrl.sci.utah.edu/papers/lujan_dissertation_final.pdf)

Pending Refereed Journal Articles (* = corresponding author)

1. Everingham JB, Martin PT, ***Lujan TJ**. A Hand-Held Device to Apply Instrument-Assisted Soft Tissue Mobilization at Targeted Compression Forces and Stroke Frequencies. In review, ASME Medical Devices.

Published or Accepted Refereed Journal Articles (* = corresponding author)

1. Frahs SM, Oxford JT, Neumann EE, Brown RJ, Keller-Peck CR, Pu X, ***Lujan TJ**. Extracellular matrix expression and production in fibroblast-collagen gels: Towards an in vitro model for ligament wound healing. 2018 Jun. 5. *Annals of Biomedical Engineering* [Epub ahead of print].
2. Yocham KM, Scott C, Fujimoto K, Tanasse E, Oxford JT, **Lujan TJ**, *Estrada D. Mechanical Properties of Graphene Foam and Graphene Foam – Tissue Composites. *Advanced Engineering Materials*. Accepted Jun. 2018.
3. Stender CJ, Rust E, Martin PT, Neumann EE, Brown RJ, ***Lujan TJ**. Modeling the Effect of Collagen Fibril Organization on Ligament Mechanical Behavior. *Biomech Model Mechanobiol. Biomechanics and Modeling in Mechanobiology*. 2018 Apr; 17(2):543-557.
4. Hollar KA, Ferguson DS, Everingham JB, Helms JL, ***Lujan TJ**. Quantifying Wear Depth in Hip Prostheses using a 3D Optical Scanner. *Wear*. 2018 Jan. 394-395:195-202.
5. Warburton KJ, Everingham JB, Helms JL, Hollar KA, Kazanovicz A, Brouman J, Fox S, ***Lujan TJ**. Wear Testing of a canine hip resurfacing implant that uses highly cross-linked polyethylene. *J Orthop Res*. 2018 Apr. 36(4): 1196-1205
6. Creechley JJ, Krentz ME, ***Lujan TJ**. Fatigue Life of Bovine Meniscus under Longitudinal and Transverse Tensile Loading. *J Mech Behavior of Biomed Materials*. 2017 May; 69:185-192. PMID: 28088070
7. Lamb C, Perkins D, Fewkes M, **Lujan TJ**, Morrill EE, Cholico G, *Mitchell K. Aryl hydrocarbon receptor activation by TCDD modulates expression of extracellular matrix remodeling genes during experimental liver fibrosis. *Biomed Research International*. 2016. 5309328
8. Morrill EE, Tulebergenov AN, Stender CJ, Lamichhane R, Brown RJ, ***Lujan TJ**. A Validated Software Application to Measure Fiber Organization in Soft Tissue. *Biomech Model Mechanobiol*. 2016 Dec; 15(6):1467-1478.
9. Lack W, Elkins J, **Lujan TJ**, Peindl R, Kellam J, Anderson DD, *Marsh, JL. Motion Predicts Clinical Callus: Construct-Specific Finite Element Analysis of Supracondylar Femur Fractures. *J Bone Joint Surg Am*. 2016 Feb 17; 98(4):276-84. PMID: 26888675
10. Porter SM, Dailey HL, Hollar KA, Klein K, Harty JA, ***Lujan TJ**. Automated measurement of fracture callus in radiographs using portable software. *J Orthop Res*. 2016 Jul; 34(7): 1224-33. PMID: 26714245.
11. *Augat P., Morgan E., **Lujan T.**, MacGillivray T.J., Cheung L. Imaging Techniques for the Assessment of Fracture Repair. *Injury*. 2014 Jun;45 Suppl 2:S16-22.
12. *Bottlang M., Doornink J, **Lujan TJ**, Fitzpatrick DC, Madey SM. Biomechanics and Use of Far Cortical Locking in Orthopaedic Trauma. *Orthopaedic Knowledge Online*. Aug. 2012.
13. ***Lujan TJ**, Wirtz, Madey SM, Bottlang M. A novel bioreactor for the dynamic stimulation and mechanical evaluation of multiple tissue engineered constructs. *Tissue Engineering Part C Methods*. 2011 Mar;17(3):367-74
14. Bahney CS, **Lujan TJ**, Hsu CW, Bottlang M, West JL, *Johnstone B. Visible light photoinitiation of mesenchymal stem cell-laden bioresponsive hydrogels. *European Cells and Matrix*. 2011 Jul 15;22:43-55.

15. Henderson CE, **Lujan TJ**, Bottlang M, Fitzpatrick DC, *Marsh JL: Healing of Distal Femur Fractures Treated with Locked Plates. Accepted Nov. 2010, Clinical Orthopaedics and Related Research. 2011 Jun;469(6):1757-65. Epub 2011 Mar 22.
16. ***Lujan TJ**, Madey SM, Fitzpatrick DC, Byrd GD, Sanderson JM, Bottlang M: A Computational Technique to Measure Fracture Callus in Radiographs. Journal of Biomechanics, 43(4):792-5, 2010.
17. **Lujan TJ**, Henderson CE, Madey SM, Fitzpatrick DC, Marsh JL, *Bottlang M: Locked Plating of Distal Femur Fractures Leads to Inconsistent and Asymmetrical Callus Formation: Journal of Orthopaedic Trauma, 24(3):156-62, 2010.
18. *Bottlang M., Doornink J, **Lujan TJ**, Fitzpatrick DC, Marsh JL, Augat P, Rechenberg B, Lesser M, Madey SM. Effects of Construct Stiffness on Healing of Fractures Stabilized with Locking Plates. Journal of Bone and Joint Surgery (Am), Dec; 92 Suppl 2:12-22, 2010.
19. Henderson CE, **Lujan TJ**, Bottlang M, Fitzpatrick DC, *Marsh JL: Stabilization of distal femur fractures with IM nails and locking plates: differences in callus formation. Iowa Orthopaedic Journal, 30:61-8, 2010.
20. **Lujan TJ**, Underwood CJ, Jacobs N, *Weiss JA: Contribution of glycosaminoglycans to viscoelastic tensile behavior of human ligament. Journal of Applied Physiology 106(2): 423-31, 2009.
21. **Lujan TJ**, Dalton MS, Thompson BM, Ellis BJ, *Weiss JA: Effect of ACL Deficiency on MCL strains and joint kinematics. Journal of Biomechanical Engineering 129(3):386-92, 2007.
22. **Lujan TJ**, Underwood CJ, Henninger HB, Thompson BM, *Weiss JA: Effect of dermatan sulfate glycosaminoglycans on the quasi-static material properties of the human medial collateral ligament. Journal of Orthopaedic Research 25(7):894-903, 2007.
23. Ellis BJ, **Lujan TJ**, Dalton MS, *Weiss JA: MCL insertion site and contact forces in the ACL-Deficient knee. Journal of Orthopaedic Research 24(4):800-810, 2006.
24. *Weiss JA, Gardiner JC, Ellis BJ, **Lujan TJ**, Phatak NS: Three-dimensional finite element modeling of ligaments: Technical aspects. Medical Engineering and Physics 27(10):845-61, 2005.
25. **Lujan TJ**, Lake SP, Plaizier TA, Ellis BJ, *Weiss JA: Simultaneous measurement of three-dimensional joint kinematics and tissue strains with optical methods. ASME Journal of Biomechanical Engineering, 127:193-197, 2005.

GRANTS

Active

Organization: National Science Foundation

Title: CAREER: Characterization and Simulation of Failure Mechanisms in Soft Fibrous Tissue

Role: Project Investigator

Dates: 3/1/16 - 2/29/21

Amount: \$500,000 total costs over 5 years.

Synopsis: This research grant will support the mechanical testing of meniscus tissue under cyclic loading. Finite element models will be developed, in collaboration with Idaho National Lab, to predict and visualize failure during testing.

Organization: National Institutes of Health / DHHS

Title: Replicating Marrow Mechanics of Stem Cells Ex Vivo

Role: Co-Investigator

Dates: 1/1/18 - 12/31/19

Amount: \$133,050 total costs over 2 years.

Synopsis: This research grant will support the mechanical testing of meniscus tissue under cyclic loading. Finite element models will be developed, in collaboration with Idaho National Lab, to predict and visualize failure during testing.

Pending

Organization: National Institutes of Health, NIAMS, R15

Title: The Biomechanical and Microstructural Consequences of Soft Tissue Mobilization

Amount: \$300,000 (3 years)

Role: PI

Submission: Feb 25th, 2018

Synopsis: This research project will investigate the physical mechanisms that promote healing in ligament.

Past, Extramural

Organization: National Institutes of Health, GMS, P20

Title: Matrix Mechanobiology of Ligament Repair

Role: Project Investigator

Dates: 9/1/14 - 8/31/17

Amount: \$165,000 annual direct costs to Dr. Lujan in first two years, \$100,000 direct costs in third year.

Synopsis: This project investigated the role of mechanical stimulation in ligament repair and remodeling. The research grant is included in a P20 COBRE grant to develop a Center for Matrix Biology (PI: Dr. Julia Oxford). In May 2016, Dr. Lujan graduated as junior investigator in the COBRE program, and now serves as a mentor on this grant. This project resulted in 5 manuscripts, 13 abstracts, 1 software application, and 1 pending patent.

Organization: Higher Education Research Council of Idaho, IGEM Program

Title: Preclinical Testing of Hip Resurfacing Technology

Amount: \$110,454 total costs

Role: PI

Dates: 2/1/14 - 3/31/16

Synopsis: This project successfully developed and experimentally verified a novel hip resurfacing device for canines, which has potential to reduce the cost of hip replacement surgery by 25%. This project resulted in 2 manuscripts, 4 abstracts, and pending patents from the industry collaborator.

Curriculum Vitae: August 2018

Julia Thom Oxford

Stueckle Endowed Chair in Biology
Distinguished Professor
Director, Center of Biomedical Research
Excellence in Matrix Biology
Director, Biomolecular Research Center
(208) 426-2395
joxford@boisestate.edu

Degrees:

Doctor of Philosophy , Biochemistry and Biophysics Washington State University, Pullman, WA Dissertation: "Export of Protein in <u>Escherichia coli</u> " Advisor: Prof. Linda L. Randall Department of Biochemistry and Biophysics Washington State University	1986
Master of Sciences , Biochemistry and Biophysics Washington State University, Pullman, WA	1985
Bachelor of Arts , Chemistry and Biology (cum Laude) Linfield College, McMinnville, OR	1981

Positions Held:

Associate Chair, Department of Biological Sciences, 2014-present
Professor, Department of Biological Sciences, Boise State University, 2008-present
Affiliate Faculty, University of Washington, School of Medicine, Department of Biochemistry, 2003-2010
Affiliate Faculty, University of Idaho, Dept of Microbiology, Molecular Biology and Biochemistry, 2002-2011
Associate Professor, Department of Biology, Boise State University, 2003-2008
Assistant Professor, Biology, Boise State University, 2000-2003.
Affiliate Faculty, Oregon Health Sciences University, School of Dentistry, 2000-2002.
Research Assistant Professor, Integrative Biosciences Department (formerly Oral Molecular Biology), School of Dentistry, and Biochemistry and Molecular Biology, School of Medicine, Oregon Health Sciences University, 1995-2000.
Visiting Assistant Professor of Clinical Sciences, Equine Orthopaedics, Colorado State University, 1996-1998.
Senior Research Associate, Shriners Hospital for Crippled Children, Portland, 1992-1996.
Postdoctoral fellow, Shriners Hospital for Crippled Children and Department of Biochemistry and Molecular Biology, Oregon Health Sciences University, 1988-1992.
Postdoctoral fellow, Biochemistry/Biophysics Program, Washington State University, 1988.
Postdoctoral fellow, Dept of Cellular Biology, Swiss Institute for Experimental Cancer Research, 1987-1988.
Graduate Research Assistant, Dept of Biochemistry/Biophysics, Washington State University, 1981-1986.

Honors and Awards:

C. Glenn King Fellowship, Chemistry Dept. Washington State University, 1981-1982.
ISREC Postdoctoral Fellowship, 1987 and 1988.
Arthritis Investigator Award, Arthritis Foundation, 1996.
Gerlinger Research Foundation Award, 1999.
Oregon Medical Research Foundation Award, 2000.
Boise State University Foundation Scholar Award, Research and Creative Activity, 2006.
Lori and Duane Steuckle Dean's Distinguished Faculty Award, 2005-2009
MMACHS Distinguished Lecture Series February 10, 2011
Boise State University Distinguished Professor 2011-present
Stueckle Endowed Chair in Biology, 2017-present
Top Ten Scholar Honored Faculty Member, 2018

Teaching

Undergraduate Courses:

Boise State University

Biology/Materials Science/Mechanical&Biomedical Engineering 477 Biomaterials Science
Biology 497 Biochemistry of Cell Signaling
Biology 497 Introduction to Bioinformatics
Biology 191 General Biology
Biology 493 Internship in Laboratory Research
Biology 451 Developmental Biology, lecture and laboratory
Biology 443 Advanced Developmental Biology
Biology 301 Cell Biology
Biology 202 General Zoology lecture and laboratory
Chem 405 Research in Chemistry
CID 200, 300, 400, 500 Vertically Integrated Projects –Plasma Medicine

Portland State University (adjunct professor)

Chemistry 450 Biochemistry, 1991-1994.
Chemistry 250 Nutrition, 1991.

Lewis and Clark College, Portland, Oregon (adjunct professor)

Chemistry 335 and 336, Biochemistry lecture and laboratory, 1992.

Graduate Courses:

Boise State University

Biology/Materials Science/Mechanical&Biomedical Engineering 577 Biomaterials Science
Biology 598 Biomaterials Graduate Seminar
Biology 597 Biochemistry of Cell Signaling
Biology 597 Introduction to Bioinformatics
Biology 465/565 Advanced Topics in Molecular Biology Techniques
Biology 466/566 Advanced Topics in Cancer and Developmental Biology
Biology 567 Extracellular Matrix in Development and Disease
Biology 596 Directed Research, Boise State University
Biology 551 Developmental Biology, lecture and laboratory
Biology 543 Advanced Developmental Biology
Biology 650 Scientific Writing in the Biomedical Sciences
BMOL 606 Scientific Proposal Writing

Oregon Health Sciences University

Oral Biology 513, Bone Physiology; endochondral and intramembranous ossification, 1998-2000.

Colorado State University (visiting professor)

PS 796, Grant writing course, Department of Physiology, 1996.
VS630, Molecular biology applications in Orthopaedic research, Veterinary Teaching Hospital, 1996.

Other: Item Writer for Medical College Admission Test, American College Testing Program, 1989-2009.

Directed research -- Graduate Student Research Projects:

*28 graduate students mentored from 1994 – present (current and most recent listed here);
information about undergraduate students available upon request*

28. **Stephanie Frahs**, 2018 – present
Novel regulation of differentiation and mineralization in adult stem cells
27. **Joe Christianson**, 2018 – present
Targeting LIFR signaling in Stuve-Wiedemann syndrome
26. **Roxanne Stone**, 2017 – present
Decellularized cartilage scaffold for stem cell differentiation and cartilage regeneration
25. **Kali Woods**, 2017 – present
Mechanisms of stem cell mechanotransduction
24. **Jae Martini**, 2017 – present
Proteomic analysis of mitochondrial stress in fluoroquinolone-induced tendon damage
23. **Makenna Hardy**, 2017 – present
Role of minor fibrillar collagens in inner ear hair cell biomechanics
22. **Aaron Sheetz**, 2016 – 2018
Mechanism of fluoroquinolone-induced tendon damage
21. **Alexandria Hughes**, 2014-2015
ER stress and the Unfolded Protein Response in Stickler Syndrome type II
Began doctoral degree program at University of Colorado, 2015
20. **Neda Shefa**, 2012-2015
BMP-2 and PTHrP in alternative splicing in skeletal development
Recipient of Sigma Xi Grant-in-aid-of-Research, 2013-2014
Began Medical School at University of Utah, 2015
19. **Jonathon Reeck**, 2010-2017
Zebrafish model system for osteogenesis; cell polarity in chondrogenesis
Recipient of Sigma Xi Grant-in-aid of research, 2011
18. **Ken Weekes**, 2013- 2014, Characterization of a new adult stem cell line
Recipient of Sigma Xi Grant-in-aid-of-Research, 2013
Began Dental School/ PhD program at OHSU in 2014
17. **Hannah Parker**, 2013-2014, Extracellular Matrix in Breast Cancer Progression
First author publication on DiGeorge Syndrome
Began Medical School in 2014
16. **Travis Baker**, 2013-2014, Mechanotransduction in bone and cartilage cells
Contributing author on publication
Began Medical School in 2014
15. **Anthony Hafez**, 2012-2013 Mineralization of the developing skeleton
First author publication in J. Dev. Biol.
Began Medical School in 2013
14. **Ming Fang**, 2007-2010 Zebrafish Craniofacial Development
Recipient of ISU Molecular Core Facility Grant for DNA Sequencing
First author on Gene Expression Pattern 2010
Began doctoral program at Cincinnati Children's Hospital, 2010.
Employed by Novartis
13. **Kendra Coonse**, 2006-2010, Master of Science, Collagen-Biglycan interactions
Began Medical School 2010

Additional information on students, 1994-2005, available upon request.

Grants for Educational Purpose:

1. Microarray analysis of gene expression for developmental studies, Course Development grant, 2002, Boise State University, \$980.
2. Enhancement of Developmental Biology Laboratory Course, 2004, Boise State University, \$650.
3. Merck/AAAS grant for undergraduate research at the interface of Chemistry and Biology, November 2, 2007, \$60,000 funded for three years, Co-P.I.s; Cornell, Jorcyk, McDougal, Charlier, Tinker, Oxford.
4. M.J. Murdock Charitable Trust Partners-in-Science 2012-2014, \$15,000 for two years, to host high school teacher in laboratory during the summer, P.I.: Julie Oxford
5. National Science Foundation, Gateway Scholarships in Biological Sciences, 2017 - 2022, \$1,000,000 for academically talented STEM students with demonstrated financial need, P.I.: Julie Oxford

Research

***Refereed Publications -- Citations: 2475; h-index: 24; i10 index: 43
1985 -2005 available upon request***

32. Warner, L., Brown, R., Yingst, S and Oxford, J "Isoform-specific heparan sulfate binding within the amino terminal noncollagenous domain of collagen $\alpha 1(XI)$ " , (2006) **Journal of Biological Chemistry**, 281:39507-16. PMC2948787.
33. Warner, L., Blasick, C., Brown, R., Oxford, J. "Expression, purification and refolding of recombinant collagen $\alpha 1(XI)$ amino terminal domain splice variants", (2007) **Protein Expression and Purification**, 52:403-409. PMC2713663.
34. Dufty, BM, Warner, LR, Hou, ST, Jiang, SX, Gomez-Isla, T, Leenhouts, KM, Oxford, JT, Feany, MB, Masliah, E, Rohn TT, "Calpain-cleavage of a-synuclein; connecting proteolytic processing to disease-linked aggregation" (2007) **Neurobiology** 170:1725-38. PMC1854966.
35. Takata, T, Oxford JT, Brandon, TR, Lampi KJ, "Deamidation alters the structure and decreases the stability of human lens betaAlpha3-crystallin" (2007) **Biochemistry**, 46:8861-71. PMC2597435.
36. Gerritsen, M, Oxford, J.T., Frary, M., Henderson, J., Hampikian, J.M. "Immuno-SEM characterization of developing bovine cartilage", (2008) **Materials Science and Engineering: C**, 28:341-346.
37. Kahler, R., Yingst, S., Krawczak, D., Oxford, J., and Westendorf, J. "Collagen 11a1 is indirectly activated by Lymphocyte Enhancer-binding factor 1 (Lef1) and negatively regulates osteoblast maturation" (2008) **Matrix Biology**, 27(4):330-8. PMCID: PMC2431459.
38. Bowen, KB, Reimers, AP, Luman, S, Kronz, JD, Fyffe, WE, Oxford, JT "Immunohistochemical localization of collagen type XI alpha 1 and alpha 2 chains in human colon tissue" (2008) **Journal of Histochemistry and Cytochemistry**, 56:275-283. PMCID: PMC2324180.
39. Halsted, KC, Bowen, KB, Bond, L, Jorcyk, CJ, Fyffe, WE, Kronz, JD, Oxford, JT "Collagen XI $\alpha 1$ in normal and malignant breast tissue", (2008) **Modern Pathology**. 21:1246-54. PMC2586035.
40. Takumi Takata, Julie T Oxford, Borries Demeler, and Kirsten J Lampi, "Deamidation destabilizes and triggers aggregation of a lens protein, A3-crystallin", (2008) **Protein Science**. 17:1565-75. PMCID: PMC2525517.

41. Yingst, S, Cole, J., Warner, L., Bloxham, K., Brown, R., Kenoyer, L., Knowlton, B., Oxford, J.T., "Characterization of Collagenous Matrix Assembly in a Chondrocyte Model System" (2009) **Journal of Biomedical Materials Science**, 90:247-55. PMC2842207.
42. Toumpoulis IK, Oxford JT, Cowan DB, Anagnostopoulos CE, Rokkas CK, Chamogeorgakis TP, Angouras DC, Shemin RJ, Navab M, Ericsson M, Federman M, Levitsky S, McCully JD. "Differential expression of collagen type V and XI alpha-1 in human ascending thoracic aortic aneurysms", (2009), **Ann Thorac Surg**. 88:506-13. PMC2834780.
43. Fang M, Adams JS, McMahan BL, Brown RJ, Oxford JT. The expression patterns of minor fibrillar collagens during development in zebrafish (2010) **Gene Expr Patterns** Oct-Dec;10(7-8):315-22. Epub 2010 Jul 18, PMC2956583.
44. Gorski JP, Huffman NT, Chittur S, Midura RJ, Black C, Oxford J, Seidah NG. Inhibition of SKI-1 proprotein convertase and caspase-3 blocks transcription of key extracellular matrix genes regulating osteoblastic mineralization,(2011) **J Biol Chem**. 286(3): 1836-49. PMC3023479.
45. Tawara, Kenneth, Oxford, Julia Thom, Jorcyk, CL. "Clinical significance of interleukin (IL)-6 in cancer metastasis to bone: potential of anti-IL-6 therapies." (2011) **Cancer Management Research**, 2011;3:177-89. Epub 2011 May 18. PMC3101113.
46. Brown, R., Mallory, C., McDougal, O.M., Oxford, J.T. "Proteomic analysis of Col11a1-associated protein complexes". (2011) **PROTEOMICS**, 11(24):4660-76. PMC3463621.
47. Mallory C , McDougal OM , Oxford JT. Collagen Type XI alpha-1 Chain Amino Propeptide Structural Model and Glycosaminoglycan Interactions in Silico, in Proceedings of 2011 International Conference on Bioinformatics & Computational Biology (ISBN #: 1-60132-172-4/CSREA), Editors: Hamid R. Arabnia and Quoc-Nam Tran, pp.: 632-635, Las Vegas, USA, 2011
48. McDougal,O.M., Mallory, C., Warner, L.R., Oxford, J.T. "Predicted structure and binding motifs of alpha 1 (XI) collagen" (2011) **JBio** (GSTF International Journal of BioScience), vol. 1:43-48.
49. Fang M, Jacob R, McDougal O, Oxford JT., Minor fibrillar collagens, variable regions alternative splicing, intrinsic disorder, and tyrosine sulfation. (2012) **Protein Cell**. Jun;3(6):419-33. PMC3484837.
50. Shea KG, Jacobs JC, Carey JL, Anderson AF. Oxford JT. Osteochondritis Dissecans Knee Histology Studies Have Variable Findings and Theories of Etiology,(2013) **Clinical Orthopaedics and Related Research** Apr;471(4):1127-36. PMC3586021
51. Berger JM, Rohn TT, Oxford JT. Autism as the Early Closure of a Neuroplastic Critical Period Normally Seen in Adolescence. (2013) **Biol Syst**. Aug 20;1. doi: 10.4172/2329-6577.1000118. PMC3864123.
52. Bullock C, Cornia N, Jacob R, Remm A, Peavey T, Weekes K, Mallory C, Oxford JT, McDougal OM, Andersen TL. DockoMatic 2.0: high throughput inverse virtual screening and homology modeling. (2013) **J Chem Inf Model**. Aug 26;53(8):2161-70. doi: 10.1021/ci400047w. Epub 2013 Aug 8. PMC3916141.
53. McDougal OM, Cornia N, Sambasivarao SV, Remm A, Mallory C, Oxford JT, Maupin CM, Andersen T. Homology modeling and molecular docking for the science curriculum. (2014) **Biochem Mol Biol Educ**. Mar;42(2):179-82. doi: 10.1002/bmb.20767. Epub 2013 Dec 20. PubMed PMID: 24376157.
54. Mikelonis D, Jorcyk CL, Tawara K, Oxford JT. Stüve-Wiedemann syndrome: LIFR and associated cytokines in clinical course and etiology. (2014) **Orphanet J Rare Dis**. Mar 12;9(1):34. doi: 10.1186/1750-1172-9-34. PMC3995696.
55. Hughes AN, Oxford JT. A lipid-rich gestational diet predisposes offspring to nonalcoholic fatty liver disease: a potential sequence of events. (2014) **Hepatic Medicine: Evidence and Research**. Mar 6 6:15-23. PMC3953741.

56. Bates JT, Jacobs JC, Jr, Shea KG, Oxford JT. Emerging genetic basis of osteochondritis dissecans. (2014) **Clin. Sports Med.** 33(2):199-220. PMC3976886.
57. Jacobs JC Jr, Shea KG, Oxford JT, Carey JL. Fluoroquinolone use in a child associated with development of osteochondritis dissecans. (2014) **BMJ Case Rep.** Sep 16. pii: bcr2014204544. doi: 10.1136/bcr-2014-204544. PMC4166236.
58. Mellor LF, Baker TL, Brown RJ, Catlin LW, Oxford JT. Optimal 3D culture of primary articular chondrocytes for use in the rotating wall vessel bioreactor. (2014) **Aviat Space Environ Med.** Aug;85(8):798-804. doi: 10.3357/ASEM.3905.2014. PMCID: PMC4207436.
59. Ryan RE, Martin B, Mellor L, Jacob RB, Tawara K, McDougal OM, Oxford JT, Jorczyk CL. Oncostatin M binds to extracellular matrix in a bioactive conformation: implications for inflammation and metastasis. **Cytokine.** 2015 Mar;72(1):71-85. PMCID: PMC4328881.
60. Goyden J, Tawara K, Hedeem D, Willey JS, Oxford JT, Jorczyk CL. The Effect of OSM on MC3T3-E1 Osteoblastic Cells in Simulated Microgravity with Radiation. **PLoS One.** 2015 Jun 1;10(6):e0127230. doi: 10.1371/journal.pone.0127230. eCollection 2015. PMCID: PMC4452373.
61. Pu X, Oxford JT. Proteomic analysis of tissue engineered cartilage. (2015) **Cartilage Tissue Engineering; Methods in Molecular Biology.** 1340:263-78. doi: 10.1007/978-1-4939-2938-2_19.
62. Parker H, Conway E, Goldsberry J, Jeffries S, Price E, Oxford JT. Genetic and Molecular Aspects of DiGeorge Syndrome. (2015) **BIOS.** Vol. 86(2): 109-117. doi: 10.1893/0005-3155-86.2.109.
63. Hafez A, Squires R, Pedracini A, Joshi A, Seegmiller RE, Oxford JT. Col11a1 Regulates Bone Microarchitecture during Embryonic Development. **J Dev Biol.** 2015;3(4):158-176. Epub 2015 Dec 16. PMCID: PMC4711924.
64. Lamb CL, Cholic GN, Perkins DE, Fewkes MT, Oxford JT, Lujan TJ, Morrill EE, Mitchell KA. Aryl Hydrocarbon Receptor Activation by TCDD Modulates Expression of Extracellular Matrix Remodeling Genes during Experimental Liver Fibrosis. **Biomed Res Int.** 2016;2016:5309328. Epub 2016 Sep 8. PMCID: PMC5031815.
65. Oxford AE, Jorczyk CL, Oxford JT. Neuropathies of Stüve-Wiedemann Syndrome due to mutations in leukemia inhibitory factor receptor (LIFR) gene. **J Neurol Neuromedicine.** 2016;1(7):37-44. PMCID: PMC5207777.
66. Hughes A, Oxford AE, Tawara K, Jorczyk CL, Oxford JT. Endoplasmic Reticulum Stress and Unfolded Protein Response in Cartilage Pathophysiology; Contributing Factors to Apoptosis and Osteoarthritis. **Int J Mol Sci.** 2017 Mar 20;18(3). pii: E665. doi: 10.3390/ijms18030665. PMCID: PMC5372677.
67. Robertson JC, Jorczyk CL, Oxford JT. DICER1 Syndrome: DICER1 Mutations in Rare Cancers. **Cancers** (Basel). 2018 May 15;10(5). pii: E143. doi: 10.3390/cancers10050143. PMCID: PMC5977116.
68. Frahs SM, Oxford JT, Neumann EE, Brown RJ, Keller-Peck CR, Pu X, Lujan TJ. Extracellular Matrix Expression and Production in Fibroblast-Collagen Gels: Towards an In Vitro Model for Ligament Wound Healing. **Ann Biomed Eng.** 2018 Jun 5. doi: 10.1007/s10439-018-2064-0. [Epub ahead of print] PubMed PMID: 29873012.
69. Yocham, KM, Scott, C, Fujimoto, K, Brown, R, Tanasse, E, Oxford, JT, Lujan, TJ, Estrada, D. Mechanical Properties of Graphene Foam and Graphene Foam - **Tissue Composites, Advanced Engineering Materials.** DOI: 10.1002/adem.201800166.

Invited Lectures and Presentations: < 70 presented from 1983 – present) available upon request

Contributed papers and posters at professional meetings: < 200 conference papers and posters from 1990 to present) available upon request

Research Funding (<\$30 M awarded; 1987-present):

Current funding:

1. TITLE: Idaho INBRE Program (PI: Carolyn Hovde Bohach)
DURATION: 7/15/04 to 6/31/19;
FUNDING SOURCE: NIH (NIGMS)
ROLE ON PROJECT: Boise State University Administrator, Steering committee member
TOTAL AWARD: \$2.6 M to Boise State University for INBRE 1, \$4.1 M to Boise State University for INBRE 2, \$443,751 for ARRA supplement, and \$868,750 to Boise State University for INBRE 3)
2. TITLE: Center of Biomedical Research Excellence in Matrix Biology
DURATION: 8/1/14 to 5/31/19;
FUNDING SOURCE: NIH/NIGMS
ROLE ON PROJECT: Principal Investigator, Program Director;
TOTAL AWARD: \$10 M
3. TITLE: Gateway Scholarships in Biological Sciences NSF #1644233
DURATION: 02/15/17-02/14/22,
FUNDING SOURCE: National Science Foundation
ROLE ON PROJECT: Oxford (PI);
TOTAL AWARD: \$1,000,000
4. TITLE: Replicating Marrow Mechanics of Stem Cells Ex vivo
DURATION: 3/07/18-3/06/20;
FUNDING SOURCE: National Institutes of Health (federal flow-through from University of Pittsburgh) P2CHD086843 subaward 126873-13 Uzer (PI)
ROLE ON PROJECT: Co-I

Previous funding:

1. Topoisomerase II and the regulation of gene expression by higher-ordered chromatin structure; January 1987-December 1988, Postdoctoral fellowship, Funded by ISREC, Swiss Institute for Experimental Cancer Research, SF 45,000.
2. Cartilage Matrix Proteins; 1989-1995, Postdoctoral Fellowship, Funded by Shriners Hospital.
3. The role of type XI collagen in the functional integrity of normal and osteoarthritic cartilage; July 1996-June 1999, Principal Investigator, Funded by Arthritis Foundation, Biomedical Science Grant, \$225,000.
4. Biological resurfacing of large articular cartilage defects; July 1996-September 1998 Co-Investigator, (P.I. C.W. McIlwraith) Funded by Steadman-Hawkins Sports Medicine Foundation and National Football League Charities (NFL) \$60,000.
5. Application of a small sample extraction technique and quantitative polymerase chain reaction in the analysis of mRNA, DNA and protein from normal and osteoarthritic equine articular cartilage; July 1996-June 1997 Co-Investigator, (P.I. Gayle Trotter) Funded by CSU College Research Council, \$9,400.
6. Synovial fluid and tissue expression of degradative enzymes, inflammatory mediators and cytokines in naturally occurring joint disease in horses; July 1997-June 1998 Co-Investigator, (P.I. Gayle Trotter) Funded by CSU College Research Council, \$34,000.
7. Synovial fluid and tissue expression of degradative enzymes, inflammatory mediators and cytokines in naturally occurring joint disease in horses--equipment; September 1997, Co-Investigator, (P.I. Gayle Trotter) Funded by Southern California Equine Foundation, \$11,095.
8. The treatment of osteoarthritis in exercised horses using interleukin-1 receptor antagonist delivered using gene therapy; January 1998 Principal Investigator, Funded by Southern California Equine Foundation, \$49,306.
9. Collagen Type XI in skeletal development and disease; February 1999, Principal Investigator, Funded by Gerlinger Foundation, \$24,988.
10. X-ray diffraction studies of protein structures, 1998, Collaborator (P.I. Oren Anderson) Funded by Research Corporation, \$25,000.
11. Type XI collagen in extracellular matrix assembly; March 1, 2000 to February 28, 2001 Principal Investigator, MRF, OHSU, \$25,000.
12. Biomedical Optics for Medical Research and Clinical Care; June 1, 2000 to May 31, 2005, NIH, Investigator (P.I. Steven Jacques) \$3,115,625 total, of which \$210,000 is designated for "Biomechanical and Optomechanical characterization of laboratory-generated cartilage" subproject-JTO).
13. NSF-EPSCOR "Acquisition of a peptide synthesizer" duration: 1 year, 2002, amount requested: \$15,000.

14. NSF MRI/RUI "Acquisition of an EPR Spectrometer for Collaborative Research and Materials Science Education", \$338,795 09/01/03 to 08/31/06.
15. Biomedical Research Infrastructure Network for Idaho, October 1, 2001 to June 30, 2004, NIH Co-Investigator (Michael Laskowski, PI), \$6,000,000 total of which \$1,383,947 was designated for BSU.
16. Supplement to Biomedical research infrastructure Network for Idaho, \$2,000,000 total, of which \$496,583 was designated for BSU.
17. MSMRI "Role of MeCP2 in neuronal cell differentiation and Rett syndrome", \$5,000, June, 2003-May, 2004.
18. Molecular regulation of bone density and trabecular structure. 10/2005 to 6/2006, NASA Idaho EPSCoR, \$4000.
19. NSF MRI/RUI "Acquisition of a Transmission Electron Microscope for Multidisciplinary Research and Education" 09/01/05 to 08/31/07, Co-PI, \$691,910.
20. Collaborative Grant Improvement Initiative, 07/01/05 to 06/30/07, Boise State University, Principal Investigator, \$150,000.
21. Investigating the role of collagen type XI in the structural integrity of cartilage tissue, 03/15/05 to 03/14/07, NASA Idaho Space Grant consortium, Principal Investigator, \$30,000.
22. Type XI collagen isoforms in skeletal biology, February 1, 2001 to January 31, 2008, NIH RO1, Principal Investigator, \$1,349,811.
23. Type XI collagen isoforms in skeletal biology-Independent Scientist Award, Career Development Grant, September 1, 2002 to August 31, 2007, NIH, Principal Investigator, \$385,516.
24. NSF MRI/RUI:Acquisition of a Confocal Microscope for Multidisciplinary Research & Education, 09/01/06 to 08/31/10, NSF, Principal Investigator, \$348,000.
25. MJMurdock Charitable Trust, Investigating mechanisms of alcohol-induced liver fibrosis using a zebrafish model system (P.I.: Kristen Mitchell), 5/17/10 to 12/31/11, Collaborator, \$15,000
26. Musculoskeletal Research Center, 07/01/07 to 06/30/11, Idaho State Board of Education, HERC, Principal Investigator, \$1,000,000
27. Acquisition of a Liquid Chromatography - Tandem Mass Spectrometer (LC/MS)(P.I.: Ken Cornell) Sept 2009 - August 2012 NSF Co-PI; \$597,877
28. NSF Engineering Education Research to Practice (E2R2P) (Don Pumlee, Linda Huglin, Steve Villachica, P.I.)10/01/2010 - 9/30/2013, NSF, Sounding board member, \$150,000
29. MRI Acquisition of a tiled-display GPU/CPU cluster for Research and Education, NSF, (PI: Inanc Senocak, Co-I Julie Oxford, Peter Mullner, Tim Andersen, HP Marshall), 10/1/2012-9/30/2015, \$555,384
30. The Effects of Simulated Microgravity on Articular Cartilage – Travel Grant; College of Arts and Sciences, Boise State University; 2012, \$800.
31. Boise State Research Vivarium Equipment; M.J. Murdock Charitable Trust; PI: Oxford, \$248,000
32. Induction of Early Stages of Osteoarthritis after Exposure to Microgravity (Postdoctoral Fellowship), November 2011 to October 2013, NASA National Space Biomedical Research Institute; Role on project: mentor; \$100,000 for two years
33. Extracellular Matrix is a Key Factor in Cancer Progression; MJMurdock Charitable Trust Partners in Science Program; Role on project: PI & Mentor, \$15,000
34. The effects of microgravity on cartilage health, June 25, 2011-June 24, 2013; NASA Idaho Space Grant Consortium; PI: Liliana Mellor, PhD; role on project: Co-PI/ Mentor, \$50,000 for two years;
35. Regulation of cell signaling by Col11a1 during craniofacial development in the zebrafish, 09/01/09 to 08/31/13, NIH (NICHD), Role on project: PI, \$211,500
36. Molecular Mechanisms of Cellular Mechanoreception in Bone, 9/1/2010 - 8/30/14, NASA, role on project: PI, \$716,733
37. Role of R-spondin1 to prevent joint damage after exposure to radiation and simulated microgravity, 1/1/14 - 12/31/14, Idaho Space Grant Consortium, PI, \$29,000
38. Tertiary methacrylamides and thiourethane additives as novel dental composite restorative systems (PI: Carmem Pfeifer), 07/01/14 - 06/30/18, NIH/NIDCR, Collaborator, \$54,002
39. Clinical and Translational Research Infrastructure Network IDeA-CTR (PI: Langer) 7/1/13 - 6/30/18; NIH/NIGMS, ROLE ON PROJECT: Subaward PI, \$115,780
40. Molecular Mechanisms of Inflammatory Cytokines in Bone Health, Jorcyk (PI), 01/01/14-09/01/15, FPK175-SB005, NASA EPSCoR Idaho Space Grant Consortium, Role: Collaborator, \$30,000
41. Role of Cellular Connectivity in Maintaining Osteogenesis Under Simulated Microgravity in Response to Mechanical Challenges, Uzer (PI), 04/15/17-04/30/18, FPK548-SB-008, National Aeronautics & Space Administration, Role: Co-PI, \$30,000
42. Matrix Assisted Laser Desorption Ionization Time of Flight Mass Spectrometry (MALDI TOF MS), Oxford (PI), 11/01/14-02/31/17, 2014092:MNL:11/20/2014, M.J. Murdock Charitable Trust, Role: PI, \$270,000
43. COBRE Administrative Supplement for core consolidation, Oxford (PI), 6/1/17 - 5/31/18, NIH/NIGMS, Role: PI, \$300,000.
44. Hilda D. Elliott Foundation Fund; Osteoarthritis Research; \$160,000

Service

Professional service:

American Society for Bone and Mineral Research,
Orthopedic Research Society
Sigma Xi
American Society for Matrix Biology

Grant Application Review: arc (Arthritis Research Council, UK), Burroughs Wellcome Trust, NSF Merit Review of grant applications for Graduate Student fellowships and for Major Research Instrumentation, Study Section (ad hoc) National Institute of Arthritis, Musculoskeletal and Skin Diseases, NIH, Skeletal Biology, Structure and Regeneration, 2001, 2004, 2005, Mountain West Clinical and Translational Research Infrastructure Network, 2015

Manuscript Peer Review for the following journals: International Journal of Cell Biology, Brain Research, Journal of Histochemistry, Journal of Neurochemistry, BMC Developmental Biology, Journal of Dentistry, Journal of Biomedical Materials Research, Gene Expression Patterns, Acta Biochimica Biophysica, Journal of Cell Biology, Journal of Histochemistry and Cytochemistry, iConceptPress Basic Methods in Protein Purification and Analysis, Orphanet Journal of Rare Diseases, BMJ Case Reports, Scanning, SpringerPlus, DNA and Cell Biology, Therapeutics and Clinical Risk Management, British Journal of Medicine and Medical Research, PLoSOne

Institutional service:

Andrus Center Women and Leadership Conference Panelist, September 9-11, 2015
Associate Chair Department of Biological Sciences, 2014-present
Faculty Advisor for Microgravity University at Boise State 2010-2014
College of Arts and Sciences Promotion and Tenure committee, 2011-2013
Faculty Advisor for Mu Delta student organization at Boise State (March of Dimes) 2010-2011
Boise State Research Scholars group 2008-2009 STEM Education
Director, Biomolecular Research Center, 2004-present
Co-director, Musculoskeletal Research Institute, 2007- 2014
Department of Biological Sciences Graduate Student Oversight Committee member, 2007-2010
Department of Biological Sciences Tenure and Promotion Committee member, 2008-2012
INBRE Senior Research Advisory Committee member, 2004-present
University Foundations Scholars Awards Committee Member, 2007-2008
College of Arts and Sciences Honors and Awards Committee Member, Fall 2007
Biology Department Research Committee member 2005-2007
Advising Freshmen in Express Program, June 2005
"NIH Funding" presented by Julie Oxford, Thursday, September 22, 2005
Biotechnology Legislative Task Force presentation, Idaho State Capitol Building, September 7, 2005
President of Boise State chapter of Sigma Xi, 2003-2005
Pre-Dental School review Committee member, 2002
Science Day, Boise State University, 2001

Community service:

Adaptive skiing program, Shriners Hospital, 1990-1995
Career Mentor Program, Linfield College, 1993-2006
Advocates for Women in Science, Engineering and Mathematics, 1995-2000
Expanding Your Horizons (Youth science career program), Yakima, WA, 1995
Advisory Board, BSU Children's Center, 2001-2002
Alumni Mentor Program, Washington State University, 1989-2006

Medical Advisory Board, BioLogic Aqua, Rogue Valley Natural Springs 1998-2005
Discovery Center Volunteer, 2004, 2005
Biology Outreach Workshop: DNA Fingerprinting; Mountain Cove High School, Boise, Idaho, 2005
Treasure Valley Arthritis Awareness Campaign member, 2006; Idaho Arthritis in Motion, 2006-2008
Computer Lab, Riverside Elementary School, 2004-2007
DNA isolation activity, Riverside Elementary, Oct 19, 2007
Treasure Valley Arthritis In Motion (I-AIM) Arthritis Symposium with St Alphonsus Regional Medical Center, April, 2009
Volunteer for local chapter of the National Arthritis Foundation, JA Family Day for families of children with juvenile rheumatoid arthritis, September, 2009 - 2012
Treasure Valley Arthritis In Motion (I-AIM) Arthritis Symposium with St Alphonsus Regional Medical Center, June, 2010-2011.
Rare Disease Day, February 28

SHAWN R. SIMONSON

CURRICULUM VITA

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Human Performance Laboratory

Department of Kinesiology

Center for Teaching and Learning

Boise State University

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Boise, Idaho 83725-1710

Education

University of Northern Colorado, Greeley, CO. (1998)

Doctor of Education, Physical Education, Physiological Kinesiology

Cognate Areas: Exercise Immunology and Space Physiology

Dissertation Title: *The Effects of Acute and Chronic Weight Training by Moderately Conditioned and Weight Trained Individuals On Selected Immune Parameters.*

University of Northern Colorado, Greeley, CO. (1990)

Master of Arts, Physical Education, Coaching

Colorado State University, Fort Collins, CO. (1986)

Bachelor of Science, Biology

Additional Study

Aims Community College, Greeley, CO. (1990)

Emergency Medical Technician – Basic, I.V., M.A.S.T.

Colorado State University, Fort Collins, CO. (1987)

Secondary Science Education

Research and Professional Experience

Professor, Department of Kinesiology, College of Health Sciences, Boise State University, Boise, ID. (2017 – Present) Instruct in pertinent areas, advise students, advise graduate student research, conduct discipline related research, maintain professional certifications and participation in national organizations, participate in faculty governance and committees, maintain working and personal relationships within the university, and serve in the community. (*Associate Professor*, 2012 – 2017. *Assistant Professor*, 2008 – 2012. *Visiting Assistant Professor*, 2007 – 2008.)

Adjunct Professor, Center for Professional Education, Seattle Pacific University, Seattle, WA (2016 – Present). Instruct EDSC 5715 *Writing POGIL Activities*.

Faculty Associate, Center for Teaching and Learning, Boise State University, Boise, ID (2014 – Present) Provide leadership for teaching and learning at Boise State, with particular foci on the Scholarship of Teaching and Learning and pedagogical tools. Assist with general consultations and Mid-Semester Assessment Processes. Conduct workshops. Facilitate Faculty Learning Communities. Contribute to assessment and planning in the Center for Teaching and Learning.

Dive Master, Dive Magic, Boise, ID (2013 – Present). Lead recreational divers as they experience the underwater world. Provide instructional and safety support to scuba instructors, new divers, and divers wishing to generally improve their diving experience.

Director – Human Performance Laboratory, Department of Kinesiology, College of Health Sciences, Boise State University, Boise, ID. (2009 – Present) Plan, develop, organize, implement, direct and evaluate laboratory operations and performance. Coordinate and foster collaboration with various clients, agencies, and researchers. Develop, implement, and make available accurate, valid, and reliable testing procedures, results reporting, and facility policies. Ensure a safe environment for test participants and technicians. Engage and oversee qualified employees, graduate and undergraduate research assistants, and interns. Ensure

optimum facility and equipment upkeep and operation. Develop and implement an operations budget within business goals. Lead and direct the development, communication and implementation of effective growth strategies and processes. Direct a successful community outreach program that provides laboratory services to the community and raises funds for laboratory maintenance and growth.

Program Coordinator – Kinesiology Bachelor's Degree (formerly Exercise Science), Department of Kinesiology, College of Education, Boise State University, Boise, ID. (2008 – 2015) Responsible for the shared management of the largest degree program in the Kinesiology Department and for managing curriculum and opportunities for student success (i.e. advising, internships, conduct) Work with other Kinesiology program faculty to set annual program goals and a member of the Kinesiology Department administrative team. Lead and direct the development, communication and implementation of effective growth strategies and processes. Initiated the annual Career Symposium that has grown from a few presenters to a department-wide multi-day conference (2011). Coordinated the re-writing and merging of three undergraduate degrees into one with three emphasis areas (2012). Developed a Student Success program to enhance timely degree completion and post-degree opportunities (2013).

Reviewer

Clinical Case Reports and Reviews. (2015)

Education Sciences. (2018)

Journal of Kinesiology and Wellness. (2015 – Present)

Journal of Sports Medicine and Physical Fitness. (2015 – Present)

Lippincott, Williams and Wilkins. (2009 – Present) Textbooks.

Professional and Organizational Development (POD) Network in Higher Education. (2015 – Present) Annual Conference presentations.

Research Quarterly for Exercise and Sport. (2008 – Present)

Science Education and Civic Engagement: An International Journal. (2012)

Strength and Conditioning Journal. (2010 – Present)

The POGIL Project. (2012 – Present) Teaching/Learning activities.

To Improve the Academy: A Journal of Educational Development. (2015 – Present)

Wadsworth Thomson Learning Publishers, Health and Physical Education Division. (2002 – 2003) Textbooks.

Wolters Kluwer. (2014 – Present) Textbooks.

Women in Sport and Physical Activity Journal. (2009)

Program Development Specialist, LifeMasters Supported SelfCare, Inc. Albuquerque, NM. (2006 – 2007) Create and implement new metabolic syndrome product. Develop relevant participant focus, identify and create multimedia deliverables, establish program objectives, metrics, and workflows, identify health educator needs and develop materials to support. Oversee health educator team development and performance.

Corporate Wellness Workplace Initiative Development Team, LifeMasters Supported SelfCare, Inc. Albuquerque, NM. (2005 – 2006) Develop and implement corporate wellness program. Initiated with chair-based exercises designed to reduce repetitive motion and hypokinetic conditions and followed by wellness education and services within and outside the workplace.

- Ergonomics Evaluator*, LifeMasters Supported SelfCare, Inc. Albuquerque, NM. (2005 – 2007)
Evaluation of workplace and worksite appropriateness for specific employees, recommended, and implemented necessary changes.
- Health Educator*, LifeMasters Supported SelfCare, Inc. Albuquerque, NM. (2005 – 2007) Disease management using telephonic health assessments, education, and monitoring of participants with chronic diseases (asthma, chronic obstructive pulmonary disease, coronary artery disease, chronic heart failure, diabetes, and low back pain) to proactively improve health and quality of life. Act as a preceptor for new nursing and health education staff.
- Executive Director*, Doc's Body Shop, Albuquerque, NM. (2004 – 2005) Owned and operated personal training gym catering to those with special needs such as injury rehabilitation and prevention, disease management, and obesity. Assessed individual goals, capabilities, and fitness levels. Designed innovative, enjoyable, and effective exercise programs to achieve a myriad of goals. Creatively educated and motivated members to achieve fitness ambitions. Educated members in the correct use of the equipment, diplomatically supervised daily use of the facility, supervised the daily operation and maintenance of equipment and facility, generated business proposal and plan, secured funding, opened new fitness center.
- Personal Trainer*, The Training Sensation, Albuquerque, NM. (2003 – 2004) Assessed individual goals, capabilities, and fitness levels. Designed innovative, enjoyable, and effective exercise programs to achieve a myriad of goals. Creatively educated and motivated members to achieve fitness ambitions (specializing in injury and illness rehabilitation). Educated members in the correct use of the equipment, diplomatically supervised daily use of the facility, assisted in the cleaning and maintenance of equipment and facility.
- Assistant Professor, Exercise Sciences*, Department of Wellness and Movement Sciences, School of Health Sciences and Human Performance, Western New Mexico University, Silver City, NM. (2000 – 2003) Instructed in pertinent areas, advised students, coordinated exercise science laboratory, managed department wellness center, conducted discipline related research, maintained professional certifications and participation in national organizations, participated in faculty governance and committees, maintained working and personal relationships within the university, and served in the community.
- Consultant*, Countermeasure Evaluation and Validation Program, Lockheed Martin Engineering and Sciences Company, NASA Ames Research Center, Moffett Field, CA. (2001 – 2003) Provide expertise and assistance in training staff, protocol preparation, and preparing the exercise physiology laboratory and bed rest facility for upcoming countermeasure studies.
- Reviewer, International Technical Review*, NASA Ames Research Center, Moffett Field, CA. (2000) Review applications and proposals for scientific and technical merit to evaluate the feasibility of developing and implementing proposed in-flight experiments.
- Research Physiologist*, Lockheed Martin Engineering and Sciences Company, NASA Ames Research Center, Moffett Field, CA. (1998 – 2000) Managed the Human Environmental Physiology Laboratory. This included supervision of laboratory technicians and graduate students, advising of graduate student research, budget management, acquisition of subjects and supplies, testing of responses to acceleration, exercise, and orthostatic challenge before and after conditioning and deconditioning, data collection and evaluation, preparations of final reports and grant applications.
- Fitness Director*, Miramont Sport Center, Fort Collins, CO. (1998) Successfully managed department resources in a full-service health club. Oversaw fitness specialists, personal training, aerobics, senior fitness, programming, wellness education, and member retention.

This included personnel and material scheduling and evaluation, recommend equipment purchases and maintenance, and program and staff development and promotion.

- Research Assistant*, NASA-ASEE Summer Faculty Fellowship Program Graduate Student Fellowship, Human Environmental Physiology Laboratory, NASA-Ames Research Center, Moffett Field, CA. (1997) Researched fluid shifts and the subsequent orthostatic intolerance in response to simulated microgravity. Developed protocols for analysis of the physiologic responses to the human powered centrifuge.
- Clinical Exercise Physiologist*, Pulse Rehab Center, Fort Collins, CO. (1997 – 1998) Injury treatment specialist that assessed patient functional status, designed and implemented training programs to improve function. Developed and monitored conditioning programs to assist patients in returning to, and surpassing, pre-injury levels. Dealt mostly with neck and back injuries.
- Self-Defense Instructor*, The Conditioning Spa, Greeley, CO. Fort Collins Pulse Aerobic and Fitness Center, Fort Collins, CO. (1996 – 1997) Taught self-defense, movement, awareness, and strategic skills. Instructed victimization prevention.
- Fitness Director*, Fort Collins Pulse Aerobic and Fitness Center, Fort Collins, CO. (1995 – 1998) Successfully managed department resources in northern Colorado's most successful health club. Included personnel and material scheduling and evaluation, recommending equipment purchases and maintenance, and program development and promotion. Developed and supervised a highly sought after practicum and internship program. Edited and/or wrote the monthly fitness column for distribution to the members.
- Tutor*, Disabled Student Services, University of Northern Colorado, Greeley, CO. (1995) Assisted undergraduate students in grasping kinesiology course material and increasing their opportunity for achievement.
- Fitness Instructor/ Personal Trainer*, Fort Collins Pulse Aerobic and Fitness Center, Fort Collins, CO. (1994 – 1998) Creatively educated and motivated members to achieve fitness goals (specializing in injury and illness rehabilitation), educated members in the correct use of the equipment, diplomatically supervised daily use of the facility, assisted in the cleaning and maintenance of equipment and facility, assisted in program development and instruction, and mentored fitness practicum students and interns.
- Personal Trainer*, Fitness Plus, Fort Collins, CO. (1994) Successfully instructed members in the proper use of equipment, designed and implemented fitness programs based on a wide variety of individual goals and limitations, performed membership sales, and assisted in the daily management of the health club.
- Instructor*, KINE 332, Sport Physiology, University of Northern Colorado, Greeley, CO. (1993) Used a wide variety of instructional techniques to teach the basics and practical implementation of exercise physiology and the principles of conditioning to undergraduate coaching minors with the intent of promoting safe and effective program design and exercise prescription.
- Graduate Research Assistant*, Exercise Physiology, University of Northern Colorado, Greeley, CO. (1991 – 1997) Assisted in the conduct of original research in exercise physiology, immunology, and space physiology with funding from a NASA/JOVE (JOint VEnture) grant. Prepared manuscripts and grant applications. Instructed in the use of, and interpretation of results obtained from, performance and anthropometric assessment equipment.

Student Athletic Trainer, Athletic Training Clinical Program, University of Northern Colorado, Greeley, CO. (1991 – 1992) Assisted certified personnel in athletic injury care and prevention, especially in the areas of taping and wrapping, therapeutic exercise, and treatment modalities.

Martial Arts Instructor/Personal Trainer, Fort Collins, CO. (1990 – 1998) Taught self-defense, movement, awareness, and strategic skills. Provided guidance and motivation to improve fitness and performance based on individual goals and abilities.

Science/Health Teacher, Milliken Middle School, Weld County School District Re-5J, Milliken, CO. (1987 – 1990) Imparted knowledge and skills to middle school children using a myriad of approaches. Taught the scientific method of problem solving, managed financial and material resources, developed curriculum, submitted and received educational grants, and dealt with the community.

Assistant Coach, Milliken Middle School, Weld County School District Re-5J, Milliken, CO. (1987 – 1990) Football, wrestling, and track. Demonstrated and taught motor skills, motivated individuals and teams of varying skill levels, managed equipment and personnel, advised conditioning and minor injury rehabilitation within one of the top programs within the athletic conference.

Research Assistant, NeuroAnatomy, Colorado State University. (1986) Developed and carried out research procedures, gathered data, and assisted in laboratory and equipment maintenance. Studied spinal cord regeneration and the effects of exercise and pharmacological interventions on step pattern generation.

Refereed Publications

Taylor, T.J., **S.R. Simonson**, S.A. Conger, Y. Gao. Iron deficiency's effect on training reductions in college distance runners. *Journal of Strength and Conditioning Research*. Submitted 10/4/16. In revision.

Simonson, S.R. Boise State University students went to great depths to learn. *Alert Diver*. Submitted 7/27/16. In revision.

Mecham, C.P, and **Simonson, S.R.** A Proposed Conditioning Program for Emergency Services Divers. *Aerospace Medicine and Human Performance*. Submitted 5/13/16. In revision.

26. **Simonson, S.R.** Control systems and muscle physiology. *TBLC Resource Portal*. XX. 2018.

25. Dobbs, T., **S.R. Simonson**, S.A. Conger. Improving power output in older adults utilizing plyometrics in an AlterG treadmill. *Journal of Strength and Conditioning Research*. XX:xx-xx, 2018.

24. **Simonson, S.R.** Modifying the Monte Carlo Quiz to increase student motivation, participation, and content retention. *College Teaching*. 65(4):158-163, 2017. doi: 10.1080/87567555.2017.1304351

23. **Simonson, S.R.** To flip or not to flip: What are the questions? *Education Science*. 7(71):1-10, 2017. doi: 10.3390/educsci7030071

22. **Simonson, S.R.** Establishing common course objectives for undergraduate exercise physiology. *Advances in Physiology Education*. 39(4):295-308, 2015.

21. Wade, S., Z.C. Pope, and **S.R. Simonson**. How prepared are college freshmen athletes for the rigors of college strength and conditioning? A survey of college Strength and conditioning Coaches. *Journal of Strength and Conditioning Research*. 28(10):2746-2753, 2014.

20. Sutherland, L.L., **S.R. Simonson**, D.M. Weiler, J. Reis, and A. Chappel. The Relationship of Metabolic Syndrome and Health-Promoting Lifestyle Profiles of Latinos in the Northwest. *Hispanic Health Care International*. 12(3):130-137, 2014.
19. **Simonson, S.R.** Making students do the thinking: Team-Based Learning in a laboratory course. *Advances in Physiology Education*. 38(1):49-55, 2014.
18. **Simonson, S.R.**, J.T. Moffitt, and J. Lawson. What is the impact of NCAA Policy 11.7.2.1.1 Weight or Strength Coach (Football Bowl Subdivision) limits on strength and conditioning as a profession? *Strength and Conditioning Journal*. 36(1):82-87, 2014.
17. Schaal, M., L. Ransdell, **S.R. Simonson**, and Y. Gao. Physiologic performance test differences in female volleyball athletes by competition level and player position. *Journal of Strength and Conditioning Research*. 27(7):1841-1850, 2013.
16. Schotzko, C. and **S.R. Simonson**. What is the role of exercise in inflammatory disease prevention and management? *The Health & Fitness Journal of Canada*. 6(2):91-100, 2013.
15. Date, A., **S.R. Simonson**, L. Ransdell, and Y. Gao. Lactate accumulation in three different volume patterns of power clean. *Journal of Strength and Conditioning Research*. 27(3):604 – 610, 2013.
14. **Simonson, S.R.** and S. Shadle. Implementing process oriented guided inquiry learning (POGIL) in undergraduate biomechanics: lessons learned by a novice. *Journal of STEM Education*. 14(1):7 – 14, 2013.
13. Sutherland, L.L., D.M. Weiler, L. Bond, **S.R. Simonson**, and J. Reis. Northwest Latinos' health promotion lifestyle profiles according to diabetic risk status. *Journal of Immigrant and Minority Health*. 14(6):999 – 1005, 2012.
12. Grieser, J.D., Y. Gao, L. Ransdell, and **S.R. Simonson**. Intensity levels of selected Wii Fit activities in college aged individuals. *Measurement in Physical Education and Exercise Science*. 16(2):135-150, 2012.
11. Behrens, M. and **S.R. Simonson**. A comparison of the various methods used to enhance sprint speed. *Strength and Conditioning Journal*. 33(2):64-71, 2011.
10. **Simonson, S.R.**, J.M. Shimon, E.M. Long, B. Lester. Effects of a walking program using the AlterG anti-gravity treadmill system on an extremely obese female: a case study. *Clinical Kinesiology*. 65(2):29-38, 2011.
9. **Simonson, S.R.** Teaching the resistance training class: a circuit training curriculum for the strength and conditioning coach. *Strength and Conditioning Journal*. 32(3):90 – 96, 2010.
8. **Simonson, S.R.** and C.G.R. Jackson. Leukocytosis occurs in response to resistance exercise in men. *Journal of Strength and Conditioning Research*. 18(2):266-271, 2004.
7. **Simonson, S.R.**, P. Norsk, and J.E. Greenleaf. Heart rate and blood pressure during initial LBNP do not discriminate higher and lower orthostatic tolerant men. *Clinical Autonomic Research*. 13(6):422-426, 2003.
6. **Simonson, S.R.** and F.B. Wyatt. The rate pressure product is greater during supine cycle ergometry than during treadmill running. *Biology of Sport*. 20(1):4-13, 2003.
5. Cowell, S.A., J.M. Stocks, D.G. Evans, **S.R. Simonson**, and J.E. Greenleaf. The exercise and environmental physiology of extravehicular activity. *Aviation, Space, and Environmental Medicine*. 73:54-67, 2002.
4. **Simonson, S.R.** The immune response to resistance exercise. *Journal of Strength and Conditioning Research*. 15(3):378-384, 2001.

3. Greenleaf, J.E., T.W. Petersen, A. Gabrielsen, B. Pump, P. Bie, N.J. Christensen, J. Warberg, R. Videbaek, **S.R. Simonson**, and P. Norsk. Low LBNP tolerance in men is associated with attenuated activation of the renin-angiotensin system. *American Journal of Physiology, Regulatory, Integrative, and Comparative Physiology*. 279:R822-R829, 2000.
2. Greenleaf, J.E., J.L. Chou, N.J. Stad, G.P.N. Leftheriotis, N. Arndt, C.G.R. Jackson, **S.R. Simonson**, and P.R. Barnes. Short-arm (1.9 m) +2.2Gz acceleration: isotonic exercise load – O₂ uptake relationship. *Aviation, Space, and Environmental Medicine*. 70(12):1173-1182, 1999.
1. Wyatt, F.B. and **S.R. Simonson**. Comparison of ventilatory threshold for treadmill and supine cycle ergometry. *International Sports Journal*. Summer:17-23, 1997.

Other Publications

20. **Simonson, S.R.** *Exercise Physiology: A Guided Inquiry*. The POGIL Press, John Wiley and Sons. In revision.
19. **Simonson, S.R.** Encouraging completion of pre-class assignments with the roll of a die. In Teaching Tips, Teaching Issues Writing Consortium, 2018-2019. XX.
18. **Simonson, S.R.** (Ed). *POGIL: An Introduction to Process Oriented Guided Inquiry Learning for Those Who Wish to Empower Learners*. Stylus Publishing. 2019.
17. **Simonson, S.R.** Assessment, Metacognition, and Grading in POGIL. In: *POGIL: An Introduction to Process Oriented Guided Inquiry Learning for Those Who Wish to Empower Learners*. S.R. Simonson (Ed.). Stylus Publishing. p. XX-XX. 2019.
16. **Simonson, S.R.** Test bank questions (chapters 9, 10, 11, 15, 16, 20, 21, 22, 23, 24). In: Stanfield, C.L. *Principles of Human Physiology* (5th Ed). Upper Saddle River, NJ. Pearson Publishing. 2012.
15. **Simonson, S.R.** and C.G.R. Jackson. Endurance training for the older adult. In: *Nutrition and Exercise Concerns of Middle Age*. J.A. Driskell (Ed.). Boca Raton, FL. CRC Press. p. 317-352. 2009
14. **Simonson, S.R.** *Exercise Coaching*. A multimedia interactive tutorial designed to educate Health Educators and Nurse Consultants in the basics of exercise science and exercise prescription. And to further enhance their counseling of participants with chronic diseases as they assist the participants in improving their overall wellness, positively impact their physical health, and reduce healthcare costs. LifeMasters Supported SelfCare, Inc. 58 pp. March 2007.
13. **Simonson, S.R.** *Diet Coaching*. A multimedia interactive tutorial designed to educate Health Educators and Nurse Consultants in the basics of nutrition science and diet prescription. And to further enhance their counseling of participants with chronic diseases as they assist the participants in improving their overall wellness, positively impact their physical health, and reduce healthcare costs. LifeMasters Supported SelfCare, Inc. 58 pp. February 2007.
12. **Simonson, S.R.** *Wellness Coaching*. A multimedia interactive tutorial designed to educate Health Educators and Nurse Consultants in the basics of coaching behavior change. And to further enhance their counseling of participants with chronic diseases as they assist the participants in improving their overall wellness, positively impact their physical health, and reduce healthcare costs. LifeMasters Supported SelfCare, Inc. 76 pp. February 2007.
11. **Simonson, S.R.** *Metabolic Syndrome One-pagers*. An interactive educational series of one-page (two sided) documents designed to provide participants with the basic information regarding the various aspects of metabolic syndrome and its management, to generate thought and discussion, and to serve as a visual reminder of their commitment to change and health management. (5 A Day, Abdominal Obesity, Dietary Approach to Stop Hypertension,

Dyslipidemia, FITT, Food Labels, Getting Started with Physical Activity I & II, Healthy Diet, Hypertension, Insulin Resistance, Mediterranean Diet, Nutrients: Carbohydrates, Nutrients: Lipids, Nutrients: Micronutrients, Nutrients: Protein, Nutrients: Supplements, OPS, Physical Activity Pyramid, Portion Control, Weight Management, What is Metabolic Syndrome). LifeMasters Supported SelfCare, Inc. December 2006.

10. **Simonson, S.R.** *Metabolic Syndrome Jump Page*. A multimedia interactive web page designed to provide Health Educators with access to pertinent information regarding metabolic syndrome to enhance their counseling of participants with metabolic syndrome as they assist the participants in improving their overall wellness, positively impact their physical health, and reduce healthcare costs. LifeMasters Supported SelfCare, Inc. September 2006.
9. **Simonson, S.R.** Metabolic Syndrome: A new health concern and a new product at LifeMasters. *The HISTorian: The LifeMasters Health Improvement Services Newsletter*. Fall:6, 2006.
8. **Simonson, S.R.** Immobilization and disuse muscular atrophy. In: *Deconditioning and Reconditioning*. J.E. Greenleaf (Ed.). Boca Raton, FL. CRC Press. p. 47-60, 2004.
7. Greenleaf, J.E., **S.R. Simonson**, J.M. Stocks, J. Evans, C.F. Knapp, S.A. Cowell, K.N. Pemberton, H.W. Wilson, J.M. Vener, S.N. Evetts, P.A. Hardy, R.E. Grindeland, H. Hinghofer-Szalkay, S.M. Smith, M.G. Ziegler, D.R. Brown, D.G. Evans, F.B. Moore, and D.T. Quach. Effect of Exercise Training and +Gz Acceleration Training on Men. *NASA Technical Memorandum 2001-210926*. 2001.
6. **Simonson, S.R.** Supporting the immune system: nutritional considerations for the strength athlete. In: *Nutrition and the Strength Athlete*. C.G.R. Jackson (Ed.). Boca Raton, FL. CRC Press. p. 175-196, 2000.
5. Greenleaf, J.E., J.L. Chou, and **S.R. Simonson**. Human exercise-acceleration countermeasure for spaceflight. In: Ames Research and Technology 1998. Moffett Field, CA: *NASA Technical Memorandum 99-208768*:143-145. 1999.
4. Chou, J.L., G.P.N. Leftheriotis, N.J. Stad, N. Arndt, C.G.R. Jackson, **S. Simonson**, P.R. Barnes, and J.E. Greenleaf. Human physiological responses during +Gz acceleration with cycle ergometer leg exercise. *NASA Technical Memorandum 98-112237*. 1998.
3. **Simonson, S.R.** Strong all over. *Living Fit Magazine*. March/April:102-109 1996.
2. Jackson, C.G.R. and **S.R. Simonson**. The relationship between human energy transfer and nutrition. In: *Nutrition and the Recreational Athlete*. C.G.R. Jackson (Ed.). Boca Raton, FL. CRC Press. p. 19-36, 1995.
1. Hardesty, A.J., J.E. Greenleaf, **S. Simonson**, A. Hu, and C.G.R. Jackson. Exercise, exercise training, and the immune system: a compendium of research (1902 - 1991). Moffett Field, CA: *NASA Technical Memorandum 93-108778*. 1993.

Invited Presentations

36. Delayed Onset Muscle Soreness, Inflammation, Adaptation, and Recovery: The Immune System in Conditioning. *NSCA Idaho State Clinic*. Boise, ID. January 2017.
35. Boyer's Model of Scholarship: An Introduction to the New Addition of Promotion and Tenure Criteria. *Albertson's Library Faculty Development*, Boise State University. Boise, ID. October 2015.
34. Research Application: Panel Discussion. *American Society of Exercise Physiologist National Meeting*. Oklahoma City, OK. October 2015. With F.B. Wyatt and S. Raiyani.

33. Undergraduate Exercise Physiology: Required of Everyone, Verified by None. Keynote Address, *American Society of Exercise Physiologists National Meeting*. Oklahoma City, OK. October 2015.
32. What do you mean “I POGIL?” *Idaho Conference on Undergraduate Research*. Boise, ID. July 2015.
31. The modified Monte Carlo Quiz format for increasing student motivation, participation, and content retention. *POGIL Northwest Regional Workshop*. Portland, OR. July 2015.
30. Team-Based Learning in *Active Learning in Large Enrollment Classes*. *College of Business and Economics, Boise State University*. Boise, ID. April 2015.
29. The role that internships and field experiences play in college-to-career transitions. *Treasure Valley Skills Summit 2014*. Boise, ID. October 2014.
28. What do you mean “I POGIL?” in *Innovations in Teaching Biomechanics*. *World Congress of Biomechanics – World Council of Biomechanics*. Boston, MA. July 2014.
27. Why do I use TBL? in ACSM Exercise Science Education Special Interest Group. *American College of Sports Medicine*. Orlando, FL. May 2014.
26. Investigating Student Learning: Using classroom assessment projects to inform your teaching. *Center for Teaching and Learning*. Boise State University, Boise, ID. February 2014. With J.A. Goodman and M. Genuchi.
25. Active Learning @ Lunch – Guided Inquiry – Encouraging Students to Develop Curiosity in the Classroom: A Look at POGIL. *Center for Teaching and Learning*. Boise State University, Boise, ID. February 2013.
24. The physiology of obesity. *Honors Seminar: Obesity Crisis in America*. Boise State University, Boise, ID. February 2013.
23. Engaging Students in Applying Content through Case Studies: Building and Revealing the Case with Interesting Twists and Turns. *Center for Teaching and Learning*. Boise, ID. September 2012. With J.A. Goodman.
22. Exercise on the road to wellness. *Diabetes and Latino Health in Our Community Conference*, Nampa, ID. April 2012.
21. What can you do with a degree in Exercise Science? *KINES (101) 201 Foundations of Kinesiology*. Boise State University, Boise, ID.
 - h. October 2014
 - g. February 2014
 - f. September 2013
 - e. February 2013
 - d. October 2012
 - c. April 2012
 - b. October 2011
 - a. March 2011
20. Implementing Process Oriented Guided Inquiry Learning (POGIL). *KINES 598 Graduate Seminar*. Boise State University, Boise, ID. November 2010.
19. Introduction to Cardiac Function in Improving Facilitation. *POGIL Northwest Regional Meeting*. Seattle, WA. July 2010.
18. Seizing the Magic Pill of Fitness. 2009 St. Alphonsus Regional Medical Center Arthritis Symposium: *Keeping in Step – Living Well with Arthritis*. Boise, ID. May 2009.
17. The Needs Analysis: Designing an Effective Conditioning Program. *NSCA Idaho Annual State Meeting*. Boise, ID. October 2008.
16. The neglected regulator: A discussion of the immune response to endurance exercise in the heat. *The Hotter 'n Hell Science and Medicine in Cycling 2008*, Wichita Falls, TX. August 2008.

15. Arthritis and exercise on the road to wellness. *Idaho Arthritis in Motion, monthly support meetings*, Boise, ID. March 2008.
14. Exercise Physiology. *USA Cycling Level 2 Coaching Certification Clinic*, Boise, ID. February 2008.
13. Exercise on the road to wellness. *Blue Cross of Idaho Wellness Challenge*, Meridian, ID. January 2008.
12. Promoting exercise adherence. *Developing Physical Activity Programs in Your Community. La Vida, HMS, Diabetes Resource Center*, Silver City, NM. April 2003.
11. Exercise guidelines for diabetes. *Developing Physical Activity Programs in Your Community. La Vida, HMS, Diabetes Resource Center*, Silver City, NM. April 2003.
10. The relationships between exercise physiology and diabetes. *Developing Physical Activity Programs in Your Community. La Vida, HMS, Diabetes Resource Center*, Silver City, NM. April 2003.
9. Writing the biomechanical analysis: the composite of writing styles. *Writing Across the Curriculum Workshop. Western New Mexico University*, Silver City, NM. November 2002.
8. Writing the wellness plan in “Concepts of Fitness and Wellness.” *Writing Across the Curriculum Workshop. Western New Mexico University*, Silver City, NM. April 2001.
7. The effects of space flight and proposed countermeasures on the immune system. *San Francisco State University*, San Francisco, CA. February 1999.
6. Care and protection of the low back in the construction environment. *Colorado Department of Transportation*, Denver, CO. January 1998.
5. Introduction to a career in personal training. *Career Pathways Day. Poudre High School*, Fort Collins, CO. October 1997.
4. Introduction to a career in personal training. *Colorado State University Wellness Club. Colorado State University*, Fort Collins, CO.
 - b. December 1997
 - a. February 1997.
3. Case studies. *American College of Sports Medicine, Health/Fitness Instructor Workshop. Denver Technical College*, Denver and Colorado Springs, CO.
 - d. March 1998
 - b. March 1997
 - c. September 1997
 - a. September 1996.
2. Exercise leadership. *American College of Sports Medicine, Health/Fitness Instructor Workshop. Denver Technical College*, Denver and Colorado Springs, CO.
 - d. March 1998
 - b. March 1997
 - c. September 1997
 - a. September 1996.
1. Pathophysiology/risk factors. *American College of Sports Medicine Health/Fitness Instructor Workshop. Denver Technical College*, Denver and Colorado Springs, CO.
 - d. March 1998
 - b. March 1997
 - c. September 1997
 - a. September 1996.

Abstracts/Presentations

42. **Simonson, S.R.** and M. Frary. A proposed rubric for evaluating teaching effectiveness. *POGIL National Meeting*, St. Louis, MO. June 2018.
41. McDonough, D.J., **S.R. Simonson**, Y. Gao, and S.A. Conger. Oral creatine hydrochloride supplementation: acute effects on intermittent, submaximal bouts of resistance exercise. *American College of Sports Medicine*. Minneapolis, MN. May 2018.

40. Frary, M. and **S.R. Simonson**. A proposed rubric for evaluating teaching effectiveness. *Great Ideas in Teaching and Learning Symposium, Center for Teaching and Learning*, Boise State University. Boise, ID. January 2018.
39. Youell, J.D., **S.R. Simonson**, M.E. Darnell, S.A. Conger. The Effects of Carbohydrate Mouth Rinse Concentration on Cycling Time Trial Performance. *American College of Sports Medicine*. Denver, CO. May 2017.
38. Dobbs, T.J., **S.R. Simonson**, and S.A. Conger. Improving Power Output in Older Adults Utilizing Plyometrics in an AlterG Treadmill. *American College of Sports Medicine*. Denver, CO. May 2017.
37. Bercier, K., **S.R. Simonson**, Y. Gao, and J. Shimon. Effect of weight loss training protocol using two different treadmills for obese individuals.
 - b. *American College of Sports Medicine*. Orlando, FL. May 2014.
 - a. *Graduate Student Research Symposium*, Boise State University. Boise, ID. May 2014.
36. **Simonson, S.R.** Making students do the thinking: Team-Based Learning in an exercise physiology laboratory course.
 - b. *American College of Sports Medicine*. Orlando, FL. May 2014.
 - a. *Great Ideas in Teaching and Learning Symposium, Center for Teaching and Learning*, Boise State University. Boise, ID. January 2014.
35. **Simonson, S.R.** Team-Based Learning (TBL) in the laboratory class: Where students answer the questions. *Great Ideas in STEM Education Research, STEM Station*, Boise State University. Boise, ID. January 2014.
34. **Simonson, S.R.** The modified Monte Carlo Quiz format for increasing student motivation, participation, and content retention.
 - d. *American College of Sports Medicine*. San Diego, CA. May 2015.
 - c. *Great Ideas in Teaching and Learning Symposium, Center for Teaching and Learning*, Boise State University. Boise, ID. January 2014.
 - b. *Great Ideas in STEM Education Research, Boise State University, STEM Station*. Boise, ID. January 2014.
 - a. *International Society for Exploring Teaching and Learning*. Orlando, FL. October 2013.
33. Weiler, D.M., L. Sutherland, J. Glogowski, and **S.R. Simonson**. Hemoglobin A1c: The new gold standard in type 2 DM screening? *The Endocrine Society Annual Meeting and Exposition*. Houston TX. June 2012.
32. Gao, Y., C. Gunderson, M. Schaal, **S.R. Simonson**, K. Larsen and K. Kennedy. Variation of walking METs among individuals in different weight categories. *AAHPERD National Convention and Exposition, Research Consortium Conference*. Boston, MA. March 2012.
31. Grieser, J.D., Y. Gao, **S.R. Simonson**, and L. Ransdell. Determining intensity levels of selected Wii-Fit activities in college aged individuals. *AAHPERD National Convention and Exposition, Research Consortium Conference*. Boston, MA. March 2012.
30. Kennedy, K., Y. Gao, C. Gunderson, M. Schaal, **S.R. Simonson**, and K. Larsen. A comparison of ActiGraph activity counts in controlled and perceived speed walking across weight categories. *AAHPERD National Convention and Exposition, Research Consortium Conference*. Boston, MA. March 2012.
29. Shimon, J.M., **S.R. Simonson**, E.M. Long, B. Lester AlterG Anti-Gravity Treadmill Walking Program on an Extremely Obese Female. *AAHPERD National Convention and Exposition, Research Consortium Conference*. San Diego, CA. March 2011.

28. **Simonson, S.R.**, G. Hynes, J. Galanter, S. Price, J. Oxford, and K.G. Shea. The effect of treadmill walking exercise with a partial reduction of body weight on knee osteoarthritis disease progression. Abstract. St. Alphonsus Regional Medical Center Arthritis Symposium: *Keeping in Step – Living Well with Arthritis*. Boise, ID. June 2010.
27. Shea, K.G., N.L. Grimm, **S.R. Simonson**, J. Jacobs. ACL and knee injury prevention programs for young athletes: Do they work?
 - b. *American Orthopaedic Society for Sports Medicine 2010 Annual Meeting*. Providence, RI. July 2010.
 - a. *Pediatric Orthopaedic Society of North America*. Waikoloa, HI. May 2010.
26. Glogowski, J., D.M. Weiler, L. Sutherland, J. Vanty, and **S.R. Simonson**. Latino population assessment: foundation, process, and discovery. *Western Institute of Nursing Annual Research Conference*. Glendale, AZ. April 2010. *Communicating Nursing Research* 43, *WIN Assembly* 18, *Nursing Science: Informing Practice and Driving Policy*. 117, 2010.
25. **Simonson, S.R.**, J. Glogowski, D.M. Weiler, L. Sutherland. Anthropometric divergence in a Latino population. *Western Institute of Nursing Annual Research Conference*. Glendale, AZ. April 2010. *Communicating Nursing Research* 43, *WIN Assembly* 18, *Nursing Science: Informing Practice and Driving Policy*. 122, 2010.
24. Weiler, D.M., L. Sutherland, J. Glogowski, and **S.R. Simonson**. Assessing diabetes risk among Latino adults: current vs. new recommendations. *Western Institute of Nursing Annual Research Conference*. Glendale, AZ. April 2010. *Communicating Nursing Research* 43, *WIN Assembly* 18, *Nursing Science: Informing Practice and Driving Policy*. 121, 2010.
23. **Simonson, S.R.** and S. Shadle. Implementing process oriented guided inquiry learning (POGIL) in undergraduate biomechanics: lessons learned by a novice.
 - b. *Hawaii International Conference on Education*. Honolulu, HI. January 2010.
 - a. *Northern Rocky Mountain Region Education Association*. Jackson Hole, WY. October 2009.
22. Cooper, B., M. Sabick, S. Kuhlman, R. Pfeiffer, **S.R. Simonson**, and K.G. Shea. Peak traction coefficients of cleated athletic shoes at various angles of internal rotation on artificial turf. *American Society of Biomechanics Annual Meeting*. University Park, PA. August 2009
21. Cooper, B., M. Sabick, S. Kuhlman, R. Pfeiffer, **S.R. Simonson**, and K.G. Shea. Peak traction coefficients of cleated athletic shoes at various angles of internal rotation on artificial turf. Abstract. *ASB Northwest Regional Meeting*. Pullman, WA. June 2009.
20. **Simonson, S.R.**, G. Hynes, J. Galanter, S. Price, J. Oxford, and K.G. Shea. The effect of treadmill walking exercise with a partial reduction of body weight on knee osteoarthritis disease progression. Abstract. St. Alphonsus Regional Medical Center Arthritis Symposium: *Keeping in Step – Living Well with Arthritis*. Boise, ID. May 2009.
19. Cooper, B., M. Sabick, S. Kuhlman, R. Pfeiffer, **S.R. Simonson**, and K.G. Shea. Peak traction coefficients of cleated athletic shoes at various angles of internal rotation on artificial turf. Abstract. St. Alphonsus Regional Medical Center Arthritis Symposium: *Keeping in Step – Living Well with Arthritis*. Boise, ID. May 2009.
18. **Simonson, S.R.** Longer duration circuit training improves flexibility and strength in college men and women. Abstract. *American College of Sports Medicine*, Annual meeting. San Francisco, CA. May 2003. *Medicine and Science in Sport and Exercise*. 35(5S):1515, 2003.
17. Greenleaf, J.E., **S.R. Simonson**, J.M. Stocks, J.M. Evans, and C.F. Knapp. Exercise versus +Gz acceleration training. Presentation. *Tenth International Conference on Environmental Ergonomics*. Fukuoka, Japan. September 2002.

16. Vener, J.M., **S.R. Simonson**, J. Stocks, S. Evetts, K. Bailey, S. Cowell, H. Biagini, C.G.R. Jackson, and J.E. Greenleaf. Cardiopulmonary responses to supine cycling during short-arm centrifugation. Abstract. *American College of Sports Medicine*, Annual meeting. Saint Louis, MO. May 2002. *Medicine and Science in Sport and Exercise*. 34(5S):1223, 2002.
15. Vener, J.M., **S.R. Simonson**, J. Stocks, S. Evetts, K. Bailey, S. Cowell, H. Biagini, C.G.R. Jackson, and J.E. Greenleaf. Cardiopulmonary responses to supine cycling during short-arm centrifugation. Abstract. *American College of Sports Medicine - Southwest Chapter*, Annual meeting. San Diego, CA. November 2001.
14. **Simonson, S.R.**, P. Norsk, and J.E. Greenleaf. Acute heart rate and blood pressure variables during lower body negative pressure (-15 mmHg and -50 mmHg) do not discriminate higher and lower orthostatic tolerance men. Abstract. *International Congress of Physiological Societies*. Christchurch, New Zealand. August 2001.
13. **Simonson, S.R.**, J.M. Stocks, S.A. Cowell, K.N. Pemberton, J. Evans, and J.E. Greenleaf. Effect of exercise and acceleration training on resting and orthostasis induced changes in hematological variables. Presentation. *Bioastronautics Investigators Workshop*. Galveston, TX. January 2001.
12. **Simonson, S.R.**, S.A. Cowell, J.M. Stocks, H.W. Biagini, J.M. Vener, S.N. Evetts, K.N. Bailey, J. Evans, C. Knapp, and J.E. Greenleaf. The influence of passive acceleration and exercise+acceleration on work capacity and orthostasis. Abstract. *International Academy of Astronautics, Humans in Space Symposium*. Santorini, Greece. May 2000.
11. Evans, J.M., **S.R. Simonson**, C.F. Knapp, J.M. Stocks, H.W. Biagini, S.A. Cowell, K.N. Bailey, J.M. Vener, S.N. Evetts, F.B. Moore, M.B. Stenger, C.M. McIntosh, and J.E. Greenleaf. Differences in acceleration training and exercise training on resting cardiovascular parameters. Abstract. *Experimental Biology*. San Diego, CA. April 2000. *FASEB Journal*, 14:A616, 2000.
10. Greenleaf, J.E., T.W. Petersen, A. Gabrielsen, B. Pump, P. Bie, N.J. Christensen, J. Warberg, R. Videbaek, **S.R. Simonson**, and P. Norsk. Low LBNP tolerance in men is associated with attenuated activation of the renin-angiotensin system. Abstract. *Experimental Biology*. San Diego, CA. April 2000. *FASEB Journal*, 14:A58, 2000.
9. Chou, J.L., N.J. Stad, G.P.N. Leftheriotis, N. Arndt, C.G.R. Jackson, **S. Simonson**, P.R. Barnes, and J.E. Greenleaf. Human physiological responses during +Gz acceleration with cycle ergometer exercise. Abstract. *Eighth International Conference on Environmental Ergonomics*. San Diego, CA. October 1998.
8. **Simonson, S.R.** Immune phage numbers increase in response to resistance exercise. Abstract. *National Strength and Conditioning Association*, National conference. Nashville, Tennessee. June 1998. *Journal of Strength and Conditioning Research*, 12(4):277, 1998.
7. **Simonson, S.R.** and C.G.R. Jackson. Natural Killer Cells increase in response to resistance training. Abstract. *American College of Sports Medicine*, National meeting. Orlando, Florida. June 1998. *Medicine and Science in Sport and Exercise*. 30(5S):108, 1998.
6. **Simonson, S.R.** and C.G.R. Jackson. Natural Killer Cells increase in response to resistance training. Abstract. *American College of Sports Medicine - Rocky Mountain Chapter*, Annual meeting. Frisco, CO. February 1998.
5. **Simonson, S.R.** Acute hematological responses to resistance training in unconditioned individuals. Abstract. *American College of Sports Medicine - Rocky Mountain Chapter*, Winter meeting. Winter Park, CO. January 1997.

4. **Simonson, S.R.**, F.B. Wyatt, S. Rodearmel, and J.K. Moffit. Comparison of Cardiovascular parameters for the supine cycle ergometer and the treadmill. Abstract. *American College of Sports Medicine - Rocky Mountain Chapter*, Winter meeting. Frisco, CO. January 1995.
3. Wyatt, F.B., **S.R. Simonson**, S. Rodearmel, and J.K. Moffit. Comparison of ventilatory threshold for the treadmill and supine cycle ergometer. Abstract. *American College of Sports Medicine - Rocky Mountain Chapter*, Winter meeting. Frisco, CO. January 1995.
2. **Simonson, S.R.**, C.G.R. Jackson, and J.E. Greenleaf. Leukocyte counts and plasma volume during supine cycle ergometry in men. Abstract. *American College of Sports Medicine - Rocky Mountain Chapter*, Winter meeting. Frisco, CO. January 1994.
1. **Simonson, S.R.** Findings of the 1993 RMC-ACSM. Membership Questionnaire. Presented at the winter meeting, *American College of Sports Medicine - Rocky Mountain Chapter*. Frisco, CO. January 1994.

Workshops

30. Writers' Retreat. *The POGIL Project*. St. Louis, MO. July 2018. With K. Deavers.
29. On the job training: successful student mentoring. *Center for Teaching and Learning*, Boise State University. Boise, ID. January 2018.
28. Introduction to Team-Based Learning series. *Center for Teaching and Learning*, Boise State University. Boise, ID.
 - c. Creating effective group assignments, case studies, and problems. November 2017.
 - b. Groups or teams? How to form and manage effective collaborative learning. October 2017.
 - a. Scratch-off tests, the Readiness Assessment Process, and getting students to do the reading. September 2017.
27. Asking questions about student learning: How do I know what works and how do I tell others about it? *Center for Teaching and Learning*, Boise State University. Boise, ID. April 2017.
26. Getting students to do something in class: active learning strategies for the classroom. Boise State University. *Center for Teaching and Learning*, Boise, ID. October 2016.
25. Writing POGIL Activities. Round Lake School District. Round Lake, IL. With M. Sullivan.
 - c. June 2018.
 - b. May 2017.
 - a. June 2016.
24. Student Development: Where are they, where do we want them to go, and how do we get them there? *Boise State Concurrent Enrollment*. Boise State University. Boise, ID. May 2016. With T. Focarile.
23. Writing Guided Inquiry Activities Series. *Center for Teaching and Learning*, Boise State University. Boise, ID.
 - c. Guided Inquiry Activity Structure. March 2016.
 - b. Designing Guided Inquiry Models. February 2016.
 - a. Writing Learning Objectives. January 2016.
22. Introduction to Team-Based Learning (TBL).
 - b. Hall International Academy for Arts and Humanities. Boise, ID. April 2017.
 - a. *Great Ideas in Teaching and Learning Symposium*, *Center for Teaching and Learning*, Boise State University. Boise, ID. January 2016.

21. Process Oriented Guided Inquiry Learning (POGIL). 1-day workshop. Round Lake High School. Round Lake, IL. With M. Sullivan, U. Halliday, and K. Plessel.
 - b. March 2016.
 - a. January 2016.
20. Developing Soft Skills. *Treasure Valley Skills Summit*. Boise State University. Boise, ID. October 2015.
19. Writing Guided Inquiry Activities so that the Students do the Thinking. *Center for Teaching and Learning*, Boise State University. Boise, ID.
 - b. December 2015.
 - a. October 2015.
18. Boyer's Model of Scholarship: An Introduction to the New Addition of Promotion and Tenure Criteria. *Center for Teaching and Learning*, Boise State University. Boise, ID. September 2015.
17. Grading: The Necessary Evil of Teaching. *Teaching Assistant Orientation, Center for Teaching and Learning*, Boise State University, Boise, ID.
 - e. August 2018.
 - d. August 2017.
 - c. *Teaching Assistant Orientation*. August 2016.
 - b. *New Faculty Orientation*. January 2016.
 - a. *Teaching Assistant Orientation*. August 2015.
16. Team-based learning: I was flipping the classroom when flipping wasn't cool. *Center for Teaching and Learning*, Boise State University. Boise, ID. March 2015. With K. Johnson.
15. Asking questions about student learning: how do I know what I am doing is making a difference? *Center for Teaching and Learning*, Boise State University. Boise, ID. January 2015.
14. Process Oriented Guided Inquiry Learning (POGIL), 1-day workshop. *Center for Teaching and Learning*. Red Deer College. Red Deer, AB Canada. January 2015.
13. Team-based inquiry labs: making students do the thinking. *Center for Teaching and Learning*, Boise State University. Boise, ID. October 2014.
12. The promising syllabus. *Center for Teaching and Learning*, Boise State University. Boise, ID.
 - d. *Course Design Institute 2*. May 2016.
 - c. *Course Design Institute 1*. May 2016.
 - b. *Course Design Institute*. May 2015.
 - a. *Course Design Institute*. May 2014.
11. Teaching and learning activities and group assignment design. *Center for Teaching and Learning*, Boise State University. Boise, ID.
 - d. *Course Design Institute 2*. May 2016.
 - c. *Course Design Institute 1*. May 2016.
 - b. *Course Design Institute*. May 2015.
 - a. *Course Design Institute*. May 2014.
10. Team-Based Learning (TBL) in the laboratory class: where the students answer the questions. *International Society for Exploring Teaching and Learning*. Orlando, FL. October 2013.
9. Process Oriented Guided Inquiry Learning (POGIL), 1-day workshop. *Boise Independent School District and Center for Teaching and Learning*, Boise State University. Boise, ID. October 2013.
8. Making Students do the Thinking: TBL in a Laboratory Course. *Boise State Teaching Scholars, Center for Teaching and Learning*, Boise State University. May 2013.

7. Process Oriented Guided Inquiry Learning (POGIL), 1/2-day workshop. *Idaho Science Teachers Association*. Boise, ID. October 2012.
6. Introduction to POGIL, Intermediate POGIL, and Advanced POGIL. *POGIL Northwest Regional Meeting*, 3-day workshop co-facilitator.
 - e. Tacoma, WA. July 2016.
 - d. Portland, OR. July 2015.
 - c. Tacoma, WA. June 2014.
 - b. McMinnville, OR. June 2013.
(Regional coordinator.)
 - a. Seattle, WA. July 2012.
5. Process Oriented Guided Inquiry Learning (POGIL), 1/2-day workshop. *American Chemical Society Northwest Regional Meeting and the American Association for the Advancement of Science*. Boise, ID. June 2012. With S.E. Shadle.
4. Process Oriented Guided Inquiry Learning (POGIL). 1-day workshop. College of Western Idaho. Nampa, ID. June 2012. With S.E. Shadle.
3. Process Oriented Guided Inquiry Learning (POGIL). 1-day workshop. *American College of Sports Medicine*. San Francisco, CA. May 2012.
2. Managing Student resistance to cooperative learning: generating student buy-in to group learning. *Center for Teaching and Learning*, Boise State University. March 2012.
1. Process Oriented Guided Inquiry Learning (POGIL) Laboratories in Exercise Science Classes: Cooperative, Student-Centered, Teaching to Increase Engagement and Learning. *Hawaii International Conference on Education*. Honolulu, HI. January 2012.

Consulting

4. Mills, R.A., Attorney. Anderson, Julian & Hull, LLP. Boise, ID. 2016.
3. Chittoori, B. NSF IUSE grant: *Permeating Sustainability and Resiliency Concepts in Civil Engineering Curriculum*. Department of Civil Engineering, College of Engineering, Boise State University. Boise, ID. 2016 – 2018.
2. Salzman, E, Attorney. Ada County Public Defender. Boise, ID. 2016.
1. Crane, T.J., Attorney. Anderson, Julian & Hull, LLP. Boise, ID. 2016.

Interviews

9. Hollingshead, N. More than just a fashion accessory: Fitness wearables. *Community Magazine*. May/June 2017, 23 – 26.
8. Sharp, S. and N. Snyder. [The Human Performance Laboratory](#). *Boise State University In the Community Television*. March 27, 2016.
7. Mullen, J. [Shawn Simonson discusses resistance training for incoming college swimmers](#). *Swim Sci*. October 31, 2014.
6. Poore, R. Faculty flip the classroom to encourage new way of learning. *Focus on Boise State University*. Fall 2013, 20-23.
5. Cripe, C. Davis Cup: the science of tennis in Boise. *Idaho Statesman*. March 31, 2013, S1,S3.
4. Montenegro, M. [Test yourself: Fix these common moves](#). *Simply Healthy by Marta*. February 6, 2013.
3. Lamay, C. Living well with arthritis. *Idaho Statesman*. April 27, 2009.
2. Getting quality help: selecting a gym and personal trainer. *The Morning Show with Nick Seibol*. KNFT AM Radio. Silver City, NM. May 22, 2002.
1. Getting started: exercise myths and fallacies. *The Doctor Mom Show with Jay Trent*. KNFT AM Radio. Silver City, NM. April 29, 2002.

Grants/Funding Received

18. **Simonson, S.R.** Boise City Fire Department. (2013) *Assessment of Firefighting Training Officers*. \$8,586.04
17. **Simonson, S.R.** Peak Power Cycling, Boise, ID. (2010) *Proof of concept for a novel strength training apparatus for improving anaerobic cycling performance*. \$6,507.00
16. **Simonson, S.R.** Center for Teaching and Learning Investigating Student Learning Grant. Boise State University, Boise, ID. (2010) *A comparison of traditional expository laboratory teaching to Process Oriented Guided Inquiry Learning (POGIL) laboratory teaching in KINES 331 Laboratory for Exercise Physiology*. \$3,500.00
15. **Simonson, S.R.** Boise State University, Boise, ID. (2010) Service-Learning Planning Grant. \$300.00
14. **Simonson, S.R.** College of Education Faculty Research Grant Program. Boise State University, Boise, ID. (2009) *The effect of body weight supported treadmill walking exercise on knee osteoarthritis disease progression*. \$4,250.00
13. **Simonson, S.R.** Immunodiagnostic Systems, Inc. Fountain Hills, AZ. (2009) Research support. *The effect of body weight supported treadmill walking exercise on knee osteoarthritis disease progression*. (Gift-in-kind) \$4479.45
12. **Simonson, S.R.** Idaho Sports Medicine Institute. (2009) Research support. *The effect of body weight supported treadmill walking exercise on knee osteoarthritis disease progression*. (Gift-in-kind) \$2,500.00
11. **Simonson, S.R.** Hearing and Balance Center at Idaho Elks. (2009) Research support. *The effect of body weight supported treadmill walking exercise on knee osteoarthritis disease progression*. (Gift-in-kind) \$7,250.00
10. **Simonson, S.R.** AlterG, Inc. Freemont, CA. (2009) Research support. *The effect of body weight supported treadmill walking exercise on knee osteoarthritis disease progression*. (Gift-in-kind) \$80,000.00
9. Weiler, D.M., L. Sutherland, M. Vallez, J. Glogowski, **S.R. Simonson**, B. Lind, Z.K. Hansen, and T. Soelberg. College of Health Sciences Developmental Research Grant. Boise State University, Boise, ID. (2008) *Diga Si a la Salud*. \$5,000.00
8. **Simonson, S.R.** Boise State University, Boise, ID. (2008) Service-Learning Planning Grant. \$300.00
7. **Simonson, S.R.** Center for Teaching and Learning, Travel Award. Boise State University, Boise, ID. (2008) Attendance at the Process Oriented Guided Inquiry Learning (POGIL) Workshop. \$300.00
6. **Simonson, S.R.** Boise State University, Boise, ID. (2007) Service-Learning Planning Grant. \$300.00
5. **Simonson, S.R.**, and M.J. Osmick. LifeMasters Supported SelfCare, Inc., South San Francisco, CA. (2007) Proof of concept pilot: Demonstration of the use of a personal computerized energy expenditure device coupled with individual and group coaching on participant motivation and weight loss. \$5,000.00
4. **Simonson, S.R.** C & I Benefit Solutions, Albuquerque, NM. (2004) Doc's Body Shop, small business start-up funding. \$150,000.00
3. Niederman, R., and **S.R. Simonson**. Western New Mexico University, Silver City, NM. (2002) Western New Mexico University, Faculty Research Grant, Effect of Tai Chi practice on indices of balance and coordination. \$1000.00

2. **Simonson, S.R.** Western New Mexico University, Silver City, NM. (2000) Western New Mexico University, Faculty Research Grant. Acute indicators or orthostatic intolerance. \$1000.00
1. Doughty, M., and **S.R. Simonson.** American Heart Association, Heart Health Education Grant. (1987) Milliken Middle School, Milliken CO. \$500.00

Teaching Assignments:

Boise State University (2007 – present)

KINES 330 Exercise Physiology
KINES 331 Exercise Physiology Lab
KINES 370 Biomechanics
KINES 371 Biomechanics Lab
KINES 432 Conditioning Procedures
KINES 436 Exercise Testing and Prescription
KINES 510 Physiology of Activity
KINES 515 Exercise Physiology Lab
KINES 520 Biomechanics

KINES 540 Applied Principles of Conditioning
KINES 545 Clinical Exercise Physiology and Testing
KINES 552 Applied Statistical Methods
KINES 580 Selected Topics: Hyperbaric Physiology
KINES 593 Thesis
KINES 688 Thesis Proposal
KINES 696 Directed Research

Seattle Pacific University (2016 – present)
EDSC 5715 Writing POGIL Activities

Western New Mexico University (2000 – 2003)

MVSC 100 Lifetime Wellness
MVSC 106 Self Defense
MVSC 109 Circuit Training
MVSC 110 Patrol Fitness
MVSC 111 Patrol Fitness II
MVSC 121 Outdoor Experiences
MVSC 213 First Aid
MVSC 240 Anatomical and Physiological Kinesiology
MVSC 307 Teaching Rhythm and Fitness

MVSC 341 Physiology of Exercise
MVSC 343 Biomechanics
MVSC 400 Motor Behavior
MVSC 402 Adapted Physical Education
MVSC 408 Assessment in Physical Education
MVSC 440 Exercise Prescription for Special Populations
MVSC 441 Principles of Conditioning
WELL 300 Nutrition and Diet Therapy

Service Activity

Department Administrative Duties and Committees

Human Performance Laboratory. Director. (2009 – Present)

Sport and Exercise Psychology Position Search. Committee member. (2015 – 2016)

Kinesiology (formally Exercise Science) Program Area, Coordinator. (2008 – 2015)

Exercise Science/Physiology Position Search. Chair. (2012 – 2013) Successfully lead search that resulted in the hiring of the department's first choice.

Facilities. Chair. (2007 – 2008) Purchased equipment to upgrade the teaching weight room located in the Kinesiology Annex. Continue to serve as a resource for decisions regarding this facility.

Biomechanics Position Search. Chair. (2008 – 2009) Successfully lead search that resulted in the hiring of the department's first choice.

Kinesiology Fundraising Reception. Co-chair with Jennifer Neil and Kris Kamann of the Boise State University Foundation. (2010 – 2012) Created, planned, and executed the first

annual Kinesiology department reception and fundraising event on November 16, 2010. Coordinated the two subsequent events and increased the size of the event and the number of gifts to the department.

Scholarship. Member. (2008 – 2013), Chair (2013 – present) Serve as the Exercise Science program representative to review and award student department scholarships.

College Committees

Technology. Member. (2007 – 2014) Represent the Kinesiology department's needs to the College of Education Technology committee resulting in the addition of approximately \$100,000.00 worth of equipment to Kinesiology. Purchases range from activity monitoring systems to high speed cameras.

University Service

University Foundations Review. Review of the Foundational Studies Program – Specifically University Foundations 100, with Mac Test (2016)

Center for Teaching and Learning. Faculty Associate (2014 – Present)

Treasure Valley Skills Summit. (2014 – 2017)

Core Reform Participant – Intellectual Foundations Work Group. (July 29, 2010)

Faculty Connections program. Mentor (2011 – 2012)

Scholarly/Professional Organizations/State Committees or Educational Agencies

NSCA ID State Clinic. 2017, Co-host with D. Jaconi (January);

2009, Co-host with L. Ransdell (March);

2008, Host (October)

NSCA ID Sate Clinic Planning Committee. Member (2007 – 2012, 2016 – Present)

POGIL NW Regional Steering Committee. Member (2011 – Present).

Coordinator (2012 – 2013)

POGIL Project National Steering Committee. Member (2016 – 2019).

POGIL TAPAS Curator. 2013 – 2017

Community Engagement

Presentations

Arthritis and exercise on the road to wellness. Idaho Arthritis in Motion, monthly support meetings, Boise, ID. Invited. March 3 and 18, 2008

Exercise on the road to wellness. Blue Cross of Idaho Wellness Challenge, Meridian, ID. Invited. January 30, 2008

Workshops/Seminars

Seizing the Magic Pill of Fitness. 2009 St. Alphonsus Regional Medical Center Arthritis Symposium: Keeping in Step – Living Well with Arthritis. Boise, ID. Invited. May 2, 2009

Consulting

Sun Valley Nordic Ski Olympic Training Center (2012 – present)

Treasure Valley YMCA: Trim Kids. (2007 – 2008)

Achievements and Honors

Service Learning Faculty Award, Nomination. Service-Learning in Action, Boise State University. (2012). Nominated for use of service-learning in the classroom.

Service Learning Faculty Award, Nomination. Service-Learning in Action, Boise State University. (2011). Nominated for use of service-learning in the classroom.

The Golden Apple, Nomination. Associated Students of Boise State University. (2009) Nominated for excellence in teaching.

Merit Award – Metabolic Syndrome Product Development, LifeMasters Supported SelfCare, Inc., South San Francisco, CA. (2007)

Achievement Award – Participant Monitoring, LifeMasters Supported SelfCare, Inc. Albuquerque, NM. (2006)

Achievement Award – Participant Self-Monitoring, LifeMasters Supported SelfCare, Inc. Albuquerque, NM. (2006)

Certificate of Appreciation, Human Environmental Physiology Laboratory, NASA-Ames Research Center, Moffett Field, CA. (2000) Dedication and contribution to project.

Lightning Award, Lockheed Martin Space Operations Corporation, NASA-Ames Research Center, Moffett Field, CA. (2000) Exceptional performance and contribution.

Graduate Student Fellowship, NASA-ASEE Summer Faculty Fellowship Program, NASA-Ames Research Center, Moffett Field, CA. (1997)

Sandan Black Belt, Shimpu-kai Kempo Karate, Ames Community College, Greeley, CO. (1993)

Certificate of Appreciation, American Heart Association, Heart Health Education Grant Program. (1988)

Certifications

*Certified Strength and Conditioning Specialist (CSCS)**, National Strength and Conditioning Association (NSCA). 1996

*Coach, Level 1**, American Coaching Effectiveness Program (Now the American Sport Education Program, ASEP). 1988

*Dive Master**, Professional Association of Dive Instructors (PADI). 2013

Emergency Medical Technician (EMT), Weld County, CO. 1990

*ACSM Certified Exercise Physiologist (EP-C)**, American College of Sports Medicine (ACSM). 1994

POGIL Facilitator, The POGIL Project.* 2011

Professional Lecturer, Physical Fitness, New Mexico Department of Public Safety Training and Recruiting Division. 2001

Secondary Science Teacher, Class A Certificate, Colorado Department of Education. 1987

Basic Cardiac Life Support, American Heart Association. 2005

American Red Cross Certifications

- Cardiopulmonary Resuscitation.** 1999
- Cardiopulmonary Resuscitation for the Professional Rescuer.* 2000
- First Aid.** 1999
- Responding to Emergencies.* 2000

American Red Cross Instructor Certifications

- Community First Aid and Safety.* 2000
- Cardiopulmonary Resuscitation for the Professional Rescuer.* 2000
- Responding to Emergencies.* 2000
- Workplace Standard First Aid.* 2000

(*Certification maintained.)

Professional Organizations

Aerospace Medical Association (AsMA). 1999 – 2001

American College of Sports Medicine (ACSM). 1993 – Present
American Society of Exercise Physiologists (ASEP). 2015 – Present
International Society of Exercise and Immunology (ISEI). 1995 – 2003
International Society for Exploring Teaching and Learning (ISETL). 2013 – 2014
National Strength and Conditioning Association (NSCA). 1995 – Present
State Clinic Committee. Participant in scheduling and planning the 2008, 2009, 2017 Idaho State Clinics in Boise, ID. 2007 – 2012, 2016 – 2017
Process Oriented Guided-Inquiry Learning (POGIL). 2008 – Present
POGIL Project National Steering Committee. Member (2016 – 2019)
POGIL NW Regional Steering Committee. Member. 2011 – Present
POGIL NW Regional Coordinator. 2012 – 2013
TAPAS Curator. 2013 – Present
Professional and Organizational Development (POD) Network in Higher Education. 2014 – Present
Professional Association of Dive Instructors (PADI). 2013 – Present
Rocky Mountain Chapter of the American College of Sports Medicine (RMC-ACSM). 1993 – 1998
Special Projects Committee. Created and implemented membership interest survey. Compiled survey results to create a membership directory and provide the RMC-ACSM board with member input and programming recommendations. Assisted in scheduling and planning the 1994 Winter Meeting in Frisco, CO. 1993
Student Representative to the RMC-ACSM board. Provided the students' perspective in the chapter decision-making process and coordination of the semi-annual meetings. 1994
Liaison to the ACSM Student Affairs Committee. Provided the student perspective in the chapter decision-making process. Involved in establishing criteria for evaluating student poster presentation at the chapter's winter meetings. Represented the Rocky Mountain Region to the National Student Affairs Committee. 1995 – 1998
Team-Based Learning Collaborative. 2012 – Present
Undersea and Hyperbaric Medicine Society. 2003

Professional Activities

American College of Sports Medicine – Health/Fitness Instructor Workshop. Denver, CO; September 1994.
American College of Sports Medicine – Rocky Mountain Chapter, Annual meeting. Frisco, CO; February 1998. Winter Park, CO; January 1997. Frisco, CO; January 1996. Frisco, CO; January 1995. Frisco, CO; January 1994.
American College of Sports Medicine – Rocky Mountain Chapter, Fall symposium. Fort Collins, CO; October 1997. Greeley, CO; October 1996. Denver, CO; September 1995.
American College of Sports Medicine – Southwest Chapter, Annual meeting. Las Vegas, NV; November 1998.
American College of Sports Medicine, Annual meeting. San Diego, CA; May 2015. Orlando, FL; May 2014. San Francisco, CA; May 2012. Seattle, WA; May 2009. Denver, CO; May 2006. San Francisco, CA; May 2003. Saint Louis, MO; May 2002. Orlando, FL; June 1998. Denver, CO; May 1997. Cincinnati, OH; May 1996. Minneapolis, MN; May 1995. Indianapolis, IN; May 1994.

American Society of Exercise Physiologist, National meeting. Oklahoma City, OK; October 2015.

Bioastronautics Investigators Workshop. Galveston, TX; January 2001.

Course Design Institute. Boise State University, Boise, ID; May 2017. May 2016. May 2015. May 2014. May 2012. May 2009.

Faculty Advising Institute. Boise State University, Boise, ID; October 2007.

Hawaii International Conference on Education, Honolulu, HI; January 2012, January 2010.

The Hotter 'n Hell Science and Medicine in Cycling, Wichita Falls, TX; August 2008.

International Academy of Astronautics, Humans in Space Symposium. Santorini, Greece; May 2000.

National Conference for Advanced POGIL Practitioners. Allentown, PA; June 2017.

International Congress of Physiological Societies. Christchurch, New Zealand; August 2001.

International Society for Teaching and Learning. Orlando, Florida; October 2013.

National Science Foundation Day at Boise State University. Boise, ID; April 2010.

National Strength and Conditioning Association, Idaho State Clinic. Boise, ID; January 2017. March 2009. October 2008.

National Strength and Conditioning Association, National Conference. Las Vegas, NV; July 2008. Nashville, TN; June 1998. Las Vegas, NV; June 1997.

NIH Regional Seminar on Program Funding and Grants Administration. Portland, OR; June 2001.

Northern Rocky Mountain Region Education Association. Jackson Hole, WY; October 2009.

Northwest Biomechanics Symposium. Boise, ID; May 2008.

POGIL (Process Oriented Guided Inquiry Learning) Facilitator Training. Myrtle Beach, SC; January 2011.

POGIL (Process Oriented Guided Inquiry Learning) National Meeting. St. Louis, MO; June 2018. St. Louis, MO; June 2017. June 2016. June 2013. June 2012. June 2011.

POGIL (Process Oriented Guided Inquiry Learning) Northwest Regional Workshop. Tacoma, WA, July 2016; Portland, OR; July 2015. Tacoma, WA; June 2014. McMinnville, OR; June 2013. Seattle, WA; July, 2012. Seattle, WA; July, 2010. McMinnville, OR; June 2009. McMinnville, OR; June 2008.

POD (Professional and Organizational Development) Network in Higher Education Annual Conference. Louisville, KY; November 2016. San Francisco, CA; November 2015. Dallas, TX; November 2014.

St. Alphonsus Regional Medical Center Arthritis Symposium: Keeping in Step – Living Well with Arthritis. Boise, ID; May 2009.

Team-Based Learning Collaborative Annual Workshop/Meeting. Orlando, FL; March 2017. St. Petersburg, FL; March 2012.

U.S. Navy Recruiting: Educators' Orientation Visit. San Diego, CA; August 2008.

World Council of Biomechanics. Boston, MA. July 2014.

Gunes Uzer, PhD

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Boise State University, Boise, ID 83725-2085
Ph. Office: (208) 426-4461, Email: gunesuzer@boisestate.edu

EDUCATION

Doctor of Philosophy, Biomedical Engineering <i>Stony Brook University, Stony Brook, NY</i>	2012
Master of Science, Mechanical Engineering <i>Stony Brook University, Stony Brook, NY</i>	2008
Bachelor of Science, Physics <i>Celal Bayar University, Manisa, Turkey</i>	2005

PROFESSIONAL APPOINTMENTS

Assistant Professor <i>Department of Mechanical & Biomedical Engineering Boise State University, Boise, ID</i>	2016-Present
Adjunct Assistant Professor <i>Department of Medicine, Division of Endocrinology University of North Carolina, Chapel Hill, NC</i>	2016-Present
Research Associate <i>Department of Medicine, Division of Endocrinology University of North Carolina, Chapel Hill, NC</i>	2016-2016
Postdoctoral Research Fellow <i>Department of Medicine, Division of Endocrinology University of North Carolina, Chapel Hill, NC</i>	2012-2016
Research Assistant <i>Department of Biomedical Engineering Stony Brook University, Stony Brook, NY</i>	2008-2012
Research Assistant <i>Department of Mechanical Engineering Stony Brook University, Stony Brook, NY</i>	2005-2008

TEACHING EXPERIENCE

Instructor Fall 2016, 2017, 2018
ME/MSE/BIOL 477&577, Biomaterials,
Boise State University, Boise, ID

Instructor Spring 2016, 2017
ME310 , Experimental Methods Laboratory,
Boise State University, Boise, ID

RESEARCH TEAM

Current Employees

Scott Birks, PhD Student

Matthew Goelzer, PhD Student

Josh Newberg, MS Student

Alexander Regner, MS Student

Kali Woods, MS Student

Matthew Thomson, MS Student

Stacie Loiate, Undergraduate Researcher

HONORS AND AWARDS

STEM CELLS Young Investigator Award, STEM CELLS, 2016

NSBRI First Award Fellowship, National Space Biomedical Research Institute, 2015

Harold Frost Young Investigator Award, American Society of Bone and Mineral Research, 2015

Young Investigator Travel Award, American Society of Bone and Mineral Research, 2015

Postdoctoral Award of Research Excellence, University of Carolina, 2015

Young Investigator Travel Award, American Society of Bone and Mineral Research, 2014

IBFF Travel Award, 12th International Bone Fluid Flow Workshop, 2014

President's Poster Award, American Society of Bone and Mineral Research, 2013

Sigma Xi Research travel Award, Stony Brook Chapter, Stony Brook University, 2012

NASA New York City Research Initiative (NYCRI) Achievement Award, 2009

Research Assistant Scholarship, Biomedical Engineering, Stony Brook University 2008-2013

Research Assistant Scholarship, Mechanical Engineering, Stony Brook University, 2005-2008

INVITED SEMINARS

- Cell Mechanosensitivity is Enabled by the LINC Nuclear Complex, World Stem Cell Summit, West Palm Beach, Florida, December 8, 2016
- COBRE/INBRE Treasure Valley Research Meeting, "Cell Mechanosensitivity is Enabled by the LINC Nuclear Complex", Student Union Building, the Barnwell Room, Boise, Nov. 2016.
- Role of LINC in maintenance of MSC β catenin signaling under microgravity, NSBRI Summer Bioastronautics Institute, Baylor College of Medicine, May 2016
- Role of nucleoskeleton in mechanical regulation of musculoskeletal tissues , Thurston Arthritis Research Center Seminars, University of North Carolina, NC, October 2015
- Nuclear-cytoskeletal tethering in mesenchymal stem cells: A role to sense and respond to mechanical input, East Carolina University, NC, October 2014
- Mechanical control of cell fate and function from a multi-scale perspective, Izmir Institute of Technology, Izmir, Turkey, September 2014
- How mechanical vibrations regulate bone cell metabolism: A Story from Outside to Inside the Cell, İzmir International Biomedicine and Genome Institute, Dokuz Eylul University, Izmir, Turkey, January 2014
- Wnt/LRP/ β -Catenin signaling in bone, University of North Carolina, School of Medicine, Division of Endocrinology Grant Rounds, Chapel Hill, NC, July 2013

PUBLICATIONS

Published/In Press

1. Pagnotti GM, Styner M, **Uzer G**, Patel V, Wright LE, PhD; Ness KK, Guise TA, Rubin J, Rubin CT. Combating Osteoporosis and Obesity with Exercise: Cell Mechanosensitivity, a Non-Drug Strategy to Stem Bone Loss and Fat Gain, Nature Reviews Endocrinology, 2018 ***in press**
2. **Uzer G**, Thompson WR, Xie Z, Sen B, Bas G, Judex S, Rubin CT, Burrige K, Rubin J, Sun-mediated Mechanical LINC between Nucleus and Cytoskeleton Regulates β catenin Nuclear Access, Journal of Biomechanics, Vol. 74(6) p.32-40, 2018
3. Graham DM, Andersen T, Sharek L, **Uzer G**, Rothenberg K, Hoffman BD, Rubin J, Balland M, Bear J and Burrige K. Eucleated cells reveal differential roles of the nucleus in cell migration, polarity and mechanotransduction. Journal of Cell Biology, Vol. 217(3) p.895-914, 2018
4. Rubin J, Styner M, **Uzer G**. Physical Signals May Affect Mesenchymal Stem Cell Differentiation Via Epigenetic Controls. Exerc Sport Sci Rev. Vol.46(1) p.42-47, 2018
5. Thompson WR, Yen S, **Uzer G**, Xie Z, Sen B, Styner M, Burrige K, Rubin J. LARG GEF and ARHGAP18 orchestrate RhoA activity to control mesenchymal stem cell lineage. Bone Vol.107 (2) p.172-180, 2018

6. Sen B, **Uzer G**, Samsonraj RM, Xie Z, McGrath C, Styner M, Dudakovic A, van Wijnen AJ, Rubin J. Intranuclear Actin Structure Modulates Mesenchymal Stem Cell Differentiation. *Stem Cells*. Vol. 35(6) p.1624-1635, 2017
7. Styner M, Pagnotti GM, McGrath C, Wu X, Sen B, **Uzer G**, Xie Z, Zong X, Styner MA, Rubin CT, Rubin J. Exercise Decreases Marrow Adipose Tissue Through β -Oxidation in Obese Running Mice. *J Bone Miner Res*. Vol. 32(8), p.1692-1702, 2017
8. **Uzer G**, Pongkitwitoon, Rubin J, Judex S, Cytoskeletal Configuration Modulates Mechanically Induced Changes in Mesenchymal Stem Cell Osteogenesis, Morphology and Stiffness, *Scientific Reports*, Oct;6:34791 , 2016
9. **Uzer G**, Rubin CT, Rubin J, Cell Mechanosensitivity Is Enabled by the LINC Nuclear Complex, *Current Molecular Biology Reports*, Vol. 2(1), p. 36, 2016
10. **Uzer G**, Fuchs RK, Rubin J, Thompson WR, Concise Review: Plasma and Nuclear Membranes Convey Mechanical Information to Regulate Mesenchymal Stem Cell Lineage, *Stem Cells* Vol. 34(6), p. 1455, 2016, *Front Endocrinol*, Vol.30(7):80, eCollection, 2016
11. Sen B, **Uzer G**, Xie Z, C McGrath, Styner M, Dudakovic A, Samsonraj R, van Wijnen AJ, Rubin J Intranuclear actin structure modulates MSC differentiation, *Stem Cells* Vol. 33(10), p.3065-76, 2016
12. Morton TL, Galior K, McGrath C, Wu X, **Uzer G**, Uzer GB, Sen B, Xie Z, Tyson D, Rubin J, Styner M, Exercise Increases and Browns Muscle Lipid in High-Fat Diet-Fed Mice, 2016.
13. **Uzer G**, Thompson WR, Xie Z, Sen B, Judex S, Rubin CT, Burrige K ,Rubin J, Cell mechanosensitivity to extremely low magnitude signals is enabled by a LINCed nucleus, *Stem Cells*, Vol. 33(6), p. 2063, 2015
14. Thompson WR, **Uzer G**, Yen S, Xie Z, Sen B, Case N, Styner M, Rubin J. A Novel Osteocyte Specific Responses to Soluble and Mechanical Stimuli in a Stem Cell Derived Culture Model, *Scientific Reports*. Vol. 5, p. 11049, 2015
15. Sen B, Xie Z, **Uzer G**, Thompson WR, Styner M, Rubin J. Intranuclear Actin Regulates Osteogenesis, *Stem Cells*. *Stem Cells*, Vol. 33(10), p. 3065, 2015.
16. Styner M, Wu X, **Uzer G**, Thompson WR, Sen B, Xie Z, Styner MA, Rubin J, Exercise regulation of marrow fat in the setting of PPAR- γ agonist treatment, *Endocrinology*. Vol. 156(8), p.2753-2761, 2015.
17. **Uzer G**, Pongkitwitoon S, Chan ME, Rubin J, Judex S ,Gap Junctional Communication in Osteocytes is Amplified by Low Intensity Vibrations in vitro, *PLoS One*, Vol. 9(3): e90840, 2014
18. Styner M, Kadari S, Galior K, **Uzer G**, Thompson WR, Case N, Sen B, Xie Z, Romaine A, Styner MA, Pagnotti G, Rubin CT, Horowitz M, Rubin J, Bone marrow fat accumulation accelerated by high fat diet is suppressed by exercise, *Bone*, Vol. 64, p. 39, 2014
19. Sen B, Xie Z, Case N, Thompson WR, **Uzer G**, Styner M, Rubin J, mTORC2 regulates mechanically induced cytoskeletal reorganization and lineage selection in marrow derived mesenchymal stem cells, *Journal of Bone and Mineral Research*, Vol. 29(1), p. 78, 2014

20. **Uzer G**, Chan ME, Pongkitwitoon S, Judex S, Vibration Induced Osteogenic Commitment of Mesenchymal Stem Cells is Enhanced by Cytoskeletal Remodeling but not Fluid Shear, *Journal of Biomechanics*, Vol. 46(13),p.2296, 2013
21. Thompson WR, Guilluy C, Xie Z, Sen B, Brobst K, Yen S, **Uzer G**, Styner M, Case N, Burrridge K, Rubin J, Mechanically Activated Fyn Utilizes mTORC2 to Regulate RhoA and Adipogenesis in Mesenchymal Stem Cells, *Stem Cells* ,Vol. 31(11),p. 2528, 2013
22. Chan ME, **Uzer G**, Rubin CT, The Potential Benefits and Inherent Risks of Vibration as a Non-Drug Therapy for the Prevention and Treatment of Osteoporosis, *Current Osteoporosis Reports*, Vol.11(1), p. 36, 2013
23. **Uzer G**, Manske S, Chan ME, Chiang FP, Rubin CT, Frame MD, Judex S, Separating Fluid Shear Stress from Acceleration during Vibrations in Vitro: Identification of Mechanical Signals Modulating the Cellular Response, *Cellular and Molecular Bioengineering*, Vol. 5(3), p. 266, 2012
24. Gupta S, **Uzer G**, Surabhi P, Judex S, Multiple Multiple Exposures to Unloading Decrease Bone's Responsivity but Compound Skeletal Losses in C57BL/6 Mice *American Journal of Physiology- Regulatory, Integrative and Comparative Physiology*, Vol. 303(2), p.159, 2012
25. Holguin N, **Uzer G**, Chiang FP, Rubin C, Judex S, A Brief Daily Exposure to Low Intensity Vibration Mitigates the Degradation of the Intervertebral Disc in a Frequency-specific Manner, *Journal of Applied Physiology*, Vol.111(6), p. 1846, 2011
26. **Uzer G** and Chiang FP, Mapping Full Field Deformation of Auxetic Foams using Digital Speckle Photography, *Physica Status Solidi B*, Vol.245(11), p. 2391, 2008
27. **Uzer G**, Chiang FP, Krukenkamp IB, Measuring Shape and Surface Strain of 3D Objects Using Digital Speckle Photography, *Strain*, Vol.45(5),p. 409, 2008

CONFERENCE PRESENTATIONS

* = Graduate Student, † = Undergraduate Student, ¥= Research Staff

Podium Presentations

1. Touchstone H[†], **Uzer G**, and S. Alwood J, The role of Nuclear Cytoskeleton in the Osteocytic response to Simulated Weightlessness. 33rd Annual Meeting of the American Society for Gravitational and Space Research, October 25-28, Seattle, WA 2017
2. **Uzer G**, Bas G, Rubin J. Mechanical LINC between nucleus and cytoskeleton regulates β catenin nuclear access. ORS 46th Sun Valley Workshop, Musculoskeletal Biology, August 7-10, Sun Valley, Idaho, 2016, ***Received "Blue Ribbon Award"**
3. **Uzer G**, Bas G, Sen B, Xie Z, Rubin J. Role of LINC in maintenance of MSC β catenin signaling under microgravity, NSBRI Summer Bioastronautics Institute, May 31-June 3, Houston, TX, 2016
4. **Uzer G**, Bas G, Thompson WR, Sen B, Xie Z, Rubin J. Nuclear envelope mechanosome regulates β catenin nuclear transport. ORS 45th Sun Valley Workshop, Musculoskeletal

- Biology, August 2-5, Sun Valley, Idaho, 2015. ***Received "Harold Frost Young Investigator Award"**
5. Thompson WR, **Uzer G**, Yen S, Sen B, Xie Z, Styner M, Rubin J. A Novel Osteocyte Model that Recapitulates in vivo Mechanical and Hormonal Responses. APTA CSM. Indianapolis, IN, 2015.
 6. **Uzer G**, Thompson WR, Sen B, Xie Z, Sen S, Bas G, Styner M, Rubin CT, Rubin J. The nuclear envelope mechanosome regulates mechanical activation of β catenin and its nuclear transport. Journal of Bone Mineral Research 29 (Suppl 1), 2014. ***Received "Young Investigator Travel Award"**
 7. Styner M, Wu X, Thompson WR, **Uzer G**, Xie Z, Sen B, Romaine A, Pagnotti GM, Rubin CT, Styner MA, Horowitz MC, Rubin J. Exercise regulation of marrow fat in the setting of PPAR γ agonist treatment. ASBMR 36th Annual Meeting, Houston, TX, 2014
 8. Yen S, Thompson WR, **Uzer G**, Xie Z, Sen B, Case N, Styner M, Burrige K, Rubin J. Regulation of RhoA through the GTPase Activating Protein ARHGAP18 is Critical for Mesenchymal Stem Cell Lineage Commitment. 96th Annual Endocrine Society Meeting, Chicago, IL, 2014.
 9. **Uzer G**, Chiang FP, Ding Y, Ho A, Rosenberger AH, Crack Propagation Characteristics in Lamellar TiAl, Proceedings of the SEM Annual Conference, June 4-6, Springfield, MA, 2007.
 10. **Uzer G**, Ding Y, Chiang FP, Auxetic Foam as a Core Material for Sandwich Panels, Proceedings of the SEM Annual Conference, June 4-6, Springfield, MA, 2007.

Poster Presentations

11. Touchstone H[†], Byrd R[†], S. Alwood J, **Uzer G**, Simulated Microgravity Decreases LINC Complex Expression in MSCs. 2018 Biomedical Engineering Society Annual Meeting, October 11-14, Phoenix, AZ 2017
12. **Olcum M**, Bas G[†], Ezcivici E, Rubin J., **Uzer G** LaminA/C knock down enhances adipogenesis but does not eliminate mechanical response in MSCs. ORS 47th Sun Valley Workshop, Musculoskeletal Biology, August 10-11, Sun Valley, Idaho, 2017.
13. Byrd R[†], Touchstone H[†], A Abend M*, Patricelli M[†], **Uzer G**, The role of low intensity vibrations on MSC proliferation and osteogenesis under simulated microgravity, 2018 Idaho Conference on Undergraduate Research, July 26-27, Boise, ID, 2017
14. Schimpf J[†], Abend M*, Patricelli M[†], **Uzer G**, Fologea D, Davis P Graugnard E, Advanced Atomic Force Microscopy for BioMaterials Research, 2018 Idaho Conference on Undergraduate Research, July 25-26, Boise, ID, 2017
15. **Uzer G**, Bas G[†], Sen B, Rubin J. Mechanical LINC between nucleus and cytoskeleton regulates β catenin nuclear access. American Society of Cell Biology Annual Meeting, Musculoskeletal Biology, December 4-7, San Francisco, CA, 2016.
16. **Uzer G**, Bas G, Rubin J. Mechanical LINC between nucleus and cytoskeleton regulates β catenin nuclear access. ORS 46th Sun Valley Workshop, Musculoskeletal Biology, August 7-10, Sun Valley, Idaho, 2016.

17. **Uzer G**, Pongkitwitoon S, Haider B, Patel R, Jia S, Brouzes E, Judex S Nuclear-Cytoskeletal Imaging towards Identification of Cellular Mechanotransduction, ORS Annual Meeting, March 5-8, Orlando, FL, 2016.
18. **Uzer G**, Pongkitwitoon S, Judex S, Vibration Direction Differentially Regulates MSC Osteogenesis In Vitro, ORS Annual Meeting, March 5-8, Orlando, FL, 2016.
19. **Uzer G**, Bas G, Sen B, Rubin J Nuclear Envelope Mechanosome Regulates Bcatenin Nuclear Transport, 2016 NASA Human Research Program Investigators' Workshop, February 8-11, Galveston, TX, 2016
20. **Uzer G**, Thompson WR, Sen B, Xie Z, Bas G, Judex S, Rubin J. Disruption of nucleocyto-skeletal connectivity increases intranuclear actin and enhances MSC differentiation, ASBMR 2015 Annual Meeting, October 9-12, Seattle, Washington, 2015. *** Received "Young Investigator Travel Award"**
21. Thompson WR, Yen S, **Uzer G**, Sen B, Xie Z, Styner M, Rubin J. Actin Cytoskeletal Structure Influences MSC Lineage through Balanced Activity of LARG GEF and ARHGAP18. ASBMR 37th Annual Meeting, Seattle, WA, 2015.
22. Thompson WR, Yen S, **Uzer G**, Sen B, Xie Z, Styner M, Rubin J. Targeting RhoA GEFs and GAPs to Direct Mesenchymal Stem Cell Osteogenic Differentiation. APTA CSM. Indianapolis, IN, 2015.
23. **Uzer G**, Thompson WR, Sen B, Xie Z, Bas G, Judex S, Rubin J. LINCed Nucleus Enables sensing of High Frequency Vibrations but not Strain, 12th Bone Fluid Flow Workshop, July 6-11, Houston, TX, 2014. ***Received "IBFF Travel Award"**
24. **Uzer G**, Thompson WR, Sen B, Xie Z, Bas G, Judex S, Rubin J. **High Frequency Low Magnitude Vibrations but Not Strain is Enabled through Nucleo-Cytoskeletal Tethering.**, 7th World Congress of Biomechanics, July 6-11, Boston, MA, 2014.
25. Thompson WR, **Uzer G**, Yen S, Sen B, Xie Z, Brobst KE, Styner M, Rubin J. Sclerostin is Mechanically and Hormonally Regulated in a Novel in vitro Osteocyte Model. Journal of Bone Mineral Research 29 (Suppl 1), 2014.
26. Thompson WR, Yen S, **Uzer G**, Xie Z, Sen B, Styner M, Burridge K, Rubin J. LARG GEF and ARHGAP18 GAP Control Cytoskeletal Dynamics to Influence MSC Lineage Allocation. Journal of Bone Mineral Research 29 (Suppl 1), 2014.
27. Yen S, Thompson WR, **Uzer G**, Sen B, Xie Z, Styner M, Rubin J. Mechanical Regulation of LARG and ARHGAP18 Controls RhoA-Mediated Mesenchymal Stem Cell Fate. George F. Sheldon Resident Research Symposium, Chapel Hill, NC, 2014.
28. Thompson WR, **Uzer G**, Yen S, Sen B, Xie Z, Brobst KE, Styner M, Rubin J. Sclerostin is Mechanically and Hormonally Regulated in a Novel in vitro Osteocyte Model. 4th Annual IU SHRS Interdisciplinary Research and Education Conference, Indianapolis, IN, 2014.
29. Thompson WR, Yen S, **Uzer G**, Xie Z, Sen B, Styner M, Burridge K, Rubin J. LARG GEF and ARHGAP18 GAP Control Cytoskeletal Dynamics to Influence MSC Lineage Allocation. 4th Annual IU SHRS Interdisciplinary Research and Education Conference, Indianapolis, IN, 2014.
30. **Uzer G**, Sen B, Xie Z, Case N, Thompson WR, Styner M, Rubin CT, Judex S, Rubin J, Enhancement of Nucleo-Cytoskeletal Connectivity by Low Intensity Vibration

- Augments Mechanosensitivity in Mesenchymal Stem Cells, *Journal of Bone Mineral Research* 28 (Suppl 1), 2013. ***Received "ASBMR President's Poster Award"**
31. **Uzer G**, Chan ME, Pongkitwitoon S, Rubin J, Judex S, Vibrations Increase Osteocyte Gap Junctional Communication Independent of the Level of Fluid Shear, *Journal of Bone Mineral Research* 28 (Suppl 1), 2013.
 32. Styner M, Kadari S, Galior K, **Uzer G**, Thompson WR, Case N, Sen B, Xie Z, Romaine A, Styner MA, Pagnotti G, Rubin CT, Horowitz M, Rubin J, Running decreases marrow adipose tissue in chow and high fat fed mice, *Journal of Bone Mineral Research* 28 (Suppl 1), 2013.
 33. Thompson WR, Yen S, Xie Z, Sen B, Case N, **Uzer G**, Styner M, Rubin J, Mechanically Activated Fyn Modulates Adipogenic Commitment through mTORC2/Akt/RhoA Effects on Mesenchymal Stem Cell Cytoskeleton, *Journal of Bone Mineral Research* 28 (Suppl 1), 2013.
 34. **Uzer G**, Manske S, Qin YX, Chan ME, Rubin CT, Frame MD, Judex S, Vibration Induced Mechanical Signals that Increase Proliferation and Osteogenic Commitment of Mesenchymal Stem Cells, *Journal of Bone Mineral Research* 27 (Suppl 1), 2012. ***Received "Sigma Xi Research travel Award"**
 35. **Uzer G**, Manske S, Qin YX, Chan ME, Rubin CT, Frame MD, Judex S, Fluid Shear Modulates COX2 mRNA Expression but not Mineralization during Oscillatory Motions, *Journal of Bone Mineral Research* 26 (Suppl 1), 2011.
 36. Manske S, **Uzer G**, Judex S, Does loading direction influence the cell's response to high frequency, low magnitude vibration?, *Journal of Bone Mineral Research* 26 (Suppl 1), 2011
 37. **Uzer G** and Judex S, Fluid induced mechanical environment of cells during high-frequency oscillations in-vitro. IEEE 37th Northeast Bioengineering Conference, April 1-3, Troy, NY, 2011.
 38. **Uzer G**, Fievisohn E, Chan, ME, Ferreri S, Qin YX, Judex S, Cell proliferation is modulated by oscillatory accelerations but not by differences in fluid shear, *Journal of Bone Mineral Research* 25 (Suppl 1), 2010.
 39. Gupta S, **Uzer G**, Judex S, Recovery of Abdominal Adiposity and Vertebral Bone after Multiple Exposures to Mechanical Unloading, *Journal of Bone Mineral Research* 25 (Suppl 1), 2010.
 40. **Uzer G**, Qin YX, Rubin CT, Judex S, Fluid Forces in the Bone Marrow during High Frequency Oscillatory Vibrations, *Journal of Bone Mineral Research* 24 (Suppl 1), 2009.
 41. Judex S, Gupta S, **Uzer G**, Bone Atrophy and Recovery upon Multiple Exposures to Mechanical Unloading, *Journal of Bone Mineral Research* 24 (Suppl 1), 2009.
 42. **Uzer G**, Ho A, Clark RAF, Chiang FP, Mechanical Properties of Pig Skin, Proceedings of the SEM Annual Conference, June 1-4, Albuquerque, New Mexico, 2009.
 43. **Uzer G** and Chiang FP, Mixed mode Brazilian tests of lamellar TiAl, *Experimental Analysis of Nano and Engineering Materials and Structures*. E. E. Gdoutos, Springer Netherlands: 209-210, 2007.

44. Chiang FP and **Uzer G**, Measuring Strain in a Spherical Rubber Ball Using Speckles, Proceedings of the SEM Annual Conference, June 4-6, Springfield, MA, 2007.
45. Chiang FP, **Uzer G**, Ding Y, Ho A, Rosenberger AH, 3-D Shape Measurement Using a Micro/Nano Speckle Method, Proceedings of the SEM Annual Conference, June 4-7, St. Louis, MO, 2006.

GRANT ACTIVITY

Ongoing Research Support (Latest first)

ISGC Research Seed Grant

PI: Gunes Uzer

Total Award Amount: \$45,000

Dates: 5/1/2018 - 4/30/2019

Title: Role of YAP-Dependent Inhibition of Radiation-Induced Cell Death Under Simulated Microgravity

National Institutes of Health AR3T Technology Development Grant

PI: Gunes Uzer

Total Award Amount: \$133,000

Dates: 4/1/2018 – 4/1/2020

Amount: \$133,000

Title: Replicating Marrow Mechanics of Stem Cells Ex vivo

P20GM109095, National Institutes of Health (NIH), NIGMS

PI: Uzer, Gunes

Total Award Amount: \$450,000

Dates: 9/1/16 - 8/31/19

Title: Nucleoskeleton regulation of the Chromatin Dynamics and Cell Fate in Response to Mechanical Signals

Completed Research Support

NNX15AK35A NASA EPSCoR Research Initiation Grant – SubAward-FPK548-SB-008

PI: Gunes Uzer

Dates: 4/15/17 - 4/30/18

Amount: \$27,000

Title: Role Cellular Connectivity in Maintaining Osteogenesis Under Simulated Microgravity in Reponse to Mechanical Challenges

NNX15AI04H ISGC Undergraduate Research Grant – SubAward-FPK900-SB-033

PI: Gunes Uzer

Dates: 5/1/17 - 3/31/18

Amount: \$10,000

Title: Role Cellular Connectivity in Maintaining Osteogenesis Under Simulated Microgravity in Reponse to Mechanical Challenges

Grant to Enhance Undergraduate STEM Engagement proposal

Title: Boise State University Undergraduate Microgravity Research Team

PI: Steve Swanson (Role: co-PI)

Dates: 5/1/17 - 3/31/18

Amount: \$18,349

2214-A, The Scientific and Tech. Research Council of Turkey

12/30/15 – 11/31/16

PI: Melis Uzan, Role: Mentor

Dates: Total Award Amount: \$30,000

Title: Age related changes in LINC mediated nuclear coupling

PF04304, National Space Biomedical Research Institute (NSBRI)

PI: Uzer, Gunes

Total Award Amount: \$55,000

Dates: 11/01/15-7/31/16

Title: Role of LINC complex in Maintenance of MSC β catenin Signaling Under Microgravity

PROFESSIONAL ORGANIZATIONS AND AFFILIATIONS

- Advisory Board Member, ORS Musculoskeletal Biology Workshop, 2016-2020
- Member, American Society of Bone and Mineral Research, 2008- Present
- Member, Orthopedic Research Society, 2013-Present
- Member, Society of Experimental Mechanics, 2006- Present

REVIEW AND EDITORIAL DUTIES

- Editorial Board, Scientific Reports (2017-2019)
- Editorial Board, AIMS Bioengineering (2016-2019)
- Accepted into Early Career Reviewer (ECR) program at the NIH Center for Scientific Review (CSR)
- Ad-hoc grant reviewer for Human Frontier Science Program (September 2016)
- Reviewer for
 - Scientific Reports
 - Tissue Engineering
 - FEBBS Open Bio
 - Stem Cells and Development
 - Experimental Cell Research
 - Bone
 - Journal of Biomechanics
 - Matrix Biology

- Journal of Orthopaedic Research
- Cell & Tissue Research
- Calcified Tissue International
- PLoS One
- Cell & Tissue Research
- PeerJ
- Rejuvenation Research
- Journal of Steroid Biochemistry and Molecular Biology
- Scandinavian Journal of Medicine and Science in Sports,
- TUBITAK-Biology

EDUCATIONAL SERVICE AND COMMUNITY OUTREACH

- Advisor, The Boise State University Micro-g NEXt Team, 2016-Current
- Workshop Organizer, "Build Your Own Computer" Reuseum educational, 2017-Current
- McNair Scholarship Program Mentor, 2017-Current
- The 2015 Oliver Smithies Nobel Symposium, Organizing Committee Member, 2015
- North Carolina Science and Engineering Fair, Judge, 2014-2015.
- Creekside Elementary School Science Night: Presenter, 2015
- NYCRI- Summer Internship Program, Lab Presenter, 2009

**INSTRUCTION, RESEARCH AND STUDENT AFFAIRS
DECEMBER 20, 2018**

IDAHO STATE UNIVERSITY

SUBJECT

Master of Arts in Spanish

APPLICABLE STATUTE, RULE, OR POLICY

Idaho State Board of Education Governing Policies & Procedures, Section III.G

ALIGNMENT WITH STRATEGIC PLAN

Goal 3: Workforce Readiness, Objective A: Workforce Alignment. IV. Increase in postsecondary programs tied to workforce needs.

BACKGROUND/DISCUSSION

The proposed online Master of Arts in Spanish will operate under the guidelines of Board Policy V.R. as it pertains to wholly online programs. Program will provide high school teachers of Spanish the opportunity to attain the qualifications and language skill level required to participate effectively in dual enrollment language programs. Program will also support Spanish-speaking students learning English as a second language, comply with continuing education and promotion requirements in a meaningful and focused manner, and be better able to act in accordance with the Every Student Succeeds Act (ESSA).

The proposed program is a timely and practical response to the national, regional and statewide demographically driven need to increase the number of K-12 teachers qualified to teach in Spanish dual enrollment programs in accordance with National Alliance of Concurrent Enrollment Partnerships policies. Additionally, prepare to implement new, national ESSA standards into Idaho classrooms and address the documented need for more qualified foreign language/Spanish teachers.

IMPACT

The online program fee was set at \$330 per credit, which is less than graduate tuition, because the primary target student group is expected to be working public school educators, who are expected to enroll in one or two courses per semester. Enrolling in six credits will cost \$1,980 per semester. This is similar to programs in other states. In addition, this program has lower costs and can be offered at a discounted rate.

Current faculty resources are available to deliver the program. The four new courses that will be created can be covered through reallocating lower division coursework to adjunct faculty. Technology resources for online and distance-learning curriculum are already available through ITRC.

ATTACHMENTS

Attachment 1 – Proposal for the M.A. in Spanish

**INSTRUCTION, RESEARCH AND STUDENT AFFAIRS
DECEMBER 20, 2018**

STAFF COMMENTS AND RECOMMENDATIONS

ISU's proposed M.A. in Spanish is consistent with their Service Region Program Responsibilities and their current institution plan for Delivery of Academic Programs in Region V. Per Board Policy III.Z, no institution has the statewide program responsibility specifically for Spanish.

ISU has indicated the proposed MA in Spanish would help address a shortage of teachers qualified to teach dual credit Spanish. ISU currently has limited capacity to offer Spanish dual credit courses in high schools due to the level of educational attainment it requires for dual credit instructors. ISU has indicated that initial enrollment will be two students in the first year and will regularly enroll a total of 5-6 students and 10-12 part-time students once the program by its sixth year. While there is no graduate program in Spanish currently offered by Idaho public institutions, staff raised questions regarding the workforce need that this proposed program intends to address. Based on responses provided by ISU, staff continues to share questions regarding the need and demand for graduate education in this discipline as outlined in the proposal.

ISU is also requesting approval to assess an online program fee consistent with Board Policy V.R.3.a.x. at \$330 per credit hour. For the 30 credits required for completion of the proposed program, the total cost will be \$9,900. This policy provides the criteria that must be met in order to designate an online program fee for a Board approved academic program. This includes programs must be fully online and that the fee is in lieu of resident or non-resident tuition. Based on the information provided in the proposal, staff finds that the request to assess the online program fee meets policy requirements.

The proposal completed the program review process and was presented to the Council on Academic Affairs and Programs (CAAP) on November 15, 2018; and to the Committee on Instruction, Research, and Student Affairs (IRSA) on November 29, 2018.

Based on insufficient evidence of workforce demand in addition to the reallocation of resources needed to develop and deliver the proposed program, Board staff recommends ISU provide further assessment of the regional and statewide need for a graduate credential in this discipline area.

BOARD ACTION

I move to approve the request by Idaho State University to create an online, Master of Arts in Spanish as presented in Attachment 1.

Moved by _____ Seconded by _____ Carried Yes _____ No _____

**INSTRUCTION, RESEARCH AND STUDENT AFFAIRS
DECEMBER 20, 2018**

I move to approve the request by Idaho State University to designate an online program fee for the Master of Arts in Spanish in the amount of \$330 per credit in conformance with the program budget submitted to the Board in Attachment 1.

Moved by _____ Seconded by _____ Carried Yes _____ No _____

Institutional Tracking No. 2017-05 revised

**Idaho State Board of Education
Proposal for Graduate Degree Program**

Date of Proposal Submission:	
Institution Submitting Proposal:	Idaho State University
Name of College, School, or Division:	Arts and Letters
Name of Department(s) or Area(s):	Spanish (Global Studies and Languages)

Program Identification for Proposed New or Modified Program:

Program Title:	Masters in Spanish				
Degree:	M.A.	Degree Designation	Undergraduate	<input checked="" type="checkbox"/>	Graduate
Indicate if Online Program:	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No	
CIP code (consult IR /Registrar):	16.0905				
Proposed Starting Date:	August 2019				
Geographical Delivery:	Location(s)	Pocatello, Idaho	Region(s)	IV, V, VI	
Indicate (X) if the program is/has:	<input type="checkbox"/>	Self-Support	<input type="checkbox"/>	Professional Fee	
Indicate (X) if the program is:	<input checked="" type="checkbox"/>	Regional Responsibility	<input type="checkbox"/>	Statewide Responsibility	

Indicate whether this request is either of the following:

- | | |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------------|
| <input checked="" type="checkbox"/> New Degree Program | <input type="checkbox"/> Consolidation of Existing Program |
| <input type="checkbox"/> Undergraduate/Graduate Certificates (30 credits or more) | <input type="checkbox"/> New Off-Campus Instructional Program |
| <input type="checkbox"/> Expansion of Existing Program | <input type="checkbox"/> Other (i.e., Contract Program/Collaborative |

Karaisa, Julie - Date 9/4/2018

College Dean (Institution)	Date	Vice President for Research (Institution; as applicable)	Date
<i>[Signature]</i>	<i>10/8/18</i>		
Graduate Dean or other official (Institution; as applicable)	Date	Academic Affairs Program Manager, OSBE	Date
<i>[Signature]</i>	<i>10/8/18</i>		
FVP/Chief Fiscal Officer (Institution)	Date	Chief Academic Officer, OSBE	Date
<i>[Signature]</i>	<i>10/11/18</i>		
Provost/VP for Instruction (Institution)	Date	SBOE/Executive Director Approval	Date
<i>[Signature]</i>	<i>10-16-18</i>		
President	Date		

Before completing this form, refer to Board Policy Section III.G., Postsecondary Program Approval and Discontinuance. This proposal form must be completed for the creation of each new program. All questions must be answered.

Rationale for Creation or Modification of the Program

1. **Describe the request and give an overview of the changes that will result.** Will this program be related or tied to other programs on campus? Identify any existing program that this program will replace.

The Department of Global Studies and Languages in the College of Arts and Letters at Idaho State University proposes the creation of an online **Master of Arts (M.A.) in Spanish**. This 30-credit graduate degree utilizes existing courses in the Department of Global Studies and Languages and the College of Arts and Letters to create a program of study that will provide high school teachers of Spanish the opportunity to attain the qualifications and language skill level required to participate effectively in dual enrollment language programs, support Spanish-speaking students learning English as a second language, comply with continuing education and promotion requirements in a meaningful and focused manner, and to be better able to act in accordance with the [Every Student Succeeds Act](#). The proposed M.A. program would capitalize on existing undergraduate and graduate level course offerings already available online and in hybrid form to give students from our state and the region a unique, quality educational opportunity.

The proposed M.A. in Spanish will demonstrate our university's and our state's commitment to the standards established by the **National Alliance of Concurrent Enrollment Partnerships (NACEP)**. The M.A. in Spanish at Idaho State University will provide our Early College Program (ECP) Spanish teachers with "meaningful, ongoing professional development" that will help our ECP teachers "adhere to the highest standards so students experience a seamless transition to college" (<http://www.nacep.org/>). The M.A. program in Spanish will be an effective vehicle for making patent our desire to uphold "high standards to ensure the academic integrity of college courses" in the high schools by engaging teachers in "quality improvement practices" (<http://www.nacep.org/accreditation-institute/>).

The ISU Department of Global Studies and Languages has demonstrated expertise in offering traditional Spanish and Spanish for Special Purposes curricula through Baccalaureate programs in Spanish for the Health Professions, the Baccalaureate program in Spanish, and a well-subscribed 15-credit Graduate Certificate in Spanish for the Health Professions. These programs include traditional, hybrid, and completely online course offerings in language, literature, culture, interpretation and translation in the field of literature, health professions interpretation and translation, professional writing, and interpretation for the courts. The proposed M.A., just like the existing graduate certificate, will be offered entirely online.

2. **Need for the Program. Describe the student, regional, and statewide needs that will be addressed by this proposal and address the ways in which the proposed program will meet those needs.**

The ISU **Master of Arts in Spanish** is a timely and practical response to the national, regional and state-wide demographically driven need to increase the number of K-12 teachers qualified to teach in Spanish dual enrollment programs in accordance with NACEP policies; able to assist Spanish-speaking students as they acquire core skills; prepared to implement new, national ESSA standards into Idaho classrooms; able to facilitate communication and cooperation between K-12 educators and Spanish-speaking parents/guardians; and prepared to address the documented need for more qualified foreign language/Spanish teachers. In addition, post-secondary institutions, business and industry are currently unable to depend upon the availability of qualified personnel to teach at community colleges, technical institutions, or at four-year institutions of higher learning.

Although a Ph.D. is required for tenure track positions, a Master's degree is the minimum requirement for adjunct instructors and lecturers at most four-year U.S. institutions of higher learning. Currently, Idaho post-secondary institutes often struggle to recruit qualified Spanish instructors because Idaho currently does not have an M.A. program in Spanish. In turn, this affects our capacity to offer dual enrollment courses in language, as the high school instructors have no in-state program available to allow them to complete a Master's program in the Spanish language. Idaho needs to "grow our own" secondary and post-secondary educational workforce by providing a M.A. in Spanish designed to serve our Spanish educational workforce needs. The ISU M.A. in Spanish will facilitate growth of Early College programming while insuring that our dual-enrollment programs are taught by appropriately qualified teachers, in accordance with NACEP accreditation standards.

In terms of the general teacher shortage, it has long been established and widely accepted among education scholars that teachers with a higher sense of efficacy exhibit greater enthusiasm for teaching (Hall, Burley, Villeme, & Brockmeier, 1992), have greater commitment to teaching (Coladarci, 1992), and are more likely to remain in teaching (Burley, Hall, Villeme, & Brockmeier, 1991). Specific to Second Language teachers, research on one's sense of efficacy in teaching languages has been related to career satisfaction in terms of the person/environment fit. Working from the perspective of aligning perceived ability to workplace environment, Swanson (2008) has investigated the relationship between Second Language (SL) teachers' perceptions of their vocational interests as they relate to workplace environment and their sense of efficacy in teaching languages. His study concludes that SL teachers whose professional interests, abilities, and competencies matched the dynamics and requirements of the workplace environment (schools) had an increased sense of efficacy in teaching languages (Swanson, 2012). A 2014 study by the same author suggests the higher one's belief about his or her abilities to teach Spanish, the higher the students' scores on the exams (Swanson 2014). **Teacher efficacy** has also been correlated to participants' future vocational plans, with higher efficacy correlating to a higher chance of teacher retention, whereas lower teacher efficacy correlates with higher teacher attrition. This research has implications for **teacher** preparation and **professional development** highlighting the importance of building a strong sense of **efficacy** in teaching Spanish. [Swanson, 2014].

It is well established that "**The quality of a student's teacher is the single-most influential in-school factor in academic achievement and future life outcomes**" (Rice, 2003). Benefits to the state and its students include but are not limited to the following: Idaho teachers of the Spanish language will be able to comply with continuing education requirements while completing graduate level coursework in the only completely online master's level graduate program in Spanish offered in our state and in our region. These better-qualified professionals will be able to participate in the State's Advanced Opportunities Program by qualifying to teach both traditional dual-enrollment courses in Spanish as well as courses in Spanish for Specific Purposes. Spanish for Specific Purposes – courses in Spanish for Health Care, Business, Tourism, or other courses designed to help students meet specific professional goals—offer students the opportunity to "practice language and navigate culture in the context of a specific field " (Crouse, 2013). Teachers qualified to teach Spanish for Specific Purposes will be a sought-after commodity in K-12 and in post-secondary education due to their role in the development of attributes needed by our students who enter the workforce.

In addition, because a large number of selective universities still require that applicants have basic language study prior to application, many Idaho students simply do not qualify to apply to more selective schools. Qualifying K-12 teachers to offer more levels and sections of language students will aid in making students more competitive candidates for admittance to selective colleges and universities, which in turn will contribute to improving Idaho's go-on rate, and the overall quality of the state's workforce.

Current and future teachers of Spanish in Idaho will be able to adhere to the State Certified Instructional Staff Salary schedule by means of the continuing education opportunities offered through the proposed online graduate program in Spanish. Teachers of Spanish will have the opportunity to improve mastery of their discipline, including the ability to teach Spanish for Special Purposes and dual enrollment courses. This will allow Idaho teachers to gain meaningful educational credits needed to receive increases in salary, which will

result in better-qualified, better-paid teachers who will then support local economies. Students will benefit from better-educated, well-compensated teachers.

The Master of Arts in Spanish responds to documented Teacher Shortage Areas in Idaho and in the U.S.

Idaho's Hispanic population has increased by 63% in the last 10 years, as compared to a 21% increase in non-Hispanics in Idaho (*Idaho Commission on Hispanic Affairs [ICHA], 2017*). According to the 2010 US Census, approximately 11.2% of the total Idaho population is Hispanic. In seven Idaho counties Hispanics make up over 20% of the population with Clark county being 42.6% Latino, Jerome 34%, Minidoka 32%, Power county at 31%, and Canyon county at 24.5% (2010), all significantly higher than the average national percentage of 16.3%. There are large areas in southern Idaho in particular with more than 20% Hispanic/Latino populations. Furthermore, according to the ICHA, there are some schools in rural areas in which the Hispanic student population has risen to nearly 80%, with ten districts statewide at, near, or above a 50% Hispanic population in the schools (2015). As Idaho's Hispanic population increases, so does the Limited English Proficiency (LEP) Hispanic population. The 2010 census revealed that 61% of Idaho Hispanics come from homes speaking a language other than English, and the 2013 *Hispanic Profile Data Book* indicated that 32% of Idaho Hispanics spoke English "not well or not at all." The state's changing demographics present a set of challenges to Idaho's already overburdened K-12 education system. The increase in dual language programs in the U.S. is well documented—from just over 200 programs in 2000 to nearly 2,000 by 2011. The need for highly trained bilingual educational professionals to meet the needs of students in those programs remains unfulfilled.

According to the U.S. Department of Education, Idaho has had, and continues to have, documented teacher shortages in Foreign Languages and in English as a Second Language (*Teacher Shortage Areas, 2015*). Spanish was designated an area of "high need" in 2017 by the Idaho Association of School Administrators [IASA]. From 2007 to 2010, the percentage of Latino children enrolled in public schools increased from 12.4 to 15.9 percent; 60 percent of this population is housed in Southwest and South-Central districts, which include large rural areas. Idaho, as well as the rest of the country, needs educators both capable of working effectively and efficiently with this growing segment of our population and qualified to expand dual-enrollment programs.

As supported by data from the U.S. Department of Education and by the IASA, there simply are not enough teachers qualified to teach Spanish as a foreign language. Providing current teachers with the prospect of attaining the skill level necessary to teach Spanish in our high schools should be a priority. Many schools offer only one foreign language, usually Spanish, but do not have sufficient qualified personnel to offer enough sections or levels to ensure that all students have the opportunity to study Spanish, which perpetuates a shortage of proficient bilingual professionals in Idaho, including and especially in Education. On a national level, English Language Learners (ELL) represent 9.2% of the U.S. K-12 student population. Spanish-speaking teachers and counselors are necessary to ensure that Idaho students who are English Language Learners attain English proficiency and make appropriate progress in core academic areas.

Bilingual teachers work in districts with high numbers of Spanish speakers to help them succeed academically in English and in Spanish while other bilingual teachers support state dual-enrollment programs to enhance graduating seniors' success in college. Teachers with these language skills are not easy to find. Thirty-two states and D.C. report shortages of bilingual teachers, and the U.S. Education Department (*Teacher Shortage Areas, 2015*) identified bilingual education and English language acquisition as high-need fields that are experiencing nationwide teacher shortages at all developmental levels. Furthermore, with bilingualism in high demand in all fields, educators with language skills often leave schools for more lucrative careers. Appropriately certified Spanish bilingual teachers are in high demand.

Finally, the importance of recruiting Latinos into the field of education cannot be over emphasized. The U.S. Secretary of Education states: "Although Hispanic students have become the largest minority and represent nearly a quarter of the nation's student population, Hispanic teachers represent only 7.8% of the field" (White House Initiative on Educational Excellence for Hispanics [EEH], 2015). In Idaho, the number of Latino K-12 educators certainly lags behind in areas in which 48% -50% of school age children are Latino/Hispanic. Idaho needs to

actively recruit Latinos into the field of teaching. Research shows quite clearly that ethnic minority students achieve greater academic success when presented with educational role models from their own culture. In Idaho, prospective teachers may certify in the traditional fashion or pursue alternative licensing. Our proposed program will actively recruit Latinos with the goal of providing an educational experience that will encourage students to pursue their teaching credential through traditional and alternative certification routes.

The ISU Graduate Program in Spanish reflects regional and national demographic trends in education needs.

On a national level, the U.S. Census projections predict that by the year 2050 the US Hispanic/Latino population will have reached 102.6 million, approximately 24.4% of the total U.S. population. The Hispanic population and Hispanic LEP (Limited English Proficient) population grew in every region of the United States between 2000 and 2010. The 2010 U.S. Census reported Hispanics are the largest minority group represented in the Intermountain West. Western states generally saw significant growth in their Hispanic populations, 34%, between 2000 and 2010. The nationwide increases have driven up the need for bilingual educators and other professionals across the country. In particular, Hispanic concentrations were found in counties within central Washington, in Kansas, Idaho, Oklahoma, Nebraska, and Colorado; around Chicago and along the East Coast from New York to Virginia; in central and southern Florida; and the District of Columbia. The nationwide shortage of bilingual K-12 teachers has school systems looking beyond the United States to fill the growing demand for qualified instructors.

According to a 2015 *U.S. News* report, "Today, more than 5 million students in the public school system are learning English, a number that has more than doubled since 1998, according to the Migration Policy Institute" (Camera). Camera also notes that the Council of Great City Schools, which represents the nation's largest school systems, found that there is a widespread shortage of teachers for English Language Learners, with half of large districts currently reporting a shortage, or anticipating one within five years (US News, 2015). A 2016 article by Corey Mitchell affirms that "Districts have struggled for decades to find bilingual teachers, especially in communities where English is not the first language for many students" (*Education Week*).

Through enrollment in the ISU graduate program in Spanish, Spanish teachers, ESL or TESOL teachers, counselors, and administrators will have the opportunity to increase their Spanish language proficiency and cultural competence through our year-round online offerings, allowing them to fill the growing need for qualified bilingual educators, and growing Idaho's local and regional supply of educators to fill the state's needs.

- a. **Workforce need:** Provide verification of state workforce needs that will be met by this program. Include State and National Department of Labor research on employment potential. Using the chart below, indicate the total projected annual job openings (including growth and replacement demands in your regional area, the state, and nation. Job openings should represent positions which require graduation from a program such as the one proposed. Data should be derived from a source that can be validated and must be no more than two years old.

List the job titles for which this degree is relevant: Teacher, secondary or middle school, Bilingual Education, Spanish as World Language or TESOL.

Idaho Teacher and ECP Outlook

The Idaho Department of Labor projects 104 average annual job openings due to growth and 143 average job openings due to replacements/retirements for elementary school teachers, 39 average annual openings due to growth, 56 due to replacement for middle school teachers, and 65 average annual openings due to growth and 99 average due to replacements for secondary school teachers through 2024. (Idaho Department of Labor and Bureau of Labor Statistics [IDLS], 2014). The number of Early College Program dual-enrollment credits has increased over 200% in the last three years. However, to comply with national accreditation, participating schools must insure that their teachers meet accreditation standards. At ISU, lower division language instructors in Spanish must have an M.A. degree in order to teach even first and second-year courses.

Teacher: Dual Enrollment, Secondary language education, K-12 Spanish/World Languages, K-12 bilingual education, or TESOL

More than 50% of private secondary and K-12 schools in the US provide foreign language instruction. In a 2011 survey, public schools not offering foreign language instruction cited the “Shortage of language teachers” as a significant impediment to offering foreign language (Pufahl and Rhodes, 2011). Nationally, from 2014 to 2024, a significant number of older teachers will reach retirement age. Their retirement will create job openings for new teachers. Employment of high school teachers is projected to grow **6 percent** from 2014 to 2024, about as fast as the average for all occupations (Bureau of Labor Statistics, U.S. Department of Labor [BLS], 2016-2017). Many schools report that they have difficulty filling teaching positions for certain subjects, including English as a Second Language, and Special Education. In addition, many school districts report difficulty in filling positions for teachers of English as a Second Language, which may represent opportunities for bilingual educators (BLS, 2016-2017). Among schools with foreign language programs, Spanish was the most commonly taught language and increased over the past decade. In 2008, 88% of the elementary schools that offered language instruction taught Spanish. As a result, teachers with education in those subjects or certifications to teach those specialties should have better job prospects. Opportunities are likely to be better in rural school districts than in suburban school districts (BLS, 2016-17).

The demand for teachers will be partially fueled by the need for teachers to teach dual enrollment courses. The *Idaho State Journal* reports that “Between the 2008 and 2016 school years, the number of Idaho students in dual-credit classes rose 252 percent to 17,659. Idaho colleges and universities report double- and triple-digit increases in the number of public school students enrolled in their dual-credit classes. A tight teacher hiring pool makes it more difficult to readily find teachers qualified to teach dual-credit classes” (Roberts, 2016).

1. **Post-Secondary Spanish teacher:** Employment of post-secondary teachers is projected to grow **13 percent** from 2014 to 2024, faster than the average for all occupations, with projected moderate growth in foreign language instruction at 1.1%. (Career Outlook in the US, 2016). Growth is expected as enrollments at post-secondary institutions continue to rise and many jobs are expected to be for part-time faculty (BLS 2016-17). Area, Ethnic, and Cultural Studies Teachers, Post-secondary positions will increase by 19% in Idaho (BLS, 2016-2017)
2. **Interpreter/Translator:** Employment of interpreters and translators is projected to grow **29 percent from 2014 to 2024**, much faster than the average for all occupations. Employment growth will be driven by increasing globalization and by large increases in the number of non-English-speaking people in the United States. Job prospects should be best for those who have professional certification. (BLS, 2017-2017)

	State DOL data	Federal DOL data	Other data source: (describe)
Local (Service Area)	K-12 educators		
State	6.0%	6.0%	
Nation	1.1%	1.1%	

Provide (as appropriate) additional narrative as to the workforce needs that will be met by the proposed program.

- b. **Student need. What is the most likely source of students who will be expected to enroll (full-time, part-time, outreach, etc.). Document student demand by providing information you have about student interest in the proposed program from inside and outside the institution. If a survey of s was used, please attach a copy of the survey instrument with a summary of results as Appendix A.**

According to the Idaho State Board of Education, there are over 500 teachers in Idaho certified to teach Spanish. None of them have a M.A. in Spanish from an Idaho university. Currently, there is no in-state master's program in Spanish to offer them a meaningful professional development experience in their content area. This is problematic. As with all U.S. states, Idaho teachers are required to hold a bachelor's degree, but not necessarily in the content area. Requirements for certification as a Spanish teacher in the State of Idaho have traditionally been much less rigorous than standards imposed in other states. No university in Idaho requires Spanish teachers to complete a baccalaureate degree in Spanish in order to teach Spanish at the high school level. Instead, university students wishing to certify to teach Spanish as a Second Language in Idaho High schools take between 20 and 30 credits of Spanish, of which 6-8 are second-year courses in which students are still establishing basic proficiency and rudimentary command of Spanish grammar and vocabulary, not upper division coursework which demands a much higher level of proficiency. This course of study is equivalent to earning a Minor in the teaching content area.

If Idaho wants a quality Spanish Early College Program whose credits will be accepted by other universities, it is crucial that ECP Spanish instructors have the same documented proficiency in the Spanish language as all ISU adjunct instructors of Spanish, understand and apply national standards that form the basis for university level language programs, and have demonstrated ability to develop and deliver university level curriculum and assessment before they are allowed to teach college level courses. Currently, high school Spanish teacher certification standards are very low --only requiring coursework credits equivalent to those required to earn a Minor in Spanish. In many cases, this does not give prospective teachers enough time to reach a proficiency level of Advanced High, the ACTFL speaking proficiency rating adopted by most states as a requirement for Spanish teacher qualification. **Teachers who do not speak well cannot teach well.** Also, the gap between language instruction goals, objectives, and outcomes in the high school classroom and those of the university language classroom is very large. This is why, for example, that 1 year of traditional high school Spanish is barely equivalent to one semester of university level language instruction. If ECP students are to have a true university level course as is desired by the Idaho Advanced Opportunities program, then participating teachers must have appropriate and documented domination of their subject and of university level methodology, expectations, outcomes, and assessment.

Neighboring states require more course-work in the content area and emphasize speaking ability to a greater extent than in Idaho. For example, to teach Spanish in Utah, a candidate must not only complete 36-38 credits of coursework – most in upper division – but must also achieve an Advanced Low on the ACTFL OPI (American Council of Teachers of Foreign Languages Oral Proficiency Interview). At Utah State University, students who wish to teach at the high school level take 38 credits, only 4 of which are lower division/2nd year, and maintain a 3.0 in the language courses. BYU Idaho requires 42 credits of Spanish in its teacher education program, with approximately only 8 credits in lower division.

If one compares these requirements to those in other disciplines which offer 45-credit endorsements, it is easy to see that unless the Spanish teacher comes from a Spanish-speaking household or has committed to an immersive experience, most Idaho Spanish Secondary Education graduates are not well-enough prepared to teach upper level or Early College Program Spanish.

University instructors need an M.A. (30 credits beyond the undergraduate requirements) to teach lower division courses – 1st and 2nd year – in the language. As previously stated, it is often difficult to find qualified university instructors to teach lower-division language courses because those with established teaching credentials, often high school Spanish teachers, simply do not have the Spanish proficiency required to teach a college level course due to the fact that language as a content area is treated as a secondary curriculum, the equivalent of a minor, in deference to the Education degree, which takes precedence over the language content area. Novice teachers graduating with their Minor in language and starting their career in classrooms sometimes populated with heritage speakers of Spanish often find that they do not have sufficient language training to serve the needs of that population, and they do not have an in-state program that would allow them to improve their skills to better meet the needs of heritage speakers and traditional students who desire

a higher level of language study.

If Idaho's Spanish teachers wish to better their skills, earn pay raises based upon educational achievement, and earn an advanced degree in their subject area, they currently must take courses from out-of-state institutions and pay graduate out-of-state tuition *or* take graduate level courses in areas that do not improve their command of their content area. If we are to provide quality dual enrollment courses that truly represent university level coursework, it is only logical to demand that the high school teachers meet the minimum requirements established by the university to teach those courses. However, it is then incumbent upon the university and the state to provide teachers with the opportunity to meet those requirements. The M.A. in Spanish at Idaho State University will provide all Spanish teachers with this opportunity through quality online coursework designed to facilitate teacher progress and success in completing a graduate degree in the Spanish language. Teachers may enroll as full-time or part-time students. We offer a variety of graduate level courses year-round, allowing our students maximum flexibility and convenience.

Apart from K-12 teachers of Spanish, Idaho teachers with ESL/TESOL certifications also lack an in-state graduate level option for improving their language skills in Spanish in order that they serve the largest group of students, Latino students, who need their educational support services. Studies show that language concordance between ESL/TESOL teachers and students improves the efficacy of ESL/TESOL interventions.

Any teacher in Idaho, whether of Spanish or of English as a Second Language, should have the opportunity to improve Spanish skills and proficiency in order to facilitate our English Language Learner (ELL) students' progress. School administrators and counselors should also have this opportunity to improve their language skills and cultural competence skills to assist them in the effective completion of their responsibilities to all Idaho parents and students.

There are 6 undergraduate Spanish education programs in the state: Idaho State University, Lewis and Clark, University of Idaho, Boise State University, Brigham Young University Idaho, and College of Idaho. Currently, none of these students have the opportunity to continue their studies at the graduate level in Spanish. ISU is perfectly positioned to offer this opportunity to both traditional and non-traditional graduates from our universities. The nature of our program – with its emphasis on Spanish for educators and Spanish for Specific Purposes – will provide opportunities for those in many sectors of our state's workforce: education, industry, tourism, agriculture and health industries will all find that our program will satisfy their professional development needs.

Finally, Spanish-speakers are the largest, fastest-growing minority group in Idaho. Hiring bilingual teachers is more necessity than luxury. There are more than 52.6 million native and bilingual Spanish speakers in the United States, making the country second only to Mexico in that category, according to a June 2015 report by *Instituto Cervantes*, a nonprofit created by the Spanish government. Just as many English-speaking students study English, there are Spanish-speakers who will wish to study Spanish language and its applications in the context of specific fields. Our program will provide native Spanish speakers with the means to enhance their employment opportunities and, hopefully, with the motivation and guidance necessary to seek alternative teaching certification or certification through more traditional routes.

c. Economic Need: Describe how the proposed program will act to stimulate the state economy by advancing the field, providing research results, etc.

The proposed program will stimulate the state economy by providing our teachers with affordable continuing education options. Teachers will spend tuition dollars in the state instead of sending that money elsewhere. As the program will be online, it will attract students from out of state. Out-of-state graduate tuition in Idaho is less expensive than in-state tuition in many states. Also, there are fewer than 20 online programs for teachers of Spanish in the United States and none in our service region (Idaho, Oregon, Washington, Wyoming, Montana). Idaho State University's M.A. in Spanish will be a viable, affordable and convenient option for in-state and out-of-state teachers or other professionals who wish or need to improve their skills through

graduate level coursework. This will in turn enable more high schools to fulfill the intent of the Advanced Opportunities program, which provides students with the means to complete university level coursework while still in high school. The ISU online M.A. program in Spanish will increase the number of qualified instructors who will then deliver high quality, university level courses at the high school to our students, and will help to keep the tuition dollars invested in those degrees in-state. The program will also make achievement of an M.A. degree affordable and accessible to Idaho's teachers, even in remote areas. An affordable and accessible M.A. option in Spanish will benefit the university and the state by producing more effective Spanish teachers in the state, promoting retention of those teachers, and potentially drawing teachers to the state through contact with the program.

d. Societal Need: Describe additional societal benefits and cultural benefits of the program.

Teachers will respond positively to being able to complete continuing education requirements in their own teaching subject area. Currently, Spanish teachers must complete continuing education, but, unlike their colleagues, they complete this course work outside their content areas. The goal of continuing education is to encourage improvement in one's area of expertise. With the addition of the M.A. in Spanish, individuals in the field will finally be able to do work towards advanced content-area proficiency in Spanish instead of spending money and time studying other less relevant material just to fulfill continuing education requirements. Their improved skills will inform their teaching, in both traditional high school courses as well as in dual-enrollment courses. Graduate level coursework will improve skills, but also boost teacher confidence so that more feel confident offering dual-enrollment courses. Further, improved communication skills and enhanced cultural competence will allow non-native speaking teachers to have more skills and confidence when working with Spanish-speaking community members and their children, bridging cultural and linguistic gaps to facilitate student academic achievement and parental involvement so necessary for student success.

BENEFITS OF BILINGUAL K-12 TEACHERS:

Students who are English Language Learners (ELL) participate in appropriate programs of language assistance, such as English as a Second Language, High Intensity Language Training, and bilingual education, to help ensure that they attain English proficiency, develop high levels of academic attainment in English, and meet the same academic content and academic achievement standards that all students are expected to meet. Participation in these types of programs can improve students' English language proficiency which, in turn, has been associated with improved educational outcomes.... The percentage of ELL students in public schools increased between 2003–04 and 2013–14 in all but 14 states.... 30 states and the District of Columbia experienced an increase in the percentage of ELL students, with the largest increase occurring in Kansas (0.6 percentage points) (National center for Education Statistics, 2017). Additionally, research indicates that offering programs that represent minorities, their language and culture, in a positive manner that emphasizes how these attributes can contribute to economic success and social integration are effective in the recruitment and retention of ethnic minority students. ISU's undergraduate Spanish programs have been successful in the recruitment and retention of Latino students. Currently 51% of the Spanish for Health Professions Program students are Latino with 49% of students being Spanish as a Second Language learners. We are confident that our program design and delivery will assist in the recruitment and retention of Latino students.

e. If Associate's degree, transferability: N/A

- 3. Similar Programs.** Identify similar programs offered within Idaho and in the region by other in-state or bordering state colleges/universities.

Currently, there is neither an M.A. nor an M.A.T. in Spanish in Idaho.

Similar Programs offered by Idaho public institutions (list the proposed program as well)		
Institution Name	Degree name and Level	Program Name and brief description if warranted
N/A		

Similar Programs offered by other Idaho institutions and by institutions in nearby states		
Institution Name	Degree name and Level	Program Name and brief description if warranted
University of Utah	MA	Masters in Spanish, Not online
Utah State University	MSLT	Second Language Teaching, Not online
Brigham Young, Provo	MA	Spanish, not online
University of Colorado, Boulder	MA	Spanish, not online

4. **Justification for Duplication with another institution listed above (if applicable). If the proposed program is similar to another program offered by an Idaho public institution, provide a rationale as to why any resulting duplication is a net benefit to the state and its citizens. Describe why it is not feasible for existing programs at other institutions to fulfill the need for the proposed program.**

N/A: There is no duplication.

5. **Describe how this request supports the institution’s vision and/or strategic plan.**

This proposal supports the following Idaho State University strategic plan goals and objectives:

The strategic plan (2017-2021) mission statement indicates that “The University provides access to its regional and rural communities through delivery of preeminent technical, undergraduate, graduate, professional, and interdisciplinary education. The University fosters a culture of diversity, and engages and impacts its communities through partnerships and services.” The proposed online Spanish M.A. program is specifically designed to provide access to graduate Spanish language to regional and rural communities, which

in turn helps to foster a culture of diversity. The program is primarily aimed at K-12 Spanish language educators seeking professional development in their subject area, which will ultimately improve teacher preparation, and therefore the product delivered to Spanish students in K-12 classrooms statewide.

Core theme 1: Learning and Discovery (Strategic plan goal 1)

This program provides students the opportunity to learn and discover through teaching, research and creative activity, as stipulated in objective 1.1. The capstone course has as its goal that students produce a faculty-mentored research project that can be submitted to a peer-reviewed venue (grant, conference presentation, journal publication). In addition, as indicated by objective 1.2, this program meets the goal of offering a graduate (M.A.) degree that will increase employment opportunities for students, particularly those seeking to work as K-12 educators, and is also designed to serve as postgraduate professional training, especially for K-12 Spanish language educators, as indicated in the description.

Core theme 2: Access and Opportunity (Strategic plan goal 2)

The proposed program fills a need in the state of Idaho for a pathway to subject-relevant professional development for K-12 educators teaching Spanish. Because it will be offered entirely online, the program will be highly accessible to students in the state of Idaho, and nationwide, both geographically and in terms of scheduling (especially for those working full-time for whom in-person coursework can be difficult to accommodate), thus advancing objective 2.1 of the strategic plan. The curricular flexibility of the program, including a student-led capstone activity that responds to individual student professional needs and/or personal interests will aid in the goal of student retention and graduation by offering a program that is highly relevant to the individual student. This program is designed to foster a close relationship between the graduate student and graduate advisor and program faculty, with the dual goals of student retention and faculty-student collaboration, as indicated in objective 2.2. Students will meet (virtually or in person) with the graduate advisor, and will work in close collaboration with department graduate faculty in the preparation of the capstone project so that students continually feel engaged and able to be successful in the program.

The integrated focus on language pedagogy will appeal specifically to the primary student population, K-12 educators. In addition, the proposed M.A. will increase the state's ability to offer more ECP Spanish courses by helping K-12 educators to meet the requirement of being enrolled in or holding an M.A degree.

Core theme 4: Community Engagement and Impact

Currently there is no pathway in the state of Idaho for K-12 educators teaching Spanish to pursue an M.A. in Spanish, and Idaho currently offers no online M.A. program to meet that need. By offering the M.A. program online, we are able to offer this valuable professional development opportunity to educators throughout the state, thereby expanding the potential for quality ECP Spanish courses taught by instructors highly prepared in the subject area. This will increase the economic impact and visibility of ISU statewide, as indicated in objective 4.1. This program will also raise the quality of Spanish programs offered to K-12 students statewide, which will increase overall student interest in ECP, in pursuing language studies at the college level, positively impacting the go-on rate in Idaho, including for heritage Spanish-speakers, who are currently often underserved by existing K-12 language programs in which instructors have limited preparation in Spanish language and Hispanic culture.

- 6. Assurance of Quality. Describe how the institution will ensure the quality of the program. Describe the institutional process of program review. Where appropriate, describe applicable specialized accreditation and explain why you do or do not plan to seek accreditation.**

No specialized national or state-level accreditation is required for this program. The M.A. in Spanish program will maintain and assess quality in the following ways:

- 1) Students applying to the program must provide STAMP 4S scores and must earn a minimum score to be accepted into the program. Students with scores below those required may be accepted conditionally and will have to re-test and earn the required scores to be accepted into the program. The STAMP exam is a**

Standards-based Measurement of Proficiency using levels of proficiency defined by the American Council on the Teaching of Foreign Languages (ACTFL). It measures proficiency in all 4 language skills: reading, writing, listening and speaking;

- 2) Our graduate program committee will meet prior to each academic semester and discuss course content, expectations, and assessment;
- 3) Each student will have an assigned advisor who will monitor individual student progress;
- 4) Student projects will be assessed by three faculty
- 5) Student MA exams will be read by 3 faculty to assess for quality of content and written expression in the language;
- 6) All students wishing to graduate must earn a minimum score of Advanced Low on the ACTFL OPI in order to graduate with the M.A. in Spanish for Teachers and Professionals. Graduating students will participate in an exit interview and complete an online survey in which they assess their progress and the program. Program faculty will periodically assess individual students, Spanish courses, and assessments to verify adherence to ACTFL Standards.
- 7) After the first graduates have completed the program, and after each subsequent graduating class, surveys will be administered to program graduates and administrators at the institutions in which they teach to assess whether and how ISU's online M.A. program has met the needs and expectations of both the teachers and their schools. A second survey will be circulated to schools and teachers 5 years after completion of our program to gauge long-term impact of the M.A. program for both the individual teacher and the school in which he/she teaches (where relevant). These data will be analyzed to produce, maintain and improve the quality of our program by responding to any needs or deficits that are indicated. In addition, these data will be used to assess the ISU M.A. program's impact on Spanish teacher retention, recruitment and satisfaction in the state of Idaho.

7. **In accordance with Board Policy III.G., an external peer review is required for any new doctoral program. Attach the peer review report as Appendix B. N/A**

8. **Teacher Education/Certification Programs** *All Educator Preparation programs that lead to certification require review and recommendation from the Professional Standards Commission (PSC) and approval from the Board.*

Will this program lead to certification?

Yes _____ No X _____

If yes, on what date was the Program Approval for Certification Request submitted to the Professional Standards Commission?

9. **Three-Year Plan: Is the proposed program on your institution's approved 3-year plan? Indicate below.**

Yes X No _____

Proposed programs submitted to OSBE that are not on the three-year plan must respond to the following questions and meet at least one criterion listed below.

- a. **Describe why the proposed program is not on the institution's three year plan.** When did consideration of and planning for the new program begin?

- b. Describe the immediacy of need for the program.** What would be lost were the institution to delay the proposal for implementation of the new program until it fits within the five-year planning cycle? What would be gained by an early consideration?

Criteria. As appropriate, discuss the following:

- i. How important is the program in meeting your institution’s regional or statewide program responsibilities? Describe whether the proposed program is in response to a specific industry need or workforce opportunity.**
- ii. Explain if the proposed program is reliant on external funding (grants, donations) with a deadline for acceptance of funding.**
- iii. Is there a contractual obligation or partnership opportunity to justify the program?**
N/A
- iv. Is the program request or program change in response to accreditation requirements or recommendations?**
- v. Is the program request or program change in response to recent changes to teacher certification/endorsement requirements?**

Curriculum, Intended Learning Outcomes, and Assessment Plan

10. Curriculum for the proposed program and its delivery.

- a. Summary of requirements.** Provide a summary of program requirements using the following table.

Credit hours in required courses offered by the department (s) offering the program. 21	SPAN 7700: Capstone 3 cr. SPAN 6690: Seminar 3 cr. SPAN 5500: Advanced Grammar 3 cr. SPAN 5501: Advanced Conversation 3-6 cr. SPAN 5541 OR 5542: Survey of lit 3 cr. SPAN 6600: Critical Theory 3 cr. LANG 5537: The Teaching of Foreign Lang 3 cr.
Credit hours in required courses offered by other departments: 0	0
Credit hours in institutional general education curriculum N/A	0
Credit hours in free electives: 9	9 credits at the 6600 level
Total credit hours required for degree program:	30

- b. Additional requirements.** Describe additional requirements such as comprehensive examination, senior thesis or other capstone experience, practicum, or internship, some of which may carry credit hours included in the list above.

By the final semester of M.A. study, the student will achieve a minimal rating of Advanced-low on the ACTFL Oral Proficiency Interview. During the final semester of study, students will take comprehensive exams based upon coursework and the M.A. reading List.

11. Program Intended Learning Outcomes and Connection to Curriculum.

- a. Intended Learning Outcomes. List the Intended Learning Outcomes for the proposed program, using learner-centered statements that indicate what will students know, be able to do, and value or appreciate as a result of completing the program.**

1. Students will converse in Spanish at the ACTFL Advanced-Low level
2. Students will write in Spanish at the ACTFL Advanced-Low level
3. Students will identify and discuss major literary and historical moments in Hispanic letters
4. Students will analyze literary texts using appropriate critical frameworks
 5. Students will identify and demonstrate contemporary pedagogical approaches to foreign language teaching.
 6. Students will design and create a research project that integrates their personal or professional aspirations with their Spanish coursework

12. Assessment plans

- a. Assessment Process. Describe the assessment process that will be used to evaluate how well students are achieving the intended learning outcomes of the program.**

1. Students will take the ACTFL OPI Exam in Spanish before completion of their coursework and will achieve an Advanced-Low rating. (LO 1)
2. Students will take a written comprehensive exam in Spanish at the conclusion of their course of study through which they will demonstrate writing at the ACTFL Advanced-low level. (LO 2)
3. Students will complete a minimum of one (1) survey course in Hispanic Letters, which will conclude with a final exam in which students will identify and discuss major historical and literary movements in Hispanic Letters. (LO 3)
4. Students will complete a minimum of one (1) seminar course in Hispanic Letters, during which they will write a minimum of two papers in which they analyze literary texts using appropriate critical frameworks. (LO 3, LO 4)
5. Students will complete a Capstone course during which they design and create a research project that integrates their professional aspirations and their Spanish coursework. (LO 4, LO 6, and in some cases LO 5)
6. Students will complete a comprehensive exam on which they will demonstrate writing skills in Spanish at the Advanced-Low level, and the ability to discuss and analyze literary texts and cultural movements in Hispanic letters. (LO 2, LO 3, LO 4)
7. Students will complete a Teaching of Foreign Language course in which they will identify and demonstrate methods of foreign language teaching through written testing as well as teaching demonstrations. (LO 5)

- b. Closing the loop. How will you ensure that the assessment findings will be used to improve the program?**

- Assessment data will be reviewed annually to ensure that students who successfully complete coursework are meeting the course learning objectives.
- Course syllabi will be collected and reviewed by the department graduate faculty committee each year to ensure that course syllabi have clear and stated objectives that align with the program intended outcomes, and that activities throughout the course align with the course and program objectives.
- At the close of two academic years, the first group of students will have completed their coursework. At that time, and each succeeding year, student outcomes on the ACTFL OPI exam and written comprehensive exam will be reviewed to ensure that students who successfully complete the program are meeting the goal of Advanced-Low on each. If students are not meeting that goal, the Advanced Conversation and Advanced Grammar courses will be reviewed and restructured to address the

achievement gap.

c. Measures used. What direct and indirect measures will be used to assess student learning?

Student learning will be measured through:

- Written exams (LO 2, 3, 4, 5)
- Essays (LO 2, 3, 4, 5)
- Presentations (LO 1, 3, 4, 5, 6)
- Oral exams (LO 1, 3, 4)
- The student Capstone project prospectus (LO 6)
- The student Capstone project presentation (LO 6)
- OPI results (1)
- Comprehensive Exam (LO 2, 3, 4)

d. Timing and frequency. When will assessment activities occur and at what frequency?

- Program-level assessments include the ACTFL OPI exam, and the Comprehensive exam, which will be administered at the conclusion of the program of study (during the 4th semester of study).
- The Capstone project will occur on a rolling basis during the program of study, but most students will complete the Capstone prospectus during the 3rd semester of study, and the capstone project/presentation during the 4th semester of study.
- Written exams, essays and presentations will be integrated into coursework. Students will take written exams and write essays each semester, and will do one in-class presentation at least yearly.

Enrollments and Graduates

13. Existing similar programs at Idaho Public Institutions. Using the chart below, provide enrollments and numbers of graduates for similar existing programs at your institution and other Idaho public institutions.

N/A: There is no comparable program in Idaho.

Existing Similar Programs: Historical enrollments and graduate numbers								
Institution and Program Name	Fall Headcount Enrollment in Program				Number of Graduates From Program (Summer, Fall, Spring)			
	FY__	FY__	FY__	FY__ (most recent)	FY__	FY__	FY__	FY__ (most recent)
BSU								
ISU								
UI								
LCSC								

14. Projections for proposed program: Using the chart below, provide projected enrollments and number

of graduates for the proposed program:

Proposed Program: Projected Enrollments and Graduates First Five Years											
Program Name: Online M.A. in Spanish For TEACHERS and Professionals											
Projected Fall Term Headcount Enrollment in Program						Projected Annual Number of Graduates From Program					
FY20 (first year)	FY21	FY22	FY23	FY24	FY25	FY 20	FY21	FY22	FY23	FY24	FY25
2	7	12	17	23	30	0	0	1	4	5	8

15. Describe the methodology for determining enrollment and graduation projections. Refer to information provided in Question #2 “Need” above. What is the capacity for the program? Describe your recruitment efforts? How did you determine the projected numbers above? STATE, REGION

Enrollment projections are based upon the 500 individuals in Idaho currently certified to teach Spanish, the annual graduation rates of Spanish majors from Idaho four-year universities and from BYU-I as well as anticipated participation from Utah, Oregon, Montana, and Wyoming which have no online master’s program in Spanish.

We also base our projected enrollment upon current enrollments in our online graduate course offerings. For example, for summer 2017, we have three graduate courses with healthy enrollment. We currently have 44 students in our graduate certificate program in Spanish for the Health Professions and receive frequent queries about the possibility of a M.A. in Spanish. We already have steady graduate enrollment numbers. Further, we now have steady graduation rates that show that students can complete 15 credits needed for the graduate certificate in two years. This indicates that students can complete the 30 credits required for a master’s program in 4 years. In fact, certificate students could apply their graduate course work in Spanish to the proposed M.A. and complete both in four years. ISU has the capacity and expertise to deliver this program. We already deliver graduate level courses every semester, 12 months of the year. Our faculty who teach our online courses have all received Quality Matters and ACTFL training to insure quality of delivery and quality of content.

16. Minimum Enrollments and Graduates. Have you determined minimums that the program will need to meet in order to be continued? What are those minimums, what is the logical basis for those minimums, what is the time frame, and what is the action that would result?

As our program will be available completely online, it is important to monitor the number of students enrolled at any given time to maintain the quality of the student experience. Online instruction takes more time than real-time instruction. We foresee, once the program is established, maintaining a total student population of between 5-6 full-time M.A. students and 10-12 part-time M.A. students at any given time. As we already have healthy graduate certificate program enrollments, we have some time to properly publicize the new program, actively recruit, and enroll qualified students. The M.A. program will have courses in common with the Graduate Certificate Program, ensuring that combined numbers result in viable courses. In the unlikely event that minimum enrollments cannot be maintained, the department will ask for permission to close the program.

Resources Required for Implementation – fiscal impact and budget

17. Physical Resources.

- a. **Existing resources.** Describe equipment, space, laboratory instruments, computer(s), or other physical equipment presently available to support the successful implementation of the program.

We already utilize MOODLE, DL, and ITRC resources such as distance learning classrooms and lecture recording to deliver our programs. We will need support from the ITRC, computer services, and our DL classrooms to offer additional coursework. Our faculty are provided with desktop computers.

- b. **Impact of new program.** What will be the impact on existing programs of increased use of physical resources by the proposed program? How will the increased use be accommodated?

We already deliver most of our classes online or via DL or via youtube as well as still maintaining traditional classrooms. We do not foresee a measureable impact on current physical resources as these courses will be offered online.

- c. **Needed resources.** List equipment, space, laboratory instruments, etc., that must be obtained to support the proposed program. Enter the costs of those physical resources into the budget sheet.

For enhanced delivery of online courses, we propose the following resources to support the proposed program:

- 4 (four) Camtasia screen-capture software licenses (ITRC has these)
- 4 (four) Adobe Pro licenses \$720 per year (Dept. purchases)

18. Library resources

- a. **Existing resources and impact of new program.** Evaluate library resources, including personnel and space. Are they adequate for the operation of the present program? Will there be an impact on existing programs of increased library usage caused by the proposed program? For off-campus programs, clearly indicate how the library resources are to be provided.

Online graduate students will have access to ISU online library resources. These resources are currently adequate. We anticipate increased usage of library databases related to Hispanic literature and culture, pedagogy and second language acquisition, but because the program is online we anticipate that use of the physical library and its holdings will not increase significantly.

- b. **Needed resources.** What new library resources will be required to ensure successful implementation of the program? Enter the costs of those library resources into the budget sheet.

We will request that the librarians hold an annual online library resources and database training for the Spanish M.A. students. Because the librarians already regularly put together such events for existing graduate and undergraduate programs, we do not anticipate that there will be a cost associated with this request.

19. Personnel resources

- a. **Needed resources.** Give an overview of the personnel resources that will be needed to

implement the program. How many additional sections of existing courses will be needed? Referring to the list of new courses to be created, what instructional capacity will be needed to offer the necessary number of sections?

The M.A. program will require the creation of only 4 new classes (3 classes and a project capstone course). Of these, three are elective courses and the fourth the student capstone. We will need to add SPAN 5541 and 5542 into our two-year rotation Spanish rotation. We will offer the capstone project as needed to individual students. We have enough faculty to teach these 4 additional courses. Currently, we easily deliver graduate coursework (6-9 credits per semester) summer, fall and spring. Currently, our faculty teach lower division courses as well as undergraduate/graduate sections. The department will need to contract an adjunct to teach one (1) lower division course per semester to allow the integration of one additional graduate level course into the rotation for fall and spring semesters. So, we will need two courses to be taught by an adjunct, one in fall and one in spring.

- b. Existing resources.** Describe the existing instructional, support, and administrative resources that can be brought to bear to support the successful implementation of the program.

ISU currently has four tenure-track professors in Spanish, and one Ph.D. lecturer who teaches Foreign Language Methods.

Currently, ISU provides support and technology resources for online and distance-learning teaching and curriculum development as well as funding for initiatives related to online teaching (eISU funds) through ITRC.

- c. Impact on existing programs.** What will be the impact on existing programs of increased use of existing personnel resources by the proposed program? How will quality and productivity of existing programs be maintained?

Structures are already in place to maintain quality in lower division programming. Increased graduate instruction should not affect lower division instruction; upper division instruction will be enhanced by faculty engagement in graduate instruction.

The departmental course-load increase to offer the online Spanish M.A. is minimal. Creating an M.A. program will increase enrollment demand for upper-level (4000 level) Spanish courses, which will be cross-listed as 5000 level graduate courses, as well as for 4000/5000 level SHP courses. This will strengthen the enrollment of upper-level Spanish courses overall. In addition, the effect of graduate students enrolled in upper-level Spanish courses with advanced undergraduates will increase the level of intellectual exchange in those courses, leading to a richer experience for all students.

The graduate program will make possible collaborative faculty-graduate student research opportunities, which will serve both the faculty and the graduate students, and give faculty the opportunity to fully utilize their education and professional formation on ways not possible in an undergraduate program. Intellectual stimulation and increased research productivity will affect the program faculty in a positive manner.

- d. Needed resources.** List the new personnel that must be hired to support the proposed program. Enter the costs of those personnel resources into the budget sheet.

The budget sheets show the reallocated cost of a portion of tenure-track faculty salaries, as well as a portion of the salary for the department and administrative assistant. These salaries will continue regardless of program approval. The only direct need will be for the Department to contract an adjunct for one course of undergraduate Spanish instruction for the fall and one course for spring semester in order to offer an additional graduate course by tenure-track

faculty each semester. The salary for an adjunct course will be lower than the salary reallocation shown in the budget sheet.

20. Revenue Sources

- a) **Reallocation of funds:** If funding is to come from the reallocation of existing state appropriated funds, please indicate the sources of the reallocation. What impact will the reallocation of funds in support of the program have on other programs?
- b) **New appropriation.** If an above Maintenance of Current Operations (MCO) appropriation is required to fund the program, indicate when the institution plans to include the program in the legislative budget request.
- c) **Non-ongoing sources:**
 - i. If the funding is to come from one-time sources such as a donation, indicate the sources of other funding. What are the institution's plans for sustaining the program when that funding ends?
 - ii. Describe the federal grant, other grant(s), special fee arrangements, or contract(s) that will be valid to fund the program. What does the institution propose to do with the program upon termination of those funds?
- d) **Student Fees:**
 - i. If the proposed program is intended to levy any institutional local fees, explain how doing so meets the requirements of Board Policy V.R., 3.b.
N/A
 - ii. Provide estimated cost to students and total revenue for self-support programs and for professional fees and other fees anticipated to be requested under Board Policy V.R., if applicable.

ISU is proposing the use of an on-line program fee, in accordance with the Online Program Fee as defined in the Board Policy V.R., 3.a.x. We will charge \$330 per credit hour. For the 30 credits required for completion of the proposed program, the total cost will be \$9,900.

Since the primary target student group is expected to be working public school educators, we expect them to enroll in only one or two courses per semester. Enrolling in six credits will cost \$1,980 per semester. A review of three public institutions offering similar in-person degrees found that the lowest tuition cost for six graduate credits was \$2,066 at Utah State University (Master of Second Language Teaching, not an M.A. degree) and the highest was \$3,828 at the University of Colorado. The University of Utah was in the middle with tuition of \$2,438 for six credits. Additional mandatory fees at these institutions were not included. Brigham Young University – Provo was not included because it is not a public institution.

21. Using the budget template provided by the Office of the State Board of Education, provide the following information:

- Indicate all resources needed including the planned FTE enrollment, projected revenues, and estimated expenditures for the first **four** fiscal years of the program.
- Include reallocation of existing personnel and resources and anticipated or requested new resources.
- Second and third year estimates should be in constant dollars.

- Amounts should reconcile subsequent pages where budget explanations are provided.
- If the program is contract related, explain the fiscal sources and the year-to-year commitment from the contracting agency(ies) or party(ies).
- Provide an explanation of the fiscal impact of any proposed discontinuance to include impacts to faculty (i.e., salary savings, re-assignments).

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**INSTRUCTION, RESEARCH AND STUDENT AFFAIRS
DECEMBER 20, 2018**

Program Resource Requirements.

Indicate all resources needed including the planned FTE enrollment, projected revenues, and estimated expenditures for the first **four** fiscal years of the program

- Include reallocation of existing personnel and resources and anticipated or requested new resources.
- Second and third year estimates should be in constant dollars.
- Amounts should reconcile subsequent pages where budget explanations are provided.
- If the program is contract related, explain the fiscal sources and the year-to-year commitment from the contracting agency(ies) or party(ies).
- Provide an explanation of the fiscal impact of any proposed discontinuance to include impacts to faculty (i.e., salary savings, re-assignments).

I. PLANNED STUDENT ENROLLMENT

	FY 2020		FY 2021		FY 2022		FY 2023	
	FTE	Headcount	FTE	Headcount	FTE	Headcount	FTE	Headcount
A. New enrollments	1	2	3.5	7	6	12	8.5	17
B. Shifting enrollments								
Total Enrollment	1	2	3.5	7	6	12	8.5	17

II. REVENUE

	FY 2020		FY 2021		FY 2022		FY 2023	
	On-going	One-time	On-going	One-time	On-going	One-time	On-going	One-time
1. New Appropriated Funding Request	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
2. Institution Funds	\$26,094.00		\$26,094.00		\$26,094.00		\$26,094.00	
3. Federal								
4. New Tuition Revenues from Increased Enrollments								
5. Student Fees	\$7,920.00		\$27,720.00	\$0.00	\$47,520.00	\$0.00	\$67,320.00	\$0.00
6. Other (i.e., Gifts)	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Total Revenue	\$34,014	\$0	\$53,814	\$0	\$73,614	\$0	\$93,414	\$0

**INSTRUCTION, RESEARCH AND STUDENT AFFAIRS
DECEMBER 20, 2018**

Ongoing is defined as ongoing operating budget for the program which will become part of the base.

One-time is defined as one-time funding in a fiscal year and not part of the base.

III. EXPENDITURES

	FY <u>2020</u>		FY <u>2021</u>		FY <u>2022</u>		FY <u>2023</u>	
	On-going	One-time	On-going	One-time	On-going	One-time	On-going	One-time
A. Personnel Costs								
1. FTE	<u>0.2</u>		<u>0.2</u>		<u>0.2</u>		<u>0.2</u>	
2. Faculty	<u>\$11,375.00</u>		<u>\$11,375.00</u>		<u>\$11,375.00</u>		<u>\$11,375.00</u>	
3. Adjunct Faculty								
4. Graduate/Undergrad Assistants								
5. Research Personnel								
6. Directors/Administrators	<u>\$5,684.00</u>		<u>\$5,684.00</u>		<u>\$5,684.00</u>		<u>\$5,684.00</u>	
7. Administrative Support Personnel	<u>\$1,618.00</u>		<u>\$1,618.00</u>		<u>\$1,618.00</u>		<u>\$1,618.00</u>	
8. Fringe Benefits	<u>\$7,417.00</u>		<u>\$7,417.00</u>		<u>\$7,417.00</u>		<u>\$7,417.00</u>	
9. Other:								
Total Personnel and Costs	<u><u>\$26,094</u></u>	<u><u>\$0</u></u>	<u><u>\$26,094</u></u>	<u><u>\$0</u></u>	<u><u>\$26,094</u></u>	<u><u>\$0</u></u>	<u><u>\$26,094</u></u>	<u><u>\$0</u></u>

**INSTRUCTION, RESEARCH AND STUDENT AFFAIRS
DECEMBER 20, 2018**

Attachment 1

	<u>FY 2020</u>		<u>FY 2021</u>		<u>FY 2022</u>		<u>FY 2023</u>	
	On-going	One-time	On-going	One-time	On-going	One-time	On-going	One-time
B. Operating Expenditures								
1. Travel								
2. Professional Services								
3. Other Services								
4. Communications								
5. Materials and Supplies	\$100.00		\$350.00		\$600.00		\$850.00	
6. Rentals								
7. Materials & Goods for Manufacture & Resale								
8. Miscellaneous	\$720.00		\$720.00		\$720.00		\$720.00	
Total Operating Expenditures	<u>\$820</u>	<u>\$0</u>	<u>\$1,070</u>	<u>\$0</u>	<u>\$1,320</u>	<u>\$0</u>	<u>\$1,570</u>	<u>\$0</u>

	<u>FY 2020</u>		<u>FY 2021</u>		<u>FY 2022</u>		<u>FY 2023</u>	
	On-going	One-time	On-going	One-time	On-going	One-time	On-going	One-time
C. Capital Outlay								
1. Library Resources								
2. Equipment								
Total Capital Outlay	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>

**INSTRUCTION, RESEARCH AND STUDENT AFFAIRS
DECEMBER 20, 2018**

Attachment 1

	FY <u>2020</u>	FY <u>2021</u>	FY <u>2022</u>	FY <u>2023</u>
D. Capital Facilities Construction or Major Renovation				
E. Other Costs				
Utilities				
Maintenance & Repairs				
1) ISU Central	\$2,376.00	\$8,316.00	\$14,256.00	\$20,196.00
2) ISU Academic Affairs	\$792.00	\$2,772.00	\$4,752.00	\$6,732.00
3) ISU ITRC	\$792.00	\$2,772.00	\$4,752.00	\$6,732.00
Total Other Costs	<u>\$3,960</u>	<u>\$0</u>	<u>\$13,860</u>	<u>\$0</u>
TOTAL EXPENDITURES:	<u>\$30,874</u>	<u>\$0</u>	<u>\$41,024</u>	<u>\$0</u>
Net Income (Deficit)	<u>\$3,140</u>	<u>\$0</u>	<u>\$12,790</u>	<u>\$0</u>

Budget Notes (specify row and add explanation where needed; e.g., "I.A.,B. FTE is calculated using..."):

I.A.B.	FTE is calculated by assuming each student takes 1-2 courses per semester.
II.2	Reallocation of institutional funds to cover personnel
II.5	Student fee revenue calculated as Student Credit Hours multiplied by \$330 per credit
III.A.1	FTE based on adding one additional graduate course each semester (reallocation from undergraduate course)
III.A.2	Salary based on current average of tenure-track faculty, 20% of workload
III.A.6	Portion of department chair salary (5%)
III.A.7	Portion of administrative assistant salary (5%)
III.A.8	Benefits calculated on salary amounts at 21% plus applicable portion of health insurance
III.B.8	Annual software license fees
III.E.1	Idaho State Central Services: 30% of Student Fees
III.E.2	Idaho State Academic Affairs Administration: Provide XYZ (10% of Student Fees)
III.E.3	Idaho State Instructional Technology Resource Center (ITRC): Provide technology and integration support, software, training (10% of Student Fees)

IDAHO STATE UNIVERSITY

SUBJECT

Master of Science in Computer Science

APPLICABLE STATUTE, RULE, OR POLICY

Idaho State Board of Education Governing Policies & Procedures, Section III.G

ALIGNMENT WITH STRATEGIC PLAN

Goal 3: Workforce Readiness, Objective A: Workforce Alignment. IV. Increase in postsecondary programs tied to workforce needs.

BACKGROUND/DISCUSSION

The proposed Master of Science in Computer Science will focus on theory and applications of computer science, and prepare students for careers as software engineers and computer scientists. This program would be unique in Idaho and not compete with programs at other state institutions. Some coursework will be shared with Mathematics, National Information Assurance Training Education Center, and the Master of Science in Health Informatics program. This program is intended to meet the heavy demand for employees with a computer science degree in the local and national hi-tech and government sectors.

IMPACT

Current faculty positions are sufficient to teach the additional courses. Recent faculty hires were added to meet the growing demand for the undergraduate program in computer science. No reallocations or new appropriation of funds are requested; no student fees are anticipated. Existing classroom space and computing resources can accommodate this program.

ATTACHMENTS

Attachment 1 – Proposal for the M.S. in Computer Science

STAFF COMMENTS AND RECOMMENDATIONS

Idaho State University (ISU) anticipates a minimum of 10 students in bi-yearly cohorts and filling those 10 students within two years of launching the program. If enrollments are not realized by year 4 and a minimum of 5 graduates per year is not met, ISU will reevaluate and increase recruitment efforts. If by year 7 those efforts are not successful, ISU will teach out and discontinue the program.

ISU's proposed M.S. in Computer Science is consistent with their Service Region Program Responsibilities and their current institution plan for Delivery of Academic Programs in Region IV, V, and VI. As provided in Board Policy III.Z, no institution has the statewide program responsibility specifically for computer science at the graduate level. The University of Idaho and Boise State University each currently offer an M.S. in Computer Science within their respective service regions.

**INSTRUCTION, RESEARCH AND STUDENT AFFAIRS
DECEMBER 20, 2018**

Staff raised questions regarding accreditation by the Accrediting Board for Education and Technology (ABET). It is the recognized U.S. accreditor for post-secondary education programs in applied and natural science, computing, engineering and engineering technology. According to ABET, its accreditation ensures students and employers that a “program meets the quality standards that produce graduates prepared to enter a global workforce.” Accreditation is not a common standard for graduate programs, it is traditionally sought for undergraduate programs in computer science and engineering for quality assurance purposes. Boise State University and the University of Idaho have earned ABET accreditation for its undergraduate Computer Science programs. Currently ISU offers a B.S. in Computer Science for which ABET accreditation has not yet been achieved. ISU is exploring accreditation for both the undergraduate and proposed graduate programs. While ABET accreditation is not a requirement for computer science programs, having an accredited program will provide ISU graduates with assurances that the instruction provided meets the expectations of industry and employers in this field.

The proposal completed the program review process and was presented to the Council on Academic Affairs and Programs (CAAP) on November 15, 2018; and to the Committee on Instruction, Research, and Student Affairs (IRSA) on November 29, 2018.

Board staff would encourage ISU to focus efforts on achieving ABET accreditation for its undergraduate program in Computer Science prior to allocating faculty efforts and institution resources towards the implementation of a graduate program in the same discipline. As approximately 20 months is required for a thorough and rigorous peer-review and evaluation within the accreditation application process, Board staff would recommend approval of the proposed program upon earning accreditation for the undergraduate program.

BOARD ACTION

I move to approve the request by Idaho State University to add an M.S. in Computer Science Program as presented in Attachment 1.

Moved by _____ Seconded by _____ Carried Yes _____ No _____

Institutional Tracking No. 2018-01 revised

**Idaho State Board of Education
Proposal for Undergraduate/Graduate Degree Program**

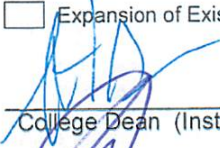
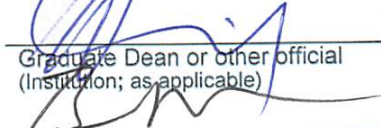
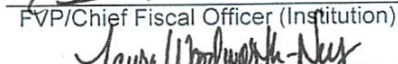


Date of Proposal Submission:	
Institution Submitting Proposal:	Idaho State University
Name of College, School, or Division:	College of Science and Engineering
Name of Department(s) or Area(s):	Informatics and Computer Science

Program Identification for Proposed New or Modified Program:

Program Title:	Master of Science in Computer Science				
Degree:	<input checked="" type="checkbox"/> Master's	Degree Designation	<input type="checkbox"/> Undergraduate	<input checked="" type="checkbox"/>	Graduate
Indicate if Online Program:	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/>	<input type="checkbox"/> No		
CIP code (consult IR /Registrar):	11.0701				
Proposed Starting Date:	Fall, 2019				
Geographical Delivery:	<input checked="" type="checkbox"/> Location(s)	Pocatello, Idaho Falls	<input checked="" type="checkbox"/> Region(s)	IV, V, VI	
Indicate (X) if the program is/has:	<input type="checkbox"/> Self-Support	<input type="checkbox"/>	<input type="checkbox"/> Professional Fee		
Indicate (X) if the program is:	<input checked="" type="checkbox"/>	<input type="checkbox"/> Regional Responsibility	<input type="checkbox"/>	<input type="checkbox"/> Statewide Responsibility	

Indicate whether this request is either of the following:

- | | |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| <input checked="" type="checkbox"/> New Degree Program | <input type="checkbox"/> Consolidation of Existing Program |
| <input type="checkbox"/> Undergraduate/Graduate Certificates (30 credits or more) | <input type="checkbox"/> New Off-Campus Instructional Program |
| <input type="checkbox"/> Expansion of Existing Program | <input type="checkbox"/> Other (i.e., Contract Program/Collaborative) |

 College Dean (Institution)	<u>8/20/18</u> Date	Vice President for Research (Institution; as applicable)	
 Graduate Dean or other official (Institution; as applicable)	<u>9/19/18</u> Date	Academic Affairs Program Manager, OSBE	Date
 FVP/Chief Fiscal Officer (Institution)	<u>9/29/18</u> Date	Chief Academic Officer, OSBE	Date
 Provost/VP for Instruction (Institution)	<u>9/20/18</u> Date	SBOE/Executive Director Approval	Date
 President	<u>10-1-18</u> Date		

Before completing this form, refer to Board Policy Section III.G., Postsecondary Program Approval and Discontinuance. This proposal form must be completed for the creation of each new program. All questions must be answered.

Rationale for Creation or Modification of the Program

- 1. Describe the request and give an overview of the changes that will result.** Will this program be related or tied to other programs on campus? Identify any existing program that this program will replace.

We are proposing to create a new Master of Science in Computer Science (CS). The proposed program is a graduate program focusing on theory and applications of Computer Science preparing students for careers as Software Engineers (also known as Computer Programmers) and Computer Scientists. No similar graduate program currently exists at ISU. However, we will be able to share some coursework from the Master in Health Informatics, Mathematics, and NIATEC.

- 2. Need for the Program.** Describe the student, regional, and statewide needs that will be addressed by this proposal and address the ways in which the proposed program will meet those needs.

- a. Workforce need:** Provide verification of state workforce needs that will be met by this program. Include State and National Department of Labor research on employment potential. Using the chart below, indicate the total projected annual job openings (including growth and replacement demands) in your regional area, the state, and nation. Job openings should represent positions that require graduation from a program such as the one proposed. Data should be derived from a source that can be validated and must be no more than two years old.

According to the Bureau of Labor Statistics, CS jobs requiring a master's degree will grow 26% by 2022, while those requiring a Bachelor's will grow 18%.¹ According to a report by Georgetown University's Center on Education and the Workforce², "software developers, applications" is the top occupational group for online job postings in Idaho, Utah, Oregon and Washington. According to the same report, the number of STEM job postings is almost double that of any other occupational group, nationally.

The Idaho K-12 Content Computer Science Standards White Paper³ states:

According to the Conference Board (used by the Idaho Department of Labor), there are currently around 1300 unfilled open jobs in the state of Idaho for computer science related professions, many of which can be attributed to a lack of qualified candidates.

List the job titles for which this degree is relevant:

1. Software engineer
2. Software developer

1 www.bls.gov/opub/mlr/2013/article/occupational-employment-projections-to-2022.htm

2 cew.georgetown.edu/report/rankingthstates

3 <https://sde.idaho.gov/topics/content-standards/files/content-standards/computer-science/White-Paper-Standards-Computer-Science.pdf>

	State DOL data	Federal DOL data	Other data source: (describe)
Local (Service Area)		12 ⁴ (growth only)	
State	259 ⁵		
Nation		2715 ⁶ (growth only)	

Provide (as appropriate) additional narrative as to the workforce needs that will be met by the proposed program.

- b. Student need.** What is the most likely source of students who will be expected to enroll (full-time, part-time, outreach, etc.). Document student demand by providing information you have about student interest in the proposed program from inside and outside the institution. If a survey of students was used, please attach a copy of the survey instrument with a summary of results.

We anticipate approximately 12 students per year from the following sources (see Question #15 for a tabular summary):

Each year from FY10 to FY15, an average of about 10% of Idaho State University CS graduates obtained a graduate degree at another institution (source: ISU Institutional Research). Over the next three years the number of CS graduates is projected to range from 15 to 25. Retaining 10% of students for master's degrees at ISU rather than other institutions yields at least 2 master's degrees per year. Further, we anticipate the ready availability of a master's degree will recruit an additional two students who otherwise would not go on for graduate study. Further, BYU-Idaho graduates over 250 CS students per year⁷, and with a master's program in the area we expect that approximately four of them will come to Pocatello for a master's (see BYU-I letter of support). Looking beyond CS graduates, other STEM graduates, particularly physics, engineering, and math majors are being hired for CS positions. A master's in CS would give them an opportunity for excellent job training, and we anticipate an additional two students for the Master of Science in Computer Science. We also expect two additional part-time master's students who have been working as professional software engineers.

- c. Economic Need:** Describe how the proposed program will act to stimulate the state economy by advancing the field, providing research results, etc.

Beyond providing a needed workforce, research in CS often leads to marketable products (both hardware, software, and occasionally consumer items) that can be manufactured and marketed by local companies and often spawn startup companies. This infusion of ideas into the local industry will stimulate existing businesses and spawn new business. As high-paying occupations stimulate the local economy, we note that the median annual wage for a software developer is \$100,080⁸.

- d. Societal Need:** Describe additional societal benefits and cultural benefits of the program.

4 data from <https://www.bls.gov/oes/current/oes151132.htm#st> - computed from 10 year outlook

5 <http://lmi.idaho.gov/projections>

6 <https://www.bls.gov/ooh/computer-and-information-technology/software-developers.htm#tab-6> - computed from 10 year outlook

7 In 2016-2017, BYU-I had 176 graduates in Computer Information Technology, a computer programming-focused program, and 116 graduates in Computer Science, for a total of 292 graduates. The previous year had 250 graduates.

8 https://www.bls.gov/emp/ep_table_104.htm

Computers are ubiquitous in today's world, from data centers to cell phones to microwave ovens. As such, computing has integrated itself into every element of society. Bringing cutting edge research into the academic environment can only help in positioning Southeastern Idaho as a player in the changing cultural landscape.

e. If Associate's degree, transferability: N/A

- 3. Similar Programs.** Identify similar programs offered within Idaho and in the region by other in-state or bordering state colleges/universities.

Similar Programs offered by Idaho public institutions (list the proposed program as well)		
Institution Name	Degree name and Level	Program Name and brief description if warranted
Idaho State University	Master of Science in Computer Science (proposed)	
Boise State University	Master of Science in Computer Science	Flexible program of 30 credits. Project or thesis option available.
University of Idaho	Master of Science in Computer Science	30 credits. Thesis or non-thesis option available.

Similar Programs offered by other Idaho institutions and by institutions in nearby states		
Institution Name	Degree name and Level	Program Name and brief description if warranted
Utah State University	Master of Science in Computer Science (MSCS) Master of Computer Science (MCS)	The MCS requires 30 credits beyond the MSCS (total of 60 credits)
Montana State University	Master of Science in Computer Science	30 credits. Thesis or course-only track
University of Montana	Master of Science in Computer Science	Thesis, project and portfolio options available.

- 4. Justification for Duplication with another institution listed above.** (if applicable). If the proposed program is similar to another program offered by an Idaho public institution, provide a rationale as to why any resulting duplication is a net benefit to the state and its citizens. Describe why it is not feasible for existing programs at other institutions to fulfill the need for the proposed program.

This program is intended to meet the heavy demand for employees with a CS graduate degree in the local and national hi-tech and government sectors. According to the Bureau of Labor Statistics, average annual job growth for software engineers over the next ten years is 17%, much higher than the average of 7% across all job descriptions⁹. Average wage increase across the country for a web developer with a bachelor's degree compared to one with a master's is \$14,000¹⁰, an increase of 23%. Southeastern Idaho currently has no graduate program in Computer Science, so our students are either continuing their education elsewhere or foregoing graduate work because it isn't available locally.

We expect that our master's program will attract students to graduate work, some of whom will then pursue Ph.D. degrees, feeding into the existing Ph.D. degrees offered by Boise State University and University of Idaho.

See **Appendix B** for letters of support from Boise State and Brigham Young University: Idaho, as well as from two major employers, Intel and Micron.

- 5. Describe how this request supports the institution's vision and/or strategic plan.**

Goals of Institution Strategic Mission	Proposed Program Plans to Achieve the Goal
Learning and Discovery	This program provides a dynamic, relevant curriculum that meets student and workforce needs.
Leadership in Health Sciences	This program will contribute to research and discovery in the health sciences through original research and health-directed projects.
Community Engagement and Impact	This program will participate in formal and informal partnerships with public agencies and private entities.

- 6. Assurance of Quality.** Describe how the institution will ensure the quality of the program. Describe the institutional process of program review. Where appropriate, describe applicable specialized accreditation and explain why you do or do not plan to seek accreditation.

Idaho State University is regionally accredited by the Northwest Commission on College and Universities (NWCCU). Idaho State University has carried this accreditation continuously since 1918.

Degrees in Computer Science fall under the accreditation of the Accreditation Board for Engineering and Technology (ABET). The College of Business and the College of Science and Engineering are currently exploring seeking ABET accreditation for the existing undergraduate Computer Science degree. Accreditation of a graduate degree in CS is very uncommon. No universities in Idaho, Utah, or Colorado have an accredited CS graduate degree. In order to obtain objective feedback on program quality, we will form an advisory board of local, regional and statewide business leaders, as well as alumni of the program. This advisory board will provide a yearly report on program quality.

⁹ <http://www.bls.gov/ooh/computer-and-information-technology/software-developers.htm>

¹⁰ <http://www.bls.gov/careeroutlook/2015/article/should-i-get-a-masters-degree.htm>

Programs not covered by specialized accreditation are required to undergo Academic Program Review every seven years.

7. **In accordance with Board Policy III.G., an external peer review is required for any new doctoral program.**

N/A

8. **Teacher Education/Certification Programs** All Educator Preparation programs that lead to certification require review and recommendation from the Professional Standards Commission (PSC) and approval from the Board.

Will this program lead to certification?

Yes _____ No _____

If yes, on what date was the Program Approval for Certification Request submitted to the Professional Standards Commission? N/A

9. **Three-Year Plan: Is the proposed program on your institution's approved 3-year plan? Indicate below.**

Yes No _____

Proposed programs submitted to OSBE that are not on the three-year plan must respond to the following questions and meet at least one criterion listed below.

- a. **Describe why the proposed program is not on the institution's three-year plan.** When did consideration of and planning for the new program begin?
- b. **Describe the immediacy of need for the program.** What would be lost were the institution to delay the proposal for implementation of the new program until it fits within the five-year planning cycle? What would be gained by an early consideration?

Criteria. As appropriate, discuss the following:

- i. How important is the program in meeting your institution's regional or statewide program responsibilities? Describe whether the proposed program is in response to a specific industry need or workforce opportunity.
- ii. Explain if the proposed program is reliant on external funding (grants, donations) with a deadline for acceptance of funding.
- iii. Is there a contractual obligation or partnership opportunity to justify the program?
- iv. Is the program request or program change in response to accreditation requirements or recommendations?
- v. Is the program request or program change in response to recent changes to teacher certification/endorsement requirements?

Curriculum, Intended Learning Outcomes, and Assessment Plan

10. **Curriculum for the proposed program and its delivery.**

- a. **Summary of requirements.** Provide a summary of program requirements using the

following table.

Credit hours in required courses offered by the department (s) offering the program.	18
Credit hours in required courses offered by other departments:	
Credit hours in institutional general education curriculum	
Credit hours in free electives	18
Total credit hours required for degree program:	36

- b. Additional requirements.** Describe additional requirements such as comprehensive examination, senior thesis or other capstone experience, practicum, or internship, some of which may carry credit hours included in the list above.

Project option: 3 of the required credit hours are project credits. This option requires the student to propose and execute a capstone project.

Thesis option: 6 of the required credit hours are thesis credits. This option requires the student to propose and execute a thesis that represents original research.

Emphasis Area: 12 credits come from one of three emphasis areas. The student must choose one area. These emphasis areas include Computer Science Education, Business, and Science. All courses and credits in those emphasis areas are offered by the Department of Informatics and Computer Science, with the exception of two courses (six credits) in the Science emphasis area which are offered from the Department of Mathematics.

The proposed curriculum is attached to this proposal as **Appendix A**.

11. Program Intended Learning Outcomes and Connection to Curriculum.

- a. Intended Learning Outcomes.** List the Intended Learning Outcomes for the proposed program, using learner-centered statements that indicate what will students know, be able to do, and value or appreciate as a result of completing the program.

Students graduating from this program will have the ability to:

- Work collaboratively across disciplines to analyze and solve key issues in computer science. Applied computer science is an inherently multi-disciplinary field, and students will be given exposure to applications in diverse fields such as healthcare, scientific computing, e-commerce, visualization and graphics, machine learning, and others.
- Analyze problems and devise algorithms and methodologies to solve the problems. They will additionally show correctness and usefulness of their algorithms both analytically and through implementation and experimentation.
- Work in a collaborative environment using the different software engineering methodologies. This will enable them to quickly become contributors in the industry.
- Communicate complex ideas effectively both orally and in writing to different audiences and stakeholder groups.
- Students completing the degree with the thesis option will perform original research.

12. Assessment plans

- a. Assessment Process.** Describe the assessment process that will be used to evaluate how well students are achieving the intended learning outcomes of the program.

As discussed in Section 6, we will form an advisory board that will assess program quality and make recommendations. Further, we will incorporate exit interviews with every graduate as well as yearly interviews with 2-5 local business leaders to assess program quality.

Learning outcomes will be incorporated into the relevant courses, and instructors will be required to collect data from assessment instruments at least twice during each five year review period. The data will be used to improve student mastery of the learning outcomes, and make adjustments to the assessment process as needed.

- b. Closing the loop.** How will you ensure that the assessment findings will be used to improve the program?

The ISU Department of Informatics and Computer Science will provide an annual report to the advisory board describing changes made to the program based on findings discussed in paragraph 12a.

- c. Measures used.** What direct and indirect measures will be used to assess student learning?

Direct measures of student learning will include the number of journal publications from students pursuing the thesis option and job placement statistics. Indirect measures include the survey of local employers discussed in 12a and exit interviews.

- d. Timing and frequency.** When will assessment activities occur and at what frequency?

The ISU Department of Informatics and Computer Science will interview each graduate and will perform other assessment activities annually during Spring semester.

Enrollments and Graduates

- 13. Existing similar programs at Idaho Public Institutions.** Using the chart below, provide enrollments and numbers of graduates for similar existing programs at your institution and other Idaho public institutions.

Existing Similar Programs: Historical enrollments and graduate numbers								
Institution and Program Name	Fall Headcount Enrollment in Program				Number of Graduates From Program (Summer, Fall, Spring)			
	FY15	FY16	FY17	FY18 (most recent)	FY14	FY15	FY16	FY17 (most recent)
BSU	39	56	51	42	4	8	7	16
ISU								
UI	16	18	26	30	14	12	10	10

LCSC									
------	--	--	--	--	--	--	--	--	--

14. Projections for proposed program: Using the chart below, provide projected enrollments and number of graduates for the proposed program:

Proposed Program: Projected Enrollments and Graduates First Five Years											
Program Name: Master of Science in Computer Science											
Projected Fall Term Headcount Enrollment in Program						Projected Annual Number of Graduates From Program					
FY19 (first year)	FY20	FY21	FY22	FY23	FY24	FY19 (first year)	FY20	FY21	FY22	FY23	FY24
8	12	16	18	20	22	-	-	5	7	9	10

15. Describe the methodology for determining enrollment and graduation projections. Refer to information provided in Question #2 “Need” above. What is the capacity for the program? Describe your recruitment efforts? How did you determine the projected numbers above?

Here we summarize the numbers in Question 2b with the number of students we expect from each source:

Source	# Students
ISU CS	4
ISU other STEM	2
BYU-Idaho	4
Pocatello/Idaho Falls professionals	2

The capacity of the program without additional faculty and administrative resources is 25 graduates per year. This is based on the number of courses offered, a maximum graduate course size of 25 and faculty advising resources.

For recruitment, we will utilize the following:

- Making ISU undergrads aware of the graduate program in undergraduate courses.
- Department sponsored recruitment activities such as mailing lists and a presence at undergraduate research conferences, funded in part using the ISU Graduate Recruitment Assistance Fund (GRAF)
- Graduate School Communication Relationship Management (CRM) system to target digital communication for prospective students through their inquiry and application process.
- Funding by the graduate school for approved program initiated recruiting functions – like conferences, seminars, GRE search service (buying names), print and digital ads, brochures, etc.
- Online recruitment fairs – specifically for international students
- Online webinars or open houses

- 16. Minimum Enrollments and Graduates.** Have you determined minimums that the program will need to meet in order to be continued? What are those minimums, what is the logical basis for those minimums, what is the time frame, and what is the action that would result?

We anticipate a minimum of 10 students in bi-yearly cohorts to create adequate amortization of faculty time, ISU resources, and community needs. We anticipate filling those 10 students within 2 years of launch. If, by year 4 of the program, we don't meet a minimum of 5 graduates per year then we will reevaluate and consider necessary actions to increase enrollments. If these efforts fail to increase enrollment by year 7 then we will teach out and discontinue the program.

Resources Required for Implementation – fiscal impact and budget

17. Physical Resources.

- a. Existing resources.** Describe equipment, space, laboratory instruments, computer(s), or other physical equipment presently available to support the successful implementation of the program.

See 17b below.

- b. Impact of new program.** What will be the impact on existing programs of increased use of physical resources by the proposed program? How will the increased use be accommodated?

The College of Science and Engineering at ISU has excellent cluster computing resources. Because our department is coupled with Informatics we can utilize a new server room in the Business Building. We have sufficient classroom space for the additional courses we propose below.

- c. Needed resources.** List equipment, space, laboratory instruments, etc., that must be obtained to support the proposed program. Enter the costs of those physical resources into the budget sheet.

See 17b above.

18. Library resources

- a. Existing resources and impact of new program.** Evaluate library resources, including personnel and space. Are they adequate for the operation of the present program? Will there be an impact on existing programs of increased library usage caused by the proposed program? For off-campus programs, clearly indicate how the library resources are to be provided.

We anticipate negligible additional load on library resources.

- b. Needed resources.** What new library resources will be required to ensure successful implementation of the program? Enter the costs of those library resources into the budget sheet.

We anticipate no need for additional library resources.

19. Personnel resources

- a. **Needed resources.** Give an overview of the personnel resources that will be needed to implement the program. How many additional sections of existing courses will be needed? Referring to the list of new courses to be created, what instructional capacity will be needed to offer the necessary number of sections?

We will offer six new courses plus project and thesis credits. Our current faculty lines are sufficient to teach all additional courses. We don't anticipate adding any sections for existing courses.

- b. **Existing resources.** Describe the existing instructional, support, and administrative resources that can be brought to bear to support the successful implementation of the program.

The Computer Science Program currently has three full-time faculty: David Beard, Paul Bodily and Isaac Griffith. Affiliated with Computer Science are Informatics faculty who have a computer science background: Kevin Parker, Corey Schou, and Thomas Ottaway. Vitae for each are available if needed.

Currently the Computer Science Program is conducting a search to hire two additional tenure-track faculty members for its existing program.

Computer Science uses support staff from both the College of Business and the College of Science and Engineering, including four full-time administrative assistants and three full-time IT administrators.

- c. **Impact on existing programs.** What will be the impact on existing programs of increased use of existing personnel resources by the proposed program? How will quality and productivity of existing programs be maintained?

Once the current searches for new faculty are complete, there will be no additional load on existing personnel and no sacrifice in quality.

- d. **Needed resources.** List the new personnel that must be hired to support the proposed program. Enter the costs of those personnel resources into the budget sheet.

Once the new faculty are hired for the existing program, no additional personnel will be needed to support the proposed master's degree.

20. Revenue Sources

- a) **Reallocation of funds:** If funding is to come from the reallocation of existing state appropriated funds, please indicate the sources of the reallocation. What impact will the reallocation of funds in support of the program have on other programs?

We anticipate no reallocations.

- b) **New appropriation.** If an above Maintenance of Current Operations (MCO) appropriation is required to fund the program, indicate when the institution plans to include the program in the legislative budget request.

We anticipate no new appropriations.

c) **Non-ongoing sources:**

- i. If the funding is to come from one-time sources such as a donation, indicate the sources of other funding. What are the institution's plans for sustaining the program when that funding ends?
- ii. Describe the federal grant, other grant(s), special fee arrangements, or contract(s) that will be valid to fund the program. What does the institution propose to do with the program upon termination of those funds?

We anticipate no funding from one-time sources or grants.

d) **Student Fees:**

- i. If the proposed program is intended to levy any institutional local fees, explain how doing so meets the requirements of Board Policy V.R., 3.b.
- ii. Provide estimated cost to students and total revenue for self-support programs and for professional fees and other fees anticipated to be requested under Board Policy V.R., if applicable.

We anticipate no funding from student fees.

21. Using the budget template provided by the Office of the State Board of Education, provide the following information:

- Indicate all resources needed including the planned FTE enrollment, projected revenues, and estimated expenditures for the first **four** fiscal years of the program.
- Include reallocation of existing personnel and resources and anticipated or requested new resources.
- Second and third year estimates should be in constant dollars.
- Amounts should reconcile subsequent pages where budget explanations are provided.
- If the program is contract related, explain the fiscal sources and the year-to-year commitment from the contracting agency(ies) or party(ies).
- Provide an explanation of the fiscal impact of any proposed discontinuance to include impacts to faculty (i.e., salary savings, re-assignments).

Program Resource Requirements.

Indicate all resources needed including the planned FTE enrollment, projected revenues, and estimated expenditures for the first **four** fiscal years of the

- program
- Include reallocation of existing personnel and resources and anticipated or requested new resources.
- Second and third year estimates should be in constant dollars.
- Amounts should reconcile subsequent pages where budget explanations are provided.
- If the program is contract related, explain the fiscal sources and the year-to-year commitment from the contracting agency(ies) or party(ies).
- Provide an explanation of the fiscal impact of any proposed discontinuance to include impacts to faculty (i.e., salary savings, re-assignments).

I. PLANNED STUDENT ENROLLMENT

	FY <u>2019</u>		FY <u>2020</u>		FY <u>2021</u>		FY <u>2022</u>	
	FTE	Headcount	FTE	Headcount	FTE	Headcount	FTE	Headcount
A. New enrollments	8	8	12	12	16	16	18	18
B. Shifting enrollments								
Total Enrollment	8	8	12	12	16	16	18	18

II. REVENUE

	FY <u>2019</u>		FY <u>2020</u>		FY <u>2021</u>		FY <u>2022</u>	
	On-going	One-time	On-going	One-time	On-going	One-time	On-going	One-time
1. New Appropriated Funding Request								
2. Institution Funds								
3. Federal								
4. New Tuition Revenues from Increased Enrollments	\$73,567		\$113,661		\$156,094		\$180,874	

**INSTRUCTION, RESEARCH AND STUDENT AFFAIRS
DECEMBER 20, 2018**

Attachment 1

5. Student Fees	_____	_____	_____	_____	_____	_____	_____	_____
6. Other (i.e., Gifts)	_____	_____	_____	_____	_____	_____	_____	_____
Total Revenue	<u>\$73,567</u>	<u>\$0</u>	<u>\$113,661</u>	<u>\$0</u>	<u>\$156,094</u>	<u>\$0</u>	<u>\$180,874</u>	<u>\$0</u>

*Ongoing is defined as ongoing operating budget for the program which will become part of the base.
One-time is defined as one-time funding in a fiscal year and not part of the base.*

III. EXPENDITURES

	<u>FY 2019</u>		<u>FY 2020</u>		<u>FY 2021</u>		<u>FY 2022</u>	
	On-going	One-time	On-going	One-time	On-going	One-time	On-going	One-time
A. Personnel Costs								
1. FTE	_____	_____	_____	_____	_____	_____	_____	_____
2. Faculty	_____	_____	_____	_____	_____	_____	_____	_____
3. Adjunct Faculty	_____	_____	_____	_____	_____	_____	_____	_____
4. Graduate/Undergrad Assistants	_____	_____	_____	_____	_____	_____	_____	_____
5. Research Personnel	_____	_____	_____	_____	_____	_____	_____	_____
6. Directors/Administrators	_____	_____	_____	_____	_____	_____	_____	_____
7. Administrative Support Personnel	_____	_____	_____	_____	_____	_____	_____	_____
8. Fringe Benefits	_____	_____	_____	_____	_____	_____	_____	_____
9. Other:	_____	_____	_____	_____	_____	_____	_____	_____
Total Personnel and Costs	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>

Appendix A. Proposed Curriculum

MASTERS OF SCIENCE IN COMPUTER SCIENCE

A graduate degree in computer science from Idaho State University prepares a student for a lifetime of discovery. It enables the graduate to advance the state of the art in computing, not merely to keep up with it. The graduate program develops the student's critical thinking, investigatory, and expository skills. The student will learn the foundations of computer science theory and application, and the interaction between the two. By understanding the extent and limitation of current knowledge in computer science, the graduate will learn to understand what issues are important and why. He or she will acquire the methodological skills to resolve important open problems and tackle challenging new projects. The student will learn to present problems and solutions, both orally and in writing.

Admission Requirement:

The student must apply to, and meet all the criteria for, admission to the Graduate School, as well as the following requirements. The study of computer science at the graduate level requires mathematical maturity, skill in the use of high-level and machine-level programming languages, and basic knowledge of computer hardware. Admission to this program is highly competitive. Mostly a bachelor's degree in computer science is required, however students with a bachelor's degree from other closely allied undergraduate programs will be considered. Students who wish to enter the graduate program must ultimately demonstrate competence in specific areas equivalent to the material covered in several of the undergraduate computer science core courses. Normally a 3.0 undergraduate GPA and a Graduate Record Examination general (aptitude) score in the 60th percentile are the minimum admission requirements. Actual admission is based on a combination of undergraduate GPA and Graduate Record Examination scores. International students for whom English is a second language must have a TOEFL score of 550 or higher for the written test, 213 or higher for the computer based test, or 79 or higher for the internet-based test.

Degree Requirements:

The following are requirements for receiving an M.S. degree in Computer Science from ISU. There is both a thesis and a non-thesis option, though in both options the student must complete courses in the graduate CS core and in a focused plan of study. In both options, the student must successfully complete the require 18 credit hours of core CS courses.

The student must acquire depth in at least one emphasis area by developing a focused plan of study in consultation with the major advisor. These areas include, Education, Business, and Science. These are emphases that investigate some aspect of computer science in depth, consistent with the goals of the graduate program in computer science.

The thesis option requires at least 36 credit hours of study. The thesis must be in the approved format and must represent significant scholarly achievement. The thesis must be presented at a public colloquium.

The non-thesis option requires at least 36 credit hours of study. At the end of the program, non-thesis students must pass a comprehensive examination that covers their graduate studies.

Required Courses: Computer Science Core – 18 Semester Hours

CS 5570	Parallel Processing: 3 semester hours (graduate version of existing course)
CS 5580	Theory of Computation: 3 semester hours (graduate version of existing course)
CS 5551	Database Theory Design and Programming: 3 semester hours (graduate version of existing course)

CS 6671	Advanced Operating Systems: 3 Semester Hours (new course)
CS 6672	Human Computer Interaction: 3 Semester Hours (new course)
CS 6673	Advanced Topics in Compilation: 3 Semester Hours (new course)

Project or Thesis Courses – 6 Semester Hours

Thesis Option

CS 6650 Thesis: 1-6 semester hours (new course)

Or

Project Option

CS 6660 Computer Science Project: 1-3 semester hours (new course)
Free Elective

Emphasis Areas – 12 Semester Hours

Education Emphasis

CS 5101	Computer Science Principles: 3 semester hours (new course)
CS 5102	Teaching and Learning Computer Science I: 3 semester hours (new course)
CS 5103	Teaching and Learning Computer Science II: 3 semester hours (new course)
CS 6101	Inclusive Strategies for Teaching Computers Science to Women and Minorities: 3 semester hours (new course)

Business Emphasis

INFO 5307	Intermediate Systems Analysis and Design: 3 semester hours (existing course)
INFO 5417	Statistical Methods for Data Analytics: 3 semester hours (existing course)
INFO 5507	Database Design and Implementation: 3 semester hours (existing course)
INFO 6670	Management of Informatics Projects: 3 semester hours (existing course)

Science Emphasis

CS 5588	Advanced Software Engineering and Project: 3 semester hours (graduate version of existing course)
CS 5558	Computer Graphics: 3 semester hours (graduate version of existing course)
MATH 6627	Complex Analysis I: 3 semester hours (existing course)
MATH 6628	Complex Analysis II: 3 semester hours (existing course)

Appendix B Letters of Support



October 4, 2016

To: Idaho State Board of Education

I am writing this letter in support of Idaho State University's proposal for a Masters of Computer Science program. While Boise State University has an existing Masters program, we view a similar program at ISU as complementary and a net benefit to the state of Idaho. The current lack of a CS graduate program in eastern Idaho means that many qualified students choose to forego graduate study because of family or work ties to the region. Providing a program local to their region will lead to a net increase in the number of Idahoans pursuing graduate degrees. Further, we believe that the ISU Masters program will be beneficial to BSU's newly-organized PhD program, as BSU will be a natural and attractive option to graduates of ISU who wish to continue on with a Doctoral degree.

Thank you,



Dr. Tim Andersen
Professor and Department Chair
Computer Science
Boise State University

1810 University Drive Boise, Idaho 83725-2059
Phone (208) 426-5767 www.boisestate.edu/cc/



Department of Computer Science and Electrical Engineering

October 18, 2017

From: Dr. Richard Grimmett
Chairman, Department of Computer Science and Electrical
Engineering, BYU-Idaho
525 South Center Str.
Rexburg, ID 83440

To whom it may Concern,

I am writing in support of a Masters of Computer Science degree at Idaho State University. I teach and am department chair at BYU-Idaho, and a significant set of our students come from Idaho, and in particular Southeastern Idaho. We have seen a significant growth in the number of students studying Computer Science at our university, our program has grown seven fold over the last five years. The need for students with this type of degree has also grown at about the same rate.

Many of our students choose to go to industry with an associates or bachelor's degree, but some of our students are interested in continuing their education, and would be particularly interested in a program that is available in the area. Today those students leave the area, and few will find their way back. I feel a program local to eastern Idaho would be of great benefit to our students at BYU-Idaho and to the region.

If you have any questions, feel free to contact me at 208 496-7686.

Sincerely,

A handwritten signature in black ink, appearing to read "Richard Grimmett".

Dr. Richard Grimmett
Chairman, Department of Computer Science and Electrical Engineering



October 10, 2016

Idaho State University
921 So. 8th Avenue
Pocatello, ID 83209-8020

This letter is in support of Idaho State University's proposal for a Masters of Computer Science program. While both Boise State University and the University of Idaho currently offer Master's programs, we believe a similar program at ISU is necessary for this region and can be a great benefit to the state of Idaho. Many qualified students who would choose to forego graduate school because of family or work ties to southeastern Idaho would have an attractive graduate school option with the proposed program, resulting in a net increase in the number of Idahoans pursuing graduate degrees.

Intel Security would benefit by increased availability of computer science graduates with advanced degrees. In recent years the majority of Idaho's software talent has been imported from out of state, and this degree will increase the pool of highly qualified Idaho graduates poised to help the state's tech industry be even more successful.

Respectfully,

A handwritten signature in black ink that reads "Matt Hulse".

Matt Hulse
SIEM Engineering
Intel Security Group

Intel Corporation
900 Pier View Drive
Suite 110
Idaho Falls, ID, 83402



Kevin R. Parker, Ph.D.
Chair and Professor
Department of Informatics and Computer Science
Idaho State University

October 12, 2016

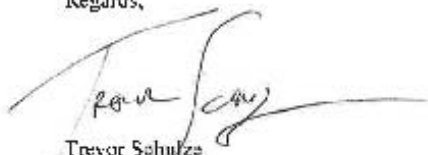
Dr. Kevin Parker,

This letter is in support of Idaho State University's proposal for a Masters of Computer Science program. While both Boise State University and the University of Idaho currently offer Master's programs, we believe a similar program at ISU would be complementary, with a net benefit to the state of Idaho. Many qualified students who would choose to forego graduate school because of family or work ties to southeastern Idaho would have an attractive graduate school option with the proposed program, resulting in a net increase in the number of Idahoans pursuing graduate degrees. Further, we view the ISU Master's program as beneficial to Boise State University's and University of Idaho's PhD programs, as they would be a natural option for Master's graduates from ISU who wish to continue on with a Doctoral degree.

At Micron, we are very aware of the technology trends disrupting the enterprise today—from mobile to machine learning. IT must evolve to be an innovation partner that provides game-changing technology solutions that make the business work better. Our IT organization is accelerating that evolution by creating a culture that inspires and rewards transformative ideas and leading-edge thinking. We strive to deliver real business value iteratively and at a faster pace to pivot more quickly to enable the company's success through technology.

So, whether it's fending off the latest cybersecurity attack or developing a data science solution to improve demand forecasting or creating a killer app for the company's new mobile platform, IT at Micron is innovating at the speed of business. We need to work tirelessly to find the right talent to help us enable this innovation engine. Therefore, we support additional educational programs available to the students of Idaho.

Regards,



Trevor Schulze
Chief Information Officer
Micron Technology, Inc.

IDAHO STATE UNIVERSITY

SUBJECT

Master of Science in Clinical Psychopharmacology

APPLICABLE STATUTE, RULE, OR POLICY

Idaho State Board of Education Governing Policies & Procedures, Section III.G

ALIGNMENT WITH STRATEGIC PLAN

Goal 3: Workforce Readiness, Objective A: Workforce Alignment. IV. Increase in postsecondary programs tied to workforce needs; and Objective B: Medical Education. V. Medical related postsecondary programs (other than nursing).

BACKGROUND/DISCUSSION

In April 2017, Idaho became the fifth state to authorize clinical psychologists with advanced specialized training to prescribe medications as part of their treatment plans. This expanded scope of practice will allow the citizens of Idaho improved access to a wider range of mental health services, including those residing in rural areas. The proposed Master of Science in Clinical Psychopharmacology received appropriated funding from the 2018 legislature to hire the faculty and administrative staff necessary to implement the new degree program. The M.S. program will provide Ph.D. educated clinical psychologists with the additional training required to be eligible to prescribe medications as part of their treatment of patients with mental and behavioral health disorders.

The proposed program will require completion of 42 semester hours, and will draw upon academic resources from the Colleges of Pharmacy and Nursing, from the Department of Biological Sciences and other departments at ISU, and will increase inter-professional educational opportunities for students and faculty. There are no similar programs in Idaho or surrounding states.

IMPACT

Appropriated funds for this program were received as of July 1, 2018, to cover 4.2 FTE of faculty and 1.0 FTE of administrative support personnel. The cost to students will be congruent with the current student fee structure for ISU graduate programs.

The M.S. in Clinical Psychopharmacology Program will be offered in Meridian. Existing classroom and faculty office space is sufficient. However, as the program grows, additional classroom space may be required and may be met through Distance Learning capability with other sites.

ATTACHMENTS

Attachment 1 – Proposal for the M.S. in Clinical Psychopharmacology

**INSTRUCTION, RESEARCH AND STUDENT AFFAIRS
DECEMBER 20, 2018**

STAFF COMMENTS AND RECOMMENDATIONS

The proposed program is in response to legislative changes that occurred in 2017 that would allow clinical psychologists with advanced specialized training to prescribe medications. The proposed program will be delivered at ISU's Meridian campus and may also include distance learning components from Pocatello; it will involve faculty from a variety of disciplines, including pharmacy, nursing, and biological sciences. ISU anticipates initial enrollment to be four students in the first year, then 4-6 per year for the subsequent two years.

Though the program proposal process inquires whether institutions have established minimum enrollment numbers necessary for program continuance, ISU does not require minimum enrollment numbers in programs due to program-specific circumstances. Historically, master's degree programs at ISU are flagged if enrollment is five or less students, requiring the academic unit to develop a plan to address low enrollment.

ISU's proposed M.S. in Psychopharmacology is consistent with their Service Region Program Responsibilities and their current institution plan for Delivery of Academic Programs in Region V. Per Board Policy III.Z, no institution has the statewide program responsibility specifically for clinical psychopharmacology. ISU currently has statewide responsibility for the PharmD program and currently offers an MS and PhD in Pharmaceutical Sciences.

Staff raised questions with regard to program need and how the program aims to address shortages of mental health professionals. Inquiries were also shared regarding the projected enrollment for a Master's degree program that is limited only to clinical practitioners holding a terminal degree. In response, ISU indicated there is a shortage of psychologists in Idaho who can prescribe medication. Having a program that would allow psychologists to prescribe medications would address that gap in health care. Staff also shared questions regarding any potential plans for a professional fee. While ISU is not proposing a fee initially, ISU may consider this option in the future if more distance learning components are added.

The proposal completed the program review process and was presented to the Council on Academic Affairs and Programs (CAAP) on November 15, 2018; and to the Committee on Instruction, Research, and Student Affairs (IRSA) on November 29, 2018.

Legislative funding for the program was allocated prior to submission of the program proposal. Board staff recommends approval.

BOARD ACTION

I move to approve the request by Idaho State University to add an M.S. in Clinical Psychopharmacology Program as presented.

Moved by _____ Seconded by _____ Carried Yes _____ No _____

Institutional Tracking No. 2018-08

**Idaho State Board of Education
Proposal for Undergraduate/Graduate Degree Program**



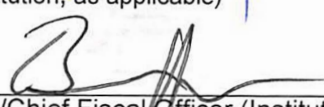
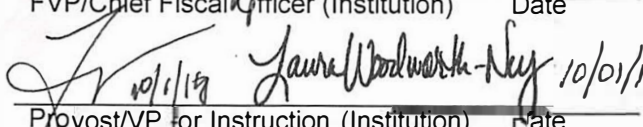

Date of Proposal Submission:	
Institution Submitting Proposal:	Idaho State University
Name of College, School, or Division:	Kasiska Division of Health Sciences
Name of Department(s) or Area(s):	College of Pharmacy

Program Identification for Proposed New or Modified Program:

Program Title:	Master of Science in Clinical Psychopharmacology			
Degree:	M.S.	Degree Designation	Undergraduate	<input checked="" type="checkbox"/> Graduate
Indicate if Online Program:			<input checked="" type="checkbox"/> No	
CIP code (consult IR /Registrar):	42.2801 (Clinical Psychopharmacology)			
Proposed Starting Date:	Fall, 2019			
Geographical Delivery:	Location(s)	Meridian	Region(s)	III
Indicate (X) if the program is/has:	<input type="checkbox"/> Self-Support		<input type="checkbox"/> Professional Fee	
Indicate (X) if the program is:	<input checked="" type="checkbox"/> Regional Responsibility		<input type="checkbox"/> Statewide Responsibility	

Indicate whether this request is either of the following:

- | | |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| <input checked="" type="checkbox"/> New Degree Program | <input type="checkbox"/> Consolidation of Existing Program |
| <input type="checkbox"/> Undergraduate/Graduate Certificates (30 credits or more) | <input type="checkbox"/> New Off-Campus Instructional Program |
| <input type="checkbox"/> Expansion of Existing Program | <input type="checkbox"/> Other (i.e., Contract Program/Collaborative) |

 10/1/18
 College Dean (Institution) _____ Date _____
 10/4/18
 Graduate Dean or other official (Institution, as applicable) _____ Date _____
 10/31/18
 FVP/Chief Fiscal Officer (Institution) _____ Date _____
 10/1/18
 Provost/VP for Instruction (Institution) _____ Date _____
 10-4-18
 President _____ Date _____

Vice President for Research (Institution; as applicable) _____ Date _____
 Academic Affairs Program Manager, OSBE _____ Date _____
 Chief Academic Officer, OSBE _____ Date _____
 SBOE/Executive Director Approval _____ Date _____

Before completing this form, refer to Board Policy Section III.G., Postsecondary Program Approval and Discontinuance. This proposal form must be completed for the creation of each new program. All questions must be answered.

Rationale for Creation or Modification of the Program

- 1. Describe the request and give an overview of the changes that will result.** Will this program be related or tied to other programs on campus? Identify any existing program that this program will replace.

This proposal requests the creation of a new master's degree in clinical psychopharmacology (MSCP) which will provide Ph.D. educated clinical psychologists with the additional training required to be eligible to prescribe medications as part of their treatment of patients with mental and behavioral health disorders, according to Idaho State law. This specialized postdoctoral education and training program has evolved over the past two decades around the country to address the shortage of mental health professionals. In April of 2017, Idaho became the fifth state to authorize clinical psychologists with advanced specialized training (i.e., an M.S. in Clinical Psychopharmacology) to prescribe medications as part of their treatment plans, thereby improving access to a wider range of mental health services to all of the citizens of our state, including those in rural areas. As of 2018, there are only three functioning programs in the United States providing the MSCP that have also been *designated* by the American Psychological Association (APA) as meeting quality assurance standards for this specialized degree. Such designation is akin to professional accreditation and signifies that a program meets the highest standards for providing the training in psychopharmacology as is mandated by Idaho and other states with similar laws – New Mexico, Louisiana, Illinois, and Iowa. Two of these designated programs are online, and one uses a hybrid model of weekends and online components in an “executive training” format. One program is no longer accepting students because pending legislation in their state (Hawaii) did not pass. The proposed program at Idaho State University will be delivered in a live format on our Meridian campus and may also include Distance Learning (DL) components from Pocatello; it will involve faculty from a variety of disciplines, including pharmacy, nursing, and biological sciences. This program will be housed in the College of Pharmacy within the Kasiska Division of Health Sciences (KDHS) on the Meridian campus.

The proposed program will result in a clinical master's degree, and will draw upon academic resources from several departments and other established university entities, including ISU Clinics. Graduates will be prepared to meet the requirements for prescriptive authority outlined by legislation passed in 2017; our graduates will serve state-wide as well as national needs related to mental and behavioral health, in those jurisdictions where psychologists have been given prescriptive authority. This program will also increase the potential for interprofessional collaborations among faculty and students within as well as outside the KDHS and will use resources currently employed in the training of pharmacy, nursing, and other health sciences students in mental health-related areas.

This program will also capitalize on several existing courses currently offered through the KDHS and the Department of Biological Sciences at ISU, including courses and faculty in other programs such as M.S. in Physician Assistant Studies (MPAS), Doctorate in Nursing Practice (DNP), and Doctor of Pharmacy (PharmD). Courses in the first semester of the first year will include biochemistry, anatomy, physiology, and pathophysiology. Basic pharmacology courses delivered by faculty in the College of Pharmacy as well as a physical assessment course provided by the DNP program will also be critical components of the first year of the program. Give the current emphasis on interprofessional education and practice in the KDHS, the addition of clinical psychology students to will provide an enriched educational experience and corresponding increase in interprofessional educational opportunities for all students and faculty.

This is a new master's program and will not replace or duplicate any other program.

2. Need for the Program. Describe the student, regional, and statewide needs that will be addressed by this proposal and address the ways in which the proposed program will meet those needs.

- a. Workforce need:** Provide verification of state workforce needs that will be met by this program. Include State and National Department of Labor research on employment potential. Using the chart below, indicate the total projected annual job openings (including growth and replacement demands in your regional area, the state, and nation. Job openings should represent positions, which require graduation from a program such as the one proposed. Data should be derived from a source that can be validated and must be no more than two years old.

State and national workforce data are not available for **prescribing** clinical psychologist positions, as this new credential represents an enhanced scope of practice within clinical psychology and is relatively new and growing. It is intended to help fill the gap in ever-growing mental health care needs in the state and around the country. According to national statistics, employment of clinical psychologists is projected to grow 14% from 2016 to 2026, which is faster than the average for all occupations. According to the U.S. Bureau of Labor Statistics job prospects *are best for those who have a doctoral degree in an applied specialty.* (<https://www.bls.gov/ooh/life-physical-and-social-science/psychologists.htm>).

Although statistics on prescribing psychologists are unavailable, it may be helpful to consider a similar field, psychiatry, to shed light on the potential need. The demand for psychiatrists has risen substantially in recent years and is currently at an all-time high, according to an annual report tracking physician-recruiting trends. The 2015 Review of Physician and Advanced Practitioner Recruiting Incentives, by Merritt Hawkins, an AMN Company that is the nation's leading physician search firm, found that psychiatrists were **second only to primary care doctors** on the list of the 20 most in-demand medical specialties. The report indicates that Merritt Hawkins was retained to conduct more searches for psychiatrists in the last year than in any other similar period in the company's 27-year history. The federal government has designated 3,968 whole or partial counties as Health Professional Shortage Areas (HPSAs) for mental health, defined as areas where there is less than one psychiatrist per 30,000 people. In Texas alone, 185 of 254 counties have no general psychiatrist, according to separate Merritt Hawkins report. Disparities by state are dramatic. While Massachusetts has 18 psychiatrists per 100,000 population, **Idaho has only five.** Approximately 40% of psychiatrists are projected to retire over the next five years, with few new practitioners available to take their place. (<https://www.amnhealthcare.com/high-demand-for-psychiatrists/>)

Another related field to consider is that of mental health and substance abuse social workers. According to the Idaho Department of Labor's Communication and Research Division, mental health and substance abuse social workers were the #4 open job listing as of December 2017. According to the Suicide Prevention Action Network of Idaho, suicide is the 2nd leading cause of death for Idahoans age 15-34 and for males up to age 44. Our state is consistently among the states with the highest suicide rates. In 2016, Idaho had the 8th highest suicide rate in the country, 57% higher than the national average. A lack of access to mental health services has been cited as a contributing factor to these statistics. (<https://www.spanidaho.org/idaho-suicide-facts>)

Taken together, these factors indicate a high need for qualified mental health practitioners in our state and nationally. Clinical psychologists with an MSCP degree will be very important for addressing these ongoing and growing needs, as this specialty degree will allow for these practitioners to prescribe medications in the course of their practice, to complement their full-array of cognitive and behavioral interventions. The program at ISU is positioned to be truly unique in the

country, in that ours will be a traditional “bricks and mortar” program that will include interprofessional components and allow MSCP students to attend the same classes as physician assistant, nursing, and pharmacology students. The background in basic and biomedical sciences will be greatly enhanced by the availability of the Treasure Valley Anatomy and Physiology Lab in Meridian. Our different health sciences students will train together in many settings, learning from, with, and about each other as they prepare for careers in their respective fields.

List the job titles for which this degree is relevant: Clinical psychologist.

- b. Student need.** What is the most likely source of students who will be expected to enroll (full-time, part-time, outreach, etc.)? Document student demand by providing information you have about student interest in the proposed program from inside and outside the institution. If a survey of students was used, please attach a copy of the survey instrument with a summary of results as **Appendix A**.

This program will consist of full-time students in a traditional 2-year master’s degree format and will be housed in the College of Pharmacy and headquartered on the Meridian campus. Similar to other master’s degrees in the health sciences (i.e., Public Health), some students may opt to complete the degree working part-time. Our program will be able to accommodate both approaches to degree completion. Since only students who have already completed doctoral degree in psychology are eligible for admission, it is likely that several students will already be in clinical practice and are seeking this degree for the added credential and the ability to prescribe medications. According to different published surveys, between 30 and 60% of practicing clinical psychologists have indicated an interest in pursuing this degree (Tompkins and Johnson, What Oregon Psychologists Think and Know About Prescriptive Authority, *Journal of Applied Behavioral Research*, 2016). In addition, a senior officer from the U.S. Navy has indicated a desire to send 2 active-duty practicing clinical psychologists per year to a rigorous full-time program to receive this training. The fact that the MSCP program at ISU will be the only traditional “bricks and mortar” program of its type in the country is a critical factor in such a decision (see attached letters from Page Haviland, Ph.D., Past-President of the Idaho Psychological Association and LCDR Yaron Rabinowitz, Psychopharmacology Subspecialty Leader, US Navy). As Lt. Commander Rabinowitz indicates, it is likely that other branches of the armed forces may likewise utilize our traditional, advanced and interdisciplinary program for their training needs.

The initial student cohort for the program is difficult to estimate, but given the 23 responses received on our survey from current Ph.D. students and practicing psychologists in Idaho who stated they are either “moderately” or “very interested” in enrolling in ISU’s program, we expect there to be at least 4 students in the inaugural class of Fall 2019, with the growth up to 10-12 students per year over the next several years. The US Navy has indicated that they plan to send 2 students per year starting in Fall 2020. According to past leadership from the Idaho Psychological Association, there will be ongoing demand for this program from professionals around the state and region. Given the uniqueness of this program, including its interprofessional approach and being housed in the KDHS, as well as its rigor and traditional format, we believe there will also be applicants from around the country.

Survey data from current Ph.D. students in ISU’s Clinical Psychology program, as well as survey data from practicing psychologists in Idaho (sent via email using Survey Monkey to membership of Idaho Psychological Association), and a random sample of attendees visiting the ISU Exhibit from the American Psychological Association’s National Convention held in San Francisco from August 8-11, 2018 is included in Appendix A. (survey instrument using Survey Monkey and results summary, Idaho; survey instrument from paper survey conducted at APA national meeting; results summary). These data show that there is interest among current practitioners and students at ISU in this program, as well as interest across the country in the proposed program from attendees at

the APA meeting.

- c. Economic Need:** Describe how the proposed program will act to stimulate the state economy by advancing the field, providing research results, etc.

The proposed program will act to stimulate the state's economy in a number of ways. It advances the efforts to fill the state's workforce needs for in-demand mental health clinical professions, who increasingly need to have the option to prescribe medications in the course of their patients' treatment. In so doing, there will be increased access to necessary health care for more of the state's population and better treatments for mental and behavioral health disorders for more people. Research has suggested that improving mental health also leads to better economic outcomes. In a study from the World Health Organization published in 2014 and published in *The Lancet Psychiatry*, it was estimated that every U.S. dollar invested in mental health treatment could have a quadruple return on investment in terms of work productivity (Chisholm D, Sweeny K, Sheehan P, et al. Scaling-up treatment of depression and anxiety: a global return on investment analysis. *Lancet Psychiatry* 2016;3:415-24). By enabling better and more expansive mental and behavioral health treatments, people are able to live happier and more productive lives, economic and otherwise.

- d. Societal Need:** Describe additional societal benefits and cultural benefits of the program.

As previously stated, the need for more mental and behavioral health practitioners is well established. Mental and behavioral health problems are very common in the U.S. and around the world and are growing in prevalence. According to the National Alliance on Mental Illness (NAMI), it is estimated that half of all Americans will be diagnosed with a mental illness or disorder at some point in their lifetime <https://www.nami.org/Learn-More/Mental-Health-By-the-Numbers>. Mental illnesses are the third most common cause of hospitalization in the United States for those aged 18-44 years old, and adults living with serious mental illness die on average 25 years earlier than others. https://www.cdc.gov/mentalhealth/data_publications/index.htm Suicide risk is a related concern and a correspondingly growing public health issue in the U.S. in general and in Idaho particularly. The suicide rate in Idaho was 57 percent higher than the national average, according to the Idaho Department of Health and Welfare. Idaho is ranked #8 among states with the highest suicide rate. According to the Substance Abuse and Mental Health Services Administration, in 2015, an estimated 243,000 Idahoans reported any mental illness in the past year. Between 2009 and 2013, 54 percent of Idahoans reporting mental illness in the past year did not receive treatment. The societal need for mental health care is clear and growing.

The proposed program will train practitioners to have an expanded scope of practice for treating their patients.

- e. If Associate's degree, transferability:** This program does not result in an Associate's degree.

- 3. Similar Programs.** Identify similar programs offered within Idaho and in the region by other in-state or bordering state colleges/universities.

There are no similar programs in Idaho or surrounding states.

*The following table includes all other MSCP Programs available in the U.S. APA Designated program are indicated with an *.*

See <http://www.apa.org/education/grad/designation.aspx>

Similar programs in other states:

Similar Programs offered by institutions in other states		
State	Degree name and Level	Program Name and brief description if warranted
California	MS in Clinical Psychopharmacology	California School of Professional Psychology Alliant International University* San Francisco, CA <i>Online Program</i>
Florida	MS in Clinical Psychopharmacology	College of Psychology Nova Southeastern University Fort Lauderdale, FL <i>Executive Program</i>
Illinois	MS in Clinical Psychopharmacology	The Chicago School of Professional Psychology Chicago, IL <i>Online</i>
New Jersey	MS in Clinical Psychopharmacology	School of Psychology Fairleigh Dickinson University* Teaneck, NJ <i>Online Program</i>
New Mexico	MS in Clinical Psychopharmacology	College of Education New Mexico State University* Las Cruces, NM <i>Executive Program</i>

**Note: The American Psychological Association (APA) designation indicates that programs have been judged by the APA Designation Committee to be consistent substantively and procedurally with the Designation Criteria for Education and Training Programs in Preparation for Prescriptive Authority for clinical psychologists.*

4. Justification for Duplication with another institution listed above. (if applicable).

If the proposed program is similar to another program offered by an Idaho public institution, provide a rationale as to why any resulting duplication is a net benefit to the state and its citizens. Describe why it is not feasible for existing programs at other institutions to fulfill the need for the proposed program.

N/A

5. Describe how this request supports the institution’s vision and/or strategic plan.

This MSCP program will be part of the College of Pharmacy within the Kasiska Division of Health Sciences and will support a legislative mandate to increase the scope of practice of mental health practitioners in the state. The completion of this degree will allow for practicing clinical psychologists to prescribe psychotropic medications to their patients in the course of appropriate treatment and in accordance with state law. With the passage of House Bill 212 in 2017, Idaho became one of the first states to allow this expanded scope of practice for clinical psychologists, an action that was praised by the leadership of the American Psychological Association (APA): “Access to appropriate mental health treatment is important throughout the United States, but is particularly critical in Idaho due to the shortage of psychiatrists, long waiting times and a high suicide rate,” said APA President Antonio E. Puente, PhD. “This law will enhance access for many Idahoans who face challenges getting treatment for their mental health conditions.”

<http://www.apa.org/monitor/2017/06/idaho.aspx>

The third of the Four Core Themes of Idaho State University's Strategic Plan is **Leadership in the Health Sciences**. ISU is an innovator and works to advance many different professions in the health sciences to better serve patients. This new MSCP program clearly supports our mission to prepare healthcare professionals to meet the medical needs of our state and the nation. As the first traditional, "bricks and mortar" program of its kind in the U.S., and with its greater emphasis on interprofessional education and a strong biomedical focus, this MSCP degree will become the gold standard of clinical psychopharmacology education and training. By leveraging our resources throughout the KDHS and working in partnership with our many established clinical training sites and preceptors, we will be able to provide an educational experience unlike anything that is currently available in this field. In addition, our interprofessional course offerings will enhance not only the education of students in the MSCP program, but our other health sciences students as well by providing opportunities for students from different health professions to learn from, with, and about each other and to experience first-hand how all of the different professional health care roles contribute to optimal patient care.

6. Assurance of Quality. Describe how the institution will ensure the quality of the program. Describe the institutional process of program review. Where appropriate, describe applicable specialized accreditation and explain why you do or do not plan to seek accreditation.

The quality of the MSCP program will be ensured through monitoring at several different levels. First, the graduate programs at ISU are governed by the Graduate School, which oversees all activities related to degree implementation, administration, and completion. All requirements, academic procedures and policies will be approved by the Graduate Council prior to initiation of the program. Second, the Kasiska Division of Health Sciences (KDHS) mandates that all programs undergo regular program review, and a schedule of this review is maintained by the ISU Office of Academic Affairs and monitored by the KDHS. Third, the Northwest Commission on Colleges and Universities is the accrediting body for ISU, and mandates review of programs within the university. Fourth, this M.S. program in Clinical Psychopharmacology will undergo the voluntary process of Prescriptive Authority Program Designation administered by the American Psychological Association (APA). The purpose of designation is "to afford public recognition of education and training programs that meet certain minimum standards and published criteria."

<http://www.apa.org/education/grad/designation.aspx>

APA Program designation was initially established in 1996 and the latest revisions were completed in 2009. The criteria include the outline of a model curriculum, including didactic and experiential components and provide guidance for ensuring that the education and training provided by designated programs "reflects the integration of research literature and practice experience on the relationship between psychopharmacological and psychological interventions." In addition, the "standards are also designed specifically to meet the needs of practicing psychologists and their patients...by describing the minimum requirements for this training." Designation must be renewed every 5 years.

Further assurance of the quality of the program will be realized in the application and admissions process for the program, which will include the following:

Students must have earned a doctoral degree in psychology (Ph.D. or Psy.D.) from an accredited program and institution. Students must also have current licensure as a psychologist, and have practiced as a health services provider as defined by state law, where applicable, or by the APA. A minimum GPA of 3.0 will be required and official transcripts must be submitted with application materials. Any coursework completed more than 7 years prior to applying to the program, will require special review and may not be accepted. Three letters of professional recommendation from faculty or

professional colleagues are required, along with a statement of intent by the applicant in which details of their desire for earning this degree must be described. All program applicants will be interviewed by an interdisciplinary KDHS admissions committee, which will consist of at least one member from the following departments: Pharmacy Practice, Biomedical and Pharmaceutical Sciences, and Nursing. Additional committee members may be drawn from other KDHS programs and/or the Department of Psychology.

7. In accordance with Board Policy III.G., an external peer review is required for any new doctoral program. Attach the peer review report as Appendix B.

N/A

8. Teacher Education/Certification Programs All Educator Preparation programs that lead to certification require review and recommendation from the Professional Standards Commission (PSC) and approval from the Board.

Will this program lead to certification?

Yes ___ No x

If yes, on what date was the Program Approval for Certification Request submitted to the Professional Standards Commission?

9. Three-Year Plan: Is the proposed program on your institution's approved 3-year plan? Indicate below.

Yes x No _____

Proposed programs submitted to OSBE that are not on the three-year plan must respond to the following questions and meet at least one criterion listed below.

- a. **Describe why the proposed program is not on the institution's three year plan.** When did consideration of and planning for the new program begin?
- b. **Describe the immediacy of need for the program.** What would be lost were the institution to delay the proposal for implementation of the new program until it fits within the five-year planning cycle? What would be gained by an early consideration?

Criteria. As appropriate, discuss the following:

- i. How important is the program in meeting your institution's regional or statewide program responsibilities? Describe whether the proposed program is in response to a specific industry need or workforce opportunity.
- ii. Explain if the proposed program is reliant on external funding (grants, donations) with a deadline for acceptance of funding.
- iii. Is there a contractual obligation or partnership opportunity to justify the program?
- iv. Is the program request or program change in response to accreditation requirements or recommendations?
- v. Is the program request or program change in response to recent changes to teacher certification/endorsement requirements?

Curriculum, Intended Learning Outcomes, and Assessment Plan

10. Curriculum for the proposed program and its delivery.

- a. **Summary of requirements.** Provide a summary of program requirements using the following table.

Credit hours in required courses offered by the department (s) offering the program.	24
Credit hours in required courses offered by other departments:	18
Credit hours in institutional general education curriculum	N/A
Credit hours in free electives	0
Total credit hours required for degree program:	42

- b. **Curriculum.** Provide the curriculum for the program, including a listing of course titles and credits in each.

Year 1

Semester	Course Number	Course Name	Credits
Fall	BIOL 66XX	Anatomy & Physiology for Clinicians	3
	NURS 6620	Advanced Human Pathophysiology	3
	BIOL 66XX (30*)	Biochemistry and Cell Biology for Clinicians	3
	RXPP 6602	Intro to Prescribing Psychologist	1
	Total		
Spring	NURS 6611 & L	Advanced Health Assessment & Lab	6
	PHAR 66XX	Basic Clinical Pharmacology	3
	PHAR 66XX	Clinical Neuropharmacology	3
	Total		
Summer	RXPP 6603	Supervised Clinical Experience I	1
Total for Year 1			23

Year 2

Semester	Course Number	Course Name	Credits
Fall	RXPP 6604	Integrated Psychopharmacotherapy I	3
	RXPP 6605	Integrated Psychopharmacotherapy II	3
	RXPP 6606	Integrated Psychopharmacotherapy III	3
	Total		
Spring	MPH 6640	Research & Writing in Health	3
	RXPP 6607	Professional & Legal Issues for Prescribing Psychologists	3
	RXPP 6608	Psychopharmacology Capstone	3

		Total	9
Summer	RXPP 6610	Supervised Clinical Experience I	1
		Total for Year 2	19
		Total	42

c. Additional requirements. Describe additional requirements such as comprehensive examination, senior thesis or other capstone experience, practicum, or internship, some of which may carry credit hours included in the list above.

In addition to the didactic curriculum included above, students must successfully complete two (2) supervised clinical experiences: a 100-hour introductory clinical experience between year one and year two of the program (RXP 6603) and a 400-hour advanced clinical experience starting in the spring of second year of the program of study that must be completed prior to graduation (RXP 6610). These experiences will require an approved site and a licensed prescribing professional as the supervisor. The *introductory* supervised clinical experience requires that a student complete 100 hours in a healthcare setting during which time they are supervised by a physician or other healthcare practitioner as allowed by Idaho law and is designed to introduce the student to basic physical assessment and laboratory and other diagnostic test interpretation. The *advanced* supervised clinical experience requires a minimum of 400 hours of supervised provision of psychopharmacotherapy, including psychotropic medications and psychotherapy as appropriate in both an inpatient and an outpatient setting. These hours must be completed in conjunction with enrollment in PHAR 6603 and PHAR 6610, respectively. Clinical supervision will be provided by full-time and affiliate faculty who are licensed practitioners who have prescriptive authority and expertise in psychotropic medications (more details will be included in the Supervised Clinical Experiences Handbook for the program).

A Capstone Examination will be administered as a comprehensive final examination, following the completion of the didactic curriculum. Students must have completed at least 120 of the 400 required hours of the advanced clinical experience prior to the exam. The Capstone Examination will cover the core areas of the curriculum and include patient case presentation and discussion. The examination will be similar to the type and rigor required of DNP and PA students and will be graded by a panel of three faculty members, one from the College of Pharmacy (Pharmacy Practice Department), one from the College of Nursing (DNP Program), and one from College of Health Professions (PA Program).

11. Program Intended Learning Outcomes and Connection to Curriculum.

a. Intended Learning Outcomes. List the Intended Learning Outcomes for the proposed program, using learner-centered statements that indicate what will students know, be able to do, and value or appreciate as a result of completing the program.

Graduate students completing the MSCP will:

- a. have the knowledge and ability to conduct comprehensive and focused physical examination and mental status evaluation, including demonstration of the proper use of instrumentation.
- b. have the knowledge and ability to systematically describe and integrate information gathered from patient reports, signs, symptoms, and a review of each of the major body systems, recognizing normal developmental variations.
- c. be able to conduct a patient/caregiver clinical interview producing a patient's medical, surgical, and psychiatric history and medication history in appropriate

cultural and family contexts and communicate findings in written and verbal formats.

- d. be able to order and interpret appropriate tests (e.g., psychometric, laboratory, and radiological) for the purpose of making a differential diagnosis and for monitoring therapeutic and adverse effects of treatment.
- e. Be able to utilize appropriate processes, including established diagnostic criteria (e.g., ICD-10, DSM-V) to determine primary and alternative diagnoses.
- f. Identify and select, using all available data, the most appropriate treatment alternatives, including medication, psychosocial, and combined treatments and to sequence treatment appropriately in a larger biopsychosocial context.
- g. Understand the parameters of the role of the prescribing psychologist and be able to work with other professionals in an advisory or collaborative manner to effect the treatment of a patient.
- h. Be able to apply, monitor, and modify, as needed, treatments and writing of valid and complete prescriptions.

12. Assessment plans

- a. **Assessment Process.** Describe the assessment process that will be used to evaluate how well students are achieving the intended learning outcomes of the program.

Student preparedness for the expanded scope of practice which is the goal of this program will be determined based on the demonstrated achieved core knowledge and competencies set by the American Psychological Association (APA) in their guidance document entitled "Recommended Postdoctoral Education and Training Program in Psychopharmacology for Prescriptive Authority," last updated in 2009. This guidance emphasizes core competencies that are holistic and represent knowledge of subject matter and procedures, performance of behaviors that demonstrate specific skills and abilities, problem solving strategies and capabilities that involve elements of critical thinking and ethical responsibility, and self-reflection that focuses on knowing the limits of one's knowledge; clarification of attitudes, beliefs, and values; and identification of self-perceptions and motivations in the context of prescriptive authority. <https://www.apa.org/about/policy/rxp-model-curriculum.pdf>

To ensure that all students are adequately prepared for prescriptive authority, a mix of formative and summative assessment activities will be employed to measure student learning and professional development. The educational outcomes described above will serve as the foundation from which assessments of curricular student learning activities will occur in supervised clinical settings. For the didactic curriculum, course grades will be utilized, as well as performance on annual knowledge-based comprehensive examinations to determine adequate progression through the program. The summative assessment at the end of year one will include items that represent foundational knowledge in the basic sciences, including neuroanatomy, neurophysiology, biochemistry, and pharmacology. The summative assessment at the end of the second year will include elements of physical assessment and therapeutic principles. Failure on either of these summative assessments will halt a student's progress and trigger remediation in identified areas of weakness.

Students will likewise be assessed throughout the program through case studies, oral presentations, examinations, and other related coursework. The final oral examination will also be used as a summative evaluation of curricular programming in preparation for prescriptive authority, as well as to determine the depth of understanding and ability to apply statistical analysis, principles of research, and clinical judgment. Course and instructor evaluations, program exit interviews, and post-graduate surveys will be used to further evaluate the program and learning outcomes.

Typically, standardized performance examinations also provide objective benchmarks for

comparison of overall curricular success for professional programs when aggregated by class year. The major examination for this purpose for this program will be the Psychopharmacology Examination for Psychologists (PEP). Pass rates on this exam will also be tracked annually.

- b. Closing the loop.** How will you ensure that the assessment findings will be used to improve the program?

Course evaluation results will be provided to each instructor to be used for course improvement. Data collected from supervised clinical practice sites will be used to improve the clinical experience and ensure that competencies are being met. The program exit interview and post-graduation survey data will be used to evaluate the program in general from the perspective of graduates. Preceptors and clinical supervisors will also be able to provide input to program leadership for quality assurance and improvement purposes. Information collected from this variety of sources will be reviewed by a program assessment committee on an annual basis and shared with program faculty and utilized to revise and update the curriculum as appropriate to best meet the needs of students and the community served.

- c. Measures used.** What direct and indirect measures will be used to assess student learning?

Direct assessment measures will include examinations, case study write-ups, presentations, and competency evaluations during supervised clinical experiences. Indirect measures will include clinical site evaluations, exit interviews, and post-graduation surveys.

- d. Timing and frequency.** When will assessment activities occur and at what frequency?

Course assessments will occur at the end of each course. At the conclusion of each supervised practice experience, students will complete an evaluation. An exit interview will occur at the end of the student's final semester. For most students this will be the Spring semester (semester 4). The post-graduation survey will be conducted one year following graduation.

Enrollments and Graduates

13. Existing similar programs at Idaho Public Institutions. Using the chart below, provide enrollments and numbers of graduates for similar existing programs at your institution and other Idaho public institutions.

N/A

Existing Similar Programs: Historical enrollments and graduate numbers								
Institution and Program Name	Fall Headcount Enrollment in Program				Number of Graduates From Program (Summer, Fall, Spring)			
	FY_15_	FY_16_	FY_17_	FY_18_ (most recent)	FY14 —	FY_15_	FY_16_	FY_17_ (most recent)

14. Projections for proposed program: Using the chart below, provide projected enrollments and number of graduates for the proposed program:

Proposed Program: Projected Enrollments and Graduates First Five Years											
Program Name: MS Clinical Psychopharmacology											
Projected Fall Term Headcount Enrollment in Program						Projected Annual Number of Graduates From Program					
FY_19 (first year)	FY_20	FY_21	FY_22	FY_23	FY_24	FY_19 (first year)	FY_20	FY_21	FY_22	FY_23	FY_24
4	8	10	12	14	18	0	4	4	6	6	6

15. Describe the methodology for determining enrollment and graduation projections. Refer to information provided in Question #2 “Need” above. What is the capacity for the program? Describe your recruitment efforts. How did you determine the projected numbers above?

Based on survey data from current students in the Clinical Psychology Ph.D. program and practitioners in the state, we project enrolling 4 students for the inaugural class and then 4-6 per year for the following two years. The U.S. military is also interested in a traditional M.S. program such as ours and the Navy has indicated its intention to send 2 students to Meridian per year, starting in Fall 2020 (see letter from LCRD Rabinowitz in Appendices). He is also confident that other branches of the military and the Public Health System may likewise follow suit. We also intended to develop our Distance Learning capacity in the next 2-3 years to allow students in Pocatello, Twin Falls, and Idaho Falls to also enroll. Our goal is at least 12 students per year.

16. Minimum Enrollments and Graduates.

- a. Have you determined minimums that the program will need to meet in order to be continued? What are those minimums, what is the logical basis for those minimums?

A minimum has not been determined at this point. We anticipate full enrollment of 12 students within the first four years. The program could still be successful at a lesser number.

- b. What is the sunset clause by which the program will be considered for discontinuance if the projections or expectations outlined in the program proposal are not met?

If it is determined that the program must be discontinued, the current cohort will be completed and no further cohorts enrolled. If necessary, students will be advised to transfer to an online graduate degree program to finish their education. Our program and structure is similar enough to existing programs to allow for transfer if necessary.

Resources Required for Implementation – fiscal impact and budget

17. Physical Resources.

- a. **Existing resources.** Describe equipment, space, laboratory instruments, computer(s), or other physical equipment presently available to support the successful implementation of the program.

The MSCP Program will have faculty office space in Meridian. Three faculty will be housed with Pharmacy and one with Nursing. Existing classroom space in Pharmacy and Nursing will be utilized for course offerings. The Treasure Valley Anatomy and Physiology Lab (TVAPL) will be utilized in the first year to complete prosection and other lab requirements of anatomy and physiology courses. Common spaces for group study and small group work in the Meridian Health Sciences Complex will be available for MSCP students as well. A Health Science Library and librarian are available for all KDHS students.

- b. **Impact of new program.** What will be the impact on existing programs of increased use of physical resources by the proposed program? How will the increased use be accommodated?

With the projected 4 students for the first cohort, the initial impact will be minimal. As the program grows to its target of 12 new incoming students per year over the following 5 years, additional classroom space will need to be determined. As this program is meant to meet the needs of the state of Idaho, DL capability to Pocatello, Twin Falls, Idaho Falls, and other sites will be explored. Current office space and equipment, as noted above, is adequate for the anticipated increase. Additional DL technicians and equipment may be needed and these will be assessed and covered as part of a professional fee for MSCP students.

- c. **Needed resources.** List equipment, space, laboratory instruments, etc., that must be obtained to support the proposed program. Enter the costs of those physical resources into the budget sheet.

Students in the MSCP program will be integrated into courses with pharmacy, PA, and nursing students in their first year. The second didactic year will utilize pharmacy classrooms and spaces. Given that PharmD courses do not begin before 10 AM (due to the need to accommodate Anchorage-based students via DL), pharmacy classrooms are available from 8 -10 AM Monday through Friday. These rooms are DL equipped. Additional DL personnel will likely be needed as the need increases, a professional fee may become necessary if DL and/or online components are added.

18. Library resources

- a. **Existing resources and impact of new program.** Evaluate library resources, including personnel and space. Are they adequate for the operation of the present program? Will there be an impact on existing programs of increased library usage caused by the proposed program? For off-campus programs, clearly indicate how the library resources are to be provided.

This program will capitalize on current course offerings at ISU, including in pharmacy, nursing, and public health, as well as biological sciences. Resources available in the Health Sciences Library, including journals and databases (e.g., *UpToDate*) used across the Kasiska Division of Health Sciences for other health science programs, including but not limited to, nursing, physician assistant, medicine, exercise science, counseling, speech and language pathology, pharmacy, along with existing dietetics programs will meet program needs.

- b. **Needed resources.** What new library resources will be required to ensure successful implementation of the program? Enter the costs of those library resources into the budget

sheet.

No additional resources will be needed. The electronic journals and databases for other health sciences students are sufficient for the additional 4-10 MSCP students per year who will be enrolled.

19. Personnel resources

- a. Needed resources.** Give an overview of the personnel resources that will be needed to implement the program. How many additional sections of existing courses will be needed? Referring to the list of new courses to be created, what instructional capacity will be needed to offer the necessary number of sections?

Anticipated personnel resources needed include 4.2 FTE of faculty and 1.0 FTE of administrative support personnel. There will be 3 new faculty in the College of Pharmacy: two in the Department of Pharmacy Practice and Administrative Sciences (one of whom will be the Training Director and also have a joint appointment with the Clinical Psychology Department), and one in the Biomedical and Pharmaceutical Sciences Department. One new faculty member will be in the College of Nursing. A part-time medical director (0.2 FTE) will have an appointment with the Department of Family Medicine. Adjunct faculty will be used for additional faculty participation in curriculum delivery from the Department of Biological Sciences. All of these faculty lines are supported by new appropriated funds to the KDHS.

Affiliate faculty will be needed for supervised clinical experiences. Practicing physicians and other providers in the community will perform these responsibilities, with appropriate support and preceptor development provided by the program's training director. Clinical supervision will be provided by full-time and affiliate faculty who are licensed practitioners in Idaho (or the state in which the experience is based) who have prescriptive authority and expertise in psychotropic medications.

- b. Existing resources.** Describe the existing instructional, support, and administrative resources that can be brought to bear to support the successful implementation of the program.

The College of Pharmacy and the College of Nursing already have a number of faculty and administrative support personnel to support this new program. This is in addition to the FTEs previously described that have been allocated. The MSCP program will be housed in the College of Pharmacy and pharmacy-based faculty will be part of the Department of Pharmacy Practice or Biomedical and Pharmaceutical Sciences. One faculty member will be housed in the College of Nursing. Department Chairs of respective departments will provide mentorship and professional support and development. Additional faculty from the Kasiska Division of Health Sciences, including from pharmacy, nursing, public health, and family medicine will help to deliver the curriculum and space in Leonard Hall and the Skagg's Meridian Health Sciences Center will be utilized for classroom and faculty office space. The Treasure Valley Anatomy and Physiology Lab will provide laboratory experiences in conjunction with course offerings in the first year of the program.

- c. Impact on existing programs.** What will be the impact on existing programs of increased use of existing personnel resources by the proposed program? How will quality and productivity of existing programs be maintained?

This is a new program with sufficient resources available from the state appropriation for start-up and maintenance. The impact on other programs in the Kasiska Division of Health Sciences will be favorable in that clinical psychologists will be represented in interprofessional activities and events.

- d. **Needed resources.** List the new personnel that must be hired to support the proposed program. Enter the costs of those personnel resources into the budget sheet.

Full-time faculty: pharmacist, psychiatric nurse practitioner, professor,
Full-time program director
Full-time administrative assistant
Part-time psychiatrist/medical director
Adjunct faculty

20. Revenue Sources

- a. **Reallocation of funds:** If funding is to come from the reallocation of existing state appropriated funds, please indicate the sources of the reallocation. What impact will the reallocation of funds in support of the program have on other programs?

Reallocation of funds is not needed.

- b. **New appropriation.** If an above Maintenance of Current Operations (MCO) appropriation is required to fund the program, indicate when the institution plans to include the program in the legislative budget request.

Appropriation received as of July 1, 2018.

- c. **Non-ongoing sources:** Not applicable

- i. If the funding is to come from one-time sources such as a donation, indicate the sources of other funding. What are the institution's plans for sustaining the program when that funding ends?
- ii. Describe the federal grant, other grant(s), special fee arrangements, or contract(s) that will be valid to fund the program. What does the institution propose to do with the program upon termination of those funds?

- d. **Student Fees:**

- i. If the proposed program is intended to levy any institutional local fees, explain how doing so meets the requirements of Board Policy V.R., 3.b.

Costs to students will be congruent with the current student fee structure for ISU Graduate Programs. The MSCP program will not charge a professional fee initially; but this may be necessary to add DL components to help with professional development for faculty and related travel and operating expenses.

- ii. Provide estimated cost to students and total revenue for self-support programs and for professional fees and other fees anticipated to be requested under Board Policy V.R., if applicable.

21. Using the budget template provided by the Office of the State Board of Education, provide the following information:

- Indicate all resources needed including the planned FTE enrollment, projected revenues, and estimated expenditures for the first **four** fiscal years of the program.
- Include reallocation of existing personnel and resources and anticipated or requested new resources.

- Second and third year estimates should be in constant dollars.
- Amounts should reconcile subsequent pages where budget explanations are provided.
- If the program is contract related, explain the fiscal sources and the year-to-year commitment from the contracting agency(ies) or party(ies).
- Provide an explanation of the fiscal impact of any proposed discontinuance to include impacts to faculty (i.e., salary savings, re-assignments).

Program Resource Requirements.

- Indicate all resources needed including the planned FTE enrollment, projected revenues, and estimated expenditures for the first **four** fiscal years of the program
- Include reallocation of existing personnel and resources and anticipated or requested new resources.
- Second and third year estimates should be in constant dollars.
- Amounts should reconcile subsequent pages where budget explanations are provided.
- If the program is contract related, explain the fiscal sources and the year-to-year commitment from the contracting agency(ies) or party(ies).
- Provide an explanation of the fiscal impact of any proposed discontinuance to include impacts to faculty (i.e., salary savings, re-assignments).

I. PLANNED STUDENT ENROLLMENT

	<u>FY 2020</u>		<u>FY 2021</u>		<u>FY 2022</u>		<u>FY 2023</u>	
	FTE	Headcount	FTE	Headcount	FTE	Headcount	FTE	Headcount
A. New enrollments	4	0	4	0	6	0	6	0
B. Shifting enrollments	0	0	4	0	4	0	6	0
Total Enrollment	4	0	8	0	10	0	12	0

II. REVENUE

	<u>FY 2020</u>		<u>FY 2021</u>		<u>FY 2022</u>		<u>FY 2023</u>	
	On-going	One-time	On-going	One-time	On-going	One-time	On-going	One-time
1. New Appropriated Funding Request	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
2. Institution Funds	\$672,100.00	\$22,000.00	\$691,754.03	\$0.00	\$711,877.67	\$0.00	\$739,323.06	\$0.00
3. Federal	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
4. New Tuition Revenues from Increased Enrollments	\$40,472.00	\$0.00	\$83,376.00	\$0.00	\$107,340.00	\$0.00	\$132,684.00	\$0.00
5. Student Fees	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00

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6. Other (i.e., Gifts)	<u>\$0.00</u>	<u>\$0.00</u>	<u>\$0.00</u>	<u>\$0.00</u>	<u>\$0.00</u>	<u>\$0.00</u>	<u>\$0.00</u>	<u>\$0.00</u>
Total Revenue	<u><u>\$712,572</u></u>	<u><u>\$22,000</u></u>	<u><u>\$775,130</u></u>	<u><u>\$0</u></u>	<u><u>\$819,218</u></u>	<u><u>\$0</u></u>	<u><u>\$872,007</u></u>	<u><u>\$0</u></u>

**Ongoing is defined as ongoing operating budget for the program which will become part of the base.
One-time is defined as one-time funding in a fiscal year and not part of the base.**

III. EXPENDITURES

	<u>FY 2020</u>		<u>FY 2021</u>		<u>FY 2022</u>		<u>FY 2023</u>	
	On-going	One-time	On-going	One-time	On-going	One-time	On-going	One-time
A. Personnel Costs								
1. FTE	<u>5.20</u>	<u>0.00</u>	<u>5.20</u>	<u>0.00</u>	<u>5.20</u>	<u>0.00</u>	<u>5.20</u>	<u>0.00</u>
2. Faculty	<u>281,819.20</u>	<u>0.00</u>	<u>290,273.78</u>	<u>0.00</u>	<u>298,981.99</u>	<u>0.00</u>	<u>307,951.45</u>	<u>0.00</u>
3. Adjunct Faculty	<u>57,253.15</u>	<u>0.00</u>	<u>57,253.15</u>	<u>0.00</u>	<u>57,253.15</u>	<u>0.00</u>	<u>57,253.15</u>	<u>0.00</u>
4. Graduate/Undergrad Assistants	<u>\$0.00</u>	<u>\$0.00</u>	<u>\$0.00</u>	<u>\$0.00</u>	<u>\$0.00</u>	<u>\$0.00</u>	<u>\$0.00</u>	<u>\$0.00</u>
5. Research Personnel	<u>\$0.00</u>	<u>\$0.00</u>	<u>\$0.00</u>	<u>\$0.00</u>	<u>\$0.00</u>	<u>\$0.00</u>	<u>\$0.00</u>	<u>\$0.00</u>
6. Directors/Administrators reallocated	<u>\$128,186.24</u>	<u>\$0.00</u>	<u>\$132,031.83</u>	<u>\$0.00</u>	<u>\$135,992.78</u>	<u>\$0.00</u>	<u>\$140,072.57</u>	<u>\$0.00</u>
7. Administrative Support Personnel reallocated	<u>\$27,664.00</u>	<u>\$0.00</u>	<u>\$28,493.92</u>	<u>\$0.00</u>	<u>\$29,348.74</u>	<u>\$0.00</u>	<u>\$30,229.20</u>	<u>\$0.00</u>
8. Fringe Benefits	<u>\$165,377.41</u>	<u>\$0.00</u>	<u>\$171,901.35</u>	<u>\$0.00</u>	<u>\$178,501.01</u>	<u>\$0.00</u>	<u>\$192,016.69</u>	<u>\$0.00</u>
9. Other:	<u>\$0.00</u>	<u>\$0.00</u>	<u>\$0.00</u>	<u>\$0.00</u>	<u>\$0.00</u>	<u>\$0.00</u>	<u>\$0.00</u>	<u>\$0.00</u>
Total Personnel and Costs	<u><u>\$660,300.00</u></u>	<u><u>\$0.00</u></u>	<u><u>\$679,954.03</u></u>	<u><u>\$0.00</u></u>	<u><u>\$700,077.67</u></u>	<u><u>\$0.00</u></u>	<u><u>\$727,523.06</u></u>	<u><u>\$0.00</u></u>

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	<u>FY 2020</u>		<u>FY 2021</u>		<u>FY 2022</u>		<u>FY 2023</u>	
	On-going	One-time	On-going	One-time	On-going	One-time	On-going	One-time
B. Operating Expenditures								
1. Travel	\$5,000.00	\$0.00	\$5,000.00	\$0.00	\$5,000.00	\$0.00	\$5,000.00	\$0.00
2. Professional Services	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
3. Other Services	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
4. Communications	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
5. Materials and Supplies	\$6,800.00	\$0.00	\$6,800.00	\$0.00	\$6,800.00	\$0.00	\$6,800.00	\$0.00
6. Rentals	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
7. Materials & Goods for Manufacture & Resale	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
8. Miscellaneous	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Total Operating Expenditures	<u>\$11,800</u>	<u>\$0</u>	<u>\$11,800</u>	<u>\$0</u>	<u>\$11,800</u>	<u>\$0</u>	<u>\$11,800</u>	<u>\$0</u>

	<u>FY 2020</u>		<u>FY 2021</u>		<u>FY 2022</u>		<u>FY 2023</u>	
	On-going	One-time	On-going	One-time	On-going	One-time	On-going	One-time
C. Capital Outlay								
1. Library Resources	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
2. Equipment	\$0.00	\$22,000.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Total Capital Outlay	<u>\$0</u>	<u>\$22,000</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>

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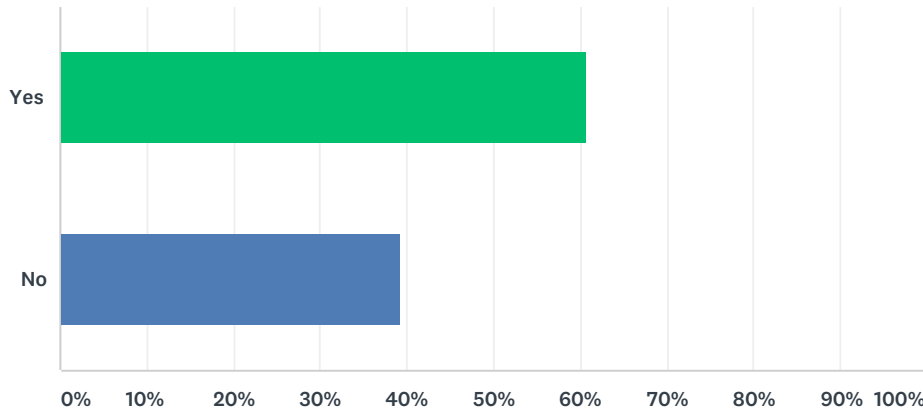
	<u>FY 2020</u>		<u>FY 2021</u>		<u>FY 2022</u>		<u>FY 2023</u>	
	On-going	One-time	On-going	One-time	On-going	One-time	On-going	One-time
D. Capital Facilities Construction or Major Renovation		\$0.00		\$0.00		\$0.00		\$0.00
E. Other Costs	On-going	One-time	On-going	One-time	On-going	One-time	On-going	One-time
Utilities	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Maintenance & Repairs	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Other	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Total Other Costs	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>
TOTAL EXPENDITURES:	<u>\$672,100</u>	<u>\$22,000</u>	<u>\$691,754</u>	<u>\$0</u>	<u>\$711,878</u>	<u>\$0</u>	<u>\$739,323</u>	<u>\$0</u>
Net Income (Deficit)	<u>\$40,472</u>	<u>\$0</u>	<u>\$83,376</u>	<u>\$0</u>	<u>\$107,340</u>	<u>\$0</u>	<u>\$132,684</u>	<u>\$0</u>

Budget Notes (specify row and add explanation where needed; e.g., "I.A.,B. FTE is calculated using..."):

II.4	Tuition amounts are increased by 3% each year from the FY19 graduate total full-time fee of \$4,688.00 and the graduate total part-time fee of \$470.00
III.A.2	Faculty salaries are increased by 3% per year.
III.A.6	Directors/administrators salaries are increased by 3% per year
III.A.7	Administrative support personnel salaries are increased by 3% per year
III.A.8	Health insurance is increased to \$13,900 for FY20 and increased every year thereafter by \$800.00

Q1 Do you currently have a license to practice as a psychologist in Idaho?

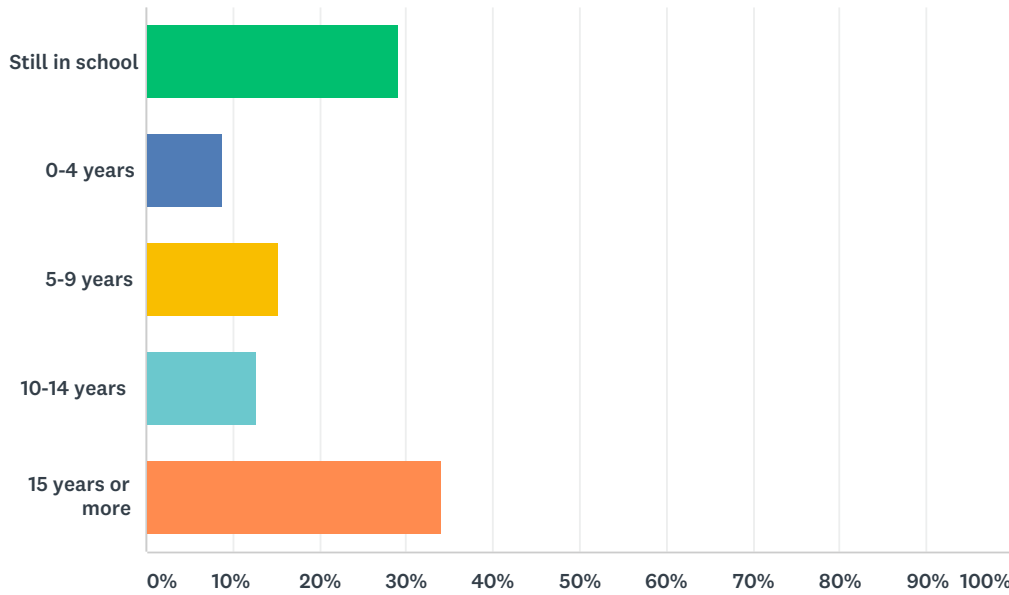
Answered: 79 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	60.76%	48
No	39.24%	31
TOTAL		79

Q2 How long have you been in clinical practice?

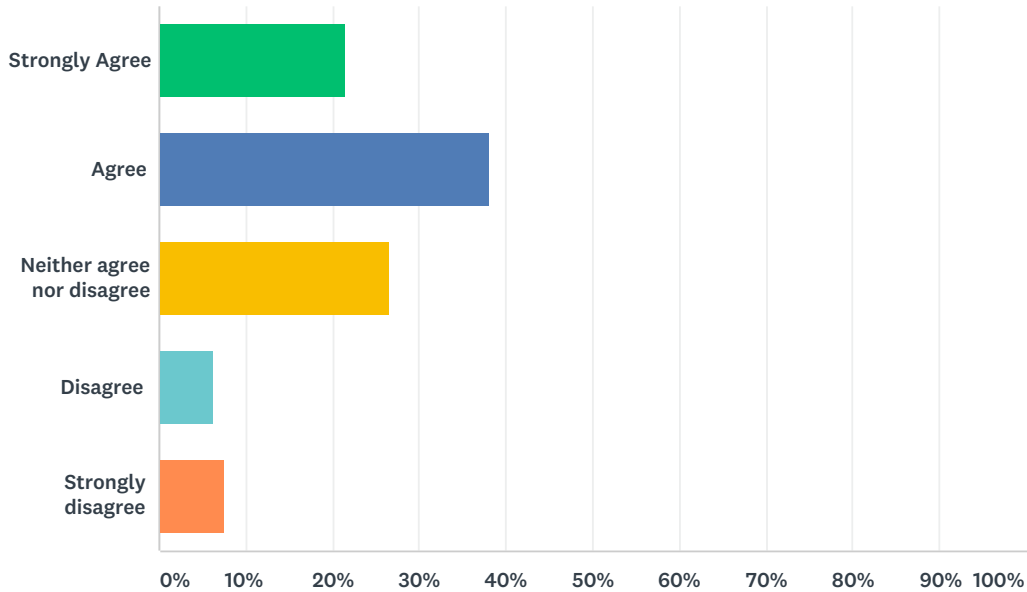
Answered: 79 Skipped: 0



ANSWER CHOICES	RESPONSES	
Still in school	29.11%	23
0-4 years	8.86%	7
5-9 years	15.19%	12
10-14 years	12.66%	10
15 years or more	34.18%	27
TOTAL		79

Q3 Please rate your level of agreement with the following statement: "Psychologists should expand their professional training and scope of practice to include the prescribing and clinical management of psychotropic medications."

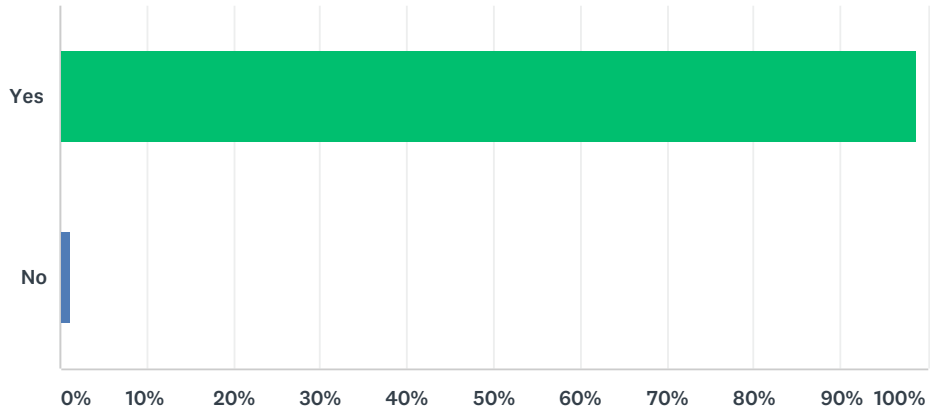
Answered: 79 Skipped: 0



ANSWER CHOICES	RESPONSES	
Strongly Agree	21.52%	17
Agree	37.97%	30
Neither agree nor disagree	26.58%	21
Disagree	6.33%	5
Strongly disagree	7.59%	6
TOTAL		79

Q4 Were you aware that RxP legislation was passed last year in Idaho giving appropriately trained clinical psychologists the authority to prescribe psychotropic medications?

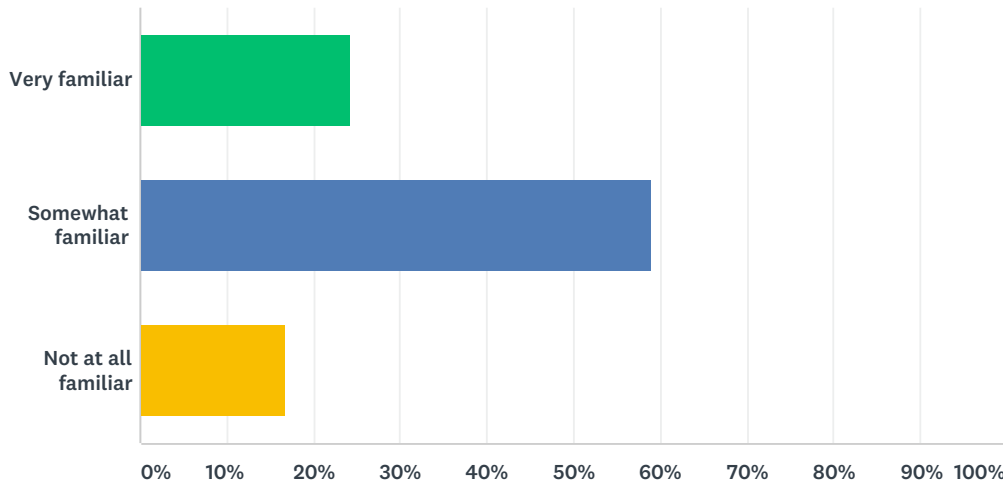
Answered: 79 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	98.73%	78
No	1.27%	1
TOTAL		79

Q5 How familiar are you with the content of the 2017 RxP legislation in Idaho (House Bill 212), including educational requirements and practice stipulations for psychologists seeking prescriptive authority?

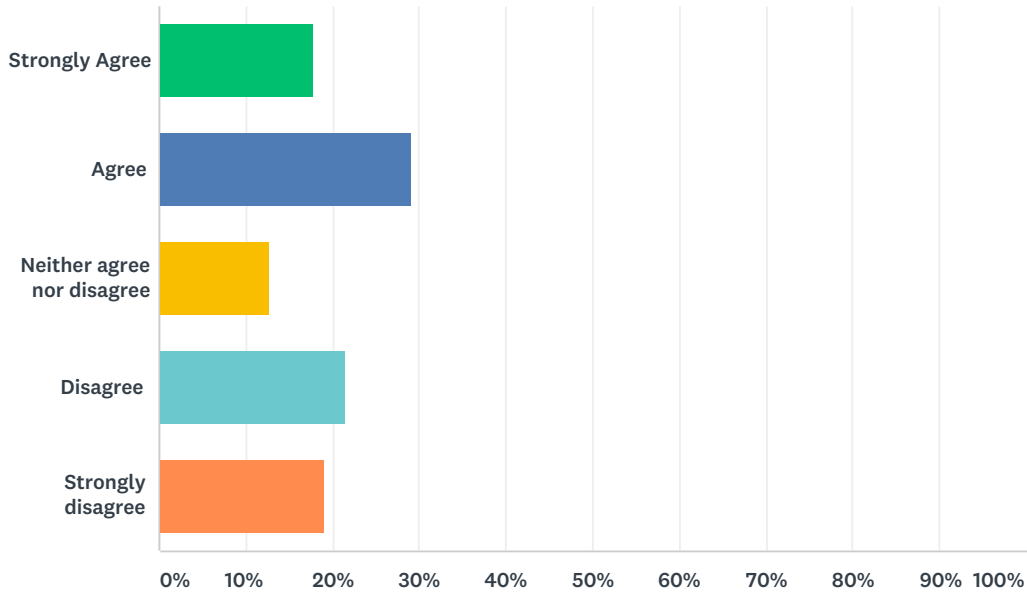
Answered: 78 Skipped: 1



ANSWER CHOICES	RESPONSES
Very familiar	24.36% 19
Somewhat familiar	58.97% 46
Not at all familiar	16.67% 13
TOTAL	78

Q6 Please rate your level of agreement with the following statement: "I would be interested in completing the appropriate training, as recommended by the APA, to enable me to prescribe psychotropic medications as part of my clinical practice."

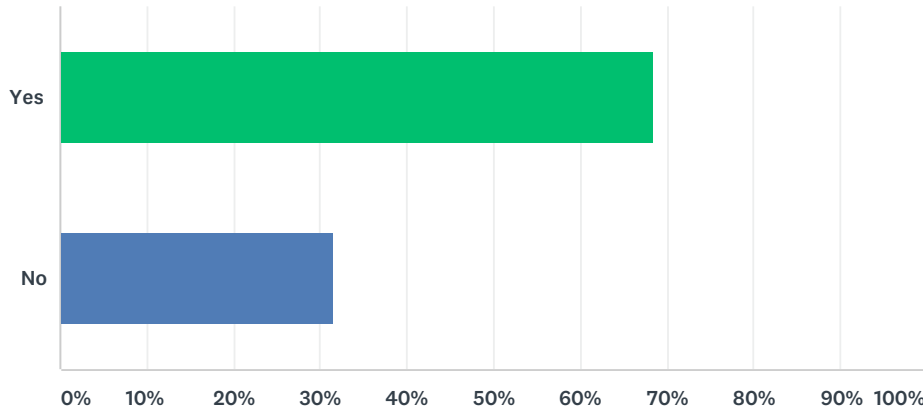
Answered: 79 Skipped: 0



ANSWER CHOICES	RESPONSES	
Strongly Agree	17.72%	14
Agree	29.11%	23
Neither agree nor disagree	12.66%	10
Disagree	21.52%	17
Strongly disagree	18.99%	15
TOTAL		79

Q7 Were you aware that Idaho State University will be offering a master’s degree in clinical psychopharmacology starting in Fall 2019, which will be congruent with the APA’s recommendations and state requirements for clinical psychologists to prescribe medications?

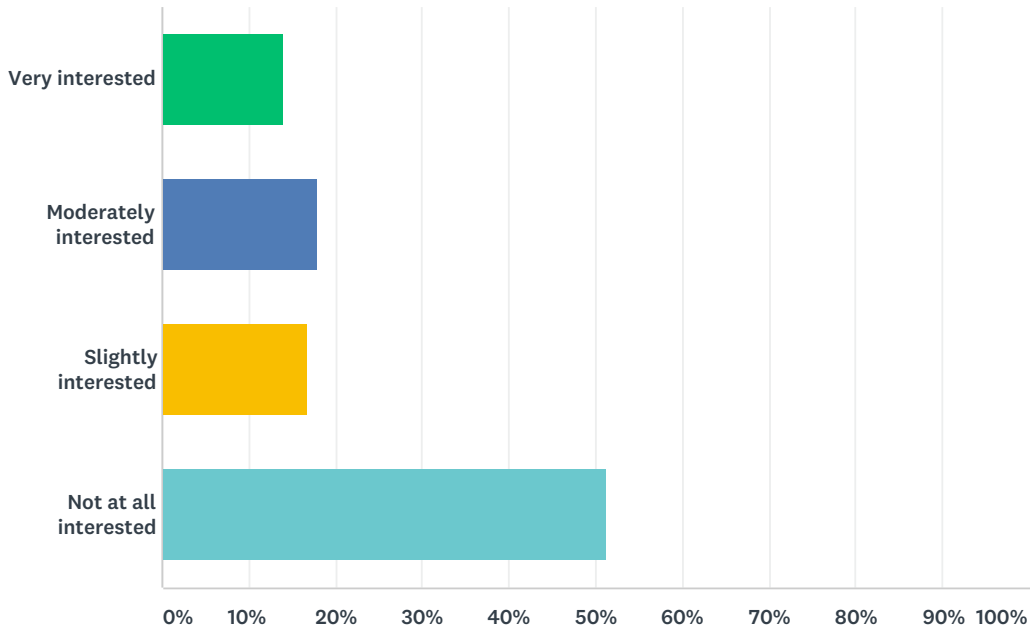
Answered: 79 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	68.35%	54
No	31.65%	25
TOTAL		79

Q8 How interested are you in enrolling in ISU's master's program in clinical psychopharmacology?

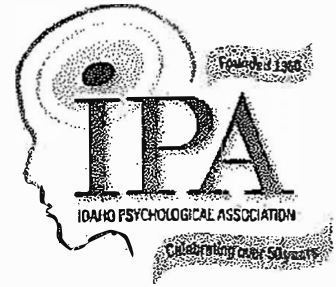
Answered: 78 Skipped: 1



ANSWER CHOICES	RESPONSES	
Very interested	14.10%	11
Moderately interested	17.95%	14
Slightly interested	16.67%	13
Not at all interested	51.28%	40
TOTAL		78

Q9 Please feel free to provide any additional comments about this survey or RxP in general:

Answered: 37 Skipped: 42



July 24, 2018

Christopher Owens, PharmD, MPH
Associate Vice President
Kasiska Division of Health Sciences
Idaho State University
921 S. 8th Ave., Stop 8055
Pocatello, ID 83209-8055

Dr. Owens,

As a prior president of the Idaho Psychological Association (IPA) and a member of its advocacy committee, I am writing to let you know of my work with the United States Navy to secure post-doctoral candidates for ISU's Masters in Psychopharmacology program. It appears the Navy will have two students each year starting in 2020. I continue to communicate with LDCR Rabinowitz, Ph.D., to reach out to both the Army and the Air Force for similar commitments.

Should you have any questions, please don't hesitate to contact me.

Sincerely,

V. Page Haviland, PhD

cc: Lyn McArthur, PhD, IPA Advocacy Chair
Barney Greenspan, PhD, IPA President

INSTRUCTION, RESEARCH AND STUDENT AFFAIRS

DECEMBER 20, 2018

UNITED STATES MARINE CORPS

U.S. MARINE CORPS FORCES
SPECIAL OPERATIONS COMMAND
MARINE SPECIAL OPERATIONS SCHOOL
PSC BOX 20185
CAMP LEJEUNE, NC 28542-0185

Attachment 1



IN REPLY REFER TO:
5300
PSYCH
20 FEB 17

From: LCDR Yaron G. Rabinowitz, MSC, USN
To: Fred Wood M.D., Chairman House Health and Welfare Committee
Subj: Idaho RxP Legislation and Training Program

Dear Chairman Wood:

I am Yaron Rabinowitz PhD, Lieutenant Commander, United States Navy. I am a prescribing psychologist and the Navy's Psychopharmacology Subspecialty Leader. In that capacity, I oversee the training and development of all prescribing psychologists in the Navy. A primary aspect of my job is to identify and cultivate appropriate training programs for Navy Psychologists.

The Navy is interested in sending psychologists to a two-year, full-time training program in Clinical Psychopharmacology. The rigorous training proposed in your prescriptive authority legislation appears to meet our needs.

Should the legislation become law, the Navy will make the Boise campus a primary training ground. It is possible that other branches of the military would be interested in such a rigorous program as well.

Please let me know if there are any questions I can answer or issues I can address.

A handwritten signature in black ink, appearing to read "Y. G. Rabinowitz". The signature is stylized and cursive.

Y. G. RABINOWITZ, PhD, ABPP, ABMP
LCDR, US NAVY

IDAHO STATE UNIVERSITY

SUBJECT

Master of Science in Nutrition with and without Dietetic Internship

APPLICABLE STATUTE, RULE, OR POLICY

Idaho State Board of Education Governing Policies & Procedures, Section III.G

ALIGNMENT WITH STRATEGIC PLAN

Goal 3: Workforce Readiness, Objective A: Workforce Alignment. IV. Increase in postsecondary programs tied to workforce needs.

BACKGROUND/DISCUSSION

Idaho State University (ISU) currently offers an undergraduate program in Dietetics and a Dietetic Internship as a post-baccalaureate certificate. Beginning in 2024, the Commission on Dietetic Registration will require a graduate degree to sit for the national credentialing exam and earn the Registered Dietitian Nutritionist (RDN) credential. ISU is proposing to offer a new M.S. in Nutrition with a public health emphasis through the Dietetic programs to meet this change in industry requirements.

The M.S. program will have two tracks: one with a Dietetic Internship and one without the internship for students who have already completed the undergraduate degree and post-baccalaureate certificate but would like to earn an advanced degree as well. The online hybrid model for the Dietetic internship will provide students opportunities to complete dietetic internships in Pocatello, Twin Falls, and Meridian to obtain degree while completing clinical training. The non-internship track will serve baccalaureate prepared RDNs and those with baccalaureate degrees in Dietetics, Food and Nutrition or similar degreed backgrounds.

IMPACT

Faculty in the Dietetic Programs have anticipated the development of this graduate program for several years as they were notified in 2014 of the 2024 mandatory requirement for a Master's degree to sit for the credentialing exam. Hence, the University's Kasiska Division of Health Sciences leadership has shifted a faculty position to dietetics to help cover the load of the Master's degree. No new appropriation or reallocation of funds is required.

The existing post-baccalaureate Dietetic Internship was approved to charge a professional fee of \$1,450 per semester, or \$2,900 for the year. ISU proposes a professional fee of \$3,000 total, spread over the three semesters that students will be in practicum. This fee is applicable only to students in Track 1 (M.S. + Dietetic Internship). Students in Track 2 (M.S. Nutrition without the internship) will not pay the professional fee.

**INSTRUCTION, RESEARCH AND STUDENT AFFAIRS
DECEMBER 20, 2018**

ATTACHMENTS

Attachment 1 – Proposal for the M.S. in Nutrition

STAFF COMMENTS AND RECOMMENDATIONS

ISU anticipates 22 initial enrollments in the first year with 18 minimum enrollments for the dietetic internship track and four part-time and/or full-time students per year for the non-internship track. Though the program proposal process inquires whether institutions have established minimum enrollment numbers necessary for program continuance, ISU does not require minimum enrollment numbers in programs due to program-specific circumstances. Historically, master's degree programs at ISU are flagged if enrollment is five or less students, requiring the academic unit to develop a plan to address low enrollment.

Additionally, ISU has included a request to change the professional fee to \$3,000 total, to be assessed over the course of the three semesters that students will be enrolled in practicum study. If approved, ISU will discontinue the current post-baccalaureate certificate.

ISU's proposed M.S. in Nutrition is consistent with their Service Region Program Responsibilities and their current institution plan for Delivery of Academic Programs in Region V. As provided in Board Policy III.Z, no institution has the statewide program responsibility specifically for nutrition or dietetics at the graduate level. The University of Idaho is also anticipating offering an M.S. in Nutrition beginning in the 2019-20 academic year according to their three-year plan.

The proposal completed the program review process and was presented to the Council on Academic Affairs and Programs (CAAP) on November 15, 2018; and to the Committee on Instruction, Research, and Student Affairs (IRSA) on November 29, 2018.

Board staff recommends approval.

BOARD ACTION

I move to approve the request by Idaho State University to add an M.S. in Nutrition as presented in Attachment 1.

Moved by _____ Seconded by _____ Carried Yes _____ No _____

I move to approve the request by Idaho State University to designate a professional fee of \$3,000 total, in conformance with the program budget submitted to the Board in Attachment 1.

Moved by _____ Seconded by _____ Carried Yes _____ No _____

Institutional Tracking No. 2018-02

**Idaho State Board of Education
Proposal for Undergraduate/Graduate Degree Program**

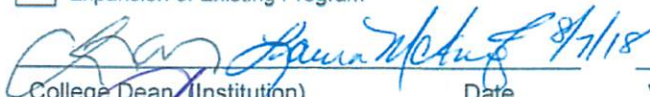

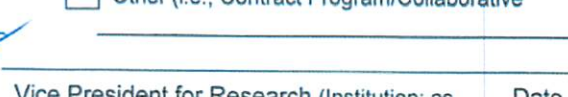
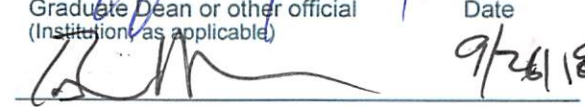

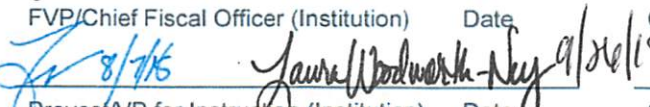

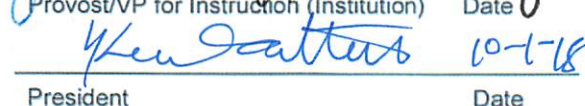
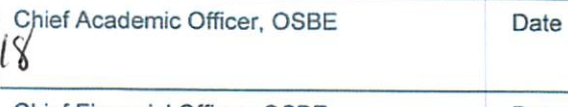
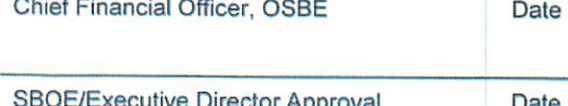
Date of Proposal Submission:	July 24, 2018
Institution Submitting Proposal:	Idaho State University
Name of College, School, or Division:	Kasiska Division of Health Sciences
Name of Department(s) or Area(s):	Dietetic Programs

Program Identification for Proposed New or Modified Program:

Program Title:	M.S. Nutrition with and without Dietetic Internship				
Degree:	Degree Designation		Undergraduate	<input checked="" type="checkbox"/>	Graduate
Indicate if Online Program:	<input checked="" type="checkbox"/> Yes Track 2		<input checked="" type="checkbox"/> Yes Track 1		
CIP code (consult IR /Registrar):	51.3101				
Proposed Starting Date:	Fall 2019				
Geographical Delivery:	Location(s)	Pocatello, Twin Falls, Meridian	Region(s)	3,4,5	
Indicate (X) if the program is/has:	<input type="checkbox"/> Self-Support	<input checked="" type="checkbox"/>	<input type="checkbox"/> Professional Fee	<input type="checkbox"/>	<input type="checkbox"/> Online Program Fee
Indicate (X) if the program is:	<input checked="" type="checkbox"/> Regional Responsibility	<input type="checkbox"/>	<input type="checkbox"/> Statewide Responsibility		

Indicate whether this request is either of the following:

- | | |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| <input checked="" type="checkbox"/> New Degree Program | <input type="checkbox"/> Consolidation of Existing Program |
| <input type="checkbox"/> Undergraduate/Graduate Certificates (30 credits or more) | <input type="checkbox"/> New Off-Campus Instructional Program |
| <input type="checkbox"/> Expansion of Existing Program | <input type="checkbox"/> Other (i.e., Contract Program/Collaborative) |

 College Dean (Institution)	8/1/18 Date		
 Graduate Dean or other official (Institution as applicable)	9/19/18 Date	 Vice President for Research (Institution; as applicable)	Date
 FVP/Chief Fiscal Officer (Institution)	9/26/18 Date	 Academic Affairs Program Manager, OSBE	Date
 Provost/VP for Instruction (Institution)	9/26/18 Date	 Chief Academic Officer, OSBE	Date
 President	10-1-18 Date	 Chief Financial Officer, OSBE	Date
		 SBOE/Executive Director Approval	Date

Before completing this form, refer to Board Policy Section III.G., Postsecondary Program Approval and Discontinuance. This proposal form must be completed for the creation of each new program. All questions must be answered.

Rationale for Creation or Modification of the Program

1. **Describe the request and give an overview of the changes that will result.** Will this program be related or tied to other programs on campus? Identify any existing program that this program will replace.

BACKGROUND: Idaho State University currently offers a Didactic Program in Dietetics (DPD) at the undergraduate level and a Dietetic Internship (DI) as a post-baccalaureate certificate program both having national accreditation through the Accreditation Council for Education in Nutrition and Dietetics (ACEND) for the Academy of Nutrition and Dietetics. Completion of both the DPD and dietetic internship are required to sit for the National Registration Examination for Dietitians and obtain the Registered Dietitian Nutritionist (RDN) credential. Beginning 2024, the Commission on Dietetic Registration (CDR) will require the addition of a graduate degree to sit for the national exam and earn the RDN credential.

This request is to deliver a new graduate degree, M.S. in Nutrition with a Public Health Emphasis through the Dietetic Programs. The M.S. degree program would have two tracks.

Track 1) M.S. in Nutrition with Dietetic Internship. The current dietetic internship will be replaced with this combined program including both course work and supervised practice to culminate in the M.S. degree. The current internship model will be discontinued at the completion of the current cohort (2018-19 academic year). This track will require 22 credits of course work along with nine (9) credits of practicum and two (2) credits of seminar for a 33 credit program. Awarding graduate credit for dietetic internship programs towards a portion of the credit hour requirements for an M.S. degree has been emerging as a norm within the Accreditation Council for Education in Nutrition and Dietetics (ACEND) to meet the emerging needs for graduate preparation. The program is planned to run four consecutive semesters with fall 1 and spring being full times, summer part time (5 credits) and fall 2 part time (6 credits). The practicum will be over the spring, summer and 2nd fall.

Track 2) M.S. in Nutrition (no internship). This track will parallel to Track 1 in required course work but will provide an opportunity for students to take a minimum of eight (8) elective credits in place of the practicum and seminar credits for a total of 30 credits for the degree. It is anticipated that most students in this track will go part time. The program, however, could be finished in 3 semesters of full time study if the student chose to do so.

Both options take advantage of courses currently offered through the Division of Health Sciences and will contribute to increased enrollment in existing graduate courses and graduate degree production. In order to fulfill the Public Health Emphasis, both tracks require two courses offered through the Department of Community and Public Health (MPH 6660 Health Behavior Change Theory and Application, and HE 6620 Health Program Planning and Evaluation). Four required graduate courses in nutrition (NTD 6620 Nutritional Epidemiology, NTD 6622 Maternal, Infant and Child Nutrition, NTD 6624 Nutrition and Aging and NTD 6640 Research Writing and Grantsmanship) will also be open as electives for graduate students in other programs as course prerequisites are met (e.g. public health or health education). Approved electives for Track 2 could potentially come from Public Health, Health Education, Health Care Administration, Business or Leadership. In addition, the new Geriatric Certificate Program (DHS 5502 Survey of Aging Issues, DHS 5503 Interprofessional Systems in Geriatric Management,

and DHS 5504 Geriatric Interprofessional Collaborative Practice), housed in the College of Nursing, could fulfill the elective requirements for Track 2.

- 2. Need for the Program.** Describe the student, regional, and statewide needs that will be addressed by this proposal and address the ways in which the proposed program will meet those needs.

Student:

The profession of dietetics is moving to graduate level preparation to sit for the National Registration Examination for Dietitians and obtain the RDN credential beginning January 2024. Graduates of the undergraduate Didactic Program in Dietetics (DPD) at ISU admitted to the M.S. in Nutrition with Dietetic Internship (Track 1) will be able to complete all requirements to take the registration exam and obtain the RDN credential in residence in Idaho. The on-line hybrid M.S. in Nutrition with Dietetic Internship will allow students completing dietetic internships in Pocatello, Twin Falls, and Meridian to obtain the M.S. degree while completing their clinical training. In addition, students would be able to qualify for graduate level financial aid to help pay for both the graduate degree and dietetic internship. The current dietetic internship, delivered as a post-baccalaureate certificate affords minimal ability to use undergraduate financial aid.

The M.S. in Nutrition (Track 2) will serve baccalaureate prepared RDNs and those with baccalaureate degrees in Dietetics, Food and Nutrition or similar degreed backgrounds. This includes former ISU program graduates, who desire to increase their knowledge and skills in nutrition and public health, earn an advanced degree and be able to compete with the MS, RDN in the marketplace. As the national requirements shift to graduate preparation, the M.S. will become the norm for practice.

Regional:

As noted above, the graduate degree will become the new entry point for the RDN; the RDN is required along with state licensure to practice dietetics in the state of Idaho. The M.S. in Nutrition with Dietetic Internship will have a total of 18 seats with sites in Pocatello, Twin Falls, and Meridian and continue to fulfill our regional mission.

Nationally, there is a significant shortage of dietetic internship seats with approximately 50% of DPD graduates matching to gain placement in these internships. The ISU dietetic internship was originally developed to address this shortage and allow students place bound in Idaho to complete all requirements in residence. The current dietetic internship receives 80-100 applications annually; the majority (>50%) of dietetic interns admitted to the ISU Dietetic Internship Program are graduates of the ISU B.S. in Dietetics (DPD). The ISU match rate (81% from 2013-2017) is considerably higher than the national average of approximately 50%. See weblink for graph of Supply and Demand for Internship Sites from the ACEND. <https://www.eatrightpro.org/-/media/eatrightpro-files/acend/supplyanddemandchart.pdf?la=en&hash=F49DB8EA7DD660FE1CBD25ACCD22221704D56622>

Given the requirement for graduate education and the guidance of ACEND, many of the current dietetic internship programs are developing graduate tracks. The proposed M.S. in Nutrition with Dietetic Internship would allow ISU to maintain the viability of its undergraduate program (DPD), retain the best and brightest students, remain competitive with the University of Idaho and other regional programs, and draw students from neighboring states to help meet workforce needs in Idaho.

The M.S. in Nutrition with Public Health Emphasis (Track 1 and 2) will provide advanced training to new and practicing RDNs to address ongoing and emerging healthcare issues in Idaho. These

include, but are not limited to, childhood obesity, diabetes, nutrition in aging, chronic disease, self-management, and health behavior change.

Statewide: As Above

- a. Workforce need:** Provide verification of state workforce needs that will be met by this program. Include State and National Department of Labor research on employment potential. Using the chart below, indicate the total projected annual job openings (including growth and replacement demands in your regional area, the state, and nation. Job openings should represent positions which require graduation from a program such as the one proposed. Data should be derived from a source that can be validated and must be no more than two years old.

List the job titles for which this degree is relevant:

1. Registered Dietitian (R.D.) which is the older title still used by some practitioners
2. Registered Dietitian Nutritionist (R.D.N.) which is the newer title used by most practitioners

	State DOL data	Federal DOL data	Other data source: (describe)
Local (Service Area)	None listed for Pocatello. IF 30. With our DI program and affiliation agreements, there are at least 40 RDNs in the Pocatello/Blackfoot area.	BLS: 2016-2026 15% growth	Academy of Nutrition and Dietetics Salary Survey; Accreditation Council for Education in Nutrition and Dietetics DI Supply and Demand chart; Idaho Academy of Nutrition and Dietetics;
State	270		627 licensed RDNs active in Idaho (State of Idaho Board of Medicine)
Nation		68000	

Provide (as appropriate) additional narrative as to the workforce needs that will be met by the proposed program.

The current job outlook based upon the Bureau of Labor Statistics shows a 15% growth expected for dietitians between 2016-2026. <https://www.bls.gov/ooh/healthcare/dietitians-and-nutritionists.htm> From the Academy of Nutrition and Dietetics Salary Survey, 50% of RDN's currently hold master's degrees. <https://www.eatrightpro.org/practice/career-development/career-toolbox/academy-member-compensation> By January 2024, a master's degree is required to sit for the National Registration Examination for Dietitians, obtain the RDN credential, and therefore practice as an RDN. <https://www.cdrnet.org/vault/2459/web/files/GraduateDegreeFAQJan2017.pdf> Idaho, like many other states, requires the RDN to become licensed to practice dietetics.

While grandfather provisions for baccalaureate-trained practitioners are in place, obtaining

the M.S. in Nutrition subsequent to the RDN will allow experienced practitioners to gain advanced training through the ISU on-line hybrid M.S. option, remain in the workforce, and continue to be competitive. It is also an option for DPD graduates with BS degrees to continue with their education by enrolling in the M.S. degree program if they fail to receive an internship appointment immediately following graduation. With less than 50% of DPD graduates nationally matching, the M.S. in Nutrition gives students an option of continue their education, improve their knowledge and skills, and submit a more competitive dietetic internship application in the future. Promoting graduate education to those students not receiving an internship appointment is a common marketing practice amongst other Master's in Nutrition and related degrees across the country.

- b. **Student need.** What is the most likely source of students who will be expected to enroll (full-time, part-time, outreach, etc.)? Document student demand by providing information you have about student interest in the proposed program from inside and outside the institution. If a survey of students was used, please attach a copy of the survey instrument with a summary of results as **Appendix A**.

Track 1: M.S. Nutrition with Dietetic Internship

ISU offers a long-standing BS in Dietetics as an accredited DPD; the dietetic internship was added in the early 1990's. The dietetic internship program has grown from eight seats in Pocatello at inception to a current 18 seats with placements in Pocatello, Twin Falls and Meridian. Annual report data collected since 2010 shows an average of 92 applications per year for the 18 seats (range 72-109). We would retain the current 18 seats for the M.S. in Nutrition with Dietetic Internship (Track 1). Graduates of the ISU, undergraduate program in dietetics will be one of the major sources of students admitted to the M.S. in Nutrition with Dietetic Internship. Given that only 50% of DPD graduates nationally match to dietetic internships, we anticipate that we would continue to receive approximately five applications per seat. The addition of the M.S. to the current dietetic internship will likely increase the state and regional demand for our program.

The proposed M.S. in Nutrition with Dietetic Internship is designed to allow students to complete both the dietetic internship and the degree requirements over four semesters (fall 1, spring, summer and fall 2). Eleven credits for the dietetic seminar and internship experience will be credited toward the 33 credit M.S. in Nutrition. This integrated program, while intense, will allow DPD graduates the opportunity to complete requirements to sit for the National Registration Exam for Dietitians while incurring a minimal amount of debt.

Over the past four years, there has been an increase from approximately 20 graduate programs combined with dietetic internships to 56 programs resulting in a graduate degree and an additional 63 programs offering some graduate credit.

<http://www.eatrightpro.org/resources/acend/accredited-programs/dietetic-internships>

While the proposed ISU program will be able to compete on the national market and regionally, it is essential to maintain the viability of both the ISU DPD and internship to expand to offer the M.S. and allow graduates the opportunity to meet all requirements to earn the RDN credential.

Track 2: M.S. Nutrition without Dietetic Internship

The M.S. in Nutrition is designed primarily for practicing RDNs and other professionals interested in the field of nutrition and public health. The online format allows clinicians to remain in practice and in their local residence if desired. Practicing RDNs will have the

opportunity to gain advanced training, earn the M.S. in their field, and remain competitive with entry-level professionals holding the MS, RDN credential. This M.S. Degree will be offered for 30 credits with eight (8) credits of approved electives to meet individual areas of emphasis in dietetics practice. There is currently no M.S. in Nutrition offered in the state of Idaho. There are several online Master's programs available across the country. The program surveyed graduates from the past five years of ISU undergraduate and dietetic internship programs along with current RDN preceptors in the region to determine interest in the proposed ISU M.S. in Nutrition (no internship). Of 84 subjects surveyed, 60 responded (71%). The following summarizes our findings. Full survey results can be found in **Appendix A**.

1. Interest in earning the M.S. Degree in Nutrition at ISU: 28 (47%) very or extremely interested +16 somewhat interested (27%)
2. If interested, full or part time: 36 (60%) part time
3. Willing to attend fall, spring and summer classes: 31 (52%) yes
4. Course delivery preference: option of either live or online 32 (53%); online only 21 (35%)
5. Completion option: capstone project 23 (38%); comprehensive exam 13 (22%); don't know 17 (28%)
6. Start date: Fall 2019 15 (25%); Fall 2020 8 (13%); don't know 24 (40%)
7. Current credential: RD/RDN 40 (67%); current intern 6 (10%)

Based on our own survey results and the Academy of Nutrition and Dietetics resources, we believe the M.S. in Nutrition (Track 2) will be a popular option for current dietetic practitioners, most of whom will choose to complete part-time while continuing to work. The course delivery is planned to be online such that students could complete all requirements via distance learning. Some courses will be delivered in an online hybrid style where a live lecture is recorded for later viewing.

- c. **Economic Need:** Describe how the proposed program will act to stimulate the state economy by advancing the field, providing research results, etc.

The Commission on Dietetic Registration (CDR) and the Accreditation Council for Education in Nutrition in Dietetics (ACEND) have conducted several extensive national surveys. The need for graduate level preparation at entry-level was evidenced by several findings: greater interprofessional practice and interface with other health professions with graduate level preparation, the increasing technical skills required of the RDN with increasing scope and depth of practice, and need for improved salary differential. Several other health professions have moved to graduate preparation including pharmacy, physical therapy, and occupational therapy. Having graduate students to engage in research should support additional departmental research and grantsmanship. The MS, RDN practitioner will be better prepared to meet emerging needs for practice in treatment and prevention of several conditions of significant disease burden and economic impact in Idaho, including but not limited to obesity, diabetes, and cardiovascular disease.

According to the Bureau of Labor Statistics, the dietetic profession is projected to experience 15% growth between 2016 and 2026. Based on data collected for the 2014 Program Prioritization, over one-third of practicing RDNs in Idaho graduated from ISU. ISU holds a Commendation from ACEND with 100% of graduates passing the National Registry Exam for Dietitians over the past five years. The program has a long history of graduating competent leaders in the field of dietetics who are active in healthcare delivery, public health, foodservice management and operations, and state and national health policy. With now mandatory graduate level preparation for entry-level practice, the M.S. in

Nutrition will be essential for maintaining and expanding the current workforce. For the stand-alone M.S. in Nutrition geared for current dietetic practitioners, the ability to obtain a Master’s degree could further their earning potential as well as increase their ability to be competitive with the incoming workforce that is Master’s prepared.

d. Societal Need: Describe additional societal benefits and cultural benefits of the program.

The Registered Dietitian Nutritionist (RDN) is a valuable and respected member of the health care team. RDNs are the nationally recognized expert in nutrition for the maintenance of health and the treatment and prevention of disease. Notably, the M.S. in Nutrition with Public Health Emphasis addresses preparing graduates with advanced knowledge and skills to help individuals make behavioral changes to improve their health outcomes. Additionally graduates are prepared to address major public health issues across the life span, including but not limited to, obesity, diabetes, and chronic disease. The value of the RDN in prevention and treatment of disease is likely to be further realized with the emerging paradigm shift in medicine that focuses on patient outcomes and accountable care funding models rather than fee for service.

e. If Associate’s degree, transferability: N/A

3. Similar Programs. Identify similar programs offered within Idaho and in the region by other in-state or bordering state colleges/universities.

Similar Programs offered by Idaho public institutions (list the proposed program as well)		
Institution Name	Degree name and Level	Program Name and brief description if warranted
University of Idaho	BS and MS (planned)	The UI Coordinated Program in Dietetics is an accredited pathway to becoming an RDN. It is currently offered at the undergraduate level. Students complete both the didactic and supervised practice portion as part of the same program and application process. To date, UI program graduates seeking a M.S. degree have been able to choose their M.S. in Consumer Sciences. <i>(The UI 3-year plan speaks to adding a graduate track for dietetics students seeking the RDN credential and a stand-alone online M.S. in Nutrition for 2021.)</i>

Similar Programs offered by other Idaho institutions and by institutions in nearby states		
Institution Name	Degree name and Level	Program Name and brief description if warranted
University of Utah	MS Nutrition Science	Coordinated Master's Degree Program in Dietetics. Offers two concentrations: Nutrition, Education, Research, and Sports Nutrition. Also have M.S. Only (non-RDN pathway) for students with undergraduate degrees in dietetics, health science or related areas.
Utah State University	BS Nutrition, Dietetics & Food Science	Nutrition, Dietetic and Food Science Degree with Dietetic Emphasis. Offers two options: 1) Didactic Program in Dietetics teaching undergraduate requirements (similar to ISU) and 2) Coordinated Program (like UI)
	Dietetic Internship Program	Utah State University Distance Dietetic Internship. Upon completion, students are eligible to sit for national registration exam and earn credits towards M.S. in Dietetic Administration.
	MS of Dietetics Administration	M.S. Dietetics Administration: 2 options 1) completed USU Distance DI or 2) current RD/RDN
	MS Nutrition and Food Sciences	M.S. Nutrition and Food Sciences: Dietetics background not required but RD/RDN's would be eligible to complete.
Washington State University: Spokane	MS Dietetics, Nutrition and Exercise Physiology	Coordinated Master's Degree Program in Dietetics
Montana State University	BS Food and Nutrition	Food and Nutrition Major with Dietetics Option (Didactic Program in Dietetics similar to ISU).
	MS Exercise Physiology and Nutrition	Exercise Physiology and Nutrition with option to complete DPD requirements to become eligible to apply for a dietetic internship.
	Dietetic Internship	Montana Dietetic Internship-Program (Dietetic Internship with 12 graduate credits earned upon completion along with Verification statement eligibility to take national exam.
Central Washington University	BS Food Science and Nutrition -Dietetics Specialization	Didactic Program in Dietetics (similar to ISU).

	Dietetic Internship	Dietetic Internship affiliated with the graduate program in nutrition earning 23 credits towards M.S. degree with emphasis in Nutrition and Dietetics.
	MS Nutrition	Department of Health Sciences M.S. degree in Nutrition. Accepts credits from CWU DI.

- 4. Justification for Duplication with another institution listed above.** (if applicable). If the proposed program is similar to another program offered by an Idaho public institution, provide a rationale as to why any resulting duplication is a net benefit to the state and its citizens. Describe why it is not feasible for existing programs at other institutions to fulfill the need for the proposed program.

Both UI and ISU have established accredited undergraduate programs in dietetics that have prepared students to take the National Registration Exam for Dietitians for many decades. ISU offers a Didactic Program in Dietetics (DPD) at the undergraduate level (BS); together with the Dietetic Internship (post baccalaureate certificate program) students are able to sit for the natation credentialing exam. UI and ISU both service our respective regions with significant crossover of both programs for students and curriculum offerings in the Treasure Valley due to the availability of training sites in the population center of the state. There are currently 215 DPD programs and 257 DI programs accredited in the U.S. Approximately 75% of program graduates are employed in dietetics within one year of graduation. Approximately 30% of the practicing RDNs in the state of Idaho are graduates of ISU.

UI offers a Coordinated Program in Dietetics (CPD), currently at the undergraduate level, that combines required didactic courses along with the supervised practice component. Their undergraduate enrollment is similar to ISU. There are currently 61 accredited CPDs in the US at both the bachelor and master level.

With this request, and as outlined above, ISU is seeking to add the M.S. in Nutrition with Public Health Emphasis with Dietetic Internship to continue to be able to prepare graduates to enter the field as registered dietitian nutritionists (RDN). Track 2 (no internship) will serve practicing RDNs, allowing them to continue in the workforce while gaining advanced preparation through an online/hybrid M.S. degree beginning Fall 2019. The UI, 3-year plan, will be moving forward towards graduate preparation within their CPD model and an on-line MS slated for summer 2021.

- 5. Describe how this request supports the institution’s vision and/or strategic plan.** As part of the Kasiska Division of Health Sciences, in the College of Health Professions, with this request, and as outlined above, ISU is seeking to add the M.S. in Nutrition with Public Health Emphasis. As described, the proposed plan will allow ISU to continue to be able to prepare graduates to enter the field as registered dietitian nutritionists (RDN), and for those with the RDN credential to gain advanced preparation and the M.S. degree beginning fall 2019. Since 1974, with the inception of an accredited undergraduate program in dietetics, the dietetics faculty and programs have provided **leadership in the health professions**. As the dietetic profession has evolved, so have program enrollment and expansion. The current Didactic Program in Dietetics offered at the undergraduate level and Dietetic Internship with 18 seats across three locations continues to support the ISU mission of **undergraduate and professional education**. The programs continue to meet workforce needs for registered dietitian nutritionists throughout Idaho and serve our geographic region. This request is to move forward with offering the graduate education needed now in Idaho to continue to meet all education requirements in residence in Idaho to prepare dietitians for entry-level practice. As part of **Core Theme Three**, the Dietetic Programs and specifically the Dietetic Internship have a history of preparing highly competent

graduates in both programs as evidenced by high pass rates (100% over the past five years) and job placement (average of over 75% within one year of completion).

6. **Assurance of Quality.** Describe how the institution will ensure the quality of the program. Describe the institutional process of program review. Where appropriate, describe applicable specialized accreditation and explain why you do or do not plan to seek accreditation.

The Dietetic Internship is accredited by the Accreditation Council for Education in Nutrition and Dietetics (ACEND), outlining program standards, *Knowledge Requirements* for didactic education and *Competency Requirements* for supervised practice, and guidance for program and student learning outcome assessment. While ACEND is supporting the addition of graduate education, ACEND is not accrediting M.S. degree programs at this time. A Future Education Model has been in the process of development for the past 5 years; it is open for the second cohort of pilot programs to apply. However, given the success of our current DPD and Dietetic Internship programs and the feasibility of adding the M.S. in Nutrition with Public Health Emphasis, which capitalizes on present course offerings at the graduate level, ISU will wait until the success of these pilot programs is established.

Track 1 and Track 2 of the proposed program will be systematically reviewed under the institutional process. Additionally, the program will employ some of our DPD and DI program and student learning assessment methodology and program review outcomes data. More detailed assessment plans can be found in the responses to question 12 of this document.

7. **In accordance with Board Policy III.G., an external peer review is required for any new doctoral program.** Attach the peer review report as **Appendix B**.

N/A

8. **Teacher Education/Certification Programs** All Educator Preparation programs that lead to certification require review and recommendation from the Professional Standards Commission (PSC) and approval from the Board.

Will this program lead to certification?

Yes _____ No _____

If yes, on what date was the Program Approval for Certification Request submitted to the Professional Standards Commission?

N/A

9. **Five-Year Plan: Is the proposed program on your institution's approved 5-year plan? Indicate below.**

Yes No _____

Proposed programs submitted to OSBE that are not on the five-year plan must respond to the following questions and meet at least one criterion listed below. N/A

a. **Describe why the proposed program is not on the institution's five year plan.** When did consideration of and planning for the new program begin?

b. **Describe the immediacy of need for the program.** What would be lost were the institution to delay the proposal for implementation of the new program until it fits within the five-year

planning cycle? What would be gained by an early consideration?

Criteria. As appropriate, discuss the following:

- i. How important is the program in meeting your institution's regional or statewide program responsibilities? Describe whether the proposed program is in response to a specific industry need or workforce opportunity.
- ii. Explain if the proposed program is reliant on external funding (grants, donations) with a deadline for acceptance of funding.
- iii. Is there a contractual obligation or partnership opportunity to justify the program?
- iv. Is the program request or program change in response to accreditation requirements or recommendations?
- v. Is the program request or program change in response to recent changes to teacher certification/endorsement requirements?

Curriculum, Intended Learning Outcomes, and Assessment Plan

10. Curriculum for the proposed program and its delivery.

a. Summary of requirements. Provide a summary of program requirements using the following table.

Option 1: M.S. Nutrition with Dietetic Internship

Option 2: M.S. Nutrition alone

Credit hours in required courses offered by the department (s) offering the program.	Option 1: 27 Option 2: 16
Credit hours in required courses offered by other departments:	Option 1: 6 Option 2: 6
Credit hours in institutional general education curriculum	N/A
Credit hours in free electives	Option 1: 0 Option 2: 8
Total credit hours required for degree program:	Option 1: 33 Option 2: 30

b. Curriculum. Provide the curriculum for the program, including a listing of course titles and credits in each.

M.S. Nutrition with Public Health Emphasis + Dietetic Internship (Track 1)

Course Number	Course Title	Credit Hours
NTD 6609	Seminar for Dietetic Internship	2
NTD 6610	Current Issues in Nutrition	1
NTD 6620	Nutritional Epidemiology	3
NTD 6622	Maternal, Infant and Child Nutrition	3
NTD 6624	Nutrition and Aging	3
NTD 6640	Research, Writing and Grantsmanship	3
NTD 6650	Capstone Project	3
NTD 6655	Internship Practicum I	3
NTD 6656	Internship Practicum II	3
NTD 6657	Internship Practicum III	3
MPH 6620	Health Program Planning and Evaluation	3
MPH 6640	Health Behavior Change Theory and Application	3
	Total Credits	33

M.S. Nutrition with Public Health Emphasis (Track 2)

Course Number	Course Title	Credit Hours
NTD 6610	Current Issues in Nutrition	1
NTD 6620	Nutritional Epidemiology	3
NTD 6622	Maternal, Infant and Child Nutrition	3
NTD 6624	Nutrition and Aging	3
NTD 6640	Research, Writing and Grantsmanship	3
NTD 6650	Capstone Project	3
MPH 6620	Health Program Planning and Evaluation	3
MPH 6640	Health Behavior Change Theory and Application	3
	Approved Electives	8
	Total Credits	30

Possible Electives (list not exhaustive)

DHS 5502	Survey of Aging Issues	3 cr.
DHS 5503	Interprofessional Systems in Geriatric Mgt	3 cr.
DHS 5504	Geriatric Interprofessional Collaborative Prac Intern	2 cr.
HE 6623	Curriculum and Supervision	3 cr.
HE 6639	Teaching Strategies in Health	3 cr.
MPH 6601	Applications in Epidemiology	3 cr.
MPH 6604	Social and Cultural Perspectives in Public Health	3 cr.
MPH 6605	Leadership Policy and Administration	3 cr.
MPH 6606	Environmental and Occupational Health	3 cr.
NTD 5539	Sports Nutrition	3 cr.*
NTD 5557	Experimental Foods	3 cr.*
NTD 5561	Nutritional Biochemistry I	3 cr. *
NTD 5585	Nutritional Biochemistry II	3 cr. *
NTD 6651	Thesis	3-6 cr

*Courses cannot be taken for graduate credit if the student has previously taken the course at the undergraduate level.

- c. Additional requirements.** Describe additional requirements such as comprehensive examination, senior thesis or other capstone experience, practicum, or internship, some of which may carry credit hours included in the list above.

Track 1 M.S. Nutrition + Dietetic Internship

Students must successfully complete a minimum of 1200 hours of supervised practice within the dietetic internship to obtain a Verification Statement (ACEND requirement) and be eligible to sit for the National Registration Exam for Dietitians. Students will complete these hours through the proposed curriculum by enrolling in the Dietetic Internship Practicum courses (NTD 6655, 6656, 6657) during the Spring, Summer, and second Fall semesters. The internship practicum courses will place students in the variety of facilities needed to allow students to complete the competency-based dietetic internship curriculum as mandated by the ACEND. Note: Students completing only a M.S. in Nutrition degree will not need to complete the Internship Practicum.

Track 1 and 2

Students completing an M.S. in Nutrition + Dietetic Internship and M.S. in Nutrition will need to complete a capstone project. The project will consist of appropriate scholarly activity including, but not limited to grant writing and submission, analysis of a current data set and preparation of a

manuscript, development and execution of a small research study leading to submission of a poster abstract as determined appropriate by the advising faculty member and student. Students may choose to do a thesis in place of the capstone. At the completion of the capstone project, students will present and defend their project in a comprehensive oral examination.

11. Program Intended Learning Outcomes and Connection to Curriculum.

a. Intended Learning Outcomes. List the Intended Learning Outcomes for the proposed program, using learner-centered statements that indicate what will students know, be able to do, and value or appreciate as a result of completing the program.

1. Graduate students completing the MS Nutrition with Dietetic Internship will demonstrate competence needed for entry-level practice as a registered dietitian nutritionist (RDN).
2. Graduate students will analyze and evaluate research as it pertains to nutrition for the maintenance of health and prevention in the treatment of disease.
3. Graduate students will use advanced nutrition knowledge to formulate appropriate nutrition interventions for specific target populations to address current and emerging public health issues.
4. Graduate students will engage in the use of behavior change theories to improve health outcomes.

12. Assessment plans

a. Assessment Process. Describe the assessment process that will be used to evaluate how well students are achieving the intended learning outcomes of the program.

Track 1

Student preparedness for entry-level practice will be determined based on achievement of the Core Knowledge and Competencies set forth within the ACEND Accreditation Standards for Nutrition and Dietetics Internship Program (Standard 5). Standard 6 outlines accreditation requirements for Student Learning Outcome Assessment and Curriculum Improvement (<https://www.eatrightpro.org/-/media/eatrightpro-files/acend/about-program-accreditation/accreditation-standards/2017-standardsfordiprograms.pdf?la=en&hash=B1F08833AABC0FA8A6EBB7B76778A09BE7EDB667>).

Students will be evaluated during and at the end of each supervised practice rotation and through performance on simulation and case study exercises. Additionally, programs are required to track graduate performance on the comprehensive National Registry Exam for Dietitians, which serves as the national standard for achievement on entry-level competence. Five-year pass rates below 80% of the class require programs to develop improvement plans to maintain accreditation. ISU currently holds a 100% 5-year pass rate.

Track 1 and 2

Students will be assessed throughout the program through case study, oral presentations, research projects, examinations, and other related coursework. The final oral examination will be used as a summative evaluation of the curricular programming in nutrition and public health, as well as the research defense and understanding of statistical analysis and research principles. Course evaluations, program exit interviews and the post-graduation survey will be used to further evaluate the program learning outcomes.

b. Closing the loop. How will you ensure that the assessment findings will be used to improve the program?

Course evaluation results will be provided to each instructor to be used for course improvement. Data collected from internship rotation site evaluations will be used to improve rotations and ensure competencies are being met. The program exit interview and post-graduation survey data will be used to evaluate the overall program from the perspective of graduates. The information collected will be shared with the dietetics and public health faculty who will discuss and create a plan to revise the program as appropriate to better meet the needs of students.

c. Measures used. What direct and indirect measures will be used to assess student learning?

Direct assessment measures include case studies, examinations, research projects, presentations, case studies, evaluation of competence during internship rotations, and simulations. Passage of the Registration Examination for Dietitians will also be used as a direct measure of assessment for those completing the dietetic internship portion of the program. Indirect assessment measures will include internship practicum rotation site evaluation, exit interviews and post-graduation survey.

d. Timing and frequency. When will assessment activities occur and at what frequency?

Course assessments will occur at the end of each course. At the conclusion of each internship rotation site, students will complete an evaluation. The exit interview will occur at the end of the student's final semester. The post-graduation survey will be conducted one year following graduation.

Enrollments and Graduates

13. **Existing similar programs at Idaho Public Institutions.** Using the chart below, provide enrollments and numbers of graduates for similar existing programs at your institution and other Idaho public institutions.

Existing Similar Programs: Historical enrollments and graduate numbers								
Institution and Program Name	Fall Headcount Enrollment in Program				Number of Graduates From Program (Summer, Fall, Spring)			
	FY_15_	FY_16_	FY_17_	FY_18_ (most recent)	FY14 —	FY_15_	FY_16_	FY_17_ (most recent)
BSU	N/A							
ISU: B.S. Dietetics	92	73	64	53	19	19	18	15
ISU: DI Post-Bacc Cert	18	18	18	18	18	18	18	18
UI: BSFCS Food/Nutr Dietetics opt	94	84	73	68	18	18	20	17
LCSC	N/A							
CEI	N/A							
CSI	N/A							
CWI	N/A							
NIC	N/A							

- 14. Projections for proposed program:** Using the chart below, provide projected enrollments and number of graduates for the proposed program:

Proposed Program: Projected Enrollments and Graduates First Five Years											
Program Name:											
Projected Fall Term Headcount Enrollment in Program						Projected Annual Number of Graduates From Program					
FY_20 (first year)	FY_21	FY_22	FY_23	FY24_	FY_25	FY_20 (first year)	FY_21	FY_22	FY_23	FY_24	FY_25
22	40	40	40	40	40	0	18	20	22	22	22

- 15. Describe the methodology for determining enrollment and graduation projections.** Refer to information provided in Question #2 “Need” above. What is the capacity for the program? Describe your recruitment efforts? How did you determine the projected numbers above?

The current post-baccalaureate dietetic internship certificate program has 18 seats. The M.S. in Nutrition with Dietetic Internship (Track 1) will encompass these 18 seats and award the M.S. degree within a total of four consecutive semesters. As noted above, these DI seats are highly competitive nationally; the ISU applicant pool represents a 5:1 ratio of applicants per seat. Since the M.S. will be required, we would anticipate this track to fill each year. As with other highly competitive ISU graduate professional programs in the health sciences educating students for entry into the respective field (e.g., PharmD, DPT, OT) student enrollment will not be dependent on availability of graduate teaching and research assistantship.

The M.S. in Nutrition (no internship) Track 2 anticipates an enrollment of four new part time and/or full time students per year. Track 2 students are anticipated to take between three semesters to three years to complete the program. This was determined through our alumni and preceptor survey results with the vast majority expecting to go part time. Though the response to interest in the program was higher, four students represents our conservative estimates. There is currently no functional cap on Track 2, as we do not anticipate exceeding our capacity.

- 16. Minimum Enrollments and Graduates.**

- a.** Have you determined minimums that the program will need to meet in order to be continued? What are those minimums, what is the logical basis for those minimums?

A minimum has not been determined at this point as with the January 2024 professional requirement for interns to have master’s degrees to sit for the credentialing exam, we anticipate continued full enrollment by fall 2023 of the 18 seats in Track 1 of the M.S. in Nutrition. If the number of seats decrease from 18 (e.g. limited clinical placement), the program would still be successful at a lesser number.

- b.** What is the sunset clause by which the program will be considered for discontinuance if the projections or expectations outlined in the program proposal are not met?

Track 1 will be delivered as a cohort over 4 consecutive semesters (Fall 1, Spring,

Summer and Fall 2). If it is determined that the program must be discontinued, the current cohort will be completed and no further cohorts enrolled. Students enrolled in Track 2 that are able to finish within the same period as the Track 1 cohort will be supported. If they are more than 1 year away from finishing, those students will be advised to transfer to a similar graduate degree (e.g. Masters of Public Health or Masters of Health Education).

Resources Required for Implementation – fiscal impact and budget

17. Physical Resources.

- a. **Existing resources.** Describe equipment, space, laboratory instruments, computer(s), or other physical equipment presently available to support the successful implementation of the program.

The Dietetic Programs have two faculty with office space in Meridian and four faculty and an administrative assistant with office space in Pocatello. Albion Hall is used for teaching in the undergraduate program with the Foods Laboratory (room 102) and two classrooms (Albion 104 and 108). Further use of these offices and classrooms is anticipated. The DI currently uses DL classrooms in Pocatello, Twin Falls and Meridian for the delivery of the Seminar in the Dietetic Internship. Further use of this technology may be used for partial delivery of the proposed NTD 6609 Seminar for Dietetic Interns and for the other NTD courses planned for online hybrid course delivery. One office space in Pocatello is being converted into a combination office space, counseling office and will have distance learning technology.

- b. **Impact of new program.** What will be the impact on existing programs of increased use of physical resources by the proposed program? How will the increased use be accommodated?

With the projected 18-22 students in the program, three new and three existing courses will be taught on an annual basis and therefore a greater frequency than in the past (NTD 6609, 6610, 6620, 6622, 6624 and 6640), more classroom time will be needed. Current office space and equipment, as noted above, is adequate for the anticipated increase.

- c. **Needed resources.** List equipment, space, laboratory instruments, etc., that must be obtained to support the proposed program. Enter the costs of those physical resources into the budget sheet.

We anticipate using existing DL classrooms on the Meridian, Pocatello and Twin Falls campuses to provide live/online hybrid courses. We plan to offer the courses either live with recording for later asynchronous viewing or totally online. One office space in Pocatello is being converted to include distance learning technology to supplement the existing resources in Pocatello for smaller class gatherings and capstone defenses.

18. Library resources

- a. **Existing resources and impact of new program.** Evaluate library resources, including personnel and space. Are they adequate for the operation of the present program? Will there be an impact on existing programs of increased library usage caused by the proposed program? For off-campus programs, clearly indicate how the library resources are to be provided.

The program offered as the M.S. in Nutrition with Public Health Emphasis is capitalizing on current course offerings in nutrition and public health. Few new courses are being developed. Resources, including journals and databases (e.g., UpToDate) used across the Kasiska Division of Health Sciences for other health science programs, including but not limited to, nursing, physician assistant, medicine, exercise science, counseling, speech and language pathology, pharmacy, along with existing dietetics programs will meet program needs. Additionally, students enrolled in the Dietetic Internship are required to join the Academy of Nutrition and Dietetics. For a student membership fee of \$60, students receive the leading research journal in the field, other periodicals, and access to a large variety of online databases and resources including the Evidence Analysis Library.

The program also maintains an online group license for the Nutrition Care Manual, the premier medical nutrition therapy resource across the lifespan, and the eNCPT, an international resource with standardized terminology for medical record entry and implementation of the nutrition care process.

To ensure that library resources are adequate, \$1500 per year is allotted to the Library to ensure resources are sufficient to meet the needs of the course offerings.

- b. Needed resources.** What new library resources will be required to ensure successful implementation of the program? Enter the costs of those library resources into the budget sheet.

None at this time.

19. Personnel resources

- a. Needed resources.** Give an overview of the personnel resources that will be needed to implement the program. How many additional sections of existing courses will be needed? Referring to the list of new courses to be created, what instructional capacity will be needed to offer the necessary number of sections?

Anticipated personnel resources needed include 1.8 FTE of faculty and 0.38 of administrative support personnel. Faculty break down included 0.5 FTE of two tenured graduate faculty, 0.5 FTE clinical faculty in Meridian and 0.3 FTE clinical faculty in Pocatello plus 0.2 FTE internship director in Pocatello for a total of 2.38 FTE. No additional sections of existing courses will be needed.

Three of the required courses to be taught by Dietetic Faculty are already in the graduate catalog but have not been taught for many years. NTD 6620 Nutritional Epidemiology, NTD 6622 Maternal, Infant and Child Nutrition and NTD 6624 Nutrition and Aging were developed in the mid 1990's, when the new Master of Public Health program had a Nutrition track. Those courses will be reinstated for this program. Adequate enrollment is anticipated as it will be required for all graduates in this major and will be an approved elective for the MPH and MHE majors at a minimum. With anticipation of this master's degree, an additional faculty member was allotted to dietetics and that position is now filled. Dietetics has also made some adjustments to the undergraduate teaching schedule to accommodate the graduate classes. Instructor loads are adequate to cover the teaching requirements for the master's and undergraduate degree. The Track 1 (M.S. Nutrition + Internship) will also have a two-credit intensive prep course (NTD 6609 Seminar for Dietetic Interns) that will replace the existing NTD 4486 Dietetic Internship Seminar I. NTD 6620 Nutritional Epidemiology, NTD 6622 Maternal, Infant and Child Nutrition, and NTD 6624 Nutrition and Aging will all increase from a current two credits to three credits to provide rigor to the curriculum. Again, this is required for all M.S. Nutrition majors and can be an elective for other programs (e.g. MPH, MHE). This is included in the faculty FTE.

The NTD 6610 Current Issues in Nutrition (one credit) will replace the current NTD 4487 Dietetic Internship Seminar II. NTD 6640 will be a new preparation but is met with the current areas of expertise within the faculty. The NTD 6650 Capstone Project (or NTD 6651 Thesis option) for three credits will be covered with the two 0.5 FTE tenured faculty overseeing these students. Finally, the Dietetic Internship Practicum will be three courses (NTD 6655, 6656, and 6657) taken Spring, Summer, and second Fall semester. This will be part of the load of the clinical faculty as it currently is in the post-baccalaureate certificate program. It is customary in Dietetics Education to offer graduate credit for the practicum as part of the graduate credit requirement.

- b. Existing resources.** Describe the existing instructional, support, and administrative resources that can be brought to bear to support the successful implementation of the program.

Faculty and students in the Dietetic Programs have anticipated the development of this Master's program for several years as we were notified in 2014 of the 2024 mandatory requirement for a Master's degree to sit for the credentialing exam. With that in mind, the KDHS leadership has worked to shift a faculty position to dietetics to help cover the load of the Master's degree. Dietetics has two graduate faculty that will have 0.5 of their time devoted to the Master's degree to include teaching one or two graduate courses and serving as committee chairs for the capstone projects. Other dietetic faculty are expected to serve on committees and assist with the teaching according to expertise. 1.0 FTE of the clinical faculty (0.5 Meridian, 0.3 + 0.2 Pocatello) are a shift from the current post baccalaureate dietetic internship to facilitating the graduate level dietetic internship. An increase in the director time has been incorporated into the budget to account for some summer time oversight.

Most of the time of our administrative assistant is spent on the dietetic internship. This position can easily accommodate the demands of the graduate program.

- c. Impact on existing programs.** What will be the impact on existing programs of increased use of existing personnel resources by the proposed program? How will quality and productivity of existing programs be maintained?

With the additional faculty position recently filled, there will be enough time for faculty to support the existing B.S. program and the new M.S. Nutrition with Internship and M.S. Nutrition alone. The management time required for the current internship will be decreased with less class time and practicum spread over 12 months.

- d. Needed resources.** List the new personnel that must be hired to support the proposed program. Enter the costs of those personnel resources into the budget sheet.

No additional personnel are anticipated at this time.

20. Revenue Sources

- a) **Reallocation of funds:** If funding is to come from the reallocation of existing state appropriated funds, please indicate the sources of the reallocation. What impact will the reallocation of funds in support of the program have on other programs?

Reallocation of funds is not needed.

- b) **New appropriation.** If an above Maintenance of Current Operations (MCO) appropriation is required to fund the program, indicate when the institution plans to include the program in the legislative budget request.

Not applicable

- c) **Non-ongoing sources:** Not applicable
- i. If the funding is to come from one-time sources such as a donation, indicate the sources of other funding. What are the institution's plans for sustaining the program when that funding ends?
 - ii. Describe the federal grant, other grant(s), special fee arrangements, or contract(s) that will be valid to fund the program. What does the institution propose to do with the program upon termination of those funds?
- d) **Student Fees:**
- i. If the proposed program is intended to levy any institutional local fees, explain how doing so meets the requirements of Board Policy V.R., 3.b.

The Dietetic Internship was approved to charge a professional fee of \$1450.00 per semester or \$2900 for the year. We would like to propose a 3.4% increase on the professional fee to \$3000 total, but spread the fee over the three semesters that the students will now be in practicum (spring, summer and fall 2). This will help the students to spread the fee over three semesters instead of two. The increase will help defray some of the costs associated with adding a summer practicum (e.g. adjunct faculty support for practicum site visits, remediation if needed and grading). The professional fee is only applicable to the Track 1 M.S. Nutrition + Dietetic Internship. No fees are being requested of students in Track 2 M.S. Nutrition only.

- ii. Provide estimated cost to students and total revenue for self-support programs and for professional fees and other fees anticipated to be requested under Board Policy V.R., if applicable.

A continuation of the current professional fee is requested with a 3.4% increase to \$3000 spread over 3 semesters. The professional fee is only applicable to the Track 1 M.S. Nutrition + Dietetic Internship.

21. Using the budget template provided by the Office of the State Board of Education, provide the following information:

- Indicate all resources needed including the planned FTE enrollment, projected revenues, and estimated expenditures for the first **four** fiscal years of the program.
- Include reallocation of existing personnel and resources and anticipated or requested new resources.
- Second and third year estimates should be in constant dollars.
- Amounts should reconcile subsequent pages where budget explanations are provided.
- If the program is contract related, explain the fiscal sources and the year-to-year commitment from the contracting agency(ies) or party(ies).
- Provide an explanation of the fiscal impact of any proposed discontinuance to include impacts to faculty (i.e., salary savings, re-assignments).

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Program Resource Requirements.

- Indicate all resources needed including the planned FTE enrollment, projected revenues, and estimated expenditures for the first **four** fiscal years of
- Include reallocation of existing personnel and resources and anticipated or requested new resources.
- Second and third year estimates should be in constant dollars.
- Amounts should reconcile subsequent pages where budget explanations are provided.
- If the program is contract related, explain the fiscal sources and the year-to-year commitment from the contracting agency(ies) or party(ies).
- Provide an explanation of the fiscal impact of any proposed discontinuance to include impacts to faculty (i.e., salary savings, re-assignments).

I. PLANNED STUDENT ENROLLMENT

	<u>FY 2020</u>		<u>FY 2021</u>		<u>FY 2022</u>		<u>FY 2023</u>	
	FTE	Headcount	FTE	Headcount	FTE	Headcount	FTE	Headcount
A. New enrollments	1	4	18	18	18	18	18	18
B. Shifting enrollments	18	18	19	22	19	22	19	22
Total Enrollment	19	22	37	40	37	40	37	40

II. REVENUE

	<u>FY 2020</u>		<u>FY 2021</u>		<u>FY 2022</u>		<u>FY 2023</u>	
	On-going	One-time	On-going	One-time	On-going	One-time	On-going	One-time
1. New Appropriated Funding Request								
2. Institution Funds	184,222.32		\$190,400.92		\$195,415.38		\$200,580.26	
3. Federal								
4. New Tuition Revenues from Increased Enrollments	\$94,428.00		\$145,188.00		\$145,188.00		\$145,188.00	
5. Student Fees	\$66,000.00		\$120,000.00		\$120,000.00		\$120,000.00	
6. Other (i.e., Gifts)								
Total Revenue	\$344,650.32	\$0.00	\$455,588.92	\$0.00	\$460,603.38	\$0.00	\$465,768.26	\$0.00

**INSTRUCTION, RESEARCH AND STUDENT AFFAIRS
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*Ongoing is defined as ongoing operating budget for the program which will become part of the base.
One-time is defined as one-time funding in a fiscal year and not part of the base.*

III. EXPENDITURES

	<u>FY 2020</u>		<u>FY 2021</u>		<u>FY 2022</u>		<u>FY 2023</u>	
	On-going	One-time	On-going	One-time	On-going	One-time	On-going	One-time
A. Personnel Costs								
1. FTE	2.38		2.38		2.38		2.38	
2. Faculty	\$101,539.36		\$104,585.54		\$107,723.11		\$110,954.80	
3. Adjunct Faculty	\$14,654.88		\$15,094.53		\$15,547.37		\$16,013.79	
4. Graduate/Undergrad Assistants	\$0.00		\$0.00		\$0.00		\$0.00	
5. Research Personnel	\$0.00		\$0.00		\$0.00		\$0.00	
6. Directors/Administrators	\$9,251.84		\$9,529.40		\$9,815.28		\$10,109.74	
7. Administrative Support Personnel	\$10,623.60		\$10,942.31		\$11,270.58		\$11,608.70	
8. Fringe Benefits	\$48,152.64		\$50,249.14		\$51,059.04		\$51,893.23	
9. Other:								
Total Personnel and Costs	<u>\$184,222.32</u>	<u>\$0.00</u>	<u>\$190,400.92</u>	<u>\$0.00</u>	<u>\$195,415.38</u>	<u>\$0.00</u>	<u>\$200,580.26</u>	<u>\$0.00</u>

	<u>FY 2020</u>		<u>FY 2021</u>		<u>FY 2022</u>		<u>FY 2023</u>	
	On-going	One-time	On-going	One-time	On-going	One-time	On-going	One-time
B. Operating Expenditures								
1. Travel	\$2,500.00		\$2,500.00		\$2,500.00		\$2,500.00	
2. Professional Services								
3. Other Services								

**INSTRUCTION, RESEARCH AND STUDENT AFFAIRS
DECEMBER 20, 2018**

Attachment 1

4. Communications	\$1,104.00		\$1,104.00		\$1,104.00		\$1,104.00	
5. Materials and Supplies	\$5,980.00		\$5,980.00		\$5,980.00		\$5,980.00	
6. Rentals								
7. Materials & Goods for Manufacture & Resale								
8. Miscellaneous								
Total Operating Expenditures	\$9,584	\$0	\$9,584	\$0	\$9,584	\$0	\$9,584	\$0

	FY 2020		FY 2021		FY 2022		FY 2023	
	On-going	One-time	On-going	One-time	On-going	One-time	On-going	One-time
C. Capital Outlay								
1. Library Resources	\$1,500.00		1500		\$1,500.00		\$1,500.00	
2. Equipment								
Total Capital Outlay	\$1,500	\$0	\$1,500	\$0	\$1,500	\$0	\$1,500	\$0

	FY 2020		FY 2021		FY 2022		FY 2023	
D. Capital Facilities Construction or Major Renovation	\$0.00		\$0.00		\$0.00		\$0.00	

**INSTRUCTION, RESEARCH AND STUDENT AFFAIRS
DECEMBER 20, 2018**

Attachment 1

E. Other Costs

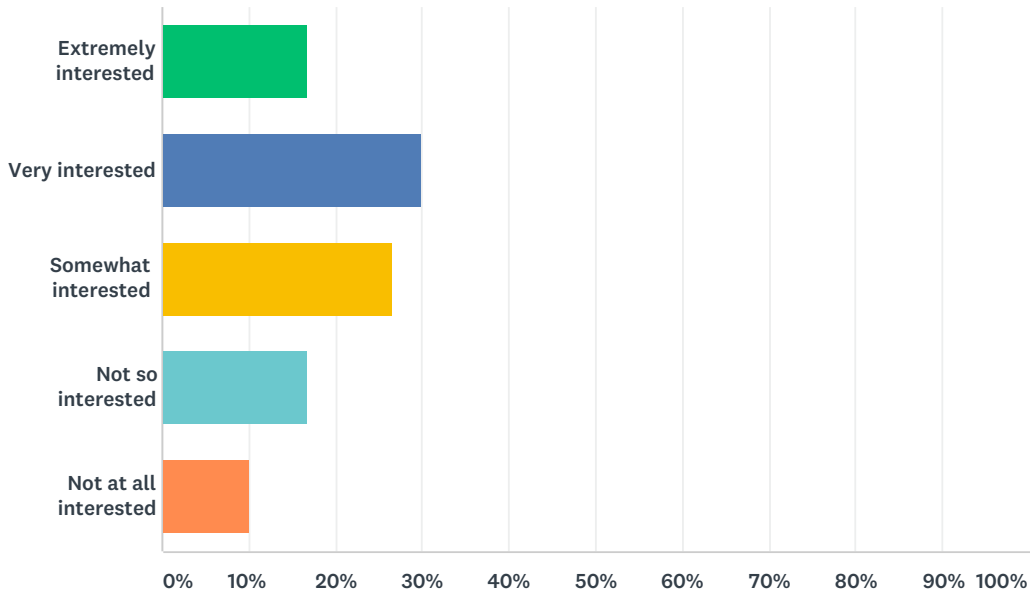
Utilites	_____	_____	_____	_____	_____	_____	_____	_____
Maintenance & Repairs	_____	_____	_____	_____	_____	_____	_____	_____
Other	_____	_____	_____	_____	_____	_____	_____	_____
Total Other Costs	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>
TOTAL EXPENDITURES:	<u>\$195,306</u>	<u>\$0</u>	<u>\$201,485</u>	<u>\$0</u>	<u>\$206,499</u>	<u>\$0</u>	<u>\$211,664</u>	<u>\$0</u>
Net Income (Deficit)	<u>\$149,344</u>	<u>\$0</u>	<u>\$254,104</u>	<u>\$0</u>	<u>\$254,104</u>	<u>\$0</u>	<u>\$254,104</u>	<u>\$0</u>

Budget Notes (specify row and add explanation where needed; e.g., "I.A.,B. FTE is calculated using..."):

II.4	This includes 18 internship students who previously were paying undergraduate tuition, who now will be paying graduate tuition. Difference of \$978 per semester for 2 semesters.
II.4	Part-time tuition calculated at \$470.00 per credit
A.	3% increase in personal costs per year
II.5	Professional fees at \$1,000.00 per semester for Spring and Summer 2nd fall semesters

Q1 Would you be interested in earning a Master's of Science degree in Nutrition with an emphasis in Public Health at Idaho State University?

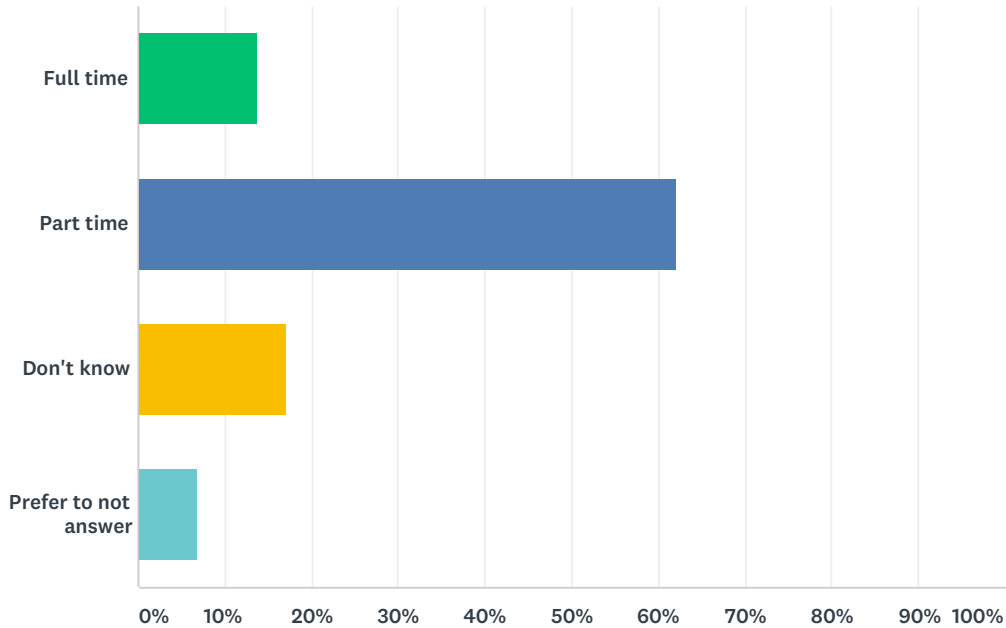
Answered: 60 Skipped: 0



ANSWER CHOICES	RESPONSES	
Extremely interested	16.67%	10
Very interested	30.00%	18
Somewhat interested	26.67%	16
Not so interested	16.67%	10
Not at all interested	10.00%	6
TOTAL		60

Q2 If you are interested, would you attend full time or part time?

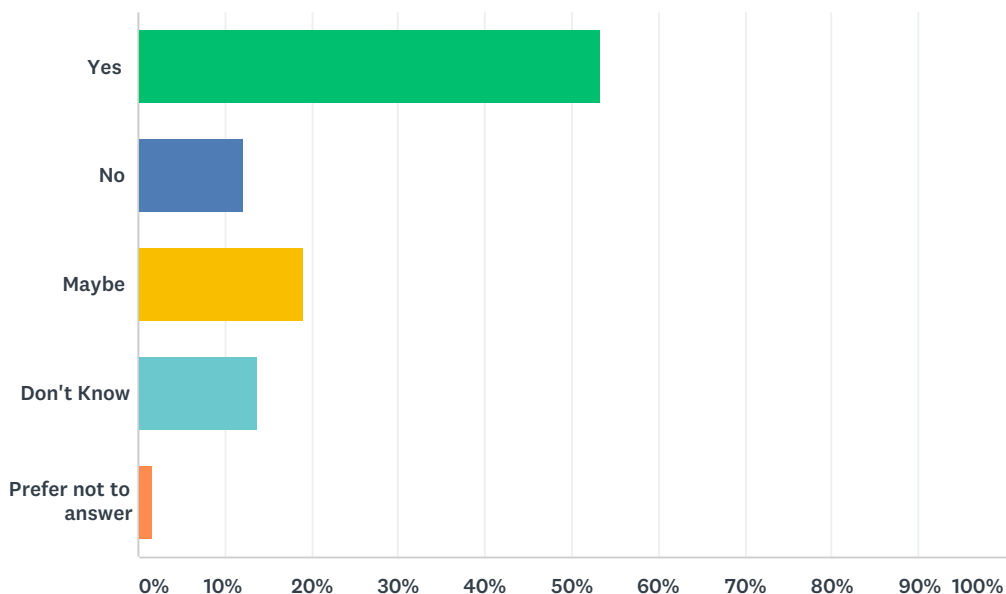
Answered: 58 Skipped: 2



ANSWER CHOICES	RESPONSES
Full time	13.79% 8
Part time	62.07% 36
Don't know	17.24% 10
Prefer to not answer	6.90% 4
TOTAL	58

Q3 Would you be willing to attend fall, spring and summer semesters to complete the program course work?

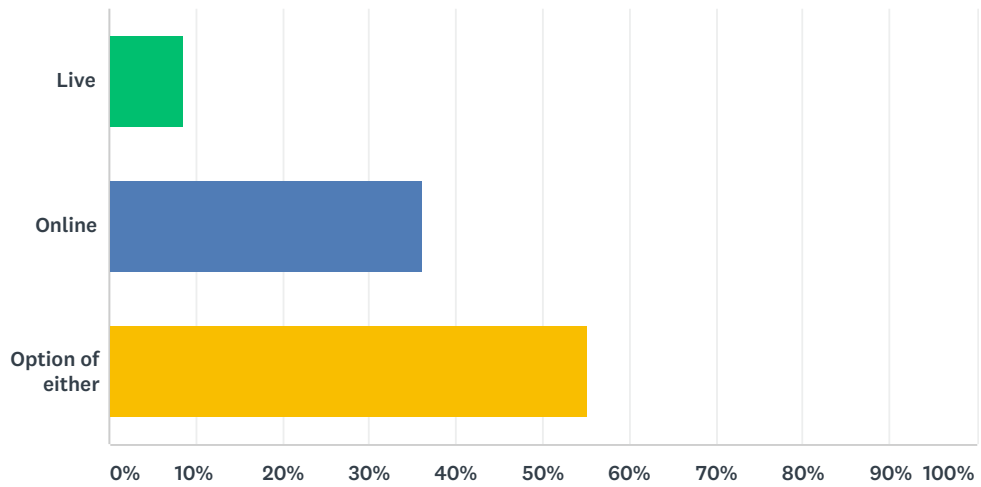
Answered: 58 Skipped: 2



ANSWER CHOICES	RESPONSES	
Yes	53.45%	31
No	12.07%	7
Maybe	18.97%	11
Don't Know	13.79%	8
Prefer not to answer	1.72%	1
TOTAL		58

Q4 For the course delivery, would you prefer

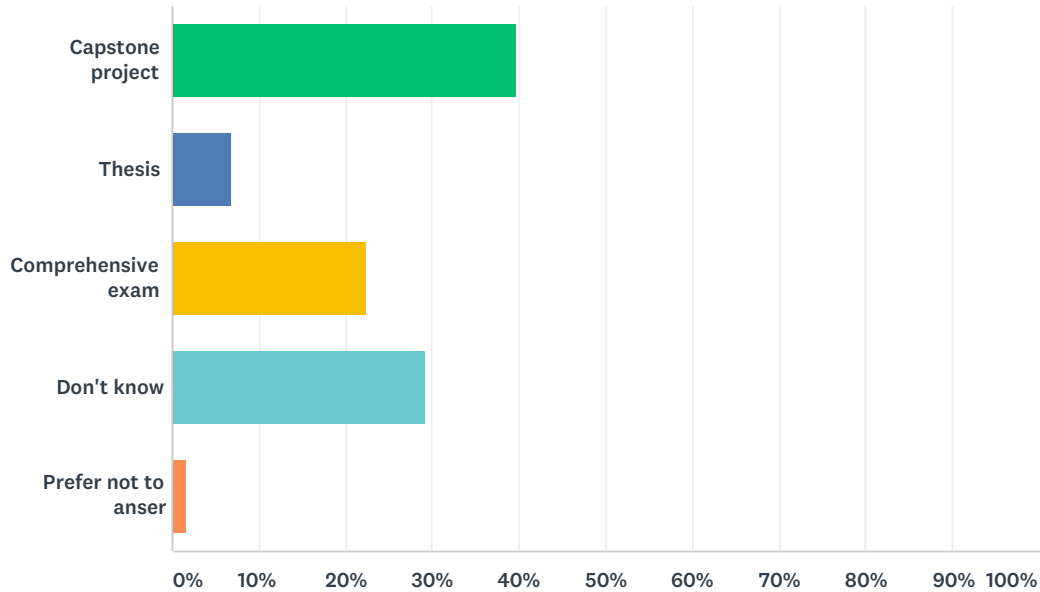
Answered: 58 Skipped: 2



ANSWER CHOICES	RESPONSES	
Live	8.62%	5
Online	36.21%	21
Option of either	55.17%	32
TOTAL		58

Q5 Which option would you be most interested in for completion?

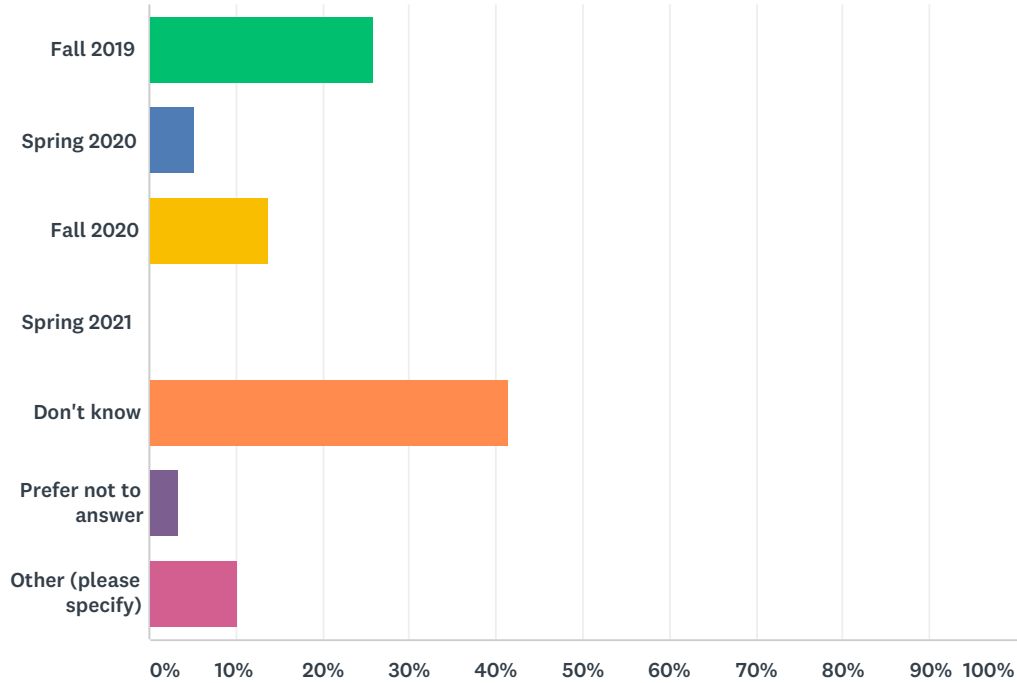
Answered: 58 Skipped: 2



ANSWER CHOICES	RESPONSES	
Capstone project	39.66%	23
Thesis	6.90%	4
Comprehensive exam	22.41%	13
Don't know	29.31%	17
Prefer not to answer	1.72%	1
TOTAL		58

Q6 Tentatively, the Master's in Nutrition will begin in fall of 2019. When would you consider starting the program?

Answered: 58 Skipped: 2

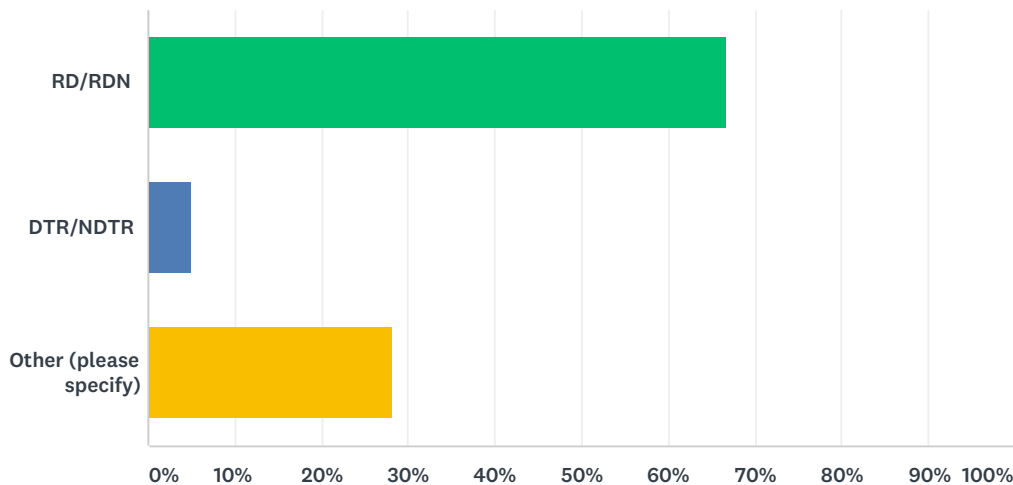


ANSWER CHOICES	RESPONSES	
Fall 2019	25.86%	15
Spring 2020	5.17%	3
Fall 2020	13.79%	8
Spring 2021	0.00%	0
Don't know	41.38%	24
Prefer not to answer	3.45%	2
Other (please specify)	10.34%	6
TOTAL		58

#	OTHER (PLEASE SPECIFY)	DATE
1	I am currently working towards a DNP credential so I'm not totally sure. In the next 3-5 years for sure.	3/9/2018 9:08 AM
2	I am interested in the Masters Program of Nutrition, however, do not particularly think Public Health is essential to what my current career as a clinical pediatric RD.	3/6/2018 8:03 PM
3	When I'm finally financially stable and if I'm still in Pocatello.	3/6/2018 12:09 PM
4	Although the thought of having a Master's in Nutrition is nice, it's probably not going to happen for me. I just finished the Master in Physician Assistant Studies program in August 2017 & am now working full-time as a PA. I'm working in integrative medicine, so more education in the nutrition field would only help me, but I don't know that I have the time/energy/motivation to go through another master's program right now! I also don't want to even think about taking on any more student loan debt...! Anyway, it's not an absolute "no", but it's very unlikely at this point.	3/6/2018 11:32 AM
5	I don't anticipate getting a master's	3/6/2018 11:09 AM
6	I would honestly love to participate but we are moving across the country so I won't be able to.	3/6/2018 11:06 AM

Q7 Which title best describes your credentials?

Answered: 60 Skipped: 0

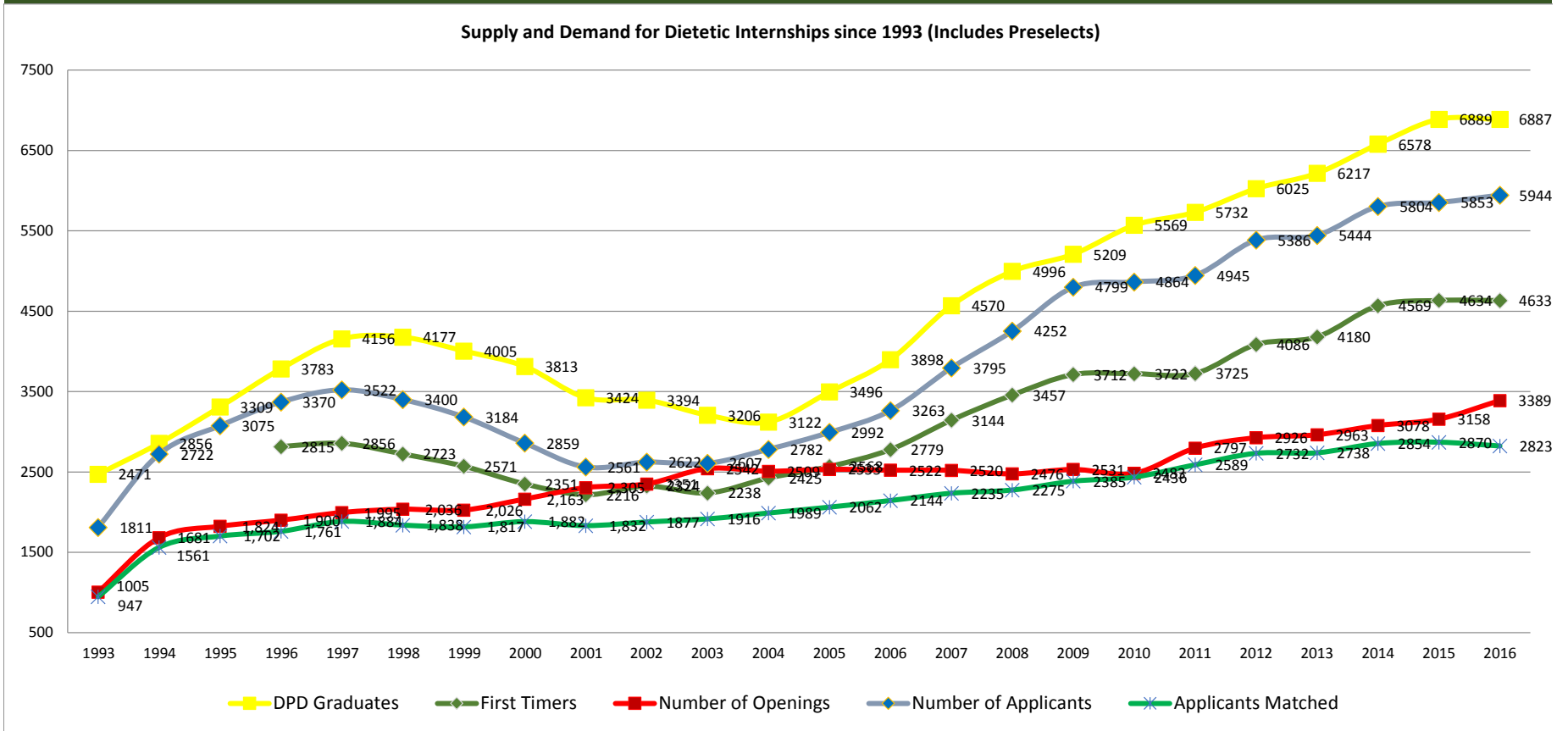


ANSWER CHOICES	RESPONSES	
RD/RDN	66.67%	40
DTR/NDTR	5.00%	3
Other (please specify)	28.33%	17
TOTAL		60

#	OTHER (PLEASE SPECIFY)	DATE
1	Bachelor's degree in Dietetics	3/15/2018 9:13 AM
2	RDN, LD, CDE	3/9/2018 9:08 AM
3	No credentials	3/7/2018 10:52 AM
4	Bachelor's Degree in Dietetics	3/7/2018 8:36 AM
5	RN/CCRN	3/7/2018 8:28 AM
6	Na	3/6/2018 11:33 PM
7	intern	3/6/2018 10:32 PM
8	n/a	3/6/2018 5:36 PM
9	Intern	3/6/2018 1:25 PM
10	na	3/6/2018 12:37 PM
11	Dietetic intern	3/6/2018 12:09 PM
12	BS Dietetics	3/6/2018 11:37 AM
13	BS, dietetics; MPAS; PA-C	3/6/2018 11:32 AM
14	Intern	3/6/2018 11:23 AM
15	intern	3/6/2018 11:08 AM
16	Dietetic program graduate	3/6/2018 10:40 AM
17	Dietetic intern	3/6/2018 10:38 AM



Supply and Demand for Internship Sites



Occupational Employment & Wages Survey

OES Dashboard

OES-Table OES-Chart OES-Wage Range *Definitions

Occupational Employment & Wage Survey - May 2016 (2017 Release)

Area Type
 (All)
 Statewide
 MSA
 Balance of State
 Idaho Labor Reg...
 US

Area Name
 (All)
 Idaho

Occupation Title
 Cost Estimators
 Counter and Rental Clerks
 Counter Attendants, Cafeteria, Food Conces...
 Couriers and Messengers
 Court Reporters
 Court, Municipal and License Clerks

Wage Type
 Annual
 Hourly

SOC Major Group
 (All)

Area Type	Area Name	SOC Code	Occupation Title	Employment	Mean	Entry Wage
Statewide	Idaho	29-1031	Dietitians and Nutritionists	270	\$54,640.00	\$41,440

<https://lmi.idaho.gov/oes>

2/13/2018



State of Idaho

Board Of Medicine

BOM - Public Record System



DIETETIC LICENSURE BOARD

License Counts

Active/Inactive License	Current	Not Current	Total
DIETITIAN	629	402	1031
DIETITIAN - INACTIVE	2	8	10
Permit	Current	Not Current	Total
PROVISIONAL LICENSE - GRADUATE DIETITIAN	1	68	69

** Press Close When Done **

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Close

Graduate Degree Registration Eligibility Requirement

Commission on Dietetic Registration

the credentialing agency for the
 Academy of Nutrition and Dietetics

Frequently Asked Questions (FAQ)

July 2013

This FAQ is intended to provide you with answers to questions you may have regarding the Commission on Dietetic Registration (CDR) action to change the degree requirement for dietitian registration eligibility from a baccalaureate degree effective January 1, 2024. This action is based on the recommendations of the Council on Future Practice Visioning Report released in Fall 2012. The full report is available at the following link:

http://cdrnet.org/pub/file.cfm?item_type=xm_file&id=10369.

Several of the recommendations directly relate to CDR's role as the credentialing agency for the Academy of Nutrition and Dietetics. Recommendations 1 and 2 specifically address the requirements for eligibility to take the entry-level registration examination for dietitians.

Recommendation #1

Elevate the educational preparation for the future entry-level RD to a minimum of a graduate degree from an ACEND-accredited program.

Recommendation #2

Recommend that ACEND require an ACEND-accredited graduate degree program and/or consortium that integrates both the academic coursework and supervised practice components into a seamless (1-step) program as a requirement to obtain the future entry-level RD credential.

As the credentialing agency for the Academy, CDR is charged in the Academy *Bylaws* with the establishment of registration eligibility requirements for its certifications. *Excerpt from Academy of Nutrition and Dietetics Bylaws, January 7, 2012 Article VII Section 2.*

Section 2. Commission on Dietetic Registration ("CDR").

Purpose Statement: CDR has sole and independent authority in all matters pertaining to certification...establish and evaluate requirements, standards, policies and procedures for certification programs, including eligibility, reinstatement, examination and recertification for all levels of dietetics practice (e.g., entry, specialty and advanced level practice).

At its April 2013 meeting, CDR took the following action:

Move to change the entry-level registration eligibility education requirements for dietitians, beginning in 2024, from a baccalaureate degree to a minimum of a graduate degree. A graduate degree includes a master's degree, practice

doctorate, doctoral degree (e.g., Ph.D., Ed.Dor, D.Sc.) All other entry-level dietitian registration eligibility requirements remain the same.

Why did CDR change the degree requirement for entry-level registration eligibility to a graduate degree?

CDR's vote to change the entry-level registration eligibility education requirements for dietitians, beginning in 2024, from a baccalaureate degree to a minimum of a graduate degree addresses Recommendation # 1 in the Visioning Report. The Visioning Report provides the following rationale for this recommendation.

- Almost all other health care professions have increased entry-level educational standards based on expansion of knowledge and need for deeper and wider expertise; further, level of education is a factor that influences respect as a valued member of the healthcare team (5). Too often, RDs at any level are seen as assisting in, rather than leading, the nutrition care process, a perception that may affect career advancement (19).
- In 2011, participants in a joint meeting of CFP, ACEND, and CDR agreed that increasing degree requirements for entry into the profession to a graduate degree—either a master's degree or practice doctorate—along with developing a new credential for DPD program baccalaureate graduates, would elevate practice at all levels of the profession (10).
- One theme that emerged from the CFP educator survey indicated that dietetics educators support a graduate degree for entry into the profession, as well (14).
- It has been observed that health care professionals with advanced degrees tend to have higher self-esteem and attain a higher profile within the profession as writers, researchers, and leaders (1).
- The Bureau of Labor Statistics (BLS) indicates that many dietitians have advanced degrees and that employment of dietitians is expected to increase 20% from 2010 to 2020, faster than the average for all occupations (20).
- In 2010, RD salaries were 40-45% less than salaries of other non-physician health professionals (21). Education beyond the bachelor's degree continues to be associated with hourly wage gains. In 2011, the difference between the median wage of RDs with a master's degree and those with a bachelor's degree was \$2.41/hour (approximately \$5,000/year difference) (22).
- "Healthcare will continue to grow fastest and provide some of the best paying jobs in the nation—but the people in these jobs will increasingly require higher levels of education to enter the field and continuous certification once they are in" (23, page 15). The need to elevate entry-level RD education to a graduate level is consistent with the knowledge, skills, and research base required in the field of nutrition and dietetics and is necessary to protect the public, remain competitive, and increase recognition and respect. Furthermore, Collier found that graduate degree requirements do not deter student interest in a health professions career (24).

1. How did CDR determine the 2024 implementation deadline date?

CDR calculated a five to six year window for those entering a DPD program in 2014 to complete the DPD program followed by two years to find and complete a supervised practice program and then two years as a cushion for any unforeseen circumstances that would interfere with submission of the registration eligibility application by January 1, 2024.

2. Will the registration examination content change with this new graduate degree requirement?

Since the content of the entry-level registration examination is based on the results of a practice audit, not on the degree content or level, the graduate degree requirement will not impact examination content until there is a change in practice as a result of the degree requirement. Practice changes are captured in CDRs recurring practice audits.

3. Will current RDs who do not have a graduate degree have to obtain a graduate degree by this deadline date?

No. This deadline only applies to initial applicants for registration eligibility and those who lose their registered status after January 1, 2024 and must retake the registration examination for dietitians to reinstate registered status.

4. Will individuals who establish eligibility with a baccalaureate degree prior to January 1, 2024, but do not pass the registration examination, have to meet this new requirement?

No. Provided registration eligibility is established prior to January 1, 2024 a graduate degree will not be required.

5. Does this mean that the DTR eligibility requirements will move to a baccalaureate degree?

No. CDR does not plan to change the requirements for eligibility to take the registration examination for dietetic technicians to the minimum of a baccalaureate degree.

6. What does the statement, "all other entry level dietitian registration eligibility requirements remain the same," mean?

The current DPD and supervised practice requirements (CP, DI or ISPP), remain in effect. The only change is the degree level moving from minimum baccalaureate degree to minimum graduate degree. The foreign degree equivalency requirement also remains in effect.

7. Does the statement, "graduate level degree can be in any major," mean that the graduate degree could be in anything (even totally unrelated to nutrition and dietetics) as long as the person has a graduate degree and meets the other requirements for registration eligibility; i.e., coursework and supervised practice?

Just as the baccalaureate degree may currently be in any area, the graduate degree may also be in any area, provided it is granted by a U.S. regionally accredited college/university, or foreign equivalent. The vast majority of applicants for registration eligibility have a degree in dietetics, food and nutrition.

Those that do not are most often second career applicants. Since they are not identified as such during the application process we do not have data on the second career population, but we estimate that it is 5% or less of the total applicant pool. It is also important to note that some institutions have established policies which require all students completing DPD requirements to also complete degree requirements at their institution. This is at the discretion of the institution.

8. Why did the CDR motion not address the seamless aspects of the recommendation in the Visioning Report? Is it because that is a function of ACEND and not CDR?

The responsibility for the establishment of all requirements for eligibility to take CDR's registration examination examinations rests with CDR, not ACEND. This includes academic degree, and supervised practice. CDR has historically accepted completion of ACEND academic and supervised practice programs to meet registration eligibility requirements.

During CDR's discussions with ACEND, it was clear that ACEND needs additional time to prepare competencies and standards for the seamless graduate degree programs. Because of these time constraints ACEND requested that CDR delay establishment of a timeline. CDR believed that establishing a deadline relative only to the degree level would meet the needs of stakeholders requesting a timeline, while still allowing ACEND time to establish competencies and standards. The intent is to address the seamless aspect of the registration eligibility requirements in the future with a separate deadline date. CDR is hopeful that more programs will move forward with the graduate degree seamless option now that the timeline for the graduate degree implementation has been established.

9. Does a graduate degree positively impact the earnings of Registered Dietitians?

(Excerpt from the 2015 Academy of Nutrition and Dietetics Compensation and Benefits Study)

Yes, as was done in 2013, the effect of entering the profession with a master's rather than a bachelor's degree was analyzed. Median wage for those in the field for less than five years and having a dietetics-related master's when registered is \$25.00; for those with a bachelor's, \$23.79. So the entry-level master's premium is currently \$1.21 per hour, which is up nearly a half dollar since 2013

Education beyond the bachelor's degree continues to be associated with hourly wage gains. The difference between the median wage of RDNs with a bachelor's as their highest degree (any major), and that of RDNs with a master's degree (any major), is \$2.63 per hour in 2015. (This differential was only \$1.89 per hour in 2013.)

Earning a PhD is associated with even greater gains; median earnings for those with a doctorate (at \$44.23) are more than \$15 per hour above RDNs with a bachelor's degree.

It is important to note that bivariate analyses such as this do not take into account other correlating factors which may also drive compensation. For example, those with PhDs tend to work primarily in academia, and pay scales are higher than average for RDNs in that setting.

10. Is there data that illustrates the impact of the practice doctorate requirement on the diversity of students in either physical therapy or pharmacy?

Ethnic diversity in student enrollment in ACEND accredited programs has increased over the past 10 years. Most notably, the number of Hispanic students has nearly doubled. ACEND talked with other health profession accreditors (Physical Therapy, Pharmacy, Occupational Therapy) who have moved their education requirements to a graduate level and learned that this change did not decrease student diversity in those professions. In pharmacy, for example, under-represented minority students (Black, Hispanic, Native American) were 10.6% of the student population in 1988, prior to implementing their practice doctorate degree requirement, and 11.4% in 2012 after implementation. Diversity of students currently enrolled in dietetic internships combined with a required graduate degree (males = 10%; under-represented minorities = 9%) and in coordinated programs at the graduate level (males = 10%; under-represented minorities = 11%) is no less than the diversity of students in dietetic internship programs that do not offer a graduate degree (males = 8%; under-represented minorities = 9%). ACEND Standards encourage programs to foster diversity in their student selection process. ACEND currently monitors and will continue to monitor student diversity in all accredited programs.

11. Did CDR discuss one of the other recommendations in the Visioning Report related to requiring an emphasis area as part of the graduate degree?

No, CDR's recent discussions focused on degree level. This does not preclude the establishment of a specific area of focus for graduate degrees in the future.

12. Does the graduate degree have to be in food, nutrition or dietetics, or can it be an MBA or MPH or something else?

CDR's motion is consistent with our past practice relative to the baccalaureate degree. It can be in any area. Under some past registration eligibility pathways the degrees had to be in a "related area". However, "related" was very broadly interpreted to include a variety of business-type degrees such as marketing, human resources, organization development, and labor relations. The diversity of the profession promotes a wide array of degree topics that are seen as related. It is anticipated that a graduate level degree in nutrition and dietetics would be the most efficient means for students to obtain the necessary competency for dietetics

practice.

13. Will a degree in any area continue to be acceptable once the seamless process is addressed?

It is anticipated that this will change once the seamless process is established. Although, it is anticipated that there would be ACEND accredited seamless programs designed for areas such as an MPH.

14. Will applicants for registration eligibility with a graduate degree have to have supervised practice? Will they have to have a verification statement to take the RD exam?

Yes. Just as baccalaureate graduates now have to have verification statements to document completion of DPD and supervised practice program completion, graduate degree applicants will have to do the same.

15. Is it ACEND's responsibility to identify what major area of a graduate degree will be acceptable? Is that outside of the purview of CDR? The content area of the degree accepted for registration eligibility is CDR's purview, not ACEND's.

16. Does the graduate degree have to be completed after the supervised practice program?

No. The graduate degree may be completed at any time prior to applying for registration eligibility.

**INSTRUCTION, RESEARCH AND STUDENT AFFAIRS
DECEMBER 20, 2018**

SUBJECT

Board Policy III.T. Student Athletes - Second Reading

REFERENCE

August 2012	Board approved second reading of amendments to Board Policy III.T. creating a separate section of Board policy to address student athletes (Formally within III.X.)
April 2016	Board approved first reading of amendments to Board Policy III.T. to improve the timeliness of the reporting requirements in subsection 6.
June 2016	Board approved the second reading of proposed amendments to Board Policy III.T.6.
October 2018	Board approved first reading of proposed amendments to Board Policy III.T. subsection 3. and 5.a.

APPLICABLE STATUTES, RULE OR POLICY

Idaho State Board of Education Governing Policies & Procedures, Section III.T.6.

ALIGNMENT WITH STRATEGIC PLAN

Board governance item – Student Safety

BACKGROUND/DISCUSSION

Board Policy III.T. Student Athletes, outlines requirements for institutions to develop policies pertaining to student athletes, student athlete conduct and limits on knowingly recruiting student athletes that have been convicted of a felony. Additionally, student athletes are required to immediately report any incident, which may result in a legal investigation or criminal charges.

Proposed amendments provide clarification to the types of investigations that must be reported. Consensus was reached among the institution to amending the term “legal investigation” with “student code of conduct or criminal investigation” and other corresponding edits to subsection 6 for uniformity. One additional amendment was identified in subsection 3 to amend the reference to athletic conference to be inclusive of the National Collegiate Athletic Association (NCAA) and National Association of Intercollegiate Athletics (NAIA) regulations. The proposed amendment would replace the reference to “NCAA regulations” with “applicable athletic conference regulations.”

IMPACT

The clarification to the types of incidences reported will remove any ambiguity around what a student athlete must report to the head coach and athletic director.

**INSTRUCTION, RESEARCH AND STUDENT AFFAIRS
DECEMBER 20, 2018**

ATTACHMENTS

Attachment 1 – Section III.T. Student Athletes – Second Reading

STAFF COMMENTS AND RECOMMENDATIONS

No comments were received between the first and second reading and no additional amendments have been made to the policy.

Staff recommends approval.

BOARD ACTION

I move to approve the second reading of amendments to Board policy III.T.6, as presented in Attachment 1.

Moved by _____ Seconded by _____ Carried Yes _____ No _____

**Idaho State Board of Education
GOVERNING POLICIES AND PROCEDURES**

SECTION: III. POSTSECONDARY AFFAIRS

SUBSECTION: T. Student Athletes

June 2016December 2018

1. Each public college and university shall have a written policy governing the conduct of student athletes. At a minimum, those policies shall include:
 - a. A disclosure statement completed and signed by the student athlete prior to participation in any intercollegiate athletic endeavor, which shall include a description of (1) all prior criminal convictions, (2) all prior juvenile dispositions wherein the student was found to have committed an act that would constitute a misdemeanor or felony if committed by an adult, and (3) all pending criminal charges, including juvenile proceedings alleging any act which would constitute a misdemeanor or felony if committed by an adult.
 - b. This statement will be kept in the office of the athletic director. Failure to accurately disclose all incidents may result in immediate suspension from the team.
2. Institutions shall not knowingly recruit any person as a player for an intercollegiate athletic team who has been convicted of a felony or, in the case of a juvenile, who has been found to have committed an act which would constitute a felony if committed by an adult. Exemptions to this restriction shall be granted only by the President of the college or university upon recommendation of the athletic director and faculty athletics representative. Such decisions shall be reported in writing to the Executive Director of the State Board of Education at the time the exception is granted.
3. A student athlete convicted of a felony after enrollment, including a plea of nolo contendere on a felony charge, shall be removed from the team and shall not be allowed to participate again in intercollegiate athletics at any Idaho public college or university. Further, an institution may cancel any athletic financial aid received by a student who is convicted of a felony while the student is receiving athletic financial aid subject to [the applicable athletic conference](#) [NCAA](#) regulations and the institution's applicable student judicial procedure. Nothing herein shall be construed to limit an institution from exercising disciplinary actions or from implementing student athletic policies or rules that go beyond the minimum requirements stated herein.
4. Subject to applicable law, all institutions shall implement a drug education and testing program and shall require all intercollegiate student athletes to give written consent to drug testing as a condition of the privilege of participating in intercollegiate athletics.
5. Institutions shall require their athletic coaches to hold an annual team meeting with their respective teams at the beginning of each season. The coaches shall be required to verbally review the team rules with team members at the meeting. Attendance at this meeting shall be mandatory. Each team member shall receive a written copy of the team rules and sign a statement acknowledging receipt of the rules and attendance at the meeting where the rules were verbally reviewed.

Idaho State Board of Education
GOVERNING POLICIES AND PROCEDURES

SECTION: III. POSTSECONDARY AFFAIRS

SUBSECTION: T. Student Athletes

~~June 2016~~December 2018

Reporting Requirements

- a. Student athletes shall immediately report any incident which may result in a ~~legal~~ student code of conduct or criminal investigation of them or ~~criminal~~ charges against them to their head coach and to the athletic director. Coaches shall be obligated to inform the athletic director of any knowledge of a ~~legal~~ investigation of one or more of their athletes. The athletic director shall report the same to the chief student affairs officer and to the institutional president, who shall report the same to the Executive Director of the State Board of Education as soon as possible after learning of the charges. The report to the Executive Director shall include a description of the alleged violation of law and the institution's proposed action, if any. Verbal reports to the Executive Director shall be followed up with written notification (e.g. email, text, memo, etc.)

- b. Coaches shall immediately report the conviction of any student athlete to the athletic director and the institutional president, who shall report the conviction to the Executive Director of the State Board of Education as soon as possible. This report shall include a description of the violation of law and the institution's proposed action, if any. Verbal reports to the Executive Director shall be followed up with written notification (e.g. email, memo, etc.).

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SUBJECT

State Common Course List

REFERENCE

June 1996	The Board adopted a common course listing for general education core.
September 2017	The Board adopted the Governor's Higher Education Task Force recommendations to include employing a common course numbering system.
February 2018	The Board was provided with an update on the establishment of common course indexing.

APPLICABLE STATUTE, RULE, OR POLICY

Idaho State Board of Education Governing Policies & Procedures, Section III.N.
General Education

ALIGNMENT WITH STRATEGIC PLAN

Goal 4, Effective and Efficient Educational System, Objective B, Alignment and Coordination

BACKGROUND/DISCUSSION

Board Policy III.N, General Education establishes the General Education Matriculation (GEM) framework. On October 18, 2018, the Board approved amendments to this policy that would institute the implementation of a common course indexing list for a core set of freshman and sophomore level curricula (100 and 200 level courses) within the GEM framework. Common course indexing includes four common components: common course prefix, common course number, common course title, and common GEM discipline area designation. The policy requires the Board to approve the list on an annual basis.

IMPACT

Development of a common course numbering system will provide greater transparency of course articulation and seamless transfer for Idaho's students. It will also provide greater consistency for equivalent courses to be recognized with similar GEM designation across all institutions. The list of courses provided will help achieve this, beginning in the 2019-20 academic year.

ATTACHMENTS

Attachment 1 – State Common Course List

STAFF COMMENTS AND RECOMMENDATIONS

Consistent with Board Policy III.N, the common course-indexing list requires Board approval. A list of courses was compiled by Board staff with feedback from the GEM discipline groups, state General Education committee, and the Council on

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Academic Affairs and Programs (CAAP). The list identifies the shared common course listing, and reflects the course numbers and titles currently utilized across institutions for these courses. Courses are designated at the 100 or 200 level; GEM stamped at most institutions; and maintain equivalencies across institutions consistent with the Board's Course Transfer website. The list was shared with the Registrars from Idaho's public postsecondary institutions at their October meeting, and has been reviewed by CAAP and Instruction, Research and Student Affairs (IRSA) at multiple meetings, most recently in November. A recommendation was shared with staff to adjust the approval timeline from December to October in future years so as to more effectively assist institutions with internal catalog planning and publication deadlines.

Efforts are underway by institutions to ensure common course indexing for the attached list of courses is included in academic catalogs and listings for the 2019-20 academic year.

BOARD ACTION

I move to approve Idaho's Common Course list effective for the 2019-2020 academic year, as presented.

Moved by _____ Seconded by _____ Carried Yes _____ No _____

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Attachment 1

General Education Common Course Listing in AY 2019-20	BSU	CEI	CSI	CWI	ISU	LCSC	NIC	UI
Written Communications								
ENGL x101: Writing and Rhetoric I	ENGL 101	ENG 101	ENGL 101	ENGL 101	ENGL 1101	ENGL 101	ENGL 101	ENGL 101
ENGL x102: Writing and Rhetoric II	ENGL 102	ENG 102	ENGL 102	ENGL102	ENGL 1102	ENGL 102	ENGL 102	ENGL 102
Oral Communications								
COMM x101: Fundamentals of Oral Communication	COMM 101	COM 101	COMM 101	COMM 101	COMM 1101	COMM 101	COMM 101	COMM 101
Mathematical Ways of Knowing								
MATH x123: Math in Modern Society	MATH 123	MAT 123	MATH 123	MATH 123	MATH 1123	MATH 123	MATH 123	MATH 123
MATH x130: Finite Mathematics	MATH 130	N/A	N/A	MATH 130	MATH 1130	MATH 130	MATH 130	MATH 130
MATH x143: College Algebra	MATH 143	MAT 143	MATH 143	MATH 143	MATH 1143	MATH 143	MATH 143	MATH 143
MATH x147: College Algebra and Trigonometry	MATH 147	MAT 147	MATH 147	MATH 147	MATH 1147	MATH 147	MATH 147	N/A*
MATH x160: Survey of Calculus	MATH 160	MAT 160	MATH 160	MATH 160	MATH 1160	MATH 160	MATH 160	MATH 160
MATH x170: Calculus I	MATH 170	MAT 170	MATH 170	MATH 170	MATH 1170	MATH 170	MATH 170	MATH 170
MATH x153: Statistical Reasoning	MATH 254	MAT 253	MATH 153	MATH 253	MATH 1153	MATH 153	MATH 253	STAT 251
Scientific Ways of Knowing								
BIOL x100: Concepts of Biology	BIOL 100	BIO 100	BIOL 100	BIOL 100	BIOL 1100	BIOL 100	BIOL 100	BIOL 102
BIOL x227: Human Anatomy and Physiology I	BIOL 227	BIO 227	BIOL 227	BIOL 227	BIOL 2227***	BIOL 252	BIOL 227	BIOL 120
CHEM x100: Concepts of Chemistry	CHEM 100	CHE 100	CHEM 100	CHEM 100	CHEM 1100	CHEM 102	CHEM 100	N/A
CHEM x101: Introduction to Chemistry	CHEM 101	CHE 101	CHEM 101	CHEM 101	CHEM 1101	N/A	CHEM 101	CHEM 101
CHEM x102: Essentials of Organic and Biochemistry	CHEM 102	CHE 102	CHEM 102	CHEM 102	CHEM 1102	N/A	CHEM 102	N/A
CHEM x111: General Chemistry I	CHEM 111	CHE 111	CHEM 111	CHEM 111	CHEM 1111	CHEM 111	CHEM 111	CHEM 111
PHYS x111: General Physics I	PHYS 111	PHY 111	PHYS 111	PHYS 111	PHYS 1111	PHYS 111	PHYS 111	PHYS 111
PHYS x112: General Physics II	PHYS 112	PHY 112	PHYS 112	PHYS 112	PHYS 1112	PHYS 112	PHYS 112	PHYS 112
GEOL x101: Physical Geology	GEOS 100	GEO 101	GEOL 101	GEOL 101	GEOL 1001	GEOL 100	GEOL 101	GEOL 101
GEOL x102: Historical Geology	GEOS 102	N/A	GEOL 102	GEOL 102	N/A	GEOL 102	GEOL 102	GEOL 102
Social and Behavioral Ways of Knowing								
ANTH x101: Physical Anthropology	N/A**	ANT 101	ANTH 101	ANTH 101	N/A	ANTH 101	ANTH 101	ANTH 251
ANTH x102: Cultural Anthropology	ANTH 102	ANT 102	ANTH 102	ANTH 102	ANTH 2250	ANTH 102	ANTH 102	ANTH 100
ECON x201: Principles of Macroeconomics	ECON 201	ECO 201	ECON 201	ECON 201	ECON 2201	ECON 201	ECON 201	ECON 201
ECON x202: Principles of Microeconomics	ECON 202	ECO 202	ECON 202	ECON 202	ECON 2202	ECON 202	ECON 202	ECON 202
HIST x101: World History I	HIST 101	HIS 101	HIST 101	HIST 101	HIST 1101	HIST 101	HIST 101	HIST 101
HIST x102: World History II	HIST 102	HIS 102	HIST 102	HIST 102	HIST 1102	HIST 102	HIST 102	HIST 102
HIST x111: United States History I	HIST 111	HIS 111	HIST 111	HIST 111	HIST 1111	HIST 111	HIST 111	HIST 111
HIST x112: United States History II	HIST 112	HIS 112	HIST 112	HIST 112	HIST 1112	HIST 112	HIST 112	HIST 112
POLS x101: American National Government	POLS 101	POL 101	POLS 101	POLS 101	POLS 1101	POLS 101	POLS 101	POLS 101
PSYC x101: Introduction to Psychology	PSYC 101	PSY 101	PSYC 101	PSYC 101	PSYC 1101	PSYC 101	PSYC 101	PSYC 101
SOC x101: Introduction to Sociology	SOC 101	SOC 101	SOCY 101	SOCY 101	SOC 1101	SOC 101	SOC 101	SOC 101
SOC x102: Social Problems	SOC 102	SOC 102	SOCY 102	SOCY 102	SOC 1102	SOC 102	SOC 102	SOC 230

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Attachment 1

Humanistic and Artistic Ways of Knowing								
MUSI x100: Introduction to Music	MUS 100	N/A	MUSI 100	MUSI 100	MUSC 1100	MUS 101	MUSH 101	MUSH 101
PHIL x101: Introduction to Philosophy	PHIL 101	PHI 101	PHIL 101	PHIL 101	PHIL 1101	PHIL 101	PHIL 101	PHIL 240
PHIL x103: Introduction to Ethics	PHIL 103	PHI 103	PHIL 202	PHIL 202	PHIL 1103	PHIL 120	PHIL 103	PHIL 103
ENGL x175: Literature and Ideas	ENGL 110	ENG 110	ENGL 175	ENGL 175	ENGL 1110	ENGL 150	ENGL 175	ENGL 175
ART x100: Introduction to Art	ART 100	N/A	N/A	N/A	ART 1100	ART 100	ART 100	ART 100
FREN x101: Elementary French I	FRENCH 101	N/A	FREN 101	FREN 101	FREN 1101	FREN 101	FREN 101	FREN 101
FREN x102: Elementary French II	FRENCH 102	N/A	FREN 102	FREN 102	FREN 1102	FREN 102	FREN 102	FREN 102
GERM x101: Elementary German I	GERMAN 101	N/A	N/A	N/A	GERM 1101	GERM 101	GERM 101	GERM 101
GERM x102: Elementary German II	GERMAN 102	N/A	N/A	N/A	GERM 1102	GERM 102	GERM 102	GERM 102
SPAN x101: Elementary Spanish I	SPANISH 101	N/A	SPAN 101	SPAN 101	SPAN 1101	SPAN 101	SPAN 101	SPAN 101
SPAN x102: Elementary Spanish II	SPANISH 102	N/A	SPAN 102	SPAN 102	SPAN 1102	SPAN 102	SPAN 102	SPAN 102

*MATH 147 equivalent at UI is MATH 143 and MATH 144.

**BSU will discontinue ANTH 104 as an equivalent for ANTH 101.

***ISU will be delivering a new course in Fall 2019 to serve as equivalent to BIOL 227 (currently this is BIOL 3301)

**INSTRUCTION, RESEARCH AND STUDENT AFFAIRS
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SUBJECT

Program Enrollment Summary

REFERENCE

December 2017

The Board was presented with program enrollment summaries for graduate programs offered by Idaho universities.

APPLICABLE STATUTE, RULE, OR POLICY

Idaho State Board of Education Governing Policies and Procedures, Section III.G.8, Postsecondary Program Approval and Discontinuance

ALIGNMENT WITH STRATEGIC PLAN

GOAL 2: EDUCATIONAL ATTAINMENT – Idaho’s public colleges and universities will award enough degrees and certificates to meet the education and forecasted workforce needs of Idaho residents necessary to survive and thrive in the changing economy. Objective A: Higher Level of Educational Attainment – Increase completion of certificates and degrees through Idaho’s educational system.

BACKGROUND/DISCUSSION

In accordance with Board Policy III.G.8.b, institutions are required to provide an initial progress report on all graduate programs approved by the State Board of Education. Consistent with this policy, and with input from the Council on Academic Affairs and Programs, the Chief Academic Officer developed a template and timeline for reports to be submitted to the Board office. A schedule for program reviews is included as Attachment 2.

While the reporting requirement pertained to graduate programs, the Board requested that staff include baccalaureate programs as part of the review process. To that end, the program list was amended to include baccalaureate programs approved by the Board and implemented on or after **January 1, 2007**.

The following was established to determine when programs will be reviewed:

- Baccalaureate programs - reviewed after six years of implementation.
- Master’s programs - reviewed after four years of implementation.
- Doctoral programs - reviewed after six years of implementation.

Program summaries consist of the following programs:

Boise State University

- Online Master of Business Administration
- Ed.S., Educational Leadership with Superintendent Endorsement
- Master, Athletic Leadership

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Idaho State University

- Ph.D., Counselor Education and Counseling (emphases in Mental Health and Marriage & Family Counseling) expansion to Boise
- Master, Physician Assistant Studies (expansion to College of Idaho)

University of Idaho

- Ed.D., Professional Practice (expansion to BYUI)
- Second Year, Law Program to Boise

IMPACT

Progress reports will provide the Board with updates on new graduate programs and whether institutions met intended goals and benchmarks.

ATTACHMENTS

- Attachment 1 – Program Summaries
- Attachment 2 – Schedule of Programs for Review

STAFF COMMENTS

Boise State University

Based on the information provided, Boise State University's (BSU) Master of Athletic Leadership program is maintaining approximately 15 enrollments each summer from the 20 students initially projected. The program is meeting graduation rate projections and will likely remain steady at 15 per year. BSU's Ed.S. in Executive Educational Leadership, Superintendent Endorsement met enrollment projections with the number of graduates and will likely remain at 15 or more per year from the 10 initially projected. BSU's online, Master of Business Administration has seen considerable growth since Fall 2014 and while enrollment and graduate numbers were below initial targets, the numbers are climbing steadily. BSU anticipates an additional 69 students can be enrolled and projects 90 graduates by end of FY19.

Idaho State University

Idaho State University's (ISU) Master of Physician Assistant Studies was an expansion that added a location at the College of Idaho through a memorandum of understanding. The program met their initial enrollment projections based on a cohort model of 12 students. Graduate projections were not collected as part of the proposal process at that time; however, ISU indicates that all students who enrolled in the first two years, graduated as expected. ISU's Ph.D. in Counselor Education and Counseling was an expansion effort to the Treasure Valley. The number of students that was projected to join the cohort each year was initially set at five with an increase of five each year thereafter. Based on the information provided, ISU enrolled two new students each year for a total of six students after the third year of implementation.

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University of Idaho

On October 18, 2012, the Board approved the second-year curriculum of the J.D. Law program as part of expansion efforts to offer the entire program in Boise. The UI met their initial enrollment projections of 30 students per year. In the first year, the number was higher at 75 due to students transferring into the program from Concordia University. While graduate projections were not collected as part of the proposal process at that time, the UI has seen high completion rates. The UI's Ed.D. Professional Practice program represents an expansion of an existing program to provide this specialized area to a cohort of students (faculty) at BYU-Idaho. The UI met their enrollment projections of 21 part-time students per semester. The actual cohort was 24 students and 22 of those students graduated in year 3 of the program. The memorandum of understanding terminated due to the lack of a second cohort of students.

BOARD ACTION

This item is for informational purposes only.

New Program Review Boise State University Master of Athletic Leadership (MAL)

Elements for Report

1. Executive Summary of the program report

Boise State’s Master of Athletic Leadership (MAL) is a self-support degree led by the Department of Kinesiology in the College of Health Sciences. The program meets the educational goals and professional aspirations of professionals who are currently employed in a variety of settings including, but not limited to K-12 teachers, coaches, athletic directors, and youth organization professionals. The projected enrollment for each cohort was estimated to be approximately 20 students. Based on the enrollment data, the program is not enrolling an additional 20 students each summer when the program commences, however the program appears to be maintaining a steady enrollment of approximately 15 new students each summer. The projected graduation rate was met almost immediately, and based on enrollment data will likely remain steady at approximately 15 students per year.

2. Brief overview of the program

The Master of Athletic Leadership is designed to enhance the leadership skills of current and future athletic leaders for service in intercollegiate, interscholastic, and/or youth sport athletic programs. The Athletic Leadership program consists of 32 credits that culminates in a comprehensive portfolio. The program’s design is based on a cohort model, with students entering the program each summer and completing the program after 6 semesters.

3. Enrollment and Graduates

- a. In the tables below, show the projected enrollment in the program and number of graduates from the program (section 14 of proposal). Please note cohort years will precede fiscal year description (i.e., FY19 would have Fall 2018 cohort).

Enrollments	Implementation Year: FY15	FY16	FY17	FY18	FY19	FY
Actual (fall headcount)	15	29	35	35	30	
Projected	20	38	38	38	38	

Number of Graduates	Implementation: FY15	FY16	FY17	FY18	FY19	FY
Actual		5	13	15		
Projected			14	14	14	

**New Program Review
Boise State University
Ed.S in Executive Educational Leadership
Superintendent Endorsement**

Elements for Report

1. Executive Summary of the program report

Boise State’s Education Specialist (Ed.S.) in Executive Educational Leadership is delivered by the faculty within the Department of Curriculum, Instruction and Foundational Studies in the College of Education. The program recommends graduates to the Idaho State Department of Education for the Idaho Superintendent endorsement. Students in the program learn specific aspects of school law and school finance as they learn about broader topics such as system-wide improvement of teaching and learning. The program’s projected enrollment and graduation rates were met almost immediately. The number of graduates will likely remain at 15 or more graduates per year.

2. Brief overview of the program

The Ed.S. in Executive Leadership provides students with the preparation they need for Idaho Superintendent Certification and central office leadership positions. The program is designed on a cohort model and consists of 5 consecutive semesters, with a total of 30 credit hours. It is designed to enable working professionals to enroll and complete the program.

3. Enrollment and Graduates

- a. In the tables below, show the projected enrollment in the program and number of graduates from the program (section 14 of proposal). Please note cohort years will precede fiscal year description (i.e., FY19 would have Fall 2018 cohort).

Enrollments	Implementation Year: FY15	FY16	FY17	FY18	FY19	FY
Actual (fall headcount)	10	25	31	29	25	
Projected	13	15	15	15		

Number of Graduates	Implementation: FY15	FY16	FY17	FY18	FY	FY
Actual		10	15	15		
Projected		10	10	10		

New Program Review Boise State University Master of Business Administration - Online

Elements for Report

1. Executive Summary of the program report

Boise State’s online Master of Business Administration (MBA) degree is a self-supported, online program offered by the College of Business and Economics. The program provides access to a growing number of students that may not be served by the traditional face-to-face MBA programs also offered at Boise State. The online MBA seeks to broaden the expertise of business leaders in Idaho, enabling students, most of whom are working professionals to enhance the competitiveness of their organizations or businesses. Since Fall 2014 the enrollment in the online MBA program has grown by 300%, and the graduation numbers are still increasing substantially. While the growth of both enrollments and graduates is below the projected targets, the numbers are continuing to climb and it is anticipated that the program can enroll a further 69 students. It is expected that the program will graduate 90 students by the end of FY 19. The projected enrollment was based on having 6 cohorts with ~40 students each. Boise State FY19 enrollment data puts the program at approximately 5 cohorts of ~40 students.

2. Brief overview of the program

The online MBA program at Boise State teaches students creative processes and project management, helps students explore and understand group dynamics and leadership techniques, and works with students to become more comfortable with accounting, finance, marketing and legal issues and topics. Total credit hours for the online MBA is 49 and the program can be completed in as few as 12 months.

3. Enrollment and Graduates

- a. In the tables below, show the projected enrollment in the program and number of graduates from the program (section 14 of proposal). Please note cohort years will precede fiscal year description (i.e., FY19 would have Fall 2018 cohort).

Enrollments	Implementation Year: FY14	FY15	FY16	FY17	FY18	FY19
Actual (fall headcount)	15	66	114	130	168	199
Projected			268	268	268	268

Number of Graduates	Implementation: FY14	FY15	FY16	FY17	FY18	FY19
Actual		9	18	56	67	
Projected				90	90	90

**New Program Review
Idaho State University
MPAS Expansion to College of Idaho**

Elements for Report

1. Executive Summary of the program report

This proposal added a third location at the College of Idaho to the ISU Physician Assistant Program, in addition to the Pocatello and Meridian campuses. ISU has statewide responsibility for this program. A Memorandum of Understanding outlined each institution’s responsibilities associated with the program expansion.

Enrollments have met projections from the original proposal. The number of graduates was not projected in the proposal, but it appears that all students who enrolled in the first two years graduated as expected.

2. Brief overview of the program

The Physician Assistant Program awards the Master of Physician Assistant Studies degree and PA certificate upon successful completion of its 24 month graduate curriculum. Graduates of the program are eligible to take the Physician Assistant National Certification Examination. Thirty seats in the program are offered in Pocatello, thirty in Meridian, and this expansion added twelve seats at the College of Idaho in Caldwell.

3. Enrollment and Graduates

- a. In the tables below, show the projected enrollment in the program and number of graduates from the program (section 14 of proposal. Please note cohort years will precede fiscal year description (i.e., FY19 would have Fall 2018 cohort).

Enrollments	Implementation Year: FY 2015	FY 2016	FY 2017	FY 2018	FY____	FY____
Actual (fall headcount)	12	24	24	23		
Projected (proposal)	12	24	24			

Number of Graduates	Implementation: FY 2015	FY 2016	FY 2017	FY 2018	FY____	FY____
Actual		12	12	10		
Projected (proposal)						

New Program Review

Idaho State University

PhD in Counselor Education and Counseling Expansion to Boise

Elements for Report

1. Executive Summary of the program report

ISU’s Ph.D. program in Counselor and Education and Counseling expanded to Boise in 2008. No other doctoral counseling programs existed in the Treasure Valley and a needs assessment indicated a strong need for such a program. ISU had a curriculum and resources in place from its Pocatello program and was accredited by the Council for Accreditation of Counseling and Related Educational Programs (CACREP).

The actual number of students that join the cohort each year in Boise (two) has been lower than projections from the original proposal (five) for two reasons. First, PhD students oversee the training of students in the Master’s program, both clinically and in the classroom; national standards support a 6-to-1 ratio of Master’s to PhD students. Hence, enrollment in the PhD program is dependent on enrollment in the Master’s program. Second, budgetary issues have prevented the addition of more GTA assistantships that would attract more students into the program. The number of students enrolled in the program, both in Pocatello and Meridian, is at capacity for current levels of funding and faculty resources.

2. Brief overview of the program

The Ph.D. in Counselor Education and Counseling is designed to prepare counselor educators for work in counselor education programs and for work in supervisory roles in university counseling centers and other counseling sites. The major emphasis of this program is to prepare graduates for careers in university teaching in counseling programs.

3. Enrollment and Graduates

- a. In the tables below, show the projected enrollment in the program and number of graduates from the program (section 14 of proposal. Please note cohort years will precede fiscal year description (i.e., FY19 would have Fall 2018 cohort).

Enrollments	Implementation Year: FY2009	FY2010	FY2011	FY2012	FY2013	FY2014
Actual (fall headcount)	6	6	6	6	6	6
Projected (from proposal)	5	10	15	20		

Number of Graduates	Implementation: FY2009	FY2010	FY2011	FY2012	FY2013	FY2014
Actual	0	0	0	2	2	2
Projected						

Executive Summary

Our report provides a review of two program expansions: the 2nd year of our J.D. Law program in Boise and the Ed.D. in Professional Practice. The 2nd year law program was started in Boise in 2014 and since then has had high enrollments, which have led to a high completion rate for the Boise law program. Note that in the first year, the 2nd year Boise program had a higher number of students than average (75) due to students from Concordia transferring into the program.

Our Ed.D. expansion in Professional Practice was created for faculty at BYU-Idaho who needed to earn an advanced degree. In 2012, we admitted 24 students into the program, and at the end of the 3-year program, 22 of them graduated, and 1 earned an Ed.S. degree. Because there was not a second cohort for the program, it has been inactive since 2014, and we will be discontinuing this expansion.

New Program Review – J.D. Law Program to Boise

Brief Overview of the Program

Since 1999, the University of Idaho College of Law, whose main campus is in Moscow, has been working to deliver legal education in Idaho's capital city of Boise, consistent with its statewide mission to provide public legal education in the State of Idaho. In 2016 and 2017, the Boise 2nd year class had approximately 40 students, and this year that number has risen to 59.

Progress on the effort has been as follows:

- We began with a semester-in-practice program in 2001, overseen by our first full-time, Boise-based instructor.
- In 2010, after obtaining ABA acquiescence for a satellite campus and State Board of Education approval, we created a full third-year program in Boise.
- In 2011, the College and the Idaho Supreme Court entered into a Memorandum of Understanding under which the College took over management of the State Law Library, moving the library (which had been displaced from the Supreme Court several years earlier) from a commercial building in downtown Boise to the Idaho Water Center, in space contiguous to the College's third-year program in Boise.
- In 2014, after obtaining ABA acquiescence and State Board of Education approval, we added a full second-year program.
- In 2015, the second and third-year programs moved from the Idaho Water Center Building in Boise to the newly renovated Idaho Law and Justice Learning Center ("ILJLC"), located on the Capitol Mall in Boise.
- In 2016, after obtaining ABA acquiescence for a branch campus and State Board of Education approval, we added a full first-year program, completing the creation of a full three-year branch campus in Boise.

The dual-location model has particular value in addressing the needs of students of diverse backgrounds. The College's Moscow campus has had success, for example, in attracting students from small, rural communities throughout Idaho and Washington, including many Latino/a students from eastern and central Washington; students from large urban settings, such as Los Angeles, who wish to study in a less hectic and crime-prone community; Native American students from the Northwest

tribes; and students from Washington State University, which has a high percentage of students from diverse backgrounds.

The Boise campus meets the needs of students in southern Idaho as well as northern Nevada, especially those who are place-bound by family ties, spousal employment, etc. Boise is the center of the State’s Latino/a population, and thus provides a good location from which to recruit Hispanic students. A diverse student body, in turn, enriches the quality of the educational experience for all students, in part by preparing students for the practice of law in an increasingly diverse State and nation.

Enrollment and Graduates

Enrollments	Implementation Year: FY 14	FY 15	FY 16	FY 17	FY 18	FY____
Actual (fall headcount)	75	28	40	41	59	

Number of Graduates	Implementation: FY 14	FY 15	FY 16	FY 17	FY____	FY____
Actual		48	45	49		

Note: Enrollments are for 2nd year students only, per this report.

New Program Review – Ed.D. Professional Practice Expansion

Brief Overview of the Program

This program represents an expansion of our existing Ed.D. program to provide a specialization area (Professional Practices) to a cohort of students who were faculty at BYU-Idaho in Rexburg. Enrollment projections were 21 part-time students per semester over a 3-year period, culminating in matriculation at the end of the 6th semester. Actual enrollment in the cohort was 24 students, and 22 of these graduated in year 3 of the program. The program allowed BYU-Idaho faculty to earn a terminal degree in higher education leadership and instructional leadership. According to the MOU between UI and BYU-I, the MOU was to terminate August 31, 2015 unless a second cohort of students was accepted. A second cohort was not accepted, and thus the MOU has terminated. UI has not offered this expansion since completion of the first cohort in 2014.

Enrollment and Graduates

Enrollments	Implementation Year: FY12	FY 13	FY14	FY____	FY____	FY____
Actual (fall headcount)	24	23	22			

Number of Graduates	Implementation: FY12	FY 13	FY14	FY____	FY____	FY____
Actual	0	0	22			

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SUBJECT

Open Education Resources Timeline Update

REFERENCE

April 2018	Board received update on Open Education Resources initiative as part of a work session.
June 2018	Board discussed system-wide access and affordability strategies including open educational resources and requested an inventory and implementation timeline be provided at the October 2018 Board meeting.
August 2018	Board approved line item request.

ALIGNMENT WITH STRATEGIC PLAN

Goal 1 (A Well-Educated Citizenry), Objectives B (Adult Learner Re-Integration) and C (Higher Level of Educational Attainment)

BACKGROUND/DISCUSSION

According to a 2014 report released by the U.S. Center for Public Interest Research, the average college student spends \$1200 each year on textbooks and other course materials. In some cases, perhaps more prevalent in community colleges, the cost of textbooks can exceed the cost of tuition. The research indicates that a majority of students base course selection decisions on textbook prices and seek to avoid courses with expensive content. Other students may not purchase required textbooks or attend classes early in the term until the more affordable used textbook found online has been delivered. Open Education Resources (OER) is a form of textbook delivery intended to address these issues.

OER is defined by The Hewlett Foundation as “teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use and repurposing by others. [They] include full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials, or techniques used to support access to knowledge.”

Textbooks delivered via OER are free online and affordable in print. Open-source textbooks have gained considerable momentum as a cost-effective alternative for traditional hard copy textbooks and fee-based online learning content. As the cost of textbooks outpaces the rate of inflation, it is the only product in the marketplace that can directly compete with the more expensive price charged by publishers for new editions. To illustrate the relevance of this, the Federal government’s General Accountability Office reported in 2013 that new textbook prices increased 82 percent between 2002 and 2012.

At its work session in April the Board requested staff to ascertain an inventory of OER utilized across the state, with the report to be provided in at the October 2018 regular Board meeting. Board staff initially requested faculty in attendance for the

**INSTRUCTION, RESEARCH, AND STUDENT AFFAIRS
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annual state General Education Summit to prepare an inventory of OER utilized for the 43 courses on the state's common courses; these courses were the primary focus given they offer the highest impact for student use and maintain the greatest frequency for transfer across the state. Due to unforeseen circumstances with reporting and data collection ascertained at the summit, the report to the Board was reassigned to its December meeting.

According to data collected by Board staff in the fall term, 15 of the 43 courses on the common course list have at least one section of OER delivery provided by at least one institution in the state. However, no more than two institutions deliver OER for any single course.

Based on feedback from institutions, there are circumstances that may restrict the utilization of OER. For example, some courses may include literary works that are not available for free and open distribution, such as novels for literature courses. Furthermore, some courses may not require textbooks, do not permit electronic devices to be accessed during classroom instruction, or require hard copy content to better serve the needs of the course and the student. There may also be ancillary services (such as tutorial, testing, assignment, grading, and analytics services) provided through online textbooks publishers that are available to faculty and students, and therefore are not free of charge.

For faculty at the postsecondary level, the adoption of OER often require a number of commitments. Among others, this includes undertaking the professional development necessary to learn how to effectively utilize OER, in addition to the work effort necessary for aligning OER to teaching needs and desired learning outcomes. These items traditionally require additional time and/or resources to be allocated to faculty for taking on additional duties and responsibilities associated with transitioning to OER. At Idaho community colleges, there is not an instructional technology support staff to assist with professional development needs, nor is there specific incentive in institutional policies for faculty to consider the development and delivery of OER in their courses. Any direction or expectation to be provided for the adoption of free and open textbook resources should bear in mind these contingencies.

IMPACT

Utilizing an average of new and used textbook costs of \$65 (National Association of College Stores), 65,000 part-time and full-time undergraduates in Idaho seeking to satisfy general education through completion of 10 common-numbered courses utilizing OER could lead to statewide savings up to \$42,250,000. This does not include costs incurred by school districts that deliver dual credit courses. Nearly 54,000 public K-12 school students completed dual credit courses from Idaho public institutions in the 2017-18 academic year.

ATTACHMENTS

- Attachment 1 – Inventory
- Attachment 2 – Timeline

STAFF COMMENTS AND RECOMMENDATIONS

Staff is supportive of pursuing OER adoption as the primary option for accessible and affordable delivery for the courses to be adopted on the Board's common-course list in the 2019-20 academic year. This method provides the greatest range of accessibility and affordability, and ensures the quality of content delivered meets the standards of instructors. However, there are a diverse range of affordable textbook delivery options that can be explored.

In light of these various options to achieving reduced costs, Board staff seeks guidance from the Board on a shared concept or definition of 'affordability' so as to assist institutions with their efforts to make college more accessible through the reduction of textbook expenses. Also, advisement offered regarding the extent to which OER be included in textbook affordability strategies would further frame the Board's vision for reducing cost-prohibitive barriers to students.

Board staff will continue to work with the state's Intermountain Open Pedagogical Education Network (IOPEN) and the Western Interstate Commission on Higher Education (WICHE) to explore options to scale OER use and to develop an online state repository for open resource textbooks, such as the proof of concept that was shared with the Board at its work session in April 2018. With \$25,000 from system-wide funds provided to each four-year institution in July to support OER development, Board staff have coordinated with these institutions to distribute proposals and applications for expanding OER implementation on their campuses. Development, alignment, and/or curation for OER texts will commence in the beginning of the Spring 2019 semester. The timeline for completion of a repository with the goal of housing at least one online open resource textbook utilized in the state for each common-indexed course, is Fall 2019. During this time options will be explored as to how four-year institutions can partner with community colleges on this system-wide effort, given that community colleges do not maintain instructional technology staff to support OER and the delivery of other of online learning resources on their campuses.

To build out the inventory of OER for the state's common course list, the Board has approved a \$200,000 one-time request for legislative funding for 43-courses in Fiscal Year 2020. The initial funding will support faculty time and effort to develop free textbook resources for courses on the common course list, with a focus on courses where currently no delivery exists for free textbooks. Once completed, these textbooks will be made available on a central online repository that can be accessed by students, as well as faculty across the state who may seek to develop similar resources utilizing the materials that have been adopted elsewhere within the system.

**INSTRUCTION, RESEARCH, AND STUDENT AFFAIRS
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An ongoing legislative funding request in the amount of \$50,000 has also been approved by the Board. If appropriated, this will support the continuing expansion of OER development for other general education courses, discipline-specific courses, and upper-level courses.

BOARD ACTION

This item is for informational purposes only.

Open Educational Resources (OER) are materials like textbooks, courses, assignments, diagrams, and other teaching and learning resources that anyone may access and modify without cost thanks to their digital distribution and use of open licenses. Though these materials are distributed digitally, they may be printed and otherwise transformed for non-digital applications thanks to the rights of users to copy, edit, remix, reuse, keep, and share openly licensed content forever. It is recognized that OER is but one means among other methods of making course materials accessible and affordable.

Data reflect total number of course sections delivered exclusively with OER. UI reported OER availability via rate of delivery (%), and has not been included in sum totals. NIC reported no courses exclusively delivered with OER. CEI did not report findings.

NA = Not applicable (course not offered). NR = Not required (textbook not required)

	BSU	ISU	LCSC	UI	CSI	CWI	Total Sections by Course (sans UI)
General Education Common Course Listing in AY 2019-20							
Written Communications							
ENGL 101: Writing and Rhetoric I	22	0	6	0	U	0	28
ENGL 102: Writing and Rhetoric II	58	0	4	0	U	0	62
Oral Communications							0
COMM 101: Fundamentals of Oral Communication	0	0	NR	0	0	0	0
							0
Mathematical Ways of Knowing							0
MATH 123: Math in Modern Society	0	0	0	4	0	0	
MATH 130: Finite Mathematics	NA	NA	0	0	NA	NA	0
MATH 143: College Algebra	0	0	0	0	0	0	0
MATH 147: College Algebra and Trigonometry	NA	0	0	NA	0	0	0
MATH 160: Survey of Calculus	0	0	0	0	0	0	0
MATH 170: Calculus I	0	0		0	0	0	0

MATH 153: Statistical Reasoning (often known as Stat. Methods)	N/A	0	2	0	0	0	2
Scientific Ways of Knowing							0
ANTH 101: Biological Anthropology (often known as Physical Anth	0	0	0	NA	0	U	0
BIOL 100: Concepts of Biology	0	0	0	NA	0	0	0
BIOL 227: Human Anatomy and Physiology I	0	NA	0	NA	0	0	0
CHEM 100: Concepts of Chemistry	0	0	0	NA	0	0	0
CHEM 101: Introduction to Chemistry	0	0	0	0	0	0	0
CHEM 102: Essentials of Organic and Biochemistry	0	0	0	0	0	0	0
CHEM 111: General Chemistry I	0	0	0	0	0	0	0
PHYS 111: General Physics I	0	0	2		0	0	2
PHYS 112: General Physics II	0	0	2	0	0	0	2
GEOL101: Physical Geology	0	0	0	4	0	0	
GEOL 102: Historical Geology	0	NA	0	0	0	0	0
Social and Behavioral Ways of Knowing							0
ANTH 102: Cultural Anthropology	0	0	0	0	0	0	0
ECON 201: Principles of Macroeconomics	0	0	0	6	0	0	
ECON 202: Principles of Microeconomics	0	1	0	4	0	0	
HIST 101: World History I	0	NA	0	0	0	0	0
HIST 102: World History II	0	NA	0	0	0	0	0
HIST 111: United States History I	1	0	0	0	0	0	1
HIST 112: United States History II	1	0	0	0	0	0	1

**INSTRUCTION, RESEARCH, AND STUDENT AFFAIRS
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Attachment 1

POLS 101: American National Government	0	0	0	0	0	0	0
PSYC 101: Introduction to Psychology	4	0	0	6	0	0	
SOC 101: Introduction to Sociology	2	0	0	0	0	0	2
SOC 102: Social Problems	6	0	0	0	0	10	16
							0
Humanistic and Artistic Ways of Knowing							0
MUSI 100: Introduction to Music	0	0	0	2	0	0	2
PHIL 101: Introduction to Philosophy	0	0	0	NA	0	0	0
PHIL 103: Introduction to Ethics	0	0	0	0	NA	0	0
ENGL 175: Literature and Ideas	2	0	0	0	0	0	2
ART 100: Introduction to Art	15	12	0	0	NA	NA	
FREN 101: Elementary French I	0	0	0	0	0	0	0
FREN 102: Elementary French II	0	0	0	0	0	0	0
GERM 101: Elementary German I	0	0	0	0	NA	NA	0
GERM 102: Elementary German II	0	0	0	0	NA	NA	0
SPAN 101: Elementary Spanish I	0	0	0	0	0	0	0
SPAN 102: Elementary Spanish II	0	0	0	0	0	0	0
Total Sections by Institution (sans UI)	111	13	16		0	10	150

**INSTRUCTION, RESEARCH AND STUDENT AFFAIRS
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Attachment 2

Open Education Resource (OER) Timeline

June 2018: Board charges Board staff with developing OER inventory and implementation plan for expanding OER use. Board staff requested to follow-up with findings and plan at the Board's October meeting.

July 2018: Boise State University, Idaho State University, Lewis-Clark State College, and the University of Idaho each receive \$25,000 in system-wide funds to support OER development.

August 2018: Board approves funding for OER expansion as its second highest priority for legislative budget requests. This includes \$200,000 in one-time funding, and \$50,000 in ongoing funding.

September-November 2018: Inventory developed by the Board office for courses on the Board's common course list that exclusively utilize OER for textbook delivery.

December 2018: OER inventory and timeline provided to Board. Advisement and direction to be provided by the Board to guide textbook affordability efforts. Institutions develop application/proposal process and distributed RFP to faculty. Priority given to requests seeking resources for courses on the Board's common course list for which OER is not delivered.

January-February 2019: Awards distributed. Faculty commence work on OER development.

March or April 2019: Open Textbook Network delivers statewide workshop on OER development at Lewis-Clark State College.

April-May 2019: Contingent on courses for which OER development is pursued in Spring 2019, and pending potential legislative appropriation, Board staff will work with institutions to chart next steps and processes for scaling textbook affordability efforts on their campuses for courses on the Board's common course list.

Summer 2019: Develop and deliver online repository for housing OER resources, to be resourced by students and faculty.

Fall 2019: Initial courses delivered with OER that utilized system-wide funds provided to institutions in July 2018. Development commences on additional OER as contingent on legislative or other funding made available.

Spring 2019: Select number of courses delivered with any legislative or other funding that may be provided.

**INSTRUCTION, RESEARCH, AND STUDENT AFFAIRS
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SUBJECT

University of Utah, School of Medicine Annual Report

REFERENCE

June 2008	The Board approved a revised three-year contract between the University of Utah School of Medicine and the State Board of Education.
December 2013	The Board approved a revised three-year contract between the University of Utah School of Medicine and the State Board of Education.
September 2016	The Board approved a revised three-year contract between the University of Utah School of Medicine and the State Board of Education.
December 2016	The Board Received the annual University of Utah School of Medicine Report.
October 2017	The board received the annual University of Utah School of Medicine Report.

APPLICABLE STATUTE, RULE, OR POLICY

Idaho Code §33-3720

BACKGROUND/DISCUSSION

Since July 1976, the State Board of Education (Board) has had an agreement with the University of Utah School of Medicine (UUSOM) to reserve a specific number of seats for Idaho residents at the in-state tuition and fee rate established by UUSOM for residents of Utah. The Board makes annual fee payments in support of such Idaho resident students enrolled under this agreement. In the 2016 legislative session, two additional seats per year were approved for this cooperative agreement. The program now provides opportunities for ten Idaho students annually to attend UUSOM through a cooperative agreement. A total of forty Idaho students can be enrolled at any one time in this four-year program.

As part of the Board's contract with UUSOM, the Board receives an annual report which provides program information to include an overview of the four-year curriculum and clerkships.

ATTACHMENTS

Attachment 1 – University of Utah School of Medicine
Annual Report for 2018

STAFF COMMENTS AND RECOMMENDATIONS

The report includes a financial overview of support provided for ten students in Academic Year 2017-2018, and an admissions summary consisting of names and home towns of those first year Idaho-sponsored students. The UUSOM contract is up for renewal at the end of the 2018-2019 academic year. Staff anticipates that the renewed contract would come before the Board at their April 2019 meeting.

**INSTRUCTION, RESEARCH, AND STUDENT AFFAIRS
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BOARD ACTION

This item is for informational purposes only. Any action will be at the Board's discretion.



University of Utah School of Medicine

Idaho State Board of Education Annual Report

1/1/2018





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Mission Statement

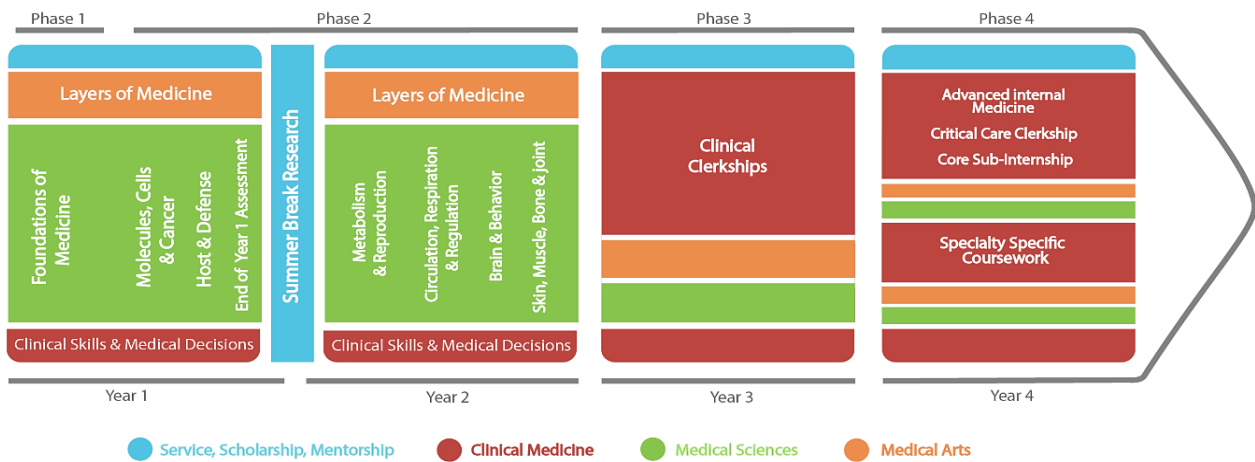
The University of Utah School of Medicine serves the people of Utah and beyond by continually improving individual and community health and quality of life. This is achieved through excellence in patient care, education, and research. Each is vital to our mission and each makes the others stronger.

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Overview of the Four Year Curriculum



Overview

The curriculum is designed to produce highly skilled physicians who are technically proficient, caring, compassionate and capable of adapting to the changing health care demands of the 21st century. Active learning approaches, critical thinking skills and information management techniques are all a part of our educational environment. Our curriculum builds upon the strengths of traditional learning methods and explores areas of study opened up by the explosion of biomedical knowledge and the transformation of America's health care delivery system.

Medical students receive basic science instruction and the critical skills of communicating with, examining and diagnosing patients through all 4 years. Instruction integrates Medical Sciences, Medical Arts and Clinical Medicine.

Phase 1 (4 months):

Students develop a solid foundation in the sciences basic to medicine (e.g. anatomy, physiology, biochemistry and genetics). Additional introductory instruction will include elements of the doctor patient relationship and how to communicate as a health care professional.

- **Clinical Medicine:** Interviewing & physical examination skills.
- **Medical Sciences:** Establishes the foundation for Phase 2 with the sciences basic to medicine and an overview of body systems.
- **Medical Arts:** Confidentiality, professionalism, ethics, communication along with medical informatics and medical systems.

Required Courses:

- MD ID 7001: Clinical Method Curriculum 1 (3 credits)
- MD ID 7101: Layers of Medicine 1 (1 credit)
- MD ID 7300: Phase 1 - Foundations of Medicine (17 credits)

Phase 2 (18 months):

- **Clinical Medicine:** Students attend and see patients in primary care clinics as well as gain exposure to subspecialty practices.
- **Medical Sciences:** Seven specific sections, Molecules, Cells and Cancer; Host and Defense; Metabolism and Reproduction; Circulation/Respiration and Regulation; Brain and Behavior; Skin/Muscle/Bone and Joint; are combined with integrated, content-specific Medical Arts and Clinical Medicine.
- **Medical Arts:** Includes professionalism, medical informatics & economics, medical systems etc.

Phase 2 MSI REQUIRED COURSES

- MD ID 7002: Clinical Method Curriculum 2 (5 credits)
- MD ID 7102: Layers of Medicine 2 (1 credit)
- MD ID 7310: Phase 2 - Molecules, Cells and Cancer (8 credits)
- MD ID 7320: Phase 2 - Host and Defense (9 credits)
- MD ID 7500: Phase 2 - End of Year 1 Assessment (1 credit)
- UUHSC 6701: IPE Simulation of Ambulatory Patient Care (0.5 credit)

Phase 2 MSII Required Courses

- MD ID 7003: Clinical Method Curriculum 3 (5 credits)
- MD ID 7004: Clinical Method Curriculum 4 (5 credits)
- MD ID 7103: Layers of Medicine 3 (1 credit)
- MD ID 7104: Layers of Medicine 4 (1 credit)
- MD ID 7340: Phase 2 - Brain and Behavior (9 credits)
- MD ID 7350: Phase 2 - Metabolism and Reproduction (9 credits)
- MD ID 7360: Phase 2 - Circulation, Respiration, and Regulation (12 credits)
- MD ID 7370: Phase 2 - Skin, Muscle, Bone and Joint (7 credits)
- UUHSC 6301: IPE Telemedicine (0.5 credit)

Phase 3 (12 months):

- **Clinical Medicine:** Is emphasized as students experience inpatient and tertiary care through Clerkships. Clerkships include: Family Medicine, Internal Medicine, Obstetrics and Gynecology, Pediatrics, Psychiatry, Surgery and Neurology.
- **Medical Sciences:** Via didactic instruction.
- **Medical Arts:** Didactic instruction covers material such as issues of humanism, professionalism and ethics.

Phase 3 Required Courses

- FP MD 7180: Family Medicine Clinical Clerkship (6 credits)
- INTMD 7200: Internal Medicine Clinical Clerkship (8 credits)

- NEURO 7900: Neurology Clinical Clerkship (4 credits)
- OBST 7010: Obstetrics and Gynecology Clinical Clerkship (6 credits)
- PED 7010: Pediatrics Clinical Clerkship (6 credits)
- PSYCT 7200: Psychiatry Clinical Clerkship (6 credits)
- *SURG 7020: Surgery Clinical Clerkship* (8 credits)
- MD ID 7520: Year 3 Assessment (1 credit)
- Electives- 4 Credits Required

Phase 4 (12 months):

Students develop advanced skills through sub-internship, critical care, advanced internal medicine and elective courses. They prepare for entry into residency by selecting curriculum specific to their career specialty interests.

REQUIRED COURSES

- Advanced Internal Medicine (4 weeks/credits)
- Core Sub-Internship (4 weeks/credits)
- Critical Care (4 weeks/credits)
- Transition to Internship (2 weeks/credits)
- IPE Experiences:
- Hospitalized Patient Care (0.5 credit)
- Disaster Preparedness and Response (0.5 credit)

ELECTIVE CREDITS

- Must complete a minimum of 24 credits
- 12 weeks must be clinical
- Not more than 12 weeks away
- Not more than 8 credits of research

The 2-year Clinical Method Curriculum partners groups of students and core clinical faculty for the longitudinal development of clinical skills in a mentored learning community environment.

The program spans the curriculum and aims to foster and guide student professional development, promote career growth, nourish skill sets, and provide support.

2017-2018 Course Catalog: <https://utah.instructure.com/courses/419551>

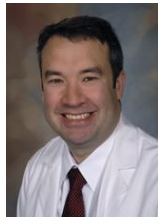
All Electives: <https://utah.instructure.com/courses/419551/pages/electives>

Clinical Electives: <https://utah.instructure.com/courses/419551/pages/clinical-electives>

Non-Clinical Electives: <https://utah.instructure.com/courses/419551/pages/non-clinical-electives>

Idaho Affairs Update

Program Leadership



Dr. Benjamin Chan is a Board Certified physician in General Psychiatry and Child & Adolescent Psychiatry. He graduated from the University of Utah School of Medicine in 2004. He completed his residency at George Washington University in Washington DC and Fellowship at University of Maryland in Baltimore, MD. He moved back to Utah in 2010 and joined the faculty in the Department of Psychiatry. He works as an inpatient hospitalist at the University Neuropsychiatric Institute (UNI) treating children and adolescents with a wide variety of acute psychiatric conditions. He was appointed Assistant Dean of Admissions in March of 2012 and Assistant Dean of Idaho Student Affairs in July 2014. In July 2017 he was promoted to Associate Dean of Admissions and Idaho Affairs.



Dr. Bridgette Baker is a Board Certified Family Medicine physician. She earned her M.D. degree from the University of Utah School of Medicine and completed her Family Medicine Residency at the Family Medicine Residency of Idaho in Caldwell. She is currently on staff at Saint Alphonsus, Saint Alphonsus Health Alliance and Saint Alphonsus Medical Group. Additionally, she is the Director of Idaho Student Programs for the University of Utah, since 2015. In this capacity, she helps coordinate the placement of Idaho students from the University of Utah medical school into clinical practices within the state of Idaho. She is a member of the Idaho Medical Association, American Medical Association and Idaho Academy of Family Physicians. Dr. Baker serves of the Admissions Committee for the University of Utah School of Medicine for Idaho applicants.

Admissions

The Office of Admissions works closely with the Premedical Advisors at the colleges in Idaho. Dr. Chan traveled to Idaho to meet with the Premedical Advisors at Boise State, Northwest Nazarene and The College of Idaho. Additionally, we attended graduate fairs in Boise and Rexburg in an effort to support the premedical advisors at these school and provide students with current information and recommendations.

Our goal is to select the most capable students to attend our school and to have a balanced, but heterogeneous group that will excel in both the art and science of medicine. We recognize that a diverse student body promotes an atmosphere of creativity, experimentation and discussion that is conducive to learning. Exposure to a variety of perspectives and experiences prepares students to care for patients in all walks of life and in every segment of society.

Considered individually, age, color, gender, sexual orientation, race, national origin, religion, status as a person with a disability, status as a veteran or disabled veteran are not determinants of diversity and are not identified as unique characteristics during the admissions process.

MCAT scores and grades are carefully scrutinized and are an important part of the application process. All grades received for college credit are included in the AMCAS GPA calculation. If a course is repeated, both grades received for that course are calculated into the GPA. Pass/Fail grades received for college credit are not included in the AMCAS GPA calculation.

As important as grades and test scores are, by themselves they do not predict who will be successful in medical school. The demands of medical education and life as a physician are not for everyone. We consider how the applicant balances outside activities and responsibilities with schoolwork to be an indicator of ability to deal with the rigors of life as a physician. The committee is interested in the applicant's motivation for attending medical school and his/her understanding of the medical profession. Commitment to community service, ethical behavior, compassion, leadership ability and communication skills are important characteristics of physicians. Applications and interviews assist us in evaluating these qualities. We expect applicants to be courteous, respectful and professional at all times.

Transfer Policy

Transfers to the University of Utah School of Medicine are not available unless the transferring student meets all of the following criteria:

- Must have a strong connection to the state of Utah. Priority will be given to those who are the spouse of a medical school faculty member or the spouse of a person accepted into one of our postgraduate physician training programs.
- Must be enrolled and in good standing at a fully LCME accredited United States or Canadian allopathic medical school. Students training in non-LCME accredited schools are ineligible to apply.
- Must have passed the USMLE Step 1 exam.

Students may only apply for transfer into the third-year of curriculum.

Opportunities for transfer are limited as openings in any given year are based on the availability of educational resources, and cannot be guaranteed.

Updated Curriculum Vitae (CV)

One-page letter addressed to Associate Dean of Admissions explaining the reason for wanting to transfer. Please include a description of your connection to Utah.

In 2018 we were contacted by a medical student (Giovanna Durman) who was originally from Pocatello, Idaho and considered an Idaho resident. She was attending an LCME accredited medical school in Puerto Rico. Her medical school experienced multiple problems because of Hurricane Maria and were supportive of her possibly transferring. After discussion about available resources here at UUSOM as well as her ties to Utah and Idaho, the Admissions Committee accepted her for transfer. The medical student began her third year rotations at the UUSOM and is on track to graduate in 2020. She is not currently sponsored by the state of Idaho.

Academic Standards and Recommended Activities

We consider how applicants balance outside activities and responsibilities with school work to be an indicator of his/her ability to deal with the rigors of life as a physician. The committee is interested in an applicant's motivation for attending medical school.

Grade Point Average (GPA)

Applicants should strive to have a science, non-science and overall GPA above 3.00. Each applicant is considered individually and their GPA is compared to the average GPA of students who have gone on to attend medical school from the applicant's undergraduate institution. The overall GPA for the current first year class is 3.75.

Medical College Admissions Test MCAT

All applicants are required to take the MCAT within three years of their application. Only the most recent MCAT score is considered. Applicants should strive to have an MCAT score at or above 492 with a score of at least 123 in each section of the MCAT. The average MCAT score for the current first year class is 512.

Community Volunteer Service

Community/Volunteer service is defined as involvement in a service activity without constraint or guarantee of reward or compensation. The medical profession is strongly oriented to service in the community. Applicants should demonstrate a commitment to the community by involving themselves in service and volunteer activities. Work performed in service learning courses and community service performed as part of employment does not satisfy this requirement.

- We recommend that applicants complete at least 36 total hours within the last 4 years. To be a competitive applicant, we recommend that applicants endeavor to complete at least 100 hours within last 4 years.

Leadership

Leadership is defined as a position of responsibility for others, with a purpose to guide or direct others. Dedication, determination, ability to make decisions and a willingness to contribute to the welfare of others are indicators of one's ability to succeed in medicine. Individuals with these characteristics readily accept positions of leadership and are an asset to their community and profession. Leadership capacity can be demonstrated in a variety of ways. Positions in employment, church, the community, and school organizations including coaching, tutoring, and mentoring will satisfy this requirement.

- We recommend that applicants have at least 1 leadership experience lasting 3 months within the last 4 years. Competitive applicants will have 3 different leadership experiences each lasting 3 months within the last 4 years.

Research

Research is defined as involvement in a scholarly or scientific hypothesis investigation that is supervised by an individual with verifiable research credentials. Research may be in any discipline and performed at any site. However, it must involve the testing of a hypothesis.

- We recommend that applicants participate in hypothesis-based research. This may be part of a class where an applicant answered or tested a hypothesis and received a grade. Examples: A writing project, laboratory work, etc.
- Applicants with a stronger research experience will have completed hypothesis-based research outside of the classroom that is supervised by an individual with verifiable research credentials. May include independent research or senior thesis.

Physician Shadowing

Physician shadowing is defined as the observation of a physician as that individual cares for and treats patients and carries out the other responsibilities of a medical practice.

Shadowing must be done with an allopathic (MD) or osteopathic (DO) physician in their practice in the United States. Time spent shadowing medical students, interns, residents, fellows, physician assistants, podiatrists, veterinarians, nurses, EMTs, PhDs etc., will not be considered. It is our recommendation that applicants shadow several physicians who work in various specialties including primary care. Shadowing family members who are physicians is discouraged.

- We recommend that applicants shadow a physician for at least 8 hours. Competitive applicants will have shadowed a variety of physicians for at least 24 hours.

Patient Exposure

Patient exposure is defined as direct interaction with patients and hands-on involvement in the care of conscious people in a health care-related environment, attending to their health maintenance, progression, or end of life needs. It is important that the applicant be comfortable working with and around people who are ill, sick, injured, or diseased.

Direct patient exposure can be gained in a variety of ways e.g. volunteering or working in hospitals, emergency rooms, clinics or nursing care facilities, hospice, or physical rehabilitation centers. Patient contact does not include indirect patient care such as housekeeping (cleaning, operating, or patient rooms) staffing the hospital information desk, or working in a pharmacy.

- We recommend that applicants complete at least 32 hours of direct patient care. Competitive applicants will have completed at least 48 hours.

Note: Physician shadowing and caring for friends and family members cannot be used to meet this requirement.

Admissions Reports

Admissions Summary

Academic Year	Idaho Med Student Applicant Pool	Selected for Interviews	Accepted for Admission	Sponsored Students	Non-Sponsored Students
2017-2018	125	50	24	10	0
2016-2017	118	40	20	10	0
2015-2016	125	50	14	10	0
2014-2015	100	45	12	8	0
2013 - 2014	118	52	11	8	0
2012 - 2013	105	50	16	8	0
2011 - 2012	89	40	14	8	1
2010 - 2011	95	49	12	8	0
2009-2010	84	45	14	8	2
2008-009	108	64	12	8	1
2007-2008	116	61	13	8	0
2006-2007	93	43	9	8	1
2005-2006	112	57	13	8	0
2004-2005	86	47	11	8	1
2003-2004	84	33	14	8	4
2002-2003	99	53	17	8	0
2001-2002	88	50	13	8	4
2000-2001	96	50	13	8	1
1999-2000	88	42	9	6	0
1998-1999	87	52	13	6	0

Hometowns



Idaho Sponsored Students, Class of 2022

Last Name	First Name	City at Time of Application	State at Time of Application	Birth City	Birth State/Country
Crabb	Brandon	Nampa	ID	Boulder	CO
Gropp	Jarom	Boise	ID	Provo	UT
Harris	Jacob	Provo	UT	Seattle	WA
Hosek	Lauren	Peoria	AZ	Pittsburgh	PA
Jessen	Nicolette	Sagle	ID	Santa Cruz	CA
Kroes	Alexandra	Nampa	ID	Upland	CA
Lavin	Courtney	Boise	ID	San Antonio	TX
Lybyer	Miranda	Lewiston	ID	Lewiston	ID
Sant	Thomas	Boise	ID	Charleston	SC
Webb	Joshua	Coeur d'Alene	ID	Boise	ID

Observational Experience

A shadowing scholarship is offered to first year medical students. The experience is typically completed in the summer between the first and second year of medical school. To receive the scholarship, students must shadow a rural family practice physician in Idaho.

Students are required to submit an essay that explains their intentions and why they would like to be considered for the scholarship.

This year a student from Sandpoint, ID was awarded the scholarship for \$1,100.00. The student shadowed physicians at the Sandpoint Family Health Center which cares for patients across the Bonner and Boundary counties. Additionally the student shadowed a doctor with the Bonner Partners in the Care Clinic which provides care to uninsured people in the area.

In addition to the shadowing scholarship, we provide funds for mileage for any Idaho student who is interested in shadowing an Idaho physician.

Below is a statement from one of our students who participated in this experience in February, 2018.

"I had the pleasure of shadowing Dr. Richard Harper of Upper Valley Family Medicine in Rigby, Idaho. This was a fantastic opportunity to be able to witness a snapshot of the daily work of a family medicine specialist in a rural and underserved community. It was fascinating to see the diversity of cases that were presented during my time shadowing, and I was impressed to see how much the patients relied on their family physician, regardless of what they presented with. It was particularly enjoyable to participate in the conversations as Dr. Harper visited with his patients, most of whom had been seeing him for many years. I am from Rigby myself, and as such, I found this opportunity very valuable. The patients I saw are the people I eventually want to serve as a physician myself. I love Idaho and its people, and I love medicine. I'm grateful for the funding that made this trip possible for me. The trip strengthened my determination to return to Idaho following my medical education so that I can give back to the state and community that I love. Perhaps one day future students from Idaho will be able to shadow me and be inspired to give back to Idaho as well." M. Bishop MSI, 2018

Idaho Rural Outreach Program (IROP)

The Idaho Rural Outreach Program (IROP) IROP encourages medical students to meet with Idaho middle school or high school students with the intent to spark in interest in the health care field. The goal is to have a significant impact on the shortage of health care providers in Idaho.

Since its creation in 2007, medical students, through IROP have traveled to high schools in various rural areas of Idaho including: Malad, Meridian, Marsh Valley, Soda Springs, Bear Lake, Burley, Preston, the Boise area, Twin Falls, McCall and the surrounding area, Idaho Falls and Rexburg.

Medical students are required to do a presentation that discusses different career options in healthcare such as medical assistant, pharmacist, dentist, doctor, nurse practitioner, physician assistant, etc. They are also required to provide the students with a hands-on learning experience.

In February, 2018 a first year medical student did a presentation at Rocky Mountain High School in Meridian.

"I loved returning to my high school with the help of the IROP. During my presentation I was able to give students information about many careers in healthcare and also point them to resources where they could further explore different career pathways. In addition I related my path to the medical field and showed them how to do selected parts of an abdominal exam. Seeing a Rocky Mountain alumnus who graduated not too long ago and is already studying medicine sparked a lot of excitement in the students, and their excitement was accompanied by a torrent of questions. It was fun to answer their questions and help them locate online or human resources to find further answers to their individual questions. I believe, however, that the most important effect was that my visit made a career in healthcare feel a little more realistic and a little more feasible for these high school students." M. Chamberlain, 2018

Clinical Medical Education in Idaho

During an Idaho medical student's third year, the Family Medicine Clinical Clerkship is completed in Idaho. The Family Medicine Clinical Clerkship is six weeks with a community-based family medicine preceptor.

Family Practice Clinical Clerkship

Brief Description of Clerkship

During the clerkship, all students develop competencies in patient care, systems-based practice, lifelong-learning, and professionalism. Students assess and manage acute, chronic, and preventive medical issues in the outpatient family medicine setting. Students also engage in reflective and interactive activities throughout the month, designed to develop awareness and hone skills for physician-patient relationships. These relationships are an essential and powerful tool for good care of patients.

The majority of time is spent in direct patient care, most of which occurs in the outpatient family medicine clinic. The patient care is under the direction of a board-certified family physician member of the clerkship faculty team. Settings are diverse and include inner city, rural, urban, and suburban. This range of choices, as well as the opportunity to conduct patient care in the community, where the majority of Americans seek care, makes the Family Medicine Clerkship unique. In addition to clinical work there is time dedicated to reading, completing projects and assignments, and attending educational sessions.

Clerkship Goals

As a result of completing the Family Medicine Clerkship:

1. Students will be able to integrate their clinical reasoning skills with their scientific background through broad-spectrum hands-on patient care in the primary care setting.
2. Students will be able to see patients collaboratively with their preceptor, managing the full spectrum of acute, chronic, and preventive care needs that are addressed in the primary care setting.
3. Students will be able to develop therapeutic relationships with patients, families and communities.
4. Students will be able to understand how the principles of Family Medicine can help create a more efficient and effective health care system.
5. Students will be able to be more prepared to serve their community, by taking an active learning role in patient care, navigation of complex health systems, lifelong learning, and professional commitment.

Timeline

The clerkship is six weeks in duration. Students will be expected to be active in clinical duties for the majority of the days, however there is built in dedicated study time for the shelf exam and the various assignments. Students will be working in the preceptor model, which means the student will work similar hours to the physician each day.

Preceptors/Site Requirements

The preceptor must be board-certified in family medicine, and hold a University of Utah Volunteer Clinical Faculty appointment with the Department of Family and Preventative Medicine. The clinical site must also have a current affiliation agreement with the University of Utah.

Formative Clinical Performance Assessment

All Phase III Clerkships employ a common formative feedback form that includes both a Student Self-Assessment and Faculty Evaluation of Student section (*Formative Clerkship Feedback Form*). This self-assessment and feedback is intended to be formative in nature and will not be used in the calculation of Preceptor Evaluation data for final grade determination.

Preceptor Evaluations

All Phase III Clerkships employ a common preceptor evaluation form that instructs evaluators to select performance based behaviors along multiple dimensions that best represent the student's highest sustained performance during the preceptor's period of observation.

Family Medicine Volunteer Clinical Faculty in Idaho

Physician	Location	Phone
Peter Crane, MD	Bear Lake Family Care and OBGYN 465 Washington Street Montpelier, ID 83254	208-847-4495
Julie Gunther, MD	Spark MD 302 West Idaho Street Boise, ID 83702	208-381-6500
Michael Maier, MD	St. Luke's Medical Center 3301 North Sawgrass Way Boise, ID 83704	208-376-9592
Waj E. Nasser, MD	St Luke's Capital City Family Medicine 1520 W State St Boise, ID 83702	208-947-7700
Richard F. Paris, MD	Hailey Medical Clinic 706 South Main Street	208-788-3434

	Hailey, ID 83333	
Barry F. Bennett, MD	South East Family Medicine 2775 Channing Way Idaho Falls, ID 83404	208-524-0133
Tyler Mayo, MD	South East Family Medicine 2775 Channing Way Idaho Falls, ID 83404	208-524-0133
Dan Ostermiller, MD	St Luke's Payette Lakes Medical Clinic 211 Forest Street, Box 1047 McCall, ID 83638	208-634-6443
William Crump, MD	St Lukes Family Health 3090 Gentry Way Ste 200 Meridian, ID 83642	208-887-6813
Andrew Holtz, DO	Praxis Medical Group 3080 East Gentry Way Ste 200 Meridian, ID 83642	208-884-3770
Trevor Satterfield, MD	St. Luke's Physician Center 775 Pole Line Ave, Suite 105 Twin Falls, ID 83301	208-814-8000
Joan Bloom, MD	Woodlands Family Medical Group 30544 Highway 200, Suite 101 Ponderay, ID 83852	208-263-6300
Facility	Bingham Memorial Hospital 98 Poplar Street Blackfoot, ID 83221	208-785-4100
Facility	Mountain View Hospital 2325 Coronado Street Idaho Falls, ID 83404	208-529-2371
R. Brett Campbell, DO	Cassia Regional Hospital 1404 Pomerelle Avenue Burley, ID 83318	208-878-9432
Terrance A. Riske, MD	Hayden Lake Family Physicians 8181 Cornerstone Drive Hayden, ID 83835	208-772-0785
Jara McDonald, MD	Heritage Health 740 McKinley Avenue W Kellogg, ID 83837	208-783-1267
Leanne Rousseau, MD	Heritage Health 925 East Polston Avenue Post Falls, ID 83854	208-618-0787

Josh Kern, MD	Magic Valley Rural Residency 777 N Raymond Street Boise, ID 83704-9251	208-948-0114
Jason Ludwig, DO	Pioneer Family Medicine 13150 West Persimmon Lane Boise, ID 83713	208-938-3663
Mark Gibby, MD	45 North 1st East Preston, ID 83263	208-852-3755
Frank Duncan MacDonald, MD	Primary Health 6052 West State Street Boise, ID 83703	208-955-6405
Michael Packer, MD	1 Professional Plaza Rexburg, ID 83440	208-356-9231
Joseph Watson, MD	393 East 200 North Rexburg, ID 83440	208-356-5401
John K. Franson, MD	292 South 3 rd West Soda Springs, ID 83276	208-547-3118
Bridgette Baker, MD	St. Alphonsus Regional Medical Center 1150 N Sister Catherine Way Nampa, ID 83687	208-302-7000
Nicole Ruske, MD	St. Luke's Medical Center 709 North Lincoln Avenue Jerome, ID 83338	208-814-9500
Aaron Brown, MD	St. Luke's Physician Center 730 North College Road Twin Falls, ID 83301	208-814-8000
Martha Wilson, MD	Terry Reilly Health Services 2017 1 st Street South Nampa, ID 83651	208-466-5359
M. Cole Johnson, MD	Twin Falls Family Medicine 526 Shoup Avenue West Street Twin Falls, ID 83301	208-733-1112
	Moscow Family Medicine 623 S Main Street Moscow, ID 83843	208-882-2011
	Valley Family Health Clinic 207 East 12 th Street Emmett, ID 83617	208-365-1065

Financial Report 2017-2018

The Idaho State Board of Education subsidizes ten seats at the University of Utah so these students are able to pay in-state tuition. For academic year 2017-18, Idaho students paid \$38,932.24 in tuition and fees. Idaho students also paid a surcharge of \$1608.00 which was returned to Idaho (to the Idaho Rural Physician Incentive Program). The State of Idaho paid \$43,000/per student.

A portion of the subsidy that the University of Utah receives from the ISBOE went towards:

Direct student support:

Administrator Travel	\$943.54
Student Rotation Expenses*	
First-Year Job Shadowing Stipend	\$1,371.42
Third/Fourth-Year Rotation Expenses	\$ 5,539.93
Idaho Rural Outreach Program	\$ 403.31
Idaho Medical Association U of U Student Rep Expenses	\$1,553.32
Boise Physician Support Salary	\$7,500
Administrative Support Salary	\$60,036.07
Total	\$77,347.59

The remainder of the funds was used for educational advancement of Idaho Medical Students.

* **Covered expenses for rotations:**

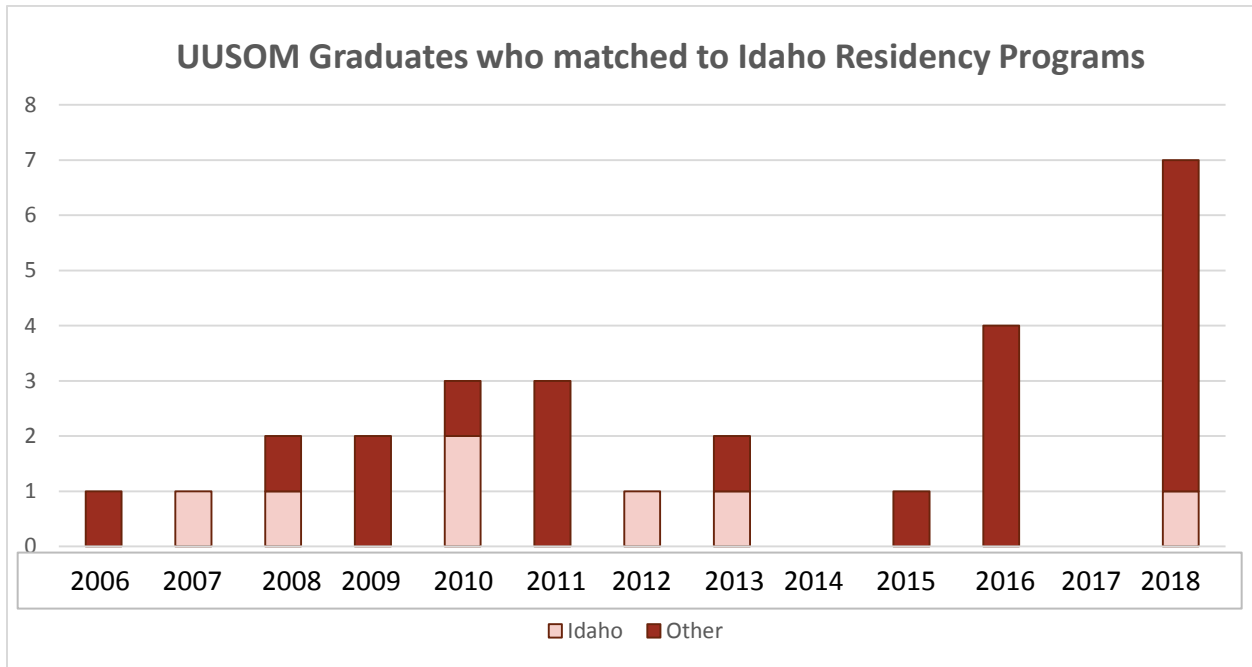
- **First-Year Job Shadowing Stipend:** \$1100.00 shadowing scholarship was awarded.
- **Mileage:** One round trip between Salt Lake City and the rotation site (\$0.545/mile) and mileage if the distance between housing and rotation sites is more than 15 miles (\$0.545/mile)
- **Housing:** If renting an apartment or motel room, the reimbursement is \$125 per week. If staying with family or friends, they can give them a gift card, gift basket or take them to dinner. They can spend up to \$75.
- **Preceptor:** \$500/week and a gift card, dinner, or gift basket of up to \$75.00.

School of Medicine Graduate Reports

The following is the medical student graduate report of both Idaho sponsored and non-sponsored graduates.

Academic Year	Sponsored	Non-sponsored
2017-2018	10	0
2016-2017	10	0
2015-2016	10	0
2014-2015	8	0
2013-2014	8	1
2012 - 2013	8	2
2011 - 2012	8	4
2010 - 2011	9	3
2009-2010	6	4
2008-2009	7	1
2007-2008	8	0
2006-2007	8	1
2005-2006	8	4
2004-2005	8	0
2003-2004	8	4
2002-2003	9	1
2001-2002	5	0
2000-2001	6	0
1999-2000	6	7
1998-1999	6	2
1997-1998	6	1
1996-1997	6	3
1995-1996	6	3

Since 2006, twenty seven UUSOM graduates have matched into Idaho GME Programs. The following indicates the number of matched graduates each year, broken into Idaho sponsored and non-sponsored graduates.



As of August 2017, the following estimated numbers of U of U graduates are practicing medicine in Idaho:

UU Medical School Graduates practicing in Idaho	287*
UU Resident Graduates practicing in Idaho	65*
Total	352*

Idaho Sponsored Students, 1977-2018: 297

* These numbers were generated by the University of Utah Alumni Office in conjunction with information provided by the Idaho Board of Medicine and research completed by the Idaho Affairs Office. They reflect U of U graduates who are currently licensed by the State of Idaho. Current 7/6/18.

Following is the resident graduate report of those who chose to practice medicine in Idaho:

Academic Year	Number of Graduates	Specialty	
2017-2018	7:251	1- Cardiovascular 1- Pediatrics 1- Neuroradiology	1- Vascular Surgery 1- Pain Medicine 1- Hematology and Medical Oncology
2016-2017	5 : 238	3- Pediatrics 2 Family Medicine	
2015-2016	7 : 301	2 – OB/GYN 1 – Dental 1 – Physical Medicine and Rehabilitation	1 – Pulmonary and Critical Care 1 – Pediatric Emergency Medicine 1 – Geriatrics
2014 - 2015	6 : 289	1 - Family Medicine - OB 1 - Sports Medicine 2 - Internal Medicine	1 - Interventional Cardiology Fellowship 1 – Nephrology Fellowship
2013 - 2014	9 : 291	1 - Internal Med 1 - Dermatology 1 - Pathology 1 - Plastic Surgery 1 - Vascular Surgery	2 - Pain Med 1 - Nephrology 1 - Pediatric Gastroenterology
2012 - 2013	8 : 305	1 – Pediatrics 2 – Cardiology 1 – Pathology 1 – Internal Medicine	1 – Anesthesiology 1 - Hematology/Oncology 1 - PM&R
2011 - 2012	8 : 297	1 – Neurology 1 – Family Medicine 1 - Pediatrics	3 – Internal Medicine 1 – Emergency Medicine 1 - Dermatology
2010 – 2011	9 : 292	4 – Family Medicine 1 – Radiation Oncology 1 – Internal Medicine	1 – General Surgery 1 – Emergency Medicine 1 - Peds-Anesthesiology
2009 – 2010	7 : 266	1 – Medicine – Psychiatry 3 –Family Medicine 3 – Internal Medicine	1 – Pediatrics 1 – Emergency Medicine

Academic Year	Number of Graduates	Specialty
2008 - 2009	7 : 287	1 - Anesthesiology 3 - Internal Medicine 1 - Family Medicine 1 - Pediatrics 1 - General Surgery
2007 - 2008	7 : 265	4 - Family Medicine 1 - Internal Medicine 2 - Anesthesiology
2006 - 2007	4 : 228	1 - Internal Medicine 2 - Pediatrics 1 - Pediatric Hematology/Oncology
2005 - 2006	8 : 214	2 - Sports Medicine 1 - Dental 1 - Pulmonary 1 - Pediatric Psychiatry 2 - Pediatrics 1 - Pathology

**INSTRUCTION, RESEARCH, AND STUDENT AFFAIRS
DECEMBER 20, 2018**

SUBJECT

Lumina Adult Promise Project

ALIGNMENT WITH STRATEGIC PLAN

Goal 1 (Educational System Alignment), Objective B (Alignment and Coordination) and Goal 2 (Educational Attainment), Objective A (Higher Level of Educational Attainment), Objective B (Timely Degree Completion), and Objective C (Access).

BACKGROUND/DISCUSSION

According to the most recent American Community Survey conducted by the United States Census Bureau, 28% of Idaho citizens have some college but no degree. In 2016, the Idaho Department of Labor (IDL) reported that while more Idaho citizens than ever are employed, many citizens remain underemployed due to a lack of needed skills. As thousands of Idaho jobs are chronically unfilled due to a shortage of qualified workers, and as Idaho businesses seek growth within rural metropolitan communities, the state remains constrained by the limited workforce prepared with the skills necessary to perform increasingly complex responsibilities. IDL projects that Idaho faces a critical shortage of tens of thousands of skilled, qualified workers by 2024, placing statewide economic growth at significant risk.

For a number of reasons not unlike those found across the country, many Idaho adults have been unable to complete their college plans. Many of these individuals can benefit from a comprehensive and accessible credit for prior learning system, and the delivery of academic advising and student support structures within their local communities. As institutions are not located near rural and isolated communities, on-campus classes often require substantial travel that becomes unpractical. However, online classes may also present a challenge due to unreliable or nonexistent internet availability within these regions.

Specifically, there are several underserved populations in the state that have been identified by Board staff that would benefit from having the availability of the aforementioned items. This includes, military veterans as well as American Indian and Hispanic/Latino populations.

Military Veterans

A significant adult population to not be overlooked are military veterans. According to a 2017 study by Wallethub, researchers found Idaho to have the third-highest average number of enlistees among all states. With many high school graduates choosing to serve (instead of matriculating directly to college), this results in a great need to ensure that systemic support is available across Idaho's public institutions when these individuals return to the state. Among other items, this includes providing transparent provisions for the application of training and instruction to postsecondary credentials.

INSTRUCTION, RESEARCH, AND STUDENT AFFAIRS
DECEMBER 20, 2018

American Indian

As another underrepresented group in Idaho, American Indian students are somewhat less likely to be college ready when they graduate from high school, due to a myriad of reasons including lack of advanced opportunities and curricula incongruences and they are considerably less likely to go on to postsecondary education. According to a study by the University of Idaho McClure Center for Public Policy in June 2016, while Idaho's American Indian adults are about as likely as all Idaho adults to have at least a high school diploma, they are less likely to have education beyond high school. American Indian students represent only 1% of all undergraduate enrollment in Idaho. To help address the issue of access, the Board authorized Idaho State University to pilot a reduced fee rate for American Indian student populations in Idaho.

Hispanic/Latino

While Idaho has a great need to increase adult college completion across all demographics only 12.7 percent of Idaho Hispanic adults hold a college degree, and that's the lowest rate in the nation. This compares with 22.6 percent of Hispanic adults in the U.S. holding a two- or four-year college degree. Since Hispanics represent the state's largest ethnic minority, they also represent a linchpin toward meeting Idaho meeting its 60% postsecondary attainment goal for citizens between 25-34 years of age. Awareness, marketing and promotion of educational and scholarship opportunities must be tailored to address the unique cultural norms of this population.

To help address the issues associated with the aforementioned underserved groups, in addition to adult learners altogether, Board staff submitted a grant proposal to the Lumina Foundation to be considered for its "Adult Promise" efforts. In October Board staff was notified the proposal would be funded in the amount of \$400,000 over a two year period.

As part of an ongoing nationwide initiative, Lumina Foundation awarded more than \$2.5 million in grants to six states supporting adults who want to earn college degrees, certificates, and other quality credentials beyond a high school diploma. In addition to Idaho, California, Hawaii, Kentucky, North Carolina and Ohio were selected to serve as the second cohort of Lumina's Adult Promise effort, a partnership with the State Higher Education Executive Officers (SHEEO).

Specific grantees include: California Community College System; the University of Hawaii System; the Idaho State Board of Education; Kentucky Council on Postsecondary Education; a partnership between the University of North Carolina System and the North Carolina Community College System; and the Ohio Department of Higher Education. States were selected through a highly competitive grant process that involved 25 applications from 22 states.

**INSTRUCTION, RESEARCH, AND STUDENT AFFAIRS
DECEMBER 20, 2018**

These states join the initial cohort of Adult Promise states that Lumina announced in November 2017: Indiana, Maine, Minnesota, Oklahoma, and Washington. To date, Lumina has invested nearly \$6.5 million in the Adult Promise effort.

IMPACT

The award will provide for several items. This includes the delivery of student advising and educational services for adults through community libraries in ten rural underserved counties. It will also render expense for contracted services with institutions or independent service providers to launch outreach to prospective adult students in partnership with colleges, industry partners, and state and local agencies. Finally, grant resources will support efforts among faculty to develop a clear and consistent statewide articulation for awarding credit for prior learning and military experience. In sum, it is expected these efforts will increase visibility for postsecondary opportunities available to adults, while also providing greater accessibility to the use of alternative learning toward the completion of a postsecondary credential.

ATTACHMENTS

- Attachment 1 – Adult Promise Project Executive Summary
- Attachment 2 – Adult Promise Budget
- Attachment 3 – Adult Promise Advisory Board Members

STAFF COMMENTS AND RECOMMENDATIONS

Board staff will be working with institutions, the Idaho Commission for Libraries, and professional organizations to deliver service and utilize best practices toward the development of postsecondary course articulation for military experience and prior learning. If determined successful, possibilities will be explored with respect to expansion.

BOARD ACTION

This item is for informational purposes only.

Idaho's Adult Promise Project
Executive Summary
August 8, 2018

The Idaho State Board of Education (SBOE) and the Idaho Commission for Libraries (ICfL) seek support from the Lumina Foundation to introduce an approach that increases adult access to a high-quality education, with a focus on meeting the educational needs of Idaho's U.S. military veteran population. The Gem State has a long history of sending a higher proportion of her citizens to serve in defense of the country than most states. Idaho resides among the top four states with the highest average number of military enlistees, with a high concentration of veterans residing in small counties. Whereas eight percent of the U.S. population are veterans, veterans make up 9.9 percent of Idaho's population and nearly half of the state's 44 counties have a higher veteran population than the national average. This is none more evident than in largely rural Elmore County, which has the highest percentage of veterans of any county in the United States.

While Idaho's veterans have demonstrated a high level of interest in education beyond high school, unique barriers have prevented realization of the educational goals of many. Forty percent of Idaho's veterans have completed some college without earning a credential, compared to just 28% of the general state population. This project intends to address these issues through helping veterans finish what they have started and to support those who have yet to begin. Idaho's Adult Promise Project will deliver services to veterans that will strategically target their greatest educational barriers. Services will include: delivering access to a comprehensive prior learning assessment (PLA) system committed to evaluating education or experience for the awarding of college credit; offering intensive academic and financial advising and social support; providing "crosswalks" that clearly reflect equivalencies between college courses and CLEP and DSST scores, JST/CCAF instruction and training; and supporting veteran use of the state's Career Information System to connect educational pathways to career opportunities. Veterans supported by this project will also benefit from current statewide efforts to guarantee transferability of college credit across Idaho's public institutions and from the state's initiative to provide free textbook resources for General Education courses at all institutions. While veterans are its focus, no adult interested in seeking to begin or continue a postsecondary education will be turned away from services offered by Idaho's Adult Promise Project.

To maximize impact, the SBOE and ICfL have identified Ten Idaho Counties with the highest concentration of veterans to serve as project sites. The veterans' location in some of Idaho's most remote communities offers an added opportunity to support rural community and economic development while assisting individual adults in those communities. No entities are better poised to help achieve these purposes and host this project than the local libraries in these ten counties. Idaho's Adult Promise Project will allow the SBOE and local librarians to work together to implement strategies that will engage rural veterans in ways that are responsive to regional

education and workforce needs as well as the needs of individuals. Idaho's eight public institutions will contribute academic advising and student support staff trained in offering services such as those described above. Utilizing a statewide messaging campaign, libraries will: communicate the accessibility of online learning resources within their communities; support student use of these resources; provide facility space for postsecondary staff members, and offer continuing education programming aligned with veterans' academic and personal goals and Adult Promise project objectives.

By serving individual veterans and other adults, this project strives to improve economic conditions in these ten counties. Poverty rates in all but one of the selected counties is at, or above, the state average, with one county experiencing a nearly 20% poverty rate. The average unemployment rate across the counties engaged in this effort is nearly double the state's rate of 2.5%. This issue is further compounded for those who carry veteran's status in these regions, as the U.S. Census Bureau reports that rural veteran employment rates are lower than that for veterans in urban areas and the percentage of veterans holding jobs is even lower in extremely rural counties. The population in the largest county among those selected for the introduction of this program slightly exceeds 25,000. The smallest resides just under 1,100. While these counties were selected for their high concentrations of veterans, not for their economic conditions, the SBOE and ICfL embrace the challenges and opportunities inherent in supporting Idaho's veterans and the rural communities in which they live.

At the state level, this project will complement many initiatives in the public and private sectors currently underway to meet the state's goal to see 60% of its population hold some form of postsecondary credential by 2025. The U.S. Census Bureau reports that just 10% of Idaho's adult population over 25 hold associate's degrees and 18% of Idaho adults over age 25 hold bachelor's degrees. Despite efforts to shrink this gap, this gulf between the 60% goal and current educational attainment levels has remained stubbornly wide. Retooling of current efforts, and developing new approaches, including Idaho's Adult Promise Project, are essential.

Many business and government leaders are now recognizing that Idaho's educational attainment gap will not be filled without the inclusion of Idahoans over age 25, a growing proportion of the population. Idaho's share of children who will go on to become traditional college or university students is being outpaced by Idaho's aging population. C.L. "Butch" Otter, state legislators, numerous state agencies, Idaho Business for Education leaders, and others have all expanded their commitment to supporting adult learners. U.S. Senator Mike Crapo has taken this one step further having convened a statewide work group focused on understanding and supporting the education and training needs of Idaho's veteran population.

In proposing Idaho's Adult Promise Project, SBOE and ICfL recognize that supporting adult educational attainment has never been more critical to the overall well-being of the state. The Idaho Department of Labor has recently concluded that a shortage of educated citizens is threatening Idaho's economic vitality beyond that initially thought. While more Idaho citizens

than ever are employed, the department reports that many citizens lacking necessary skills remain underemployed. This complements the agency's projection indicating that Idaho faces a critical shortage of tens of thousands of skilled, qualified workers by 2024.

At its core, Idaho's Adult Promise Project is intended to improve the lives of individual Idaho veterans and other adults seeking to earn postsecondary credentials. As individuals realize their educational goals local communities, counties, and the state are all positioned to benefit. This research-based project has been strategically designed by SBOE and ICfL to serve as the template by which a statewide scale will be modeled. Project designers envision that meaningful outcomes will prompt sustained support for achieving implementation within all corners and communities of Idaho.

**LUMINA
PROPOSAL BUDGET**

ORGANIZATION NAME:

Date:

	SUGGESTED BUDGET CATEGORIES	REQUESTED LUMINA SUPPORT				TOTAL LUMINA SUPPORT REQUESTED	TOTAL NON-LUMINA SUPPORT		TOTAL PROJECT BUDGET
		Year 1	Year 2	Year 3	Year 4		In-Kind*	Other Funds	
1	Direct Project Costs								
	Personnel Expenses								
	Salaries* Five Advisors(5) \$40,000					0			0
	Benefits (list % rate)		0			0			0
	<i>SUBTOTAL: Personnel Expenses</i>	0	0	0	0	0	0	0	0
	Other Direct Expenses								
	Materials and Supplies*	0				0			0
	Equipment Purchase Hardware/software	8,000	2,000			10,000			10,000
	Travel *	8,000	8,000			16,000			16,000
	Meetings/Conferences*	40,000	4,000	0	0	44,000	25,000		69,000
	Consultants*	0	200,000			200,000	300,000		500,000
	Develop web portal for PLA		20,000			20,000	80,000		100,000
	Communication*	8,000	2,000			10,000			10,000
	Subcontracts or subgrants					0			0
	Third-Party Grant Management	55,000	35,000			90,000			90,000
	<i>SUBTOTAL: Other Direct Expenses</i>	119,000	271,000	0	0	390,000	405,000	0	795,000
2	Indirect Costs (if requested)								
	Indirect Expenses **	5,000	5,000						0
	<i>SUBTOTAL: Indirect Expenses</i>	5,000	5,000	0	0	10,000	0	0	10,000
3	GRAND TOTAL	124,000	276,000	0	0	400,000	405,000	0	805,000

NOTE: Please prepare your budget so that the total project budget is rounded to the nearest \$100.

*Please attach an itemized list of all anticipated direct project expenses. ** Refer to Section IV in the grant proposal form.

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Advisory Board Members

Lisa Atkinson is a vice president and market manager for Zions Bank's business payments and technology department. Atkinson is responsible for the western Idaho business payments and technology team, as well as managing a portfolio of clients. Her leadership helps her team provide significant value in cost savings and operating efficiencies for clients. A veteran banker with more than 20 years of experience, Atkinson has experience with many aspects of banking, including operations, relationship management, and financial technology. Because of her commitment to excellence, Atkinson has been honored with awards that include Circle of Excellence and being named as a WCA TWIN Honoree. Her industry experience has allowed her to mentor many financial professionals and help them be successful. Atkinson is a graduate of Leadership Boise and is heavily involved in the community. She shares her passion and leadership with many organizations, including the American Red Cross, First Tee of Idaho, and the Association of Financial Professionals.

Manuelita (Lita) Burns, a Wyoming native, currently serves as the Vice President for Instruction at North Idaho College in Coeur d'Alene, ID. Dr. Burns has worked in higher education for 26 years; initially serving as faculty at Central Wyoming College. She moved to north Idaho in 2001 after accepting the position as Director of Health Professions and Nursing. She was later promoted to a dean's position and in 2012 became the Vice President for Instruction. Lita earned her Bachelor of Science degree in nursing from the University of Wyoming, a Master of Science degree in nursing from the University of Colorado, and a Ph.D. in Leadership Studies from Gonzaga University.

Aaron Kunz has been in broadcast since 1993 when he accepted a position as a board operator at a radio station in Blackfoot. Before getting his first job as a television reporter in 2000 he joined the army. Over the next decade, Aaron wore many hats including: host, anchor, photographer, reporter and weather forecaster. He has done it all, but the common thread was storytelling. Aaron documented eastern Idaho farmers who were finding ways to make their operations better for the environment while improving their crops. He also covered stories on a family struggling to survive in a draught stricken eastern Idaho, and hosted programming for the 2002 Winter Olympics. Additionally, Aaron covered the Idaho Legislature for the past eight years. He became the face of the statehouse in eastern Idaho and worked for regional public media project EarthFix. Aaron joined Idaho Public Television

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fulltime in 2013, acting as production manager and co-host of Idaho Reports. Aaron was the producer of the Journey to College Series for Idaho Public Television. This three piece series features Idaho High School students, young adults and American Indian youth as they plan and prepare for life after high school.

John Russ is an area manager for the Idaho Department of Labor overseeing ten labor offices in Southwestern and South Central Idaho. For over 10 years, John has been a leader in Idaho's workforce development efforts specifically in the areas of employment services, business outreach, unemployment insurance, and Veteran's services. In addition, John serves as the project manager for Apprenticeship Idaho, a statewide effort between education, employers and government, to expand apprenticeship opportunities for Idahoans. Prior to his public service, John served as business coordinator with Goodwill Staffing Services and a placement coordinator at the Women's and Children's Alliance. John got his start in workforce development by proudly serving 20 years in the US Army as a recruiter and tank instructor.

Adrian San Miguel is the director of postsecondary education for Idaho Career & Technical Education in Boise. Originally from Texas, he received his degrees from Baylor University and has spent the last 14 Years working in higher education in Texas, Indiana, and Idaho. His career and passion has focused on Serving special populations, nontraditional students and diversity related initiatives. He provides state Leadership for Federal Perkins and Adult Education programs at the postsecondary level. He also provides oversight of programs designed to create awareness and a vision of equity for special populations and nontraditional occupations through Idaho's Centers for New Directions. Adrian supports and provides technical assistance to Idaho's six technical colleges for degree & certificate career & technical education programs and non-credit workforce training center programs.

Mike Satz serves as the associate vice president and chief executive officer for the University of Idaho in Boise, Idaho. In this role, Mike is representing the university's interests in outreach, economic development, and academic programming for Southwestern Idaho. He also serves as the coordinating administrator for the president's Latino Advisory Council whose efforts focus on enrollment, supporting research, and outreach with respect to Idaho's Latino population. During his time as the interim dean for University of Idaho College of Law, Mike established a law externship program with Shoshone Bannock tribe. While serving as associate dean for Faculty Affairs, Mike's work focused on creating a safe and

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respectful learning environment for students from all backgrounds. Mike earned his JD from the University of Michigan and BA/BS in History and Political Science from Southern Methodist University.

Robert F. Sobotta is the Director of Native American/Minority & Veterans Services at Lewis-Clark State College in Lewiston, Idaho; a Nez Perce tribal member and lifelong resident of Lapwai, Idaho. He has been involved in education within Idaho for the past 29 years and been employed with LCSC since 1992. Bob received his bachelor's degree in Social Science-Secondary Education from LCSC, and a master's degree in Education Administration from the University of Idaho. Working at LCSC, Bob has been a leader and advocate of multicultural education focusing on recruitment, retention, outreach and cultural awareness programming. Along with a variety of campus committees, Bob currently serves on State Board of Education's Idaho Indian Education Committee and the Native American Inter-Institutional Collaborations Committee (WSU, UI, LCSC, and NIC & NWIC). Bob is also the Head Boys Basketball Coach at Lapwai High School which won the 2017 & 2018 Idaho Boys State 1A Championship.

Don Soltman is a Grangeville, Idaho native with a bachelor's degree in Life Sciences from the Air Force Academy and a master's degree in Health Care Administration from Baylor University in Texas. He served 10 years in the Air Force, working at various health care facilities across the United States, Europe and in Vietnam. In addition to his service, Don is a current member of the Idaho State Board of Education and he served four years on the state's Professional Standards Commission – which advises the Board of Education on standards for teacher certification in Idaho schools – including three years as chairman of its budget committee. He also served on the state committee that developed the graduation standards in science for Idaho students.

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SUBJECT

Complete College America Momentum Pathways Work Plan

REFERENCE

August 2010	Board established an attainment goal that 60% of Idaho's 25-34 year olds will have a postsecondary degree or certificate by 2020.
August 2011	Board reviewed data regarding Idaho's status in meeting the 60% goal by 2020, and heard strategies to meet the goal.
December 2011	Board approved the framework for Complete College Idaho: A Plan for Growing Talent to Fuel Innovation and Economic Growth in the Gem State, and directed staff to obtain stakeholder feedback and buy-in, and bring back the plan for approval at the June 2012 Board meeting.
June 2012	Board approved the postsecondary degree and certificate projections and the Complete College Idaho: A Plan for Growing Talent to Fuel Innovation and Economic Growth in the Gem State.
June 2015	Board approved changes to Board Policy III.S., establishing co-requisite, accelerated, and emporium support models as the approved delivery of remedial instruction, a strategy included in the Complete College Idaho plan.
September 2017	Board adopts the Governor's Higher Education Task Force recommendations, which includes Complete College America 'Game Changer' strategies.
December 2017	Board reviewed implementation of Complete College America "Game Changer" strategies and the effectiveness of initiatives supported by Complete College Idaho funding.
August 2018	Board provided with overview regarding Idaho's selection as a Momentum Pathways state by Complete College America.

APPLICABLE STATUTE, RULE, OR POLICY

Idaho State Board of Education Governing Policies & Procedures, Section III.Q. Admission Standards, Section III.R. Retention Standards, and Section III.S. Remedial Education

ALIGNMENT WITH STRATEGIC PLAN

GOAL 1: Educational System Alignment – Ensure that all components of the educational system are integrated and coordinated to maximize opportunities for all students. Objective A: Data Access and Transparency – Support data-informed decision-making and transparency through analysis and accessibility of our public K-20 educational system. Objective B: Alignment and Coordination – Ensure the articulation and transfer of students throughout the education pipeline (secondary school, technical training, postsecondary, etc.)

GOAL 2: Educational Attainment – Idaho’s public colleges and universities will award enough degrees and certificates to meet the education and forecasted workforce needs of Idaho residents necessary to survive and thrive in the changing economy. Objective A: Higher Level of Educational Attainment – Increase completion of certificates and degrees through Idaho’s educational system. Objective B: Timely Degree Completion – Close the achievement gap, boost graduation rates and increase on-time degree completion through implementation of the Game Changers (structured schedules, math pathways, co-requisite support)

BACKGROUND/DISCUSSION

Idaho became a Complete College America (CCA) Alliance State in 2010. It has since worked closely with CCA on a range of academic initiatives including transforming remediation, creating clear academic pathways, and promoting timely credential completion. Recently CCA has modified its strategies to also include a focus on first year student guidance and engagement and addressing adult learner needs through accelerated courses, year-round predictable schedules, and prior learning assessment opportunities.

In 2010, subsequent to the Board adopting a goal calling for 60% of Idahoans age 25 to 34 hold a postsecondary credential, Board staff presented statewide degree completion projections and proposed possible strategies to aid the state in meeting the goal. In October 2011, the Complete College Idaho (CCI) Team attended the CCA Annual Convening and Completion Academy to develop a draft completion Plan. In December 2011, the Board approved the framework for Complete College Idaho: A Plan for Growing Talent to Fuel Innovation and Economic Growth in the Gem State (CCI Plan). In addition to integrating CCA strategies into the proposed plan, staff collected feedback from public and private stakeholders. The final version of the CCI Plan was approved by the Board at its June 2012 Regular meeting.

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Since that time significant work has commenced on the plan, with collaboration between the Office of the State Board of Education and the public postsecondary institutions to implement many of the initiatives proposed in the CCI Plan. Additionally, over \$8.5 million was allocated from the Idaho Legislature from 2014-2017 to support CCI initiatives.

With meaningful progress having been achieved through the implementation of CCI strategies on individual campuses, work still remains to fully deliver and scale CCA strategies across all eight institutions. As a result, in July 2018 CCA selected Idaho as a Momentum Pathways state. Due to the commitment exhibited by institutional leadership, the Governor's Higher Education Task Force, and recent legislative support for Board initiatives, Complete College America has chosen Idaho as one of two states to invest additional resources to help complete the work that has been undertaken with the aforementioned strategies.

The Momentum Pathways Project is designed to help states/Alliance members and their postsecondary institutions scale a core set of evidence-based strategies proven to close equity gaps and generate significant gains in college completion rates. Individually, these strategies are CCA's well-known Game Changers: 15 to Finish, Math Pathways, Corequisite Support, Momentum Year and Academic Maps with Proactive Advising. The overarching structure of Momentum Pathways represents a tested and guided approach to scaling these strategies with intentional sequencing and division of labor among faculty and staff. The Momentum Pathways model also includes built-in success checkpoints: annual opportunities to collect and report data proving that recent efforts are getting the intended results. These checkpoints fuel momentum for the project teams as they see the impact of their efforts within months, rather than waiting two to six years to see if their graduation rates were affected.

Since the announcement of Idaho's selection as a Momentum Pathways state, institutional provosts and their staff members have developed a work plan with clear goals and objectives. The work plan envelopes: Complete College America strategies; Governor's Higher Education Task Force (HETF) recommendations assigned to the Board's Instruction, Research, and Student Affairs (IRSA) Committee; and, standing IRSA goals.

IMPACT

Determining priorities and timelines for the aforementioned plan will provide direction to institutions and Board staff. Upon completion of these items across the system, Idaho's public colleges and universities will deliver a more accessible and affordable postsecondary education system for students and families, whereby the needs of all levels and backgrounds of learners are more effectively accommodated. Furthermore, implementation of the plan will address many of the student-centered HETF recommendations adopted by the Board, leading to improved retention, progression, and completion rates.

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STAFF COMMENTS AND RECOMMENDATIONS

Board staff will work with institutional leadership, CCA staff, and stakeholders to coordinate implementation of work plan objectives based on direction rendered by the Board. The prioritization and timeline of goals as discussed by the Board at its December 2018 work session will provide guidance and expectations for accomplishing Board goals with fidelity.

BOARD ACTION

I move to adopt the updated Complete College America Game Changers as provided herein.

AND

I move to approve the goals identified in the Work Session TAB 2, Attachment 1 prioritization and scale implementation timelines as identified below.

	Priority Level	Implementation Timeline
Goal 1	_____	_____
Goal 2	_____	_____
Goal 3	_____	_____
Goal 4	_____	_____
Goal 5	_____	_____
Goal 6	_____	_____
Goal 7	_____	_____
Goal 8	_____	_____
Goal 9	_____	_____