

LEVEL II MEMORANDUM

DATE: June 15, 2019

TO: Chief Academic Officers, Montana University System

FROM: Brock Tessman, Deputy Commissioner for Academic, Research, and Student Affairs

RE: July 2019 Level II Proposals

The campuses of the Montana University System have proposed new academic programs or changes under the Level II approval process authorized by the Montana Board of Regents. The Level II proposals are being sent to you for your review and approval. If you have concerns about a particular proposal, you should share those concerns with your colleagues at that institution and try to come to some understanding. If you cannot resolve your concerns, raise them at the Chief Academic Officer's conference call July 26th. Issues not resolved at that meeting should be submitted in writing to OCHE by noon on Friday, July 28th. If no concerns are received, OCHE will assume that the proposals have your approval.

Level II Items

The University of Montana Missoula:

- Request for Authorization to retitle the Department of Health and Human Performance to the School of Integrative Physiology and Athletic Training
[Item # 182-1001-R0719](#) | [Request Form](#)
- Request for Authorization to retitle the Department of Speech, Language, and Hearing Sciences to the School of Speech, Language, Hearing, and Occupational Sciences
[Item # 182-1002-R0719](#) | [Request Form](#)
- Request for Authorization to Establish a Mountain Water Institute
[Item # 182-1003-R0719](#) | [Request Form](#) | [Center/Institute Form](#) | [Intent to Plan](#)

July 11-12, 2019

ITEM 184-1001-R0719

Request for authorization to retitle the Department of Health and Human Performance to the School of Integrative Physiology and Athletic Training.

THAT

The University of Montana-Missoula requests authorization from the Montana Board of Regents to retitle the Department of Health and Human Performance to the School of Integrative Physiology and Athletic Training.

EXPLANATION

The Department of Health and Human Performance (HHP) has recently been moved to the College of Health Professions & Biomedical Sciences. The Community Health program and faculty within HHP are joining the School of Public and Community Health Sciences. The remaining faculty and academic programs in HHP are better identified by an Integrative Physiology and Athletic Training designation. As academic units in CHPBS are schools, we request to retitle the department to the School of Integrative Physiology and Athletic Training.

ATTACHMENTS

Academic Proposal Request Form

Montana Board of Regents
ACADEMIC PROPOSAL REQUEST FORM

ITEM 184-1001-R0719 Submission Month or Meeting: July 11-12, 2019

Institution: University of Montana-Missoula CIP Code: 51.0913; 26.0908

Program/Center/Institute Title: Department of Health and Human Performance retitled to the School of Integrative Physiology and Athletic Training

Includes (please specify below): Online Offering Options

Please mark the appropriate type of request and submit with an Item Template and any additional materials, including those listed in parentheses following the type of request. For more information pertaining to the types of requests listed below, how to complete an item request, or additional forms please visit <http://mus.edu/che/arsa/academicproposals.asp>.

 A. Level I:

Campus Approvals

- 1a. Placing a postsecondary educational program into moratorium** (Program Termination and Moratorium Form)
- 1b. Withdrawing a postsecondary educational program from moratorium**
- 2. Establishing, re-titling, terminating or revising a campus certificate of 29 credits or less**
- 3. Establishing a B.A.S./A.A./A.S. area of study**
- 4. Offering an existing postsecondary educational program via distance or online delivery**

OCHE Approvals

- 5. Re-titling an existing postsecondary educational program**
- 6. Terminating an existing postsecondary educational program** (Program Termination and Moratorium Form)
- 7. Consolidating existing postsecondary educational programs** (Curriculum Proposal Form)
- 8. Establishing a new minor where there is a major or an option in a major** (Curriculum Proposal Form)
- 9. Revising a postsecondary educational program** (Curriculum Proposal Form)
- 10. Establishing a temporary C.A.S. or A.A.S. degree program** *Approval limited to 2 years*

Montana Board of Regents
ACADEMIC PROPOSAL REQUEST FORM

X **B. Level II:**

- 1. Establishing a new postsecondary educational program** (Curriculum Proposal and Completed Intent to Plan Form)
- 2. Permanent authorization for a temporary C.A.S. or A.A.S degree program** (Curriculum Proposal and Completed Intent to Plan Form)
- 3. Exceeding the 120 credit maximum for baccalaureate degrees** *Exception to policy 301.11*
- 4. Forming, eliminating or consolidating an academic, administrative, or research unit** (Curriculum or Center/Institute Proposal and Completed Intent to Plan Form, except when eliminating or consolidating)
- X **5. Re-titling an academic, administrative, or research unit**

Proposal Summary [360 words maximum]

What

We request authorization to retitle the Department of Health and Human Performance to the School of Integrative Physiology and Athletic Training.

Why

The Department of Health and Human Performance (HHP) has recently been moved to the College of Health Professions & Biomedical Sciences. The Community Health program and faculty within HHP are joining the School of Public and Community Health Sciences. The remaining faculty and academic programs in HHP are better identified by an Integrative Physiology and Athletic Training designation. As academic units in CHPBS are schools, we request to retitle the department to the School of Integrative Physiology and Athletic Training. This name is consistent with the identity of similar programs at regional universities with whom UM competes.

Resources

Minimal clerical costs will be required to change the program identity.

Relationship to similar MUS programs

There are similar programs offered within the MUS but they should not be materially impacted by the requested change.

July 11-12, 2019

ITEM 184-1002-R0719

Request for authorization to retitle the Department of Speech, Language, and Hearing Sciences to the School of Speech, Language, Hearing, and Occupational Sciences.

THAT

The University of Montana-Missoula requests authorization from the Montana Board of Regents to retitle the Department of Speech, Language, and Hearing Sciences to the School of Speech, Language, Hearing, and Occupational Sciences.

EXPLANATION

The Department of Speech, Language, and Hearing Sciences has moved to the College of Health Professions and Biomedical Sciences. The other academic units in that college are schools, so the new name will match the existing structure, as well as incorporate the Occupational Therapy program that is currently in development (slated to start in 2021) and that will be included in this school.

ATTACHMENTS

Academic Proposal Request Form

Montana Board of Regents
ACADEMIC PROPOSAL REQUEST FORM

ITEM 184-1002-R0719 Submission Month or Meeting: July 11-12, 2019

Institution: University of Montana-Missoula CIP Code: 51.0204, 51.0203, 51.0816,
52.2306

Program/Center/Institute Title: Department of Speech, Language and Hearing Sciences retitled to the School of Speech,
Language, Hearing, and Occupational Sciences

Includes (please specify below): Online Offering Options

Please mark the appropriate type of request and submit with an Item Template and any additional materials, including those listed in parentheses following the type of request. For more information pertaining to the types of requests listed below, how to complete an item request, or additional forms please visit <http://mus.edu/che/arsa/academicproposals.asp>.

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- 1b. Withdrawing a postsecondary educational program from moratorium**
- 2. Establishing, re-titling, terminating or revising a campus certificate of 29 credits or less**
- 3. Establishing a B.A.S./A.A./A.S. area of study**
- 4. Offering an existing postsecondary educational program via distance or online delivery**

OCHE Approvals

- 5. Re-titling an existing postsecondary educational program**
- 6. Terminating an existing postsecondary educational program** (Program Termination and Moratorium Form)
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- X 5. **Re-titling an academic, administrative, or research unit**

Proposal Summary [360 words maximum]

What

We request authorization to retitle the Department of Speech, Language, and Hearing Sciences to the School of Speech, Language, Hearing, and Occupational Sciences.

Why

The Department of Speech, Language, and Hearing Sciences has moved to the College of Health Professions and Biomedical Sciences. The other academic units in that college are schools, so the new name will match the existing structure, as well as incorporate the Occupational Therapy program that is currently in development (slated to start in 2021) and that will be included in this school.

Resources

Minimal clerical costs will be required to change the program identity. Existing programmatic and clinical opportunities will allow for shared instructional clinical resources across these sister health professions therapeutic programs.

Relationship to similar MUS programs

There are no other similar programs within the MUS.

July 11-12, 2019

ITEM 182-1003-R0719

Request for Authorization to establish a Mountain Water Institute

THAT

The University of Montana requests authorization from the Montana Board of Regents to establish a Mountain Water Institute.

EXPLANATION

The purpose of the University of Montana Mountain Water Institute is to catalyze research, creative activity, technological innovation, policy advances, and education focused on water in mountain regions, at local, regional, national, and international scales.

ATTACHMENTS

Academic Proposal Request Form
Center/Institute Proposal Form
Intent to Plan

Montana Board of Regents
ACADEMIC PROPOSAL REQUEST FORM

ITEM 182-1003-R0719 Submission Month or Meeting: July 11-12, 2019

Institution: University of Montana-Missoula CIP Code: _____

Program/Center/Institute Title: Mountain Water Institute

Includes (please specify below): Online Offering _____ Options _____

Please mark the appropriate type of request and submit with an Item Template and any additional materials, including those listed in parentheses following the type of request. For more information pertaining to the types of requests listed below, how to complete an item request, or additional forms please visit <http://mus.edu/che/arsa/academicproposals.asp>.

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- 4. Offering an existing postsecondary educational program via distance or online delivery**

OCHE Approvals

- 5. Re-titling an existing postsecondary educational program**
- 6. Terminating an existing postsecondary educational program** (Program Termination and Moratorium Form)
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X **B. Level II:**

- _____ 1. **Establishing a new postsecondary educational program** (Curriculum Proposal and Completed Intent to Plan Form)
- _____ 2. **Permanent authorization for a temporary C.A.S. or A.A.S degree program** (Curriculum Proposal and Completed Intent to Plan Form)
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- _____ 5. **Re-titling an academic, administrative, or research unit**

Proposal Summary [360 words maximum]

What

The University of Montana is requesting to establish a Mountain Water Institute

Why

The security and stability of water resources in Montana are both influenced by and have important consequences for national and global processes. Our mountain setting provides an especially important context for a deeper understanding of water and its many ramifications for societal health. The University of Montana has broad expertise in research, education, and policy as related to water. This expertise, including associated research and curriculum, is spread across campus and the infrastructure and opportunity for productive collaboration within UM is hindered by this broad dispersal of faculty and students. Coordination among water scientists and other scholars across campus would result in synergies and more firmly establish UM as a leader in water-related research and training.

Resources

To provide initial support for MWI activities in its early existence the VP for Research and Creative Scholarship will support an existing UM faculty member as Director (one-course buy-out and one month summer salary), part-time administrative assistance (up to \$45,000 including fringe), and initial MWI activities as described above (\$10,000) for the first year. Thereafter the MWI will be funded by external support generated by the Director (e.g., foundation grants, philanthropic giving) and indirect cost returns, under the model proposed by the VP of Research and Creative Scholarship. The level of funding will therefore be contingent on success in generating research grants and other external support.

Relationship to similar MUS programs

The MWI will build on and complement existing strengths at UM and in the MUS.

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The Montana Water Center (MWC), housed at MSU but with a cross-institutional leadership team, aims to investigate and resolve water problems by fostering water-resource stewardship and sponsoring statewide water-related research. Wilcox, one of the leaders of the efforts to develop the MWI, is Associate Director of the MWC; he will work to ensure that the MWI complements, and does not duplicate or compete with, the MWC. The Montana Water Center is one of 54 federally funded water research institutes in the United States. These institutes were created by the Water Resources Act of 1964, and collectively form the National Institutes for Water Resources.

The Montana Bureau of Mines and Geology (MBMG) also has extensive expertise and experience in water-resource sciences and pursues a mandate of collecting and publishing information on water and other geological resources and of providing advisory, technical, and information services regarding water and other geological resources. The MWI will seek to learn from and build collaborations with the MBMG to advance water science and management in Montana.

The MWI will synergize with the Institute on Ecosystems, which attempts to integrate research and academic activity across both UM and MSU campus systems in all areas of environmental science. We anticipate coordinating and sharing costs for visiting speakers, workshops, and scientific meetings when IoE activities coincide with the mountain water emphasis of MWI.

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Research Centers and Institutes differ from one another in focus, scope, and staffing, but each contributes in unique ways to the common goals of expanding knowledge, generating new discoveries and/or having a positive impact on society through informing policy and systemic change. Communities of researchers and staff in Research Centers and Institutes provide a stimulating environment that encourages early researchers and challenges experienced researchers. Research Centers and Institutes also contribute to the education and training of the researchers of the future by serving as learning environments for students. Interdisciplinary collaboration is promoted by Research Centers and Institutes both within the Institution and among MUS Institutions. Research Centers and Institutes do not provide didactic coursework, confer academic degrees or academic certificates or require accreditation by external accrediting bodies. Research Centers and Institutes frequently provide a portal for obtaining external funding in response to federal and/or state research priorities. As such, apparent duplication of mission between MUS research centers and institutes is not generally problematic as with academic programs due to the different sources of funding.

1. State the proposed Institute/Center's name and purpose.

The University of Montana Mountain Water Institute.

The purpose of the University of Montana Mountain Water Institute is to catalyze research, creative activity, technological innovation, policy advances, and education focused on water in mountain regions, at local, regional, national, and international scales.

2. A comprehensive statement of the Institute/Center's mission and its relationship to the University mission.

A. State the Institute/Center's mission.

The mission of the University of Montana Mountain Water Institute is to catalyze the development of new knowledge about water in mountain regions and the application of that knowledge to policy, education, and innovation across scales and to diverse water-resource stakeholders.

B. Identify the Institute/Center's goals and objectives.

The University of Montana Mountain Water Institute (MWI) aims to be internationally recognized as a global resource in providing fundamental understanding and practical solutions to the water-driven challenges that society faces in mountain regions and to advance UM to a global leadership position in this realm. The stature of the MWI will attract the best students, researchers, and scholars at all levels and across diverse disciplines to meet those challenges. The MWI will also provide an excellent foundation for collaboration with other water researchers across Montana, the U.S. and internationally. The MWI will distinguish itself from other water institutes across the country in two ways: by emphasizing UM's unique strengths in issues pertaining to water in and originating from mountain regions and by taking a transdisciplinary approach that unites biological, chemical, and physical sciences, social sciences, the humanities, and other disciplines. We can realize this vision because of the University of Montana's natural strengths, in personnel, scholarly capability and legacy, and geography, in the many domains of mountain water.

The goal of MWI is to provide an organizational focus for existing and emerging programs that will advance UM's innovation agenda for water, including:

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RESEARCH CENTER AND INSTITUTE PROPOSAL FORM

- Advanced interdisciplinary and transdisciplinary research to transform our fundamental understanding of geological, chemical, biological, and social dimensions of water in mountain regions, while connecting those insights to policies, technologies, institutions, and other innovations that improve management, mitigation, and restoration of Montana's precious aquatic resources.
- Advanced training in water sciences and related disciplines, including policy, law, sociological, and business dimensions. Programs will also engage with the creative and expressive arts to add richness to emerging approaches to water, given how water has shaped and continues to shape Montana's history and culture, including perspectives of our region's indigenous people.
- Community and stakeholder engagement around mountain water and water-related themes, including internationally renowned speakers and public science events.

C. What specific need is being responded to in developing the proposed Institute/Center?

The security and stability of water resources in Montana are both influenced by and have important consequences for national and global processes. Our mountain setting provides an especially important context for a deeper understanding of water and its many ramifications for societal health. As the "Crown of the Continent," Montana contains headwaters of the Columbia and Missouri Rivers that supply water for irrigation, hydropower, and other uses. Restoration of rivers, lakes, and groundwater systems is globally a multi-billion dollar industry and in Montana reflects the legacies of land uses such as mining, agriculture, and species invasions and subsequent environmental and health impacts. Water issues are critical to native peoples in Montana, including water rights settlements, control over hydroelectric energy production facilities, and influences of energy development on reservation land on water resources. Water-based tourism is a key economic driver; agriculture is one of Montana's leading industries and largest water user; and water supply for and impacts from energy and food production are key issues about which our faculty can educate future leaders and contribute to solving regional and global problems. Furthermore, water lies at the core of what it means to be a Montanan, meanings captured in numerous domains of expression and most famously perhaps in Norman McLean's novella, *A River Runs Through It*.

The University of Montana has broad expertise in research, education, and policy as related to water. This expertise, including associated research and curriculum, is spread across campus and the infrastructure and opportunity for productive collaboration within UM is hindered by this broad dispersal of faculty and students. Coordination among water scientists and other scholars across campus would result in synergies and more firmly establish UM as a leader in water-related research and training. Faculty have recognized the need for and value of cross-campus collaboration, resulting in the development of a campus water initiative during the last 2 years and the emergence of a vision to develop the water institute proposed here. The support for interdisciplinary collaboration and proposal development will also better position UM to respond to research solicitations related to water, which is emerging as a key federal funding priority, including National Science Foundation funding programs related to the nexus of food-energy-water systems, water security and water-related hazards, convergent research, and coupled human-natural systems.

A water institute focused on mountain water is especially timely given ongoing climate change. For example, a recent paper (Huss et al. 2017 *Earth's Future*) envisions a future of "mountains without permanent snow and ice," and our own Glacier National Park exemplifies such changes. It is

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essential that UM researchers lead the world as mountain communities develop means to mitigate and adapt to such drastic changes in mountain water.

Addressing complex societal challenges related to water resources requires interdisciplinary research and innovative training approaches to equip faculty and students to move between academic and non-academic settings, to bridge science and practice, and to integrate across disciplines (Nerad 2010, *Canadian Journal of Higher Education*; Jacob 2015, *Interdisciplinary trends in higher education. Palgrave Communications*). Advanced training increasingly requires a combination of depth in one discipline, including core knowledge and cutting-edge tools; breadth across disciplines; and skills, such as multimedia communication and computational dexterity (Gould 2015, *Nature*). The UM Mountain Water Institute, by stimulating interdisciplinary research and the development of interdisciplinary training opportunities, will be an important way for the University of Montana to meet societal needs for improved water management as well as student and workforce demands.

D. Describe how the Institute/Center benefits the department, college, or institution.

The UM Mountain Water Institute will benefit participating departments and colleges, and UM in general, by catalyzing interdisciplinary research and creative activity, training, and outreach to advance the University of Montana to a global leadership position in water sciences and policy for mountain regions. The MWI will also provide an excellent foundation for collaboration with other water researchers across the state. By raising UM's profile as a leader in water science and policy, the MWI will help attract undergraduate and graduate students interested in environmental and earth sciences and sustainability.

E. Describe the Institute/Center's relationship to the University mission.

The proposed MWI fits with the proposed UM Strategic Plan (Strategic Vision 1.1) in several key respects. The MWI will foster and promote the principles outlined therein, including innovation and creativity, openness, impact, and partnership. Building a MWI especially fits with Strategic Opportunities 3 (Partner with place) and 5 (Foster knowledge creation and innovation). UM has natural geographic strengths in the study of mountain water upon which the MWI will capitalize. The MWI will also promote synergistic research and creative activity and thereby contribute to the goal of attaining Carnegie R1 status.

The growing strength of the University of Montana in water sciences and policy reflects the core role of water in Montana. The MWI will benefit participating departments and colleges, and UM in general, by catalyzing interdisciplinary research and creative activity, training, and outreach to advance UM to a global leadership position in water sciences and policy for mountain regions. The MWI will contribute to these departments and academic programs via the activities identified above, which will provide a means by which students and researchers can move beyond the confines of their particular disciplines to advance knowledge and curricula at the interface of geological, ecological, and societal dimensions of mountain water. No such forum currently exists.

The MWI will also contribute to the University mission by producing and promoting academic excellence, and by raising the quality of curriculum, instruction, and research in water sciences. The MWI will contribute to education of students and citizens that help solve local to global problems in the realm of water resources. By raising UM's profile as a leader in water science and policy, the MWI will help attract undergraduate and graduate students interested in environmental and earth

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sciences and sustainability, across the departments and programs listed above. The MWI's activities will benefit local communities, the state, nation, and world

3. Briefly describe the Institute/Center's anticipated activities.

UM's Mountain Water Institute (MWI) will be a center of excellence that will catalyze research and creative activity, education, and outreach across diverse disciplines to advance the University of Montana to a global leadership position in water sciences and policy for mountain regions. The MWI will engage in several activities to achieve its goals.

The MWI will serve as an interdisciplinary research institute that catalyzes research proposal efforts, including identifying relevant funding opportunities, bringing together researchers from across campus to target those opportunities, and providing grant development, peer review, and submission support. In the initial years of the MWI, this will be the institute's primary focus, in an effort to both build research infrastructure surrounding mountain water and to generate funds, via indirect cost returns, to support a more comprehensive set of activities. The MWI will especially seek to support and stimulate large, interdisciplinary proposals, via leadership in assembling teams and in writing and assembling proposals. UM currently has substantial expertise and qualification for such efforts, but individual faculty often lack capacity to pursue large, interdisciplinary proposals without the type of support MWI would provide. For example, the MWI could catalyze proposals in response to solicitations from NSF INCLUDES (Inclusion across the Nation of Communities and Learners of Underrepresented Discoverers in Engineering and Science), NSF INFEWS (Innovations at the Nexus of Food, Energy, and Water Systems), and NASA ROSES (Research Opportunities in Earth and Space Sciences). Other specific support for proposal development will include direct assistance with proposal writing and editing, arranging pre-submission external peer review, coordinating small groups of faculty to provide each other with peer review and writing support, and preparation of budgets and other proposal materials (e.g., letters of support, current and pending support forms).

As the MWI develops a reputation and funding base, activities will expand beyond the initial focus on catalyzing research proposal efforts. By accentuating UM's reputation as a premier water-sciences institution, the MWI will help UM attract the best students, undergraduate and graduate, to study in this important area and become next-generation leaders in the private sector, public policy, and research. Research grants generated through the MWI will generate research assistant stipends to aid recruitment of top graduate students at M.S. and Ph.D. levels. We also envision a diverse set of internships, scholarships, and fellowships to which outstanding students from within Montana and beyond could apply. For example, the MWI will strive to distribute research seed funds to graduate students and help place undergraduate interns in research labs. The MWI will also seek to assist faculty in generating research funds to support students by disbursing small grants to support faculty salary time for proposal development and collection of seed data.

The new institute will also plan to host advanced research and policy forums, assembling scientists from UM and beyond around specific questions concerning water science and its applications to advance water sustainability in regional, state, national, and international domains. An annual symposium with a renowned keynote speaker will drive discussion and spark collaborative innovation. These efforts will be modeled on the successful Montana Aquatic Research Colloquium, held in April 2017 and April 2019 at the Flathead Biological Station. The MWI will also organize periodic fora for practitioners and academics to network and exchange ideas. In addition, the MWI will coordinate among existing speaker series across campus to marshal resources for water-oriented speakers and to disseminate speaker

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announcements. The MWI will also seek to develop online access to water-related colloquia at UM, especially the keynote at the annual symposium, to broaden the reach of the research and policy forums.

The MWI will develop and maintain an active website that will be content-rich and frequently updated. The site will link to social media (Twitter, Facebook, Instagram), relevant blogs, water data sites, and various other information about water policy and science. The site will aim to be a “go-to” site for those seeking information about mountain water and will serve as the gateway and public face of the MWI.

A. Identify faculty expertise available for participation in the Institute/Center’s activities.

The University of Montana has broad and deep expertise in research, education and policy as related to water, and in particular mountain water, with faculty spread across social and biophysical sciences and professional schools. Relevant UM faculty and units / organizations that are available for participation in the MWI include:

- Faculty within the College of Humanities & Sciences offer important expertise in water sciences, including *Mike DeGrandpre* (autonomous aquatic sensors), *Winsor Lowe* (population and community ecology of amphibians & fish), *Erick Greene* (ecology of aquatic raptors), *Scott Miller* (aquatic microbial ecology), and *Maury Valett* (stream ecology and UM’s Director of the Institute on Ecosystems). Faculty in the Department of Geosciences bring expertise in physical sciences of the water cycle and water systems and connections to energy and food systems, including hydrologic modeling (*Marco Maneta*), hydrogeology (*Payton Gardner*), glaciology (*Joel Harper*), aquatic geochemistry (*Nancy Hinman*), and fluvial geomorphology (*Andrew Wilcox*). Geosciences also houses The Center for Riverine Sciences and Stream Renaturalization.
- Aquatic sciences are particularly strong in the W.A. Franke College of Forestry and Conservation. Key faculty include *Ashley Ballantyne* (bioclimatology), *Lisa Eby* (fish ecology), *Ben Colman* (aquatic ecosystem ecology), *Kelsey Jencso* (hydrology and director of the Montana Climate Office), and *Andrew Whiteley* (conservation genomics).
- UM’s renowned Flathead Lake Biological Station (FLBS) is in an active period of renewal under its new director, Bierman Professor of Ecology *James Elser*, an award-winning limnologist, National Academy of Sciences member, and recent president of the Association for the Sciences of Limnology and Oceanography. FLBS’ other tenure-track faculty include *Gordon Luikart* (conservation genomics), *Matthew Church* (aquatic microbial ecology), and *Robert Hall* (stream ecology; Distinguished Professor of Limnology). New FLBS research faculty include *Shawn Devlin* (limnology, modeling), *Brian Hand* (informatics and statistics), and *Cody Youngbull* (sensor innovation and engineering).
- Faculty across campus examine human dimensions and social science issues related to water resources, including water economics (*Katrina Mullan*, Economics), resilience and adaptation to drought (*Laurie Yung*, W.A. Franke CFC), water-related recreation and social dimensions of river restoration (*Elizabeth Metcalf*, W.A. Franke CFC), water governance and tribal water issues (*Brian Chaffin*, W.A. Franke CFC), water resource geography and hazards (*Sarah Halvorson*, Geography), water policy (*David Shively*, Geography), and water law (*Michelle Bryan*, A. Blewett III School of Law).
- Many other faculty across campus have expressed interest in participating in the MWI’s activities and have contributed to planning. Examples include *Justin Angle* (marketing; Business School), *Andrij Holian* (director of the Center for Environmental Health Sciences), *Beth Covitt* (head of science education research and evaluation, spectrUM Discovery Area),

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Steve Shen (director of the Electronics Technology program), and *Barry Brown* (science librarian, Mansfield Library). Many faculty beyond those identified here are anticipated to participate in the MWI's activities.

B. Which departments on campus will be involved and how will the Institute/Center contribute to the academic programs of the institution?

The departments and academic programs at UM that will potentially be involved in the MWI are:

- College of Humanities & Science: including but not limited to Division of Biological Sciences, Geosciences, Geography, Chemistry, Economics, Native American Studies, Environmental Studies, Computer Sciences
- W.A. Franke College of Forestry and Conservation: Department of Ecosystem & Conservation Sciences, Society & Conservation, Forest Management, Systems Ecology, Wildlife Biology (also part of CHS)
- Flathead Lake Biological Station
- A. Blewett III School of Law
- College of Health Professions and Biomedical Science: Center for Environmental Health Sciences
- School of Journalism
- School of Business Administration
- Missoula College: Electronics Technology, Energy Technology.

The contributions of the MWI to the academic programs of UM are described in Question 2 above.

4. Identify the organizational structure of the Institute/Center within the institution.

The MWI, as a cross-campus effort, will not be housed in any specific department or college and will be administered by and report to the Office of the Vice President for Research and Creative Scholarship. The MWI will be led by a Director, initially appointed from the UM faculty by the VP of Research and Creative Scholarship to a 3-year term. The MWI Director will be responsible for day-to-day operation, fundraising, and the development and promotion of the MWI and its goals. In the 3rd year of a Director's term, participating faculty will select a new Director to serve a subsequent 3-year term. A part-time Assistant Director will be hired to assist the Director with all MWI operations, including budgeting, maintaining the website, and other administrative and program work. The MWI will also be guided by a 5-member faculty Steering Committee that serves 2-year terms. The Steering Committee will assist the Director with MWI activities, assessment, and budgeting, including decision-making about allocation of student grants and other expenditures.

A. Identify all agencies, organizations and/or institutions that will be involved.

The MWI will primarily involve UM faculty but will also seek to interact with water-resource agencies and research groups (e.g., , Montana Bureau of Mines and Geology, Montana Department of Natural Resources, Montana Fish, Wildlife and Parks, United States Geological Survey, Missoula Water), other educational institutions in Montana (e.g., Montana State University, Montana Tech), the Montana Water Center, and for-profit (private consulting) and non-profit organizations with interests in water resources in Montana and regionally.

B. Identify advisory council information.

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An External Advisory Committee (EAC) composed of nationally and internationally recognized scientists and researchers will be formed. EAC members will be selected based on their ability to advise us from both academic and non-academic perspectives and will include experts in both water sciences and in leading analogous institutes. In consultation with the Vice President of Research and Creative Scholarship, the Director and Steering Committee, the EAC will assist in focusing MWI activities on key regional, national and international water issues. The EAC will help guide both MWI design and assessment through annual videoconference meetings with the Director and Steering Committee, as well as periodic site visits. During the MWI's first year, the EAC will work closely with MWI faculty and leadership to ensure that the Institute's activities are designed to realize its goals and objectives. The EAC will provide formal written assessment of the MWI every three years.

5. Identify first year and continuing finances necessary to support the Center/Institute, including the sources of funding.

To provide initial support for MWI activities in its early existence the VP for Research and Creative Scholarship will supporting an existing UM faculty member as Director (one-course buy-out and one month summer salary), part-time administrative assistance (up to \$45,000 including fringe), and initial MWI activities as described above (\$10,000) for the first year. Thereafter the MWI will be funded by external support generated by the Director (e.g., foundation grants, philanthropic giving) and indirect cost returns, under the model proposed by the VP of Research and Creative Scholarship whereby new centers and institutes receive 32% of the indirect cost returns generated by external funding. The level of funding will therefore be contingent on success in generating research grants and other external support as well as how well the vision of MWI is articulated and communicated to UM's benefactors.

A. Will additional faculty and other resources be required to implement this Center/Institute? If yes, please describe the need and indicate the plan for meeting this need.

No additional faculty or resources will be required to create the MWI. Existing faculty at UM have considerable strength in water sciences, as described elsewhere here, sufficient to assemble a strong Institute. The MWI will leverage existing water-related efforts at UM. These include the \$3 million, 5-year National Research Traineeship program, UM BRIDGES: Graduate Training at the Nexus of Food-Energy-Water Systems. A new, water-focused EPSCoR Track I (submitted August 2017) could also, if funded, develop strong synergies with the MWI. The inaugural director will be selected from existing UM faculty.

B. Are other, additional resources required to ensure the success of the proposed Center/Institute? If yes, please describe the need and indicate the plan for meeting this need.

No additional resources are required.

6. Describe other similar Centers/Institutes or research capacities in the state and surrounding region.

A. Describe the relationship between the proposed Center/Institute and any similar Centers/Institutes, programs, or research capacities within the Montana University System.

The UM Mountain Water Institute will build on and complement existing strengths within the MUS. At UM:

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- The Flathead Lake Biological Station has been a flagship of UM's research and education efforts for more than a century. Under leadership of its new director James Elser (currently Past-President of the Association for the Sciences of Limnology and Oceanography), FLBS has hired two new world-class faculty members in aquatic microbial ecology and in stream ecology, is growing its research and innovation efforts in sensor development and deployment, and is expanding its community engagement in the Flathead Lake basin via K-12 outreach and citizen science. FLBS scientists would be integral participants in the MWI.
- The Center for Riverine Science and Stream Renaturalization (River Center, directed by Andrew Wilcox) supports interdisciplinary research that bridges science and practice. The MWI will allow UM to build on its strong foundation in restoration science, in concert with ongoing efforts by the River Center. The MWI would strengthen connections between the River Center and other initiatives, both across campus and beyond, including by aiding the River Center to expand beyond its current focus on biophysical elements of river sciences and to establish a stronger cross-campus presence.
- The Montana Climate Office, based at UM and directed by Kelsey Jencso, links science-based climate information to a diversity of stakeholders, from ranchers to scientists to policy makers, and connects climate science with water and agriculture. The MWI would complement the Climate Office and strengthen connections between the Climate Office and other initiatives, both across campus and beyond.
- The Montana Conservation Genomics Lab, directed by Andrew Whiteley, has a 30-year history of working closely with Montana Fish, Wildlife, and Parks to inform fisheries management decisions with genetics/genomics data.
- The MWI will work closely with a NSF-funded graduate training program at UM (\$3 million National Research Traineeship) on the Water-Energy-Food nexus, to position UM for leadership in this realm, which is an area of pressing global and regional concern and a priority funding area for the NSF.
- UM's Center for Integrated Research on the Environment (CIRE) is funded by the Department of Defense for projects including those related to water sciences.
- The Maureen and Mike Mansfield Center works in the realm of water policy, as part of its broader aims of enhancing mutual understanding between the US and Asia and fostering ethical public policy and leadership. For example, the Mansfield Center hosted a Water Summit in May 2018 to understand global water issues in relation to agriculture, energy, and health.

The MWI also complements other efforts in the MUS:

- The Montana Water Center (MWC), housed at MSU but with a cross-institutional leadership team, aims to investigate and resolve water problems by fostering water-resource stewardship and sponsoring statewide water-related research. Wilcox, one of the leaders of the efforts to develop the MWI, is Associate Director of the MWC; he will work to ensure that the MWI complements, and does not duplicate or compete with, the MWC. The Montana Water Center is one of 54 federally funded water research institutes in the United States. These institutes were created by the Water Resources Act of 1964, and collectively form the National Institutes for Water Resources.
- The Montana Bureau of Mines and Geology (MBMG) also has extensive expertise and experience in water-resource sciences and pursues a mandate of collecting and publishing information on water and other geological resources and of providing advisory, technical,

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and information services regarding water and other geological resources. The MWI will seek to learn from and build collaborations with the MBMG to advance water science and management in Montana.

- An NSF EPSCoR Research Infrastructure Improvement-Track I proposal was funded for 2018 – 2023 to create the Consortium for Research on Environmental Water Systems (CREWS). The CREWS award proposes establishment of the Montana Water Consortium, a state-wide network promoting partnerships between the research team, government, NGO and private sectors. This Consortium could provide a potential mechanism to coordinate water research efforts across the state, including the Mountain Water Institute at UM, the Montana Water Center at MSU and the MBMG at MTU.
- The MWI will synergize with the Institute on Ecosystems, which attempts to integrate research and academic activity across both UM and MSU campus systems in all areas of environmental science. We anticipate coordinating and sharing costs for visiting speakers, workshops, and scientific meetings when IoE activities coincide with the mountain water emphasis of MWI.

B. In cases of substantial duplication, explain the rationale for the proposed Center/Institute.

The MWI is not expected to substantially duplicate existing efforts within the MUS as no other institute is centered on interdisciplinary work focused on mountain water.

7. Assessment: How will the success of the center/institute be measured?

Assessment will be guided by the Steering Committee, Assistant Director, and External Advisory Committee (EAC). One of the MWI participants, Beth Covitt, has extensive experience in program assessment and will help advise the MWI in assessment efforts. The MWI will solicit regular feedback from faculty, administrators, students, and partners to guide both large and small adjustments to increase the Institute's effectiveness and its achievement of outcomes. This will include informal feedback and, as a key component of assessment, formal surveys of MWI participants and other faculty regarding the MWI's effectiveness, financial priorities, and governance. Results will be examined by the EAC and MWI leadership, including the Steering Committee. To ensure the MWI is adaptive, assessments will measure responses to feedback and track change over time. This model will increase accountability and allow for real-time improvements based on rigorous assessment tools. Assessment results will be summarized and communicated with MWI participants. Quantitative assessment will annually measure research proposals generated (number, amount, sources), grant funds acquired, the number of faculty affiliates and participants (including demographics and department), journal publications by affiliates / participants, and research support distributed (e.g., student research grants). The MWI will also learn from other institutes as part of the ongoing evaluation process and adapt accordingly.

8. State the internal campus review and approval process which has occurred prior to submission to the Commissioner's Office. Indicate, where appropriate, involvement by faculty, students, community members, professional constituencies, etc.

During the last 2 years, faculty from across the UM campus met as part of a campus water initiative. A subcommittee comprising faculty from schools and colleges across UM met to envision the MWI and to develop this proposal. Prior to submission to the Commissioner's Office, the proposal has gone

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through UM's internal review process, including review by the UM Faculty Senate, chairs and deans of affected units, the Provost, and the President of the University of Montana.



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Program/Center/Institute Title: Montana Mountain Water Institute

Campus, School/Department: University of Montana-Missoula Expected Submission Date: Fall 2017

Contact Name/Info: Andrew Wilcox (Geosciences; andrew.wilcox@umontana.edu), James Elser (Flathead Lake Biological Station; jim.elser@flbs.umt.edu)

To increase communication, collaboration, and problem solving opportunities throughout the MUS in the program/center/institute development process, please complete this form not more than 18 months in advance of the anticipated date of submission of the proposed program/center/institute to the Board of Regents for approval. The completed form should not be more than 2-3 pages. For more information regarding the Intent to Plan process, please visit <http://mus.edu/che/arsa/preparingacademicproposals.asp>.

1) Provide a description of the program/center/institute.

The Montana Mountain Water Institute (MWI) will be a center of excellence that will catalyze research, education, and outreach across disciplines to advance the University of Montana to a global leadership position in water sciences and policy for mountain regions. The MWI will also provide an excellent foundation for collaboration with other water researchers across the state. The MWI will distinguish itself from other water institutes across the country by emphasizing UM's strengths in issues pertaining to water in and originating from mountain regions. The University of Montana has natural strengths, in terms of personnel, research legacy, and geography, in the study of mountain water.

The security and stability of water resources in Montana are both influenced by and have important consequences for national and global processes. As the "Crown of the Continent," Montana contains the headwaters of the Columbia and Missouri Rivers that supply water for irrigation, hydropower, and other uses. Restoration of rivers, lakes, and groundwater systems is globally a multi-billion dollar industry and in Montana reflects the legacies of land uses such as mining, agriculture, and species invasions and subsequent environmental and health impacts. Water issues are critical to native peoples in Montana, including water rights settlements, control over hydroelectric energy production facilities, and influences of energy development on reservation land on water resources. Water-based tourism is a key economic driver; agriculture is Montana's leading industry and largest water user; and water supply for and impacts from energy and food production are key issues about which our faculty can educate future leaders and contribute to solving regional and global problems.

The MMWI would provide an organizational focus for a number of programs that will advance UM's research and educational programs, including:

- Advanced interdisciplinary research to transform our fundamental understanding of geological, chemical, and biological dimensions of water in mountain regions while connecting those discoveries to policies, technologies, and other innovations that improve management, mitigation, and restoration of Montana's aquatic systems;
- Comprehensive graduate and undergraduate training in water sciences and related disciplines, including policy, law, sociological, and business dimensions. Programs will also engage with the creative and expressive arts to add richness to emerging approaches to water given how it has shaped and continues to shape

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Montana's history and culture, including perspectives of our region's indigenous people.

- Extensive community engagement around water and water-related themes, including internationally renowned speakers, public science events, effective K-12 engagement, and citizen science initiatives.

2) Describe the need for the program/center/institute. Specifically, how the program/center/institute meets current student and workforce demands. (Please cite sources).

The University of Montana has broad expertise in research, education and policy as related to water. This expertise, including associated research and curriculum, is spread across campus, and coordination among water scientists across campus would result in synergies and more firmly establish UM as a leader in water-related research and education. During the last year, faculty from across campus met as part of a campus water initiative, including envisioning a Water Institute and interdisciplinary academic curricula in water sciences and policy.

Addressing complex societal challenges related to water resources and preparing students for the 21st century workforce requires interdisciplinary research and innovative educational approaches to equip students to move between academic and non-academic settings, to bridge science and practice, and to integrate across disciplines (Nerad 2010, *Canadian Journal of Higher Education*; Jacob 2015, *Interdisciplinary trends in higher education. Palgrave Communications*). Student training increasingly requires a combination of depth in one discipline, including core knowledge and cutting-edge tools; breadth across disciplines; and skills, such as multimedia communication and computational dexterity (Gould 2015, *Nature*). The Montana Mountain Water Institute, by stimulating interdisciplinary research and the development of interdisciplinary educational opportunities for students, will be an important way for the University of Montana to meet societal needs and student and workforce demands. A water institute focused on mountain water is especially timely given ongoing climate change; for example, a recent paper (Huss et al. 2017 *Earth's Future*) envisions a future of "mountains without permanent snow and ice." It is essential that UM researchers lead the world as mountain communities develop means to mitigate and adapt to such drastic changes in mountain water.

3) Describe how the program/center/institute fits with the institutional mission, strategic plan, and existing institutional program array.

The University of Montana is exceptionally well positioned to develop an effective and innovative water institute. Our faculty brings diverse and relevant disciplinary expertise to the study of mountain water, as well as a strong foundation of grant-supported research and publications. UM faculty has extensive expertise on water—from the ecological, biophysical, and social sciences, to law and policy—and researchers from across campus, and the Flathead Lake Biological Station, would be brought together within the MWI. The growing strength of the University of Montana in water sciences and policy reflects the core role of water in Montana.

The proposed MWI fits with the proposed UM Strategic Plan (Strategic Vision 1.0) in several key respects. The MWI will foster and promote the principles outlined therein, including innovation and creativity, openness, impact, and partnership. Building a MWI especially fits with Strategic Opportunities 2 (partner with place) and 5 (foster knowledge creation and innovation). As noted above, UM has natural geographic strengths in the study of mountain water upon which the MWI will capitalize. The MWI will also promote synergistic research and creative activity and thereby contribute to the goal of attaining Carnegie R1 status.

4) Describe how the program/center/institute overlaps, compliments, or duplicates existing efforts in the MUS.

The Water Institute, in addition to broadly promoting water sciences and policy across UM, will build on UM's existing strengths.


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- The MWI will work closely with a new, NSF-funded graduate training program at UM (\$3 million National Research Traineeship) on the Water-Energy-Food nexus, to position UM for leadership in this realm, which is an area of pressing global and regional concern.
- The Center for Riverine Science and Stream Re naturalization (River Center, directed by Wilcox) supports interdisciplinary research that bridges science and practice. The MWI will allow UM to build on our strong foundation in restoration science, in concert with ongoing efforts by the River Center, and would strengthen connections between the River Center and other initiatives, both across campus and beyond.
- The Montana Climate Office (directed K. Jencso) links science-based climate information to a diversity of stakeholders, from ranchers to scientists to policymakers, and connects climate science with water and agriculture. The MWI would complement the Climate Office and strengthen connections between the Climate Office and other initiatives, both across campus and beyond.
- A new National Science Foundation EPSCoR Research Infrastructure Improvement-Track I proposal is being submitted this year based on a theme of water resources. We envision complementary efforts among EPSCoR, if funded, and the MWI.
- The Flathead Lake Biological Station has been a flagship of UM’s research and education efforts for more than a century. Under leadership of its new director James Elser (currently Past-President of the Association for the Sciences of Limnology and Oceanography), FLBS has hired two new world-class faculty members in aquatic microbial ecology and in stream ecology, is growing its research and innovation efforts in sensor development and deployment, and is expanding its community engagement in the Flathead Lake basin via K-12 outreach and citizen science.

The MWI also complements other efforts in the MUS. The Montana Water Center (MWC), housed at MSU but with a cross-institutional leadership team, aims to investigate and resolve water problems by fostering water-resource stewardship and sponsoring statewide water-related research. The Montana Water Center is one of 54 federally funded water research institutes in the United States. These institutes were created by the Water Resources Act of 1964, and collectively form the National Institutes for Water Resources. Wilcox, one of the leaders of the efforts to develop the MWI, is Associate Director of the MWC; he will work to ensure that the MWI complements, and does not duplicate or compete with, the MWC.


The Montana Bureau of Mines and Geology (MBMG) also has extensive expertise and experience in water-resource sciences and pursues the collection and publishing of information on water and other geological resources. MBMG provides advisory, technical, and information services in these areas. The MWI will seek to learn from and build collaborations with the MBMG to advance water science and management in Montana.

Signature/Date

College/School Dean:  14 June, 2017

Chief Academic Officer: _____

Chief Executive Officer: _____

Flagship Provost*: 

Flagship President*: 

*Not applicable to the Community Colleges.

Date of Final Review: September 13, 2017

When submitting the proposal to the BOR, include this signed form with the Level II request.