1. Program Overview
The proposal is to authorize the creation of a new Doctor of Philosophy Degree in Individual Interdisciplinary Program (IIP). The goal of the IIP program is to better prepare students to address challenges that are problem-oriented rather than discipline or technique-oriented. It is not intended to be a replacement for students’ who can receive the doctoral degree in well-established programs.

All basic rules and requirements (including residence, continuous registration, grade point average, approved committee appointments, time in program, dissertation, oral defense and so forth) pertaining to the Doctor of Philosophy degree apply to the IIP.

The IIP will be administered by and managed through The Graduate School. Additionally, an IIP Advisory Committee will be established, consisting of four to six faculty members from doctoral programs appointed by the Dean of the Graduate School in consultation with the University Graduate Council. This committee will review and advise the Dean on all applications to the IIP and will conduct an annual review of the progress of students in the program.

The IIP will advance the 2012 Strategic plan of Montana State University:
Discovery: elevate the research excellence by creating the IIP, which will result in improved ranking of the graduate programs and bring national and international recognition of MONTANA STATE UNIVERSITY faculty.
Learning: student and faculty-centered programs that couple interdisciplinary research interaction with educational practice to better prepare the student to be problem-oriented rather than discipline or technique oriented.
Engagement: prepare students to better address new and innovative areas of research. Provide faculty opportunities to work with colleagues from different backgrounds and other disciplines and close mentoring of exceptional doctoral students.
Integration: doctoral students will take their interdisciplinary science training into the teaching practice of undergraduate students and collaborative research with other graduate students.
Access: As a Land Grant and Carnegie Very High Research Activity University, increasing access to cross-disciplinary graduate education training is paramount. The University of Montana already provides for an interdisciplinary doctoral degree since spring 2000, and there is no reason that Montana State University cannot do the same given that these two universities have different research emphases.

2. Provide a one-paragraph description of the proposed program. Be specific about what degree, major, minor or option is sought.
Degree: Ph.D. in Individual Interdisciplinary Program
The proposal is to authorize the creation of a new Doctor of Philosophy Degree in Individual Interdisciplinary Program (IIP). All prospective applicants must first consult with the Dean of The Graduate School before beginning the application process. A master’s degree or equivalent degree program of study that includes at least 20 credit hours of graded graduate work, a minimum cumulative graduate grade point average of 3.5, and a written description of the program concept and goals are requirements for full admission. The proposed IIP must have the approval and support of at least two or more heads of the relevant academic units that offer the Ph.D. degree. The curriculum is individualized and developed by the student’s committee within one year of submitting an application to the program. The student’s committee, department heads of the academic units involved, the IIP advisory committee, and the Dean of The Graduate School must approve the curriculum. The success of the program relies heavily upon the individual initiative and self-discipline of each student and the commitment of the student's doctoral committee. Applications are considered only once a year.

3. Need
A. To what specific need is the institution responding in developing the proposed program?

Many doctoral and research universities in the United States and Canada have established interdisciplinary doctoral programs in recognition of "the need for a cadre of broadly prepared Ph.Ds with multi-disciplinary backgrounds and the technical, professional, and personal skills essential to addressing the varied career demands of the future" (National Science Foundation (NSF). Further, at least for a decade the NSF has been actively encouraging cross-disciplinary research programs.

In the most recent NSF Research Traineeship (NRT, NSF-16503) description, the call for proposals state:

“... there is increasing recognition that addressing the grand challenges in science and engineering requires interdisciplinary and broader professional training that is atypical for most graduate programs.”

And that the goals of the traineeship track of the NRT are to:

“• Catalyze and advance cutting-edge interdisciplinary research in high priority areas,
• Increase the capacity of U.S. graduate programs to produce interdisciplinary STEM professionals with technical and transferable professional skills for a range of research and research-related careers within and outside academia, and
• Develop innovative approaches and knowledge that will promote transformative improvements in graduate education.”

Faculty members also are interested in participating in interdisciplinary doctoral programs. Such programs provide opportunities to work with colleagues in other disciplines, to mentor exception doctoral students, and also to develop new and innovative research at the boundaries between the disciplines.

A similar program has existed at the University of Montana since 2000 to meet the growing need for innovative, cross-disciplinary research and educational opportunities. Their data
show that since the IIP establishment they have graduated on average 2 students per year. There is a companion Masters of Science in Interdisciplinary Studies program at the University of Montana and Montana Tech. Also recently, the Board of Regents has been supportive of interdisciplinary doctoral programs as evidence by the multi-university materials science program approved in 2014.

B. How will the proposed program serve students and any other affected constituencies?

The world of the future will require scholars with a global approach to problem solving. The IIP is intended to prepare them for these global challenges and also to facilitate the student’s career advancement.

C. What is the anticipated demand of the program? How was this determined?

The Graduate School receives about five to ten inquires a year requesting information about interdisciplinary degrees at both the master’s and doctoral level. The University of Montana’s graduate application statistics 2001-2015 report an average enrollment of 4 students/year with an average graduation rate of 2 students/year from 2002-2016. Other near-by universities with a similar doctoral program include the University of Arizona, the University of Washington, Washington State University, the University of Oregon, Oregon State University, the University of Idaho, Boise State University, the University of California, Davis, the University of California, Berkeley, the University of Colorado, Stanford University, the University of Texas-Austin, and New Mexico State University.

4. Institutional and System Fit

A. What is the connection between the proposed program and existing programs at the institution?

There are no other existing programs at Montana State University that will be either directly connected to, similar to, or in competition with this program. Thus, the IIP doctoral program is neither a mechanism for offering the Ph.D. degree within academic units that do not have their own approved Ph.D. programs nor as an alternative for students unable to gain admission to an established program. The proposed Ph.D. program is intended to strengthen our rankings of graduate programs in both traditional and interdisciplinary research and bring national and international recognition to Montana State University faculty.

B. Will approval of the proposed program require changes to any existing programs at the institution? If so, please describe.

The University’s primary commitment is to its established disciplinary programs. No existing program changes are proposed.

C. Describe what differentiates this program from other, closely related programs at the institutions (if appropriate).
The major differences between the IIP to any other Montana State University doctoral program are 1) the admissions process for the proposed research program and 2) the admissions and program requirements.

C.1. Admissions Process
All prospective applicants with demonstrated ability, intellectual maturity, and research skills may apply for admissions to the IIP.

1. All prospective applicants must first consult with the Dean of The Graduate School before starting the application process.
2. The prospective applicant must find a research advisor who agrees to chair the applicant's doctoral graduate committee (referred to as the committee). In consultation with the research advisor, the applicant will assemble a committee consisting of at least four (4) faculty members, in addition to the committee chair, who are willing to supervise the interdisciplinary degree research. Optionally, at least one member of the committee (excluding the chair) can be a faculty member of a doctoral program at another accredited institution. All committee members must hold a doctorate degree and be approved by the Dean of The Graduate School. The committee chair may petition for exceptions to this policy. The Dean of The Graduate School or the Dean's designee from a doctoral program at Montana State University will serve as an ex-officio, non-voting member of the committee.
3. The committee will make recommendations to the IIP advisory committee for admission to the IIP.
4. The IIP advisory committee will review the application and make a recommendation about admission of the prospective applicant to the Dean of The Graduate School.

C.2. Admissions Requirements

1. A Master’s degree or equivalent degree program of study that includes at least 20 credit hours of graded graduate course work
2. Outstanding academic achievement in graduate studies as evidenced by a minimum cumulative graduate GPA of 3.50 for full admissions
3. A written description of the program concept and goals consisting of:
   a. At least two areas of study, background competencies the applicant brings to the doctoral level studies, and identification of the additional preparation to have an approved program in the two or more areas of study.
   b. Proposed curriculum and how it relates to the program goals.
   c. Objectives and an outline for dissertation research.
   d. Justification for not using an existing department’s degree program.
4. Approval and support of at least two or more heads of the relevant academic units

D. How does the proposed program serve to advance the strategic goals of the institution?

Montana State University enrollment in the last two years averaged over 15,000 students of which 13.3% are graduate students. This is a low percentage when compared to other land-grant universities who have achieved the Carnegie Foundation Very High Research Activity (VH/RA) designation. To achieve the Carnegie VH/RA designation, a university must have
awarded more than 20 Ph.D.s per year. In the last two years, Montana State University has awarded over 60 Ph.D.s per year with a strategic target of 80 Ph.D.s awarded per year by 2019.

Table 1 lists how the proposed IIP doctoral degree meets the Montana State University 2012 strategic learning, discovery, and integration goals.

<table>
<thead>
<tr>
<th>GOAL</th>
<th>Objective</th>
<th>Metric by 2019</th>
<th>Strategy</th>
<th>Unit Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEARNING: Prepare students equipped for careers to address global challenges</td>
<td>L.3: Increase job placement and further education rates</td>
<td>L.3.2: the percent of graduates pursuing an advanced degree will increase from an average of 21% to 25%</td>
<td>Align graduate programs with careers, national interest and institutional priorities</td>
<td>Develop and enhance graduate programs</td>
</tr>
<tr>
<td>DISCOVERY: Raise the national and international prominence of MSU in research, creativity, innovation, and scholarly achievement</td>
<td>D.3: Expand the scale, breadth, and quality of doctoral education</td>
<td>Create inter-disciplinary graduate programs, especially at the Ph.D. level</td>
<td>Create new inter-disciplinary programs, especially at the Ph.D. level</td>
<td></td>
</tr>
<tr>
<td>INTEGRATION: By working across disciplines MSU community will improve the world</td>
<td>I.2: Increase work across disciplines</td>
<td>I.2.1: the number of students completing interdisciplinary programs will increase</td>
<td>Create new interdisciplinary programs that leverage other strategic priorities</td>
<td>Increase the number of graduate students conducting applicable research</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I.2.2: MSU will increase interdisciplinary research and creative projects on campus</td>
<td></td>
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</tbody>
</table>


E. Describe the relationship between the proposed program and any similar programs within the Montana University System. In cases of substantial duplication, explain the need for the proposed program at an additional institution. Describe any efforts that were made to collaborate with these similar programs; and if no efforts were made, explain why. If articulation or transfer agreements have been developed for the substantially duplicated programs, please include the agreement(s) as part of the documentation.

An IIP program similar to this proposed program exists at the University of Montana. The Board of Regents approved the IIP for U. Montana in September of 1999 (ITEM 104-1006-R0999) with a start date for the IIP program in Spring 2000. In the comments found in that item, it states,

“The IIP model does not lend itself to proprietary exclusivity. If Montana State University is interested, it would seem totally appropriate to extend this option to both institutions in the system.”

There is substantial room for differentiation rather than duplication since both the University of Montana and Montana State University have different discipline emphases. For example, Montana State University has strengths in five different engineering disciplines including computer science; Ph.D. degrees in Physics, Psychology, Education, and History; a DNP (doctor of nursing practice) degree that emphasizes clinical leadership; a research-based MPA degree; and so forth that a student has a large selection to create an interdisciplinary degree plan with two or more departments in more than one college.

5. Program Details

A. Provide a detailed description of the proposed curriculum. Where possible, present the information in the form intended to appear in the catalog or other publications. NOTE: In the case of two-year degree programs and certificates of applied science, the curriculum should include enough detail to determine if the characteristics set out in Regents’ Policy 301.12 have been met.

The IIP will encourage integration and collaboration among the different colleges but only in the context that a single discipline cannot achieve what the student’s program of study proposes. The student’s individual program of study will be developed in partnership with the student’s graduate committee. The initial screening of the application will involve the IIP Advisory Committee. Once admitted, the student’s graduate committee will evaluate the student’s satisfactory progress toward the degree following the policies, procedures, and timeline to the Ph.D. degree as set by The Graduate School.

A.1. Program Requirements

All basic rules and requirements pertaining to the Doctor of Philosophy degree apply to the IIP, including:
1. A minimum of 15 credits of course work beyond the master's degree and a minimum of
28 dissertation credits. **No more than 20 credits of graded course work can be applied to the student's program of study**, and of these only 9 credits can be 4xxx level courses.
2. A comprehensive examination, the nature of which will be determined by the student's committee, taken after course work has been taken and before admission to candidacy.
3. A prospectus prepared and presented by the student and approved by the student's committee that clarifies the expectations under which the dissertation will be conducted and evaluated. A satisfactory prospectus admits the student to candidacy.
5. A dissertation defense, the format following standard practice.
6. All requirements completed within five (5) years of the start of graduate studies at Montana State University in the IIP program.
7. Continuous registration.
8. A cumulative grade point average of 3.0 or greater.

(Minimum cumulative credits to the Ph.D. degree = 63 cr.)

**B. Describe the planned implementation of the proposed program, including estimates of numbers of students at each stage.**

Once the proposal is approved, The Graduate School anticipates announcing the availability of the program as part of its recruitment package at all opportunities – including at the Council of Graduate Schools annual meeting and the Western Association of Graduate Schools annual meeting; professional conferences likely to be attended by top undergraduate and Master’s of Science students – Society of Women Engineers conference, American Indian Science & Engineering Society conference, American Chemical Society regional and national conference, SACNAS, McNair; internal media organized and prepared by The GRADUATE SCHOOL (webpage, Coffee Talks, pamphlets, annual report); and distribution by personal communication to faculty at other institutions. The GRADUATE SCHOOL anticipates advertising the availability of the IIP program during spring of 2017 and accepting the first cohort of students to start fall of 2017. It is expected that the initial set of cohorts to be no more than three students.

6. Resources

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

The IIP is no different from other doctoral programs. Competitive research stipends and tuition remission make the program attractive. The Graduate School is prepared to promote this degree program by offering 12 credits of tuition waiver in the first year of study and a Meritorious Fellowship ($5K/AY) on top of the research stipend to each applicant that is fully admitted based on the admissions process and requirements outlined above.

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

No
7. Assessment

How will the success of the program be measured?

Variables from the National Academy of Sciences ratings of research doctoral programs will be the primary outcomes for the IIP: research activity, student support and outcomes, and diversity of educational environment.

In addition, the following data will be collected:

- Percentage of students who complete the program within 5 years of first enrollment
- Per capita rate of student-authored and co-authored research presentations at national, international and regional conferences
- Per capita rate of student-authored and co-authored publications in refereed journals
- Percentage of graduates receiving full-time employment related to their specific expertise after graduation
- Percentage of students receiving outside fellowships (NSF, NIH pre-doctoral, or other)
- Faculty productivity in grant funding, publications, conference presentations, editorships and service on review panels