



IoE Mentoring Program for Interdisciplinary Initiatives (PI2)

The need to accelerate the adoption of interdisciplinary approaches has become even more compelling in an era of increasingly complex problems, vast data sets, and powerful research tools. Moreover, the complexity of the science demands the integration of vocabulary, concepts and methods from different disciplines, and many of the most interesting and important research problems require collaborative efforts.

One of the grand challenges in environmental sciences is to understand the vulnerability of human and natural systems to environmental change. Montana is positioned to make great strides in this area of scholarship given its growing institutional capacity to examine the social and ecological dynamics of some of the most pristine landscapes in North America. In response to this challenge, the Montana Board of Regents approved the creation of a statewide Montana Institute on Ecosystems (IoE) in 2011. The IoE has the dual mission of supporting and fostering inter-institutional research and education in the ecosystem sciences, while at the same time communicating new discoveries in ways that make a difference to the people of Montana. Through Montana EPSCoR, the IoE has supported new faculty hires and postdoctoral research associates across the Montana University System to enhance statewide capacity in critical areas of ecosystem sciences. These individuals are expected to contribute to interdisciplinary collaborative research, as well as participate in related educational and outreach activities.

The IoE Mentoring Program for Interdisciplinary Initiatives (PI2) is designed to support the professional development of faculty and students working together on initiatives related to Montana's environmental and ecosystem sciences. **The initial goals of the Program are to help early-career faculty and postdoctoral research associates succeed in interdisciplinary research, work effectively in collaborative inter-institutional teams, improve their science communication skills, and achieve career success in their disciplinary area.** We believe these skills will translate to improved interdisciplinary education. The IoE PI2 Program is designed to complement mentoring activities for graduate students and undergraduates that are underway within the IoE. It also builds on existing university discipline and department-based mentoring programs by offering support to early-career scholars in the following areas related to interdisciplinary scholarship and education:

- Paired mentoring to enable formal and informal opportunities for leadership development in interdisciplinary areas
- Skills, knowledge and experience necessary to succeed in interdisciplinary research, including guidance in:
 - pursuing new interdisciplinary collaborative research initiatives and funding opportunities
 - publishing multi-authored papers while recognizing individual contributions

- communicating complex research, effectively, to scientific and public audiences
- Achievement of personal career objectives in interdisciplinary topics, through:
 - advising on strategies for promotion and tenure within their departments
 - discussing employment opportunities (in the case of post-doctoral research associates).
 - maintaining a healthy balance between professional and personal values and activities necessary for growth and satisfaction'
 - maintaining a work-life balance necessary for personal growth and satisfaction
 - facilitating informal feedback on career decision-making

The IoE PI2 Program fits within the team structure that has been developed to address science focus areas within the MT EPSCoR Track 1 grant. It supports development of structured mentoring within focus area teams and among individuals, career planning assistance, and opportunities to advance career and leadership skills relevant to the pursuit of interdisciplinary scholarship. In addition, in an attempt to separate mentoring from oversight, mentees will have the opportunity for to participate cross-team and/or cross-institutional mentoring.

Program Participants

Mentees in the formal program are untenured IoE faculty members as well as IoE post-doctoral research associates. Informal mentees may include more senior faculty members who are new to interdisciplinary research and graduate students working in science teams.

Mentors are senior faculty within the science focus areas who have a track record of successful interdisciplinary collaborative research as evidenced by publication and grant success. IoE co-Directors also serve as informal mentors in this program, providing advice as needed.

Program Components for Formal Participation

Training for Program Mentors

Two training sessions will occur during the fall semester of 2013. A mentor training session for the faculty members who have agreed to participate as formal mentors in the program on a

<p>IoE Mentors Provide:</p> <ul style="list-style-type: none"> • Guidance • Opportunities • Training <p>By Being:</p> <ul style="list-style-type: none"> • Accessible • Open-minded • Consistent • Patient • Honest • Knowledgeable 	<p>volunteer basis and a second mentor-mentee pairing and contract development session will be held on each of the two large institution campuses (MSU and UM) with broadcasting to other IoE institutions. The goals of these sessions are to learn about other mentors in the group and begin building a leadership community, to reflect on group dynamics and how to make the group functional, and to establish ground rules and expectations for mentor/mentee participation. Topics of discussion will include how to: achieve the program's goals through effective communication within the mentoring relationship; report mentoring meetings and activities; align expectations of the mentee and the mentor; and assess understanding, foster</p>
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independence, and promote professional development. If there is a change in mentor or mentee status (i.e., a mentor is added to the program), the mentor trainer will meet with the new individual for training purposes. An initial assessment of the mentoring experience will take place in spring 2014.

Training for Program Mentees

Mentees in the formal program will receive information about the program and be asked to respond to the mentee trainer with a description of his/her initial needs. The mentees will also participate in the two training sessions discussed earlier.

Pair Assignments

Mentees in the formal program will be assigned to a Mentor working in their focus area or closely related field. The mentor may be from the home or other institutions and be one of the outreach partners.

Each mentee should meet with his/her mentor prior to November 29 to discuss mutual expectations and finalize the Individual Professional Development Plan.

Record-Keeping

The times of formal and informal meetings between the mentee and the mentor will be documented to meet EPSCoR reporting requirements.

IoE Mentees Have:

- Individual Needs
- Aspirations
- Skills for Development

And Can Contribute to the Mentoring Relationship by:

- Sharing Energy and Ideas
- Being Proactive
- Asking Questions
- Being Respectful
- Reciprocating
- Accepting Feedback

Specific elements of the IoE PI2 Program include:

1. Guidance

A. Orientation

Topics at the orientation meeting will include: (a) the degree of research independence in the context of expectation for participating in collaborative interdisciplinary grants; (b) expected degree of interaction across the IoE focus areas; (c) scholarly productivity, including the importance of scientific publications; and, (d) documentation and meta-data standards, such that research outcomes could be repeated by other researchers at a later date.

The orientation session will include conversations among researchers with closely aligned research interests at each of the EPSCoR partner institutions, as well as with members of the IoE outreach, cyberinfrastructure, diversity, and workforce teams. Grant-wide expectations will be discussed between the mentee and mentor, and with other members of the focus area. The format/timeline of expectations and deliverables of the Leadership Program will be agreed upon by the mentee and mentor, in consultation with the IoE co-Directors, and the cognizant Department Head (in the case of faculty) or Direct Supervisor (in the case of the postdoctoral research associates).

Based on these interactions, the mentees may revise their **Individual Professional Development Plan** that will include a timeline and list of mutually agreed upon deliverables that will be attained during the time frame that their projects are funded over the next three years.

B. Career Counseling

The mentor/mentee will meet on a regular basis to provide guidance regarding their current position, Promotion and Tenure goals related to interdisciplinary research, potential training activities, and opportunities to build a professional skillset. The mentor will also support the mentee in pursuing career development opportunities.

In addition to guidance provided by the mentor, the mentee will be encouraged to discuss career options with: (1) other researchers at their home institution; (2) IoE affiliates at other institutions; (3) non-university partners; and, (4) former students and colleagues of the mentor. Travel funds will be available to support these exchanges.

C. Diversity, Equity, and Inclusion

The mentor and IoE co-Directors will encourage the mentees to enrich their professional portfolios through exposure to persons with a diversity of backgrounds, experiences, and concepts. Understanding issues concerning equity and inclusion will be achieved via interactions with IoE affiliates in other disciplines and via broader engagement goals of the MT EPSCoR project.

D. Conflict Resolution

There are a variety of reasons that relationships among mentor pairs may become strained. Other members of the focus area team can be invaluable in the situation where the relationship between the mentee and his/her mentor is affected. In other instances, the IoE co-Directors can provide conflict management techniques and strategies to the mentee.

E. Moral Support and Encouragement

The mentor will help the mentee to realize his/her own potential and work towards achieving goals and outcomes set forth in the Individual Professional Development Plan.

2. Opportunities

A. Building Professional Network and Connections

Mentees will be able to apply for IoE travel funds to attend at least one conference or training course per year focused on professional development. These workshops are in addition to EPSCoR/IoE statewide and project meetings. Mentees will be encouraged to travel to deliver seminars on their research at the other higher education institutions in

Montana, including institutions other than Montana State University or the University of Montana, through participation in the IoE Rough Cut seminar series and other events.

Mentees are expected to present their research at MT-EPSCoR/IoE meetings and other professional venues. Mentors will provide constructive feedback on presentation and communication.

As available, the mentee will be encouraged to take advantage of opportunities to network with IoE visiting scholars who are proven interdisciplinary leaders. This will be achieved through the IoE Rough Cut seminar series, the Distinguished Visiting Lecture series, Visiting Scientist program, and departmental seminar programs and other events.

B. Proposal writing experience

When an appropriate grant submission opportunity presents itself, the mentee will work with other IoE scholars and the IoE office for assistance and advice in the preparation and submission of the proposal. Team submissions and proposals for new funding will be supported to the extent possible. The mentor will provide constructive advice on developing successful interdisciplinary proposals.

C. Teaching experience and informal mentoring

The mentee will gain teaching experience and informal mentoring experience by working with both graduate students and undergraduate cohorts within the Science Focus areas. The IoE will also encourage post-docs to participate in and contribute to a senior/graduate course relevant to their interest in interdisciplinary research as well as develop and participate in interdisciplinary reading groups. Such reading groups meet informally on a regular basis to discuss recent journal articles in the field and to discuss how to write and submit journal articles.

D. Stakeholder engagement and science communication experience

Mentees will have opportunities to meet and interact with a diverse array of regional stakeholders. They will be encouraged to present seminars and participate in both formal and informal meetings with these stakeholders. In particular, Montana has a diverse set of state and federal agencies and NGOs in the areas of ecosystems research and land and resource management. Training in scientific communication and providing opportunities for meaningful engagement with partners and stakeholders are vital components of this plan.

E. Learning

All faculty and students involved in the focus areas are engaged in a learning environment. Working directly with the mentor within these focus areas will provide the mentee with opportunities to learn more in that specific area as well as to learn more about interdisciplinary and inter-institutional collaboration. It will also provide experience for the mentee as they, in turn, mentor post-docs, graduate students, and undergraduates.

3. Training

A. Experience with Preparation of Grant Proposals

The mentee will be encouraged to attend workshops, such as NSF CAREER webinars, on how to write a successful competitive funding proposal. They will be encouraged to attend trainings provided by the universities' offices of sponsored programs on how to identify funding opportunities, develop research questions, methods, budgets, and timelines, and write competitive proposals.

B. Communication Skills

Several publications and presentations are expected to result from the MT EPSCoR project. The mentee will be provided with training in writing publications for technical and non-technical audiences. The mentor and IoE co-Directors will discuss and advise the mentee on the balance of quality versus quantity in publication and the value of rapid communications and review papers as ways to gain attention by their peers. The mentor will gain experience in leading the coordination and development of an interdisciplinary publication or grant submission. This experience will involve collaboration and coordinating writing among researchers within IoE Science Focus areas.

The mentee will be advised on presenting their research at scientific conferences (poster and oral presentations). The IoE will also provide or support attendance at meetings and workshops on science communication. Participation in these learning opportunities is expected for mentees.

C. Goal Setting

The mentee will be advised on realistic goal setting in conjunction with his/her Individual Professional Development Plan. For example, the mentor will discuss and advise mentees on publishing goals, including deadlines, on job-hunting or promotion and tenure goals, or on developing new research skills.

D. Technical Skills and Lab Management

Where appropriate, the mentee will be encouraged to develop his/her own research and technical skills within the expectations of the focus area team. In addition, the mentor may provide increasing responsibility and information about all aspects of managing a lab and the projects within that lab.

E. Teaching and Mentoring Skills

The mentor and the other faculty members will discuss pedagogical strategies with the mentee. Additionally, mentors and others will sit in on instructional sessions developed and delivered by the mentee in order to provide constructive feedback. The mentee, under the guidance of the mentor and other members of the focus area team, will be encouraged to directly guide undergraduates and graduate student research connected with the project.

F. Instruction in Professional Practices

The mentor will discuss topics such as scientific ethics, time management, and diversity with the mentee.

A successful IoE PI2 Program will lead to the development of relationships that are key to academic success at any level. The progress of the program will be measured through: (i) comparison of outcomes and their Individual Professional Development Plan; (ii) informal assessment and feedback to the mentee by the mentor; (iii) involvement of the mentee in IoE interdisciplinary and inter-institutional activities; (iv) IoE co-Director discussion with the mentee during the annual evaluation period; and (iv) tracking of the mentee's progress toward their career goals.