EPSCoR Faculty Handbook

Mentoring STEM Students

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Purpose of the Handbook:

The purpose of the handbook is to serve as a resource for Idaho ESPCoR faculty in mentoring STEM students participating in EPSCoR research activities. This faculty resource will help the mentor and student benefit from a more enjoyable, productive mentoring experience.

Mentoring Defined

Effective STEM student mentoring equips students with self-advocacy skills, demystifies STEM university culture and decodes STEM discipline-specific language and norms. Mentors would do well to reflect upon their own mentorship experiences to help guide their mentorship approach. *How did you learn of and participate in STEM research opportunities? What crucial conversations with faculty and/or student support services staff empowered and inspired you to pursue STEM graduate education?*

Roles & Expectations

"It is the professor who owns primary responsibility for initiating this process and ferreting out the student's expectations" (Johnson, 2007).

Be clear about expectations. Discuss the role that faculty and student will play. Introduce students to policies, responsibilities, expectations, and resources. Provide a department handbook. Students need a guide that clarifies expectations and serves as a roadmap for the program. Include detailed, up-to-date information about requirements and resources for each stage of the educational experience. Include forms and deadlines. Make it available in print and electronically (Johnson, 2007 & Rackham, 2013).

Consider the following:
- Will the mentor provide feedback?
- How long is the mentor's turnaround time when reading drafts of a thesis or dissertation?
- What are the mentor's expectations concerning co-authorship and intellectual property stemming from collaborative work with students?
- What can the student expect in terms of letter of recommendation and other early career support? (Johnson, 2007 & Rackham, 2013)

Graduate Student Involvement:

Research shows that both students and faculty benefit when graduate students are involved in effective mentoring and advising relationships.

- The student is more productive in terms of research activity, conference presentations, pre-doctoral publications, instructional development, and grant-writing. The well-mentored students' academic success is evident in higher completion rates and a shorter than average time to degree.

- Faculty benefit in terms of both personal and professional satisfaction. As these students are more productive, faculty in turn attract better students, extend their professional network of future colleagues, and amplify their own success (Rackham Graduate School, 2013).

Goal Identification

"It is imperative that…the professor begins to help the student shape and articulate both short-term and long-term goals" (Johnson, 2007).

Establish milestones between start and finish, including setting of timelines and construction of tentative plans for achieving specific goals. For many students, knowing that his/her mentor has set expectations, and the context of those expectations, is enough to keep research and writing on track. Encourage the effective use of time. Share techniques and practices that have been useful for others but recognize that people are different (Johnson, 2007 & Rackham, 2013).

Mentoring Timeline

The following "checklist" provides a general outline of a "mentoring timeline" and may be modified according to individual faculty-STEM student mentee needs:

1. **Initiate contact** – Once a student research opportunity offer has been made, faculty mentors should initiate *e-mail and telephone* contact with student mentees. This initial meeting should be somewhat informal and focus upon welcoming the student to the faculty's research group. While faculty will certainly need to include some program-specific details, this initial contact establishes the tone of future interactions and need not overwhelm students with too much information. At this time, it may prove useful for faculty to establish a standing "appointment" with mentees whether via e-mail, telephone, Skype, etc. complete with a "mini-agenda" which will help track "benchmarks" for future conversations. Such appointment setting also serves to help STEM students become accustomed to professional accountability and ensures that communication between faculty mentor and mentee is consistent and purposeful.

2. **Designate lab space** – Part of establishing a positive "first impression" for ALL student researchers involves designating lab space and/or a desk, even if that space is shared. While student research and work space may be limited and scant resources need to be shared, providing students with a well-thought-out "plan" reassures students that their scholarly contributions are valued. Convening a meeting with lab group members will permit current students to welcome an incoming student researcher. At that time, a lab work schedule may be devised whereby students may maximize their research time and address any issues regarding work space and equipment use overlap. Faculty mentors may encourage current mentees to devise their prospective work schedules in advance of this meeting, realizing that each person will need to make concessions for the benefit of all.

3. **Create work schedule** – Faculty mentors should define both short-term and long-term research goals for student mentees. Short-term goals may include tasks to be completed within a week-long timeframe. Long-term goals will likely describe research completion outcomes, including papers, posters, and presentations.

4. **Schedule meetings** – Mentors may designate a weekly "one-on-one" meeting with STEM mentees. While mentees will undoubtedly participate in lab group meetings, such individualized attention

permits students to address academic and personal concerns in a confidential setting. Such meetings may be brief, especially if the faculty mentor and mentee together devise a "mini-agenda." These meetings should be purposeful and allow mentees to receive answers to specific questions and require that mentees come prepared to provide academic and research updates. Again, such interactions permit students to hone their skills in meeting research deadlines and completing "benchmark" tasks. Faculty mentors may elect to require student mentees to submit a brief synopsis of the meeting discussion via e-mail within 24 hours as a means of establishing a permanent discussion record.

5. **Provide feedback** – Faculty mentors must decide upon feedback format and frequency. Faculty may choose to provide student mentees with feedback via e-mail and thus establish a documented chronology of student mentee research progress.

6. **Define research product(s)** – STEM student mentees' final research products will vary and may include papers, posters, and/or presentations. Faculty mentors must explicitly describe their format expectations of student mentees' research results.

7. **Explain research presentation norms and standards** - Faculty mentors may assist student mentees in preparing their research results for publication submission and/or national/regional conference presentation.

Quick Tips

Faculty mentors should bear the following in mind as they interact with STEM student mentees:
- **Clarify** – specify your research expectations of your student mentee.
- **Define** – denote criteria that characterize research excellence.
- **Develop** – create a "research schedule" with student mentees to track research progress toward meeting benchmarks.
- **Establish** – cultivate an atmosphere of mutual respect within your lab group by setting "ground rules" for group discussion and explain your discussion participation expectations.
- **Facilitate** – promote student mentee professional development by providing additional lab procedure training, sample curricula vitae/résumés, cover letters, conference abstracts/proposals and posters.
- **Model** – foster collegiality by encouraging student mentees to participate in study groups, access tutoring services, or serve as a tutor.
- **Network** – encourage student mentees to identify and cultivate positive professional relationships with other mentors who may be faculty, emeriti, alumni, staff and/or graduate students.
- **Share** – inform student mentees of research techniques and models that have proven useful while at the same time encouraging their intellectual creativity.

Relationship Boundaries

"It is…wise to collaborate with the student early on in setting basic professional boundaries around the mentorship" (Johnson, 2007).

Boundary setting might involve specifying appropriate and inappropriate roles. Confidentiality and expectations of such should be discussed. Model professional responsibility - it's not enough to act with integrity in every aspect of your work as a teacher, researcher, and author. You need to help students understand the reasons for you actions. Share the right skills at the right time. Remember that there are multiple phases in the degree completion process so it's best to introduce students to the skills they are most likely to need currently or in the near future (Johnson, 2007 & Rackham, 2013).

Consider the impact of the student's ethnicity and other group identities on the mentoring relationship:
- Gender
- Age
- Sexual Orientation
- Religious Affiliation
- Educational Level
- Generation in College
- Physical Capabilities (Driscoll, 2004)

Mentoring Underrepresented Minorities (URM)

Faculty mentors can best serve URM students by knowing all the resources available to them. For example, in addition to encouraging URM STEM student participation in discipline-specific academic and professional societies and conferences, faculty mentors may do well to learn about and encourage URM student participation in local and national organizations specifically devoted to fostering URM STEM scholarship and professional workforce participation.

Some local organizations and/or programs that focus on broadening participation of URM populations include the Louise Stokes Alliance for Minority Participation (LSAMP), Ronald E. McNair program, and the College Assistance Migrant Program (CAMP). National organizations include The American Indian Science and Engineering Society (AISES), the Annual Biomedical Research Conference for Minority Students (ABRCMS), the National Society of Black Engineers (NSBE), the National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (NOBCChE), the Society of Hispanic Professional Engineers (SHPE), and the Society for the Advancement of Chicanos and Native Americans in Science (SACNAS).

These organizations offer URM students opportunities to participate in formal presentations and network with a variety of faculty and professionals. Faculty mentors who choose to accompany URM student mentees to such conferences also benefit from opportunities to expand their professional networks and strengthen their mentor-mentee relationship. Appendix "A" provides a list of the aforementioned URM STEM national student organizations.

Faculty establish the "tone" and nature of mentor-mentee interactions and are responsible for modeling professional collegiality. To this end, informal meetings with members of URM STEM student organizations and their faculty advisors may facilitate a URM STEM student's smooth transition into research and eventually STEM graduate education.

Mentoring 2 and 4 Year College Students

Faculty who are mentoring STEM students from 2 and 4 year colleges, also known as primarily undergraduate institutions (PUIs), will best serve the students if they know resources available to them at both the PUI and institution that the student is interested in transferring into.

MILES Ambassadors:
To increase the participation of PUIs in Idaho EPSCoR activities, the Ambassador Program was created to promote Idaho EPSCoR's diversity and workforce development goals and objectives by providing assistance to Idaho EPSCoR's MURI Program, Adventure Learning/Bridging and Learning Communities, and State Initiatives. The Ambassadors assist with promotion of EPSCoR, assist in the facilitation of research collaboration, and most importantly, recruitment and mentoring. Establishing partnerships between Ambassadors, PUI faculty, and RII faculty will assist in creating an effective mentoring relationship and will further enhance the pathways of PUI students into STEM fields.

With the assistance from the MILES Ambassadors, the following ideas were generated to further assist in the mentoring of STEM PUI students:
- Facilitate MILES site visits (PUI students and faculty visitation to Idaho RII institutions)
- Utilize currently scheduled trainings at PUIs to learn about transferable credits
- Make statewide and institution-to-institution articulation agreements more transparent for students and their parents
- Provide an active up-to-date list of faculty from various STEM fields (for recruiters/PUI faculty/students)
- Provide more direct contact with PUI students
- Provide more online recruitment and online advertisements geared towards PUI students regarding STEM opportunities available
    o Create simple you-tube videos/recruitment segments by MILES faculty (i.e. describing research opportunities available and types of students needed)
    o Video focus can include topics such as, 1) MILES, 2) MURI, 3) Adventure Learning, 4) Expectations of particular careers

"Mentoring is a power-free partnership between two individuals who desire mutual growth. One of the individuals usually has greater skills, experiences, and wisdom (Weinstein, 1998)."

--APPENDIX A--

MENTORING RESOURCES

Idaho Resources (URM/STEM):

STATE UNIVERSITIES		
Boise State University	College Assistance Migrant Program (CAMP) http://education.boisestate.edu/camp/	Scott Willison, Director: swillis@boisestate.edu (208) 426-3292 Janine Balfour, Math-Science Coordinator: JanineBalfour@boisestate.edu (208) 426-2863
	Louis Stokes Alliance for Minority Participation (LSAMP) http://academics.boisestate.edu/undergraduate/student-success/lsamp/	Emily Flores, LSAMP Coordinator: emilyflores@boisestate.edu (208) 426-1701
	McNair Scholars Program http://education.boisestate.edu/mcnair/	Gregory Martinez, Director/TRIO College Programs: gregorymartinez@boisestate.edu (208) 426-3684
	Multicultural Student Services http://culturalcenter.boisestate.edu/	Francisco Salinas, Student Diversity and Inclusion Director: franciscosalinas@boisestate.edu (208) 426-5950
	STEM Station http://stem.boisestate.edu/home.html	Patricia Pyke, STEM Station Director: ppyke@boisestate.edu (208) 426-1987
	Women's Center http://womenscenter.boisestate.edu/	Jess Caldwell-O'Keefe, Director: jesscaldwellokeefe@boisestate.edu (208) 426-4256
	Society of Hispanic Professional Engineers	Contact Person: Silvino Jimenez silvinojimenez@u.boisestate.edu
	Society of Women Engineers	Contact person: Danielle Torres, danielletorres@u.boisestate.edu
	STEM Educators of BSU	Contact Person: Brian Zuber, brianzuber@u.boisestate.edu
Idaho State University	Diversity Resource Center http://www.isu.edu/drc/index.shtml	James H. Yizar, Jr., Director: yizajame@isu.edu (208) 282-3545
	Native American Academic Services http://www.isu.edu/drc/naas/index.shtml	(208) 282-4429
	Janet C. Anderson Gender Resource Center: http://www.isu.edu/andersoncenter/index.shtml	General Contact Information: gndrctr@isu.edu 208-282-2805
	Society of Women Engineers	Advisor: Mary Hofle hoflmary@coe.isu.edu 208-282-3148
University of Idaho	Idaho Experimental Program to Stimulate Competitive Research (EPSCoR) www.idahoepscor.org	Rick Schumaker, Project Administrator rschumak@uidaho.edu 208-885-5742 Sarah Penney, Project Manager sarahp@uidaho.edu 208-885-2345

	College Assistance Migrant Program (CAMP) http://www.uidaho.edu/studentaffairs/oma/camp	Jesse Martinez, Assistant Director: jessem@uidaho.edu (208) 885-5283
	Native American Student Center (NASC) http://www.uidaho.edu/nativeamericancenter	Sydel Samuels, Director: ssamuels@uidaho.edu (208) 885-4237
	Native American Tribal Liaison	Yolanda Bisbee, Director: yobiz@uidaho.edu (208) 885-5173
	Office of Multicultural Affairs: http://www.uidaho.edu/studentaffairs/oma	OMA Office: (208) 885-7716
	Women's Center: http://www.uihome.uidaho.edu/default.aspx?pid=64714	Heather Shea Gasser, Director: hgasser@uidaho.edu (208) 885-6616
	American Indian Science and Engineering Society (AISES)	Advisor: Aaron Thomas, amthomas@uidaho.edu
	National Society of Black Engineers (NSBE) http://www.nsbe-uidaho.org/aboutus.aspx	
	Society of Hispanic Professional Engineers (SHPE): http://stuorgs.uidaho.edu/search/org.php?id=744	Advisor: Carmen Suarez, csuarez@uidaho.edu (208) 885-4285
	Society of Women Engineers (SWE): http://stuorgs.uidaho.edu/search/org.php?id=382	Advisor: Aicha Elshabini, elshabini@uidaho.edu (208) 885-6470
2 & 4 YEAR COLLEGES		
Lewis Clark State College	Native American/Minority Student Services: http://www.lcsc.edu/studentservices/minorityprograms/index.htm	Bob Sobotta, Director: bsobotta@lcsc.edu 208-792-2812
	Idaho EPSCoR Ambassador Program	Keegan Schmidt, Ambassador
College of Southern Idaho	Multicultural and International Student Services: http://www.csi.edu/international_/index.asp	
	Idaho EPSCoR Ambassador Program	Dave Makings, Ambassador
College of Western Idaho	Latinos Unidos College Hispanic Association (LUCHA) student organization	Luis Caloca, Student Services Enrollment Specialist: luiscaloca@cwidaho.cc, (208) 562-2002 Sam Galan, Student Services Enrollment Specialist: samgalan@cwidaho.cc, (208) 562-3228
	Idaho EPSCoR Ambassador Program	Willard Pack, Ambassador
Eastern Idaho Technical College	EITC Tutoring Center: http://www.eitc.edu/tutoring.cfm	Lindsay Gardner, Academic Support Coordinator: lindsay.gardner@eitc.edu (208) 524-3000, ext. 3621
North Idaho College	American Indian & Minority Student Support Services: http://www.nic.edu/websites/index.asp?dpt=6	Evanlene Melting Tallow, Advisor: Evanlene_MeltingTallow@nic.edu (208) 769-3365
	Idaho EPSCoR Ambassador Program	Julie VanMiddlesworth, Ambassador
Tribal College/University (TCU):		

Northwest Indian College (NWIC)	Nez Perce Tribe Location: http://www.nwic.edu/group/nez-perce	Renee Roman Nose, Outreach Coordinator: rromannose@nwic.edu, (360) 631-3441
	Northwest Indian College Space Center (NWIC-SC): http://blogs.nwic.edu/spacecenter/	Gary Brandt, IT/Robotics Faculty and NWIC-SC Director: gbrandt@nwic.edu (360) 392-4318

URM STEM National Organizations

▶ American Indian Science and Engineering Society (AISES): http://www.aises.org/
▶ Annual Biomedical Research Conference for Minority Students (ABRCMS): http://www.abrcms.org/index.html
▶ Indigenous Women in Science Network (IWSN): http://iwsnetwork.org/
▶ National Society of Black Engineers (NSBE): http://www.nsbe.org/
▶ National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (NOBCChE): http://www.nobcche.org/
▶ Society of Hispanic Professional Engineers (SHPE): http://oneshpe.shpe.org/wps/portal/national
▶ Society for the Advancement of Chicanos and Native Americans in Science (SACNAS): http://sacnas.org/
▶ Society of Women Engineers (SWE): http://societyofwomenengineers.swe.org/index.php

Additional Faculty Mentoring Resources

▶ Alliance for Graduate Education and the Professoriate (AGEP) Resource Manual for STEM Departments: http://www.indiana.edu/~grdschl/agep/AGEP%20Resource%20Manual%20for%20STEM%20Disciplines%202010.pdf
▶ Empowering the Faculty: Mentoring Redirected and Renewed: http://www.ntlf.com/html/lib/bib/95-3dig.htm
▶ Faculty Mentor Training Project: http://www.csun.edu/eop/htdocs/fmtp.pdf

Sources

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Driscoll, D. M. (2004). *Mentoring and diversity: A handbook for faculty mentoring LSAMP Indiana students in science, technology, engineering, and mathematics fields*. Purdue University: West Lafayette, IN.

Rackham Graduate School. (2013). *Mentoring & advising*. Retrieved from http://www.rackham.umich.edu/faculty-staff/information-for-programs/academic-success/mentoring-advising

"Front Matter." *Enhancing the Community College Pathway to Engineering Careers*. Washington, DC: The National Academies Press, 2005.