



Physics Research Mentor Training Seminar



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Introduction for Facilitators

Physics Research Mentor Training Seminar Overview

Course Objective: Seminar participants will work with a community of peers to develop and improve their mentoring skills. By the end of the seminar, participants should be able to clearly articulate a personal mentoring philosophy to anyone inside or outside their discipline, and have multiple strategies for dealing with mentoring challenges.

Content

The content of each session in this curriculum is designed to address the key concerns and challenges identified by research mentors. The topics include:

- Establishing Expectations
- Maintaining Effective Communication
- Assessing Understanding
- Fostering Independence
- Addressing Diversity
- Dealing with Ethics

Many people have a much easier time talking about topics such as expectations or communication style than they do talking about issues of diversity and power hierarchies. People who use this guide are encouraged to explore issues of diversity and power dynamics in *all* activities because these issues can often be a subtext for miscommunication, misunderstanding, and conflict in mentoring relationships.

The *Physics Research Mentor Training Seminar* is designed to address issues that are relevant to mentoring relationships in physics research. Much of the content of this seminar is adapted from *Entering Mentoring: A Seminar to Train a New Generation of Scientists*, created by Jo Handelsman, Christine Pfund, Sarah Miller Lauffer, and Christine Pribbenow, with support from Howard Hughes Medical Institute Professors Program (PI: Jo Handelsman). A PDF version of the book is available at: www.hhmi.org/grants/pdf/labmanagement/entering_mentoring.pdf. The original, biology-focused *Entering Mentoring Seminar* materials were adapted for use across science, technology, engineering and math through the Delta Program in Research, Teaching, and Learning with funding from the National Science Foundation (Grant # 0717731; PI: Christine Pfund). This adaptation process involved a full collaborative effort between faculty and staff from Astronomy, Biology, Chemistry, Engineering, Math, Physics, and Psychology. The process was supported by existing NSF-funded projects at the University of Wisconsin-Madison including the Midwest Alliance, Wisconsin Alliance for Minority Participation (WiscAMP), Interdisciplinary Graduate Education in Research Training (IGERT), Center for the Integration of Research Teaching and Learning (CIRTL), Nanoscale Science and Engineering Center (NSEC) and Undergraduate Research and Mentoring (URM). The Physics adaptation was supported by the American Physical Society (APS) and the CIRTL Network.

Format

Experiential learning and facilitated discussion form the structural foundation of this research mentor training seminar. The content and process are based on the experiences of faculty and staff who have implemented the mentor training seminar at the University of Wisconsin-

Madison. These seminar facilitators have learned that the best results come from keeping an open discussion format to allow participants to integrate their diverse experiences into the course materials and activities. In order to accommodate the unique idiosyncrasies of each mentor-mentee relationship, this seminar focuses on core principles that apply broadly across disciplines. Simply asking the mentors a few guiding questions typically leads to vigorous discussion. The case studies and reading materials can provide a tangible starting point, and the mentors will often move quickly from the hypothetical examples to their own experiences with undergraduate researchers. The seminar is most effective with mentors who are working with undergraduate research mentees full-time, for example, in an undergraduate summer research program. The short duration of such a program intensifies the urgency of dealing successfully with challenges that arise. Likewise, the frequent contact with the undergraduate researchers provides mentors with the opportunity to implement immediately the ideas generated by the discussions.

Implementation: Facilitating the Seminar

Facilitating the Research Mentor Training Seminar is not the same as teaching it. Your role as facilitator is to enable the seminar participants to take ownership of their own learning by helping them to engage in self-reflection and shared discovery and learning. Your role in the group is to get others to work through their thoughts and ideas---it is not your role to be the expert on mentoring. As a facilitator, you may also walk a fine line between facilitator and participant, but remember that the group members will look to you for guidance and structure. Your own experiences and ideas should enhance the discussion but should not dominate and become the focus of the discussion.

Being an effective facilitator is the key to helping the research mentors in the seminar meet the learning objectives and become more successful mentors. To assist you in your own facilitation abilities, we have included a brief facilitator guide in the next section which contains additional information, tips, and tools for facilitation.

Implementation: Using this Guidebook to Facilitate Weekly Sessions

Ideally, it is best to hold the first seminar session with research mentors BEFORE they begin working with their research mentees. You should prepare for each session by copying the readings, descriptions of session themes and learning objectives, case studies, and any worksheets for each mentor in the group. Alternatively, all of the materials can be copied at the start of the seminar and distributed at the first meeting or posted on a course website. The specific themes and objectives for each session are included at the beginning of the seminar materials. You might consider asking participants to review the themes and learning objectives at the beginning of each session. As an alternative, you can review the objectives and themes after a few weeks to check in on their progress.

Detailed notes for group facilitators are also included in each session plan. Time estimates for activities and facilitated discussions for each of the sessions are indicated in parentheses and can be adjusted at your discretion. The facilitator notes provide directive signposts (e.g., ACTIVITY, TELL, ASK, NOTE, DISCUSS) to support the facilitation process. “ACTIVITY” indicates that participants are to engage in some process on their own, in small groups or as a large group. “TELL” means that the information that follows needs to be shared with the whole group. “ASK” means a specific question or questions needs to be put to the group. “NOTE” means that

some particular issue or content needs to be emphasized. “DISCUSS” means that a broader discussion, usually supported by guiding questions, needs to occur. The appendix includes “typical responses” to guiding questions recorded by seminar facilitators who have used the materials. Sometimes more discussion questions are provided than can reasonably be addressed in the time allotted for the activity or group discussion. The questions suggested for the case studies in this seminar are based on experiences of those who have facilitated the seminar in the past. A “Reflection and Notes” space is provided for you to make your own notes about how each session went and things you want to remember, change, or do differently the next time you facilitate the session. You can find additional questions for the case studies, as well as additional case studies, at the “Build Your Own Curriculum and Workshops” section of the “Curriculum Options” tab at www.researchmentortraining.org.

Grading

The seminar emphasizes experiential learning and the integration of knowledge—drawn from reflection, discussion, readings and seminar activities—with practice. The seminar is often graded using a contract “A,” which means that attending the seminar, doing the assignments, and participating in the activities will result in an “A” for the class. This approach allows each participant to invest personally in the learning experience and develop a unique and authentic identity as a mentor. In some cases, the seminar has been offered as a practicum in which credit is given for participating in the research mentor training seminar and engaging in the practice of mentoring an undergraduate student.

Physics Research Mentor Training Seminar Facilitation Guide

Role of Facilitators

- **Make it safe:** Take time to tell the group members that the seminar is a safe place to be honest about their ideas and feelings. Everyone's ideas are worth hearing.
- **Keep it constructive and positive:** Remind members of your group to keep things positive and constructive. Ask the group how they want to deal with negativity and pointless venting. Remind them that the seminar is about working together to learn, not complaining about their current situation or discounting the ideas of others in the interest of a personal agenda.
- **Make the discussion functional:** At the start of each session, explain the goals of the session to the group. Try to keep the group on task without rushing them. If the conversation begins to move beyond the main topic, bring the discussion back to the main theme of the session.
- **Give members of the group functional roles and responsibilities:** Assign or ask for volunteers to take notes, keep track of time, and report out in the larger group at the end of the session. Functional roles help keep participants engaged.
- **Give all participants a voice:** In a group, there are likely to be issues of intimidation and power dynamics that can play out in ways that allow certain members of the group to dominate and others to remain silent. At the start of the conversation, mention that the group is mixed by design, and point out that a diversity of perspectives is an essential part of the process. Remind group members to respect all levels of experience. It's important that everyone's voice is heard!

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- Discomfort and silence are ok, but with a clearly stated context and purpose. Silence may seem like a waste of time in meetings, but it gives people a chance to think, digest, and reflect. Allow for a few silent breaks before, during, and at the end of a meeting.
- Make it easy, rewarding, and fun for people to participate, and encourage others to do the same for each other. Simple things like friendly reminders of meetings, coffee, and follow-up calls to check in with someone if they miss a meeting, can send the message that you care, and make it easier to participate.

Group Dynamics

Suggestions for How to Handle Challenges

What do I do when no one talks?

- Have everyone write an idea, thought, or answer to a question on a piece of paper and toss it in the middle of the table. Each participant then draws a piece of paper from the center of the table (excluding their own) and reads it out loud. All ideas are read out loud before any open discussion begins.
- Have participants discuss a topic in pairs for 3-5 minutes before opening the discussion to the larger group.

What do I do when one person is dominating the conversation?

- Use a “talking stone” to guide the discussion. Participants may only talk when holding the stone. Each person in the group is given a chance to speak before anyone else can have a second turn with the stone. Participants may pass if they choose not to talk. Importantly, each person holding the stone should share his or her *own* ideas and resist responding to another person’s ideas. Generally once everyone has a chance to speak, the group can move into open discussion without the stone.
- Use the “Constructive/ Destructive Group Behaviors Exercise”. Each participant chooses their most constructive and destructive group behavior from a list (see following page). Each person writes the two behaviors on the back of their table tent (a card with their name on it folded in a wedge). Participants then share their choices with the larger group and explain why they chose those behaviors.

What do I do when the group members direct all their questions and comments to me, instead of their fellow group members?

- Each time a group member talks to you, move your eye contact to someone else in the group to help the speaker direct his or her attention elsewhere.
- Ask the participants for help in resolving one of *your* mentoring challenges. For example, ask them for advice on how to deal with an apathetic undergraduate researcher. This helps the group members stop looking to you for the *right* answers and redirects the problem-solving and discussion to the entire group.

What do I do when a certain person never talks?

- Have a different participant initiate each week’s discussion so that different people have the chance to speak first.
- Assign participants in the group different roles in a scenario or case study and ask them to consider the case from a certain perspective. Ask the participants to discuss the case in the larger group from the various perspectives. For example, some participants could consider the perspective of the mentee while others consider the perspective of the mentor.

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- Try some smaller group discussions (2-3 participants per group) as the person may feel more comfortable talking in the smaller group.

What do I do when the group gets off topic?

- Have everyone write for 3 minutes about the ideas they want to share on a given topic. This short writing time will help participants collect their ideas and decide what thoughts they would most like to share with the group so they can focus on that point.
- Ask someone to take notes and recap the discussion at the half-way and end-point of the session to keep the conversation focused.

Constructive and Destructive Group Behaviors*

Constructive Group Behaviors

Cooperating: Is interested in the views and perspectives of the other group members and is willing to adapt for the good of the group.

Clarifying: Makes issues clear for the group by listening, summarizing and focusing discussions.

Inspiring: Enlivens the group, encourages participation and progress.

Harmonizing: Encourages group cohesion and collaboration. For example, uses humor as a relief after a particularly difficult discussion.

Risk Taking: Is willing to risk possible personal loss or embarrassment for the group or project success.

Process Checking: Questions the group on process issues such as agenda, time frames, discussion topics, decision methods, use of information, etc.

Destructive Group Behaviors

Dominating: Takes much of meeting time expressing his or her own views and opinions. Tries to take control by use of power, time, etc.

Rushing: Encourages the group to move on before task is complete. Gets “tired” of listening to others and working as a group.

Withdrawing: Removes self from discussions or decision making. Refuses to participate.

Discounting: Disregards or minimizes group or individual ideas or suggestions. Severe discounting behavior includes insults, which are often in the form of jokes.

Digressing: Rambles, tells stories, and takes group away from primary purpose.

Blocking: Impedes group progress by obstructing all ideas and suggestions. “That will never work because...”

* Adapted from Brunt, J. (1993). Facilitation Skills for Quality Improvement. *Quality Enhancement Strategies*. 1008 Fish Hatchery Road. Madison WI 53715

Physics Research Mentor Training Seminar Syllabus

Sessions	Topics	Assignments <u>Due</u>	Readings
Week 1	Getting Started and Project Design		
Week 2	Establishing Expectations	<ol style="list-style-type: none"> 1. Description of mentee's research project 2. Draft mentoring strategy or philosophy or a draft mentoring contract 	National Academy of Sciences, (1997). "What is a Mentor?"
Week 3	Maintaining Effective Communication	Summary of the discussion about expectations	
Week 4	Assessing Understanding	A short biography of mentee	
Week 5	Fostering Independence	Thoughts on what to do if you don't get along with your mentee	
Week 6	Mentoring Challenges and Solutions	Bring in copies of your own case study to share with the class (or be prepared to present one verbally)	Handelsman, Pfund, Miller Lauffer, & Pribbenow, (2005). "Mentoring Learned, Not Taught."
Week 7	Addressing Diversity	<ol style="list-style-type: none"> 1. Solution to a Mentoring Challenge 2. Reflection on differences and how they affect the research experience 	Fine & Handelsman, (2005). "Benefits and Challenges of Diversity." Crutcher, B.N., (2007). "Mentoring across cultures."
Week 8	Dealing with Ethics	Look over the general ethics guidelines for your discipline. Be prepared to talk about how they apply to you and your work. Bring a copy of them to class.	Lee, Dennis, & Campbell, (2007). " <i>Nature's Guide for Mentors.</i> "
Week 9	The Elements of Effective Mentoring	Summary of a mentor's response to a mentoring challenge	
Week 10	Developing a Mentoring Philosophy	Revised mentoring philosophy	

Physics Research Mentor Training Seminar
Session 2
Establishing Expectations

Core themes and Objectives

Expectations

One critical element of an effective mentor-mentee relationship is a shared understanding of what each person expects from the relationship. Problems between mentors and mentees often arise from misunderstandings about expectations. Importantly, expectations change over time, so frequent reflection and clear communication about expectations are needed on a regular basis.

Learning Objectives for Expectations

Mentors will have the knowledge and skill to:

- Establish expectations and clearly communicate them to the mentee
- Design and communicate clear goals for the mentoring relationship
- Listen to and consider the expectations of their mentee in the mentoring relationship
- Assess the mentee's knowledge and skill level and adjust the project design accordingly
- Consider how differences may affect the relationship

SESSION OUTLINE

Activities

- Introductions
- Review seminar logistics
- Share research project descriptions
- Case Studies: Expectations

Participant Materials

- Table tents and markers (or table tents from previous week)
- Copies of description and learning objectives for Expectations
- Copies of *Expectations* case studies

Assignments for Next Session

Discuss expectations with your mentee (or another young researcher in your group or department) and write a paragraph about the discussion. Alternatively, draft a contract to use with your mentee. For an example, see <https://www.aamc.org/download/49868/data/gradcompact.pdf.pdf>.

FACILITATOR NOTES

- ❖ Introductions (10 minutes)
 - ASK: Please remind everyone who you are and share one thing you learned from the reading “What is a Mentor?”.
 - See Appendix: Session 2 for typical responses from participants about the reading.

- ❖ Review of the Seminar and Logistics (5 minutes)
 - TELL: Briefly review the basic logistics and process for the seminar.
 - Expectations for attendance and participation in weekly meetings
 - How readings and assignments will be distributed and collected for the course
 - Confidentiality is important to the seminar and everything discussed in seminar or on the course website will remain confidential.
 - How to enroll in seminar if participants are taking the seminar for credit
 - The seminar is designed for mentors actively working with a mentee. If that is not the case, participants can use their past experience in the discussions and adapt the assignments to plan for future mentoring relationships.

- ❖ Sharing research project descriptions in pairs and with the whole group (10 minutes)
 - ACTIVITY (5 minutes): Have participants pair up and read one another’s project descriptions (or verbally share the projects if they did not do the assignment).
 - TELL: Direct the pairs to discuss what the descriptions tell the reader about what physics research is like. Ask them to consider what an undergraduate researcher’s perception of physics research might be if they heard this description. Ask mentors to consider what their mentee’s paragraph would say if he/she wrote a description of the research project? Would it align?
 - DISCUSS (5 minutes): Have each pair share what they learned in their conversation with the whole group.

- ❖ Case Study: *Expectations: In over his head* (15 minutes)
 - ACTIVITY (2-3 minutes): Distribute the case study. Let participants read the case individually.
 - DISCUSS (12-13 minutes): Have the participants discuss their reactions to the case study. Some possible guiding questions:
 - How do you design goals and projects for a mentee?
 - When choosing a project for your mentee, how do you weigh the mentee's interest with the immediate needs of the research PI or group?
 - As an advisor or mentor, what should you do if a mentee does not like the project?
 - How do you assess your mentee's skills so you can choose an appropriate project?
 - How can you make sure your expectations take into account a mentee’s individual work style and learning style (e.g., lots of interaction vs. very little interaction, lots of independent reading/research vs. lots of one-on-one learning)?
 - How can you make sure your expectations take into account a mentee’s individual background and abilities (e.g., what basic lab skills, programming skills, mathematics skills, and fundamental physics knowledge do they have/need)?
 - See Appendix: Session 2 for typical responses from participants.

- ❖ Case Study: *Expectations: Mismatched Priorities* (15 minutes)
 - ACTIVITY (2-3 minutes): Distribute the case study. Let participants read the case individually.
 - DISCUSS (12-13 minutes): Have the participants pair up and discuss the case study for 7-8 minutes. Then ask the pairs to share one salient point from their pair-wise discussions. Some possible guiding questions:
 - What can you do as a mentor to avoid this kind of situation?
 - How do you establish and communicate your expectations to your mentee?
 - How do you find out what expectations your mentee has of you and of his or her research experience?
 - Do you think the mentor in this case has been clear about his/her expectations? How could the expectations have been more clearly articulated?
 - What is the responsibility of the mentee to find out what the expectations are in the relationship?
 - See Appendix: Session 2 for typical responses from participants.

- ❖ REVIEW: Assignment for next session (5 minutes)

Discuss expectations with your mentee (or another young researcher in your group or department) and write a paragraph about the discussion. Alternatively, draft a contract to use with your mentee. For an example, see <https://www.aamc.org/download/49868/data/gradcompact.pdf>.

 - The Mentoring Philosophy/Strategy is an evolving document, so while participants are not formally given the assignment to revise their philosophy each week, they may find it beneficial to review and update as the seminar progresses. See Appendix: Session 2 for additional ideas and questions to share with the participants that will help them think about how to incorporate what they've discussed about expectations into their mentoring philosophy.

Space for Reflection and Notes

Case Study

Expectations: In Over His Head

Tom arrives as a Research Experience for Undergraduates (REU) student, excited by the new research opportunities in front of him. After talking with him, Tom's mentor, Alice, learns that he is a junior at a small college where there are only two physics professors, one of whom knows a bit of astronomy. He has not had any astronomy or astrophysics courses, although he helped set up a new undergraduate observatory on the campus. He has had no experience with scientific computing. As Tom seems like a sharp student, Alice decides to engage him in an astrophysics research project that includes some computing elements.

Tom is enthusiastic about the numerical simulation project that he has been given. He is attentive during the first weeks as he receives a lot of preparatory information covering a wide array of subjects. His first steps in actually doing the project are slow and a bit tentative, which Alice chalks up to a steep learning curve. He puts in full days and asks a lot of questions, albeit rather elementary ones.

But by the fifth week, Alice begins to wonder if Tom may be in over his head. He isn't progressing with either the computing or the astrophysics as fast as she had expected. He has become quiet at team meetings now that the conversations have shifted toward ongoing research, and when questions are directed to him about his research, Tom answers curtly and without much content. He doesn't talk with the other REU students about his work, especially an REU student in the same research team who is making great progress.

Alice is concerned that the summer may be turning into a negative experience for Tom. But when she asks Tom how things are going, Tom says everything "is fine." He still puts in many hours each day, although Alice is not sure what he is doing.

Alice wonders what to do now, if anything.

Case Study

Expectations: Mismatched Priorities

Jo was helping me collect data for a paper we hoped to submit for publication at the end of the semester. One of the last, key experiments we needed to run was a study of the temperature dependence of the sample's conductivity that required continuous data acquisition over about six hours. In order to have a long block of time available to us, I scheduled the experiment for a Saturday. Jo helped me get everything ready on Friday: we prepared all of our thin-film samples, soldered probes to the substrates, made certain we had a full liquid helium tank, calibrated the instrument, and gathered all of the other equipment we would need to conduct the experiment.

On Saturday morning I waited for several hours for Jo to show up but she never did. Finally I started the experiment myself. It wasn't a huge problem to have to do the experiment myself, but I was disappointed that Jo didn't show up. The next Monday, I expressed my disappointment, and her reply was, "The Pitchfork Music Festival was starting in Chicago, and I really wanted to go see this band playing there." I didn't know what to say.