Introduction

This guide is intended primarily to support advisor and advisee to make this important relationship effective and rewarding for both parties. The advisor-advisee relationship ideally extends beyond simple advice and supervision, and is a mentor-mentee relationship, where the mentor has a holistic approach, attuned to the deeper needs of the mentee to have a sense of belonging and to develop their professional identity. Mentoring can, and does, also take place outside of the advisee-advisor relationship. Our guidance extends to these less-official relationships, as SPT’ers have found them very valuable.

Why read this guide

We all want to make the SPT Collaboration a place that supports the development of junior scientists, and mentoring relationships are key to that outcome. As a scientific collaboration we also rely heavily on the contributions of graduate students and postdocs, and the quality of their work depends on the guidance they receive from each other, and from the more senior scientists. Successful mentoring can also be a significant source of satisfaction for both mentor and mentee, and a reputation for good mentoring can help to recruit and retain junior scientists.

Mentoring is clearly an important activity. Perhaps surprisingly, most of us in the collaboration have had little to no formal training. For many of us, our most informative guide to mentoring may be our own limited experience of how we were mentored as a grad student and then postdoc.

The mentor-mentee relationship can be improved by education of both mentors and mentees. In this brief guide we point mentors and mentees to written materials that some of us have found helpful in the development of our own mentoring practices. We encourage mentors and mentees to read some of these documents. We encourage mentors and mentees (mentors in particular) to seek out training opportunities, perhaps ones available at their own institutions.

This brief guide should not be taken as a substitute for these external resources, but rather an exhortation to take advantage of them, complemented with some SPT-specific guidance.

Outline

For efficient navigation of this document, please consult the outline at the upper left.
Guidance for Mentors

Perhaps one of the most important things for mentors to know is that a mentoring relationship can be much more than one in which technical guidance is delivered. From the National Academy of Sciences, Engineering, and Medicine (NASEM) document we recommend below, we are aware of this summary, by Morris Zelditch, of a mentor’s multiple roles: “Mentors are advisors, people with career experience willing to share their knowledge; supporters, people who give emotional and moral encouragement; tutors, people who give specific feedback on one’s performance; masters, in the sense of employers to whom one is apprenticed; sponsors, sources of information about and aid in obtaining opportunities; models, of identity, of the kind of person one should be to be an academic.”

You can learn more about this multitude of roles, and how to fulfill them, by reading the NASEM guide linked below. It has chapters on the mentor as each of the following: faculty adviser, career adviser, skills consultant, and role model. It has separate guidance for when the mentee is undergraduate student, graduate student, postdoctoral researcher, or junior faculty.

For briefer guides that are targeted to mentoring graduate students we recommend either of the ones linked below from the University of Chicago, or University of Michigan.

Recommended documents

- From the National Academy of Sciences, Engineering, and Medicine, Adviser, Teacher, Role Model, Friend: On Being a Mentor to Students in Science and Engineering. Also available here.
- The University of Chicago Graduate Student Mentoring Toolkit
- The University of Michigan's How to Mentor Graduate Students: A Guide for Faculty

Best Practices from Guides for Mentors

The guidance to mentors in all of these documents is broadly similar and focuses on the key areas of defining the scope of the mentoring relationship, setting expectations, using effective mentoring strategies, and providing feedback to the mentee. Numerous modalities of mentoring relationships exist in the academic context, ranging from the informal---such as our SPT collaboration mentoring program---to the formal relationship that exists between a student and their PhD supervisor. The Chicago and Michigan guides emphasize that all of these types of relationships are important to students’ success, although the exact strategies that are appropriate to each type will vary.

It is important that mentors and mentees define and agree on their expectations for the mentoring relationship upfront. Some specific suggestions culled from these guides include:

- Set expectations early, both for progress towards the degree and for communication. When is the mentor available? For what kinds of questions? When will the student be available to discuss with the mentor? How and when will feedback be given? What are
appropriate ways to reach each party? What are expected work hours? Vacation timing? ("Many students who are unsatisfied with their mentoring experience highlight the inaccessibility of mentors as a concern, rather than the mentor's lack of expertise.")

- Consider creating a mentoring agreement with the student to explicitly define expectations and responsibilities in writing. The content might include the information in the previous bullet, but it could also cover timelines and procedures for publishing results or reviewing paper drafts, agreements on intellectual property, collaborators, etc.

Several basic strategies for effective mentoring interactions include:

- Agree on meeting discussion topics in advance
- Have mentee send a follow-up email after each meeting summarizing their reflections and next steps
- Have mentee stay connected with peer writing groups, journal clubs, and departmental seminars
- Adjust expectations and goals when uncertain constraints arise (such as the pandemic), and ask “how are you generally doing? Are there ways I can help?”

Giving feedback is essential for students to understand how they are progressing in their degree.

- Pay attention to hunches
- Don’t leave long gaps between meetings and provide constructive feedback regularly
- Consider how you might be contributing to the problem (have you given timely feedback? Did you ask a student to tackle a problem that they were not equipped to do?)
- Structure feedback to include the goal and steps toward reaching it
- Reach out to students even if they aren’t reaching out to you
- Mentees should transition to student-led projects meaningfully before graduation. Set this as an expectation and provide feedback that guides students to the goal of independence
- Provide annual reviews of student progress

Delivering Feedback

If your student’s (or postdoc’s) goal is an academic career, you almost certainly have a much better understanding than they do of what is necessary for them to achieve their goals. As such, your feedback is very valuable to the student. It can also be difficult to give if you see that student performance is falling short of what they need to achieve their goals. Complicating matters is that you may be uncertain in your assessment. Further, you might be wondering if some of the blame lies with the guidance you have provided.

We have found that honest feedback is facilitated by keeping it focused on performance, being open about uncertainties you have about what you see and what it means, and bringing the student into the conversation aimed at understanding what is going on, and aimed at joint problem solving of how to improve performance going forward. Ultimately, it is the student’s
responsibility to figure out how to achieve their goals. You are here to help. Encourage the student to adopt a growth mindset where one can learn and improve over time, rather than a fixed-ability mindset.

Students benefit from feedback even if they are performing well. Students often wonder how they are doing relative to how other students were doing at their stage of development. They may think they are not doing well at all, simply because they only see more senior students and have not correctly applied an age correction. Let them know as best you can.

One of the hardest things an adviser has to do is let a student know that a trial period has led the adviser to the conclusion that this is not a good match. These are heartbreaking decisions for most of us, as we remember being the young researcher with hopes and dreams about the future. They are important though as not all student/professor pairings are good advisor/advisee pairings. When entering such conversations, be as honest and helpful as possible, without being unnecessarily hurtful. The student will usually provide some guidance about how much honesty they want -- they may display curiosity about what you saw would not work, or they may be eager for the unpleasant conversation to end as quickly as possible. We have found it helpful to remind the students or postdocs that we are not infallible assessors of talent and predictors of the future, because we are not; we might be wrong, but nevertheless we need to make decisions.

Guidance to PhD advisers specifically addressing suggestions following the 2020 climate survey

We recommend the following:

1. Have sufficiently frequent one-on-one meetings so that you can make sure the student is spending their time on projects that are worth the investment, and so you have opportunities to convey the big picture.
2. For more fine-grained guidance, if you cannot meet once-per-week one-on-one with the student, see if you can find someone else, with the requisite experience, to do so.
3. Have an annual performance review with the student. This is probably already required by the university. Consult the guides for mentors summarized above to help you figure out how to conduct this review.
4. Meet with the SPT faculty mentor in advance of the annual performance review meeting with the student, to take advantage of insights they may have.
5. Look out for speaking opportunities for your advisee, and opportunities to turn a small project into a conference proceeding.
6. Discuss alternatives to an academic career if these are of interest to the student. Point them to SPT Collaboration and other resources that can support such a transition.
This list is, of course, not comprehensive; there is much more to successful mentoring than checking the above six boxes.

SPT Mentors

In 2020 Jessica Avva and Nick Huang created the SPT Mentoring Program, which includes graduate student mentoring of more junior graduate students, as well as mentoring for graduate students by a senior scientist who is not their adviser. We recommend continuation of this program. Participants will find the SPT Mentoring Program Outline a useful reminder of expectations for mentors in this program, as well as the expected value of the program.

Example training programs

UC Davis Grad Studies Mentoring at Critical Transitions Program.
U. Michigan MORE

Guidance for Mentees

Even for mentees, an important starting point is to know the value of mentoring relationships and some examples of what they might look like. It’s also important to know that one can seek mentoring from more than just one’s adviser. Plentiful access to potential mentors (a senior graduate student, postdoc, senior scientist) is one of the advantages of working in a large collaboration.

Recommended external document

We recommend the University of Michigan’s Graduate Student Mentoring Guide: A Guide For Students and provide a summary:

- Mentors in grad school come in a variety of formal and informal forms. These people will help you with three important aspects of mentorship: psychosocial, instrumental/task, and networking support.
- It is important to be proactive in assembling a team of mentors. To help understand who might meet your needs as a graduate student, these questions are useful:
  - What were/are my objectives in entering graduate school?
  - What type of training do I desire?
  - What are my strengths and what skills do I still need to develop?
  - What kinds of research or creative projects will engage me?
  - What type of careers might I want to pursue?
- To discern who will be a good mentor, go to department events to see how potential mentors interact with colleagues and graduate students. Enroll in classes by faculty who
most interest you. Ask advanced graduate students for advice about their advisors and mentors. Additionally, within the context of SPT, there are many senior members with diverse specialities. You should feel free to reach out to them if they could be useful for your research.

- A network of mentors (both faculty and peer) is a good safety net in case issues develop between you and your academic advisor.

- Develop clear expectations with your advisor
  - How and in what form can you expect to receive an assessment of your general progress?
  - What does your advisor/dissertation chair consider to be a normal workload? How many hours should you be spending each week on your research/scholarship? How often do you expect to meet?
  - Which projects that you're working on have the possibilities of becoming publications or conference presentations?
  - When requesting a reference, what information does your advisor/dissertation chair need, how much lead time do they require, and how do they prefer to be reminded of deadlines?

- If problems arise, first try to talk directly and work out differences with your advisor. If you find that you need to change advisors, here are some basic guidelines:
  - Seek the advice of another trusted faculty member to determine whether it is in fact desirable to change your advisor/dissertation chair
  - Think through the most diplomatic, respectful way to express to your advisor/dissertation chair -- and to others -- why you want to make this change
  - Before you discontinue your relationship with your advisor, find another suitable faculty member to be your advisor
  - Make the change promptly and update any formal paperwork

Other resources

Ombuds

Junior scientists are in a vulnerable stage of their career, highly dependent on a faculty adviser and on other members of the collaboration for their advancement. Sometimes it can be helpful for junior scientists to seek assistance in managing a conflict or other problem. In addition to their advisor and other team members, the collaboration also has a more formal resource in our two ombuds (the gender neutral version of the, surprisingly still, widespread term of ‘ombudsman’). The International Ombudsman Association (IOA) writes that, “The primary duties of an organizational ombudsman are (1) to work with individuals and groups in an organization to explore and assist them in determining options to help resolve conflicts, problematic issues or concerns, and (2) to bring systemic concerns to the attention of the organization for resolution.” They also write that the “… most important skills of an effective ombudsman include active listening, communicating successfully with a diverse range of people, remaining nonjudgmental, having the courage to speak up and address problems at higher levels within an organization,
problem-solving and analytical ability, and conflict resolution skills." For more on the role of an ombuds, see this brief description provided by the IOA.

Within SPT we do not have an ombuds who is completely free of other roles in the organization. For this reason we keep two, to minimize the possibility that there is no ombuds who is not already involved in a particular conflict. You can find out who the current ombuds are, and their contact info, on the SPT-3G wiki here. Most universities will also have an Ombuds Office, or some unit with a similar title.

The Team Science Field Guide

Problems and opportunities that come from working in a large collaboration are not unique to SPT. You can look to your advisor and others in the SPT Collaboration for guidance, and also consult a guide developed by the National Cancer Institute that we’ve found quite helpful.

SPT Collaboration Experts

Cultivating additional mentors, beyond your immediate adviser, is a useful strategy, as a student, postdoc, or at any stage of your career. One way to do this is to organically track down specific expertise as you need it, for example by posting on an appropriate Slack channel a question you have, or even explicitly asking there about who’s an expert on topic XYZ. Ask a few questions, ask for feedback, converse about these things -- next thing you know you have an additional mentor.