

Applied Mathematics PhD Program Advising Guidelines

The purpose of these guidelines is to assist both faculty and students in the somewhat mysterious process by which a recent undergraduate becomes a scientist, capable of both independent research and effective teaching. This document is advisory in nature, and not meant to be a formal set of rules, schedules, etc.

The environment. There are many elements that go into the making of a first-rate applied mathematician, or, for that matter, of a first-rate scientist in any area. But one requirement is universal, and non-negotiable: an atmosphere of respect and trust. This applies to interactions among all of us, but most especially to the relations of the faculty with students and post-docs. Some forms of disrespect are simply prohibited by law, and others are against University regulations – but all of these formal rules should be viewed as guardrails, as opposed to guidelines. A truly professional atmosphere makes all such issues moot, greatly contributing to the success of teaching and learning, and making the process enjoyable for all involved.

Diversity, Equity, and Inclusion. An essential feature of the Graduate program is a commitment to Diversity, Equity, and Inclusion (DEI) consistent with Yales policies and plans described in “Belonging at Yale” and plans within the Yale School of Engineering and Applied Sciences SEAS Commitment to Diversity, Equity, Inclusion, and Belonging. Specifically, The School of Engineering Applied Science (SEAS) at Yale strives to create an inclusive and supportive environment for all members of its community to learn, work, and live our lives together. We acknowledge, welcome, and celebrate our differences, including those related to age, race and ethnicity, gender and gender identity, nationality, immigration status, sexual orientation, religion, disability status, and socioeconomic status. Students are encouraged to consult these university and school level policy and plans and familiarize themselves with the resources provided. Students are also encouraged to contact the Department Chair and/or the Director of Graduate Studies with concerns about issues in the department regarding DEI. Specific violations of Yales policy on discrimination and harassment should be reported to the Office of Institutional Equity and Accessibility

Adviser. There are many ways to be a great mentor: some famous advisers work very closely with their students, while others (just as successful!) maintain a greater distance. And, of course, each student is unique, and flexibility is essential. Still, some general observations can be made.

It is a good idea for a Ph.D. adviser to meet with the doctoral students regularly and on an individual basis. Initially this could mean weekly or biweekly (or more frequently, depending on the adviser’s style), and as the student enters a more independent research phase, every two to three weeks.

One of most acute dangers facing students in graduate school is isolation. The contact with the adviser is only one way (and often not the best one!) to avoid isolation, or the feeling thereof. Contact with other students working with the same adviser, or in similar fields, can be most beneficial. While these interactions are often established without any faculty involvement, research seminars or group meetings (*ad hoc* or otherwise) are a very good way to facilitate contacts between graduate students and postdocs.

Learning takes place in many ways, and any catalyst which helps the student in the often mysterious process of learning is essential. One of best ways to learn is to teach. Thus, having students give lectures critiqued by faculty as well as graduate students and postdocs can be a transformative experience. It is important for an adviser to have clear expectations and to communicate them to the student. In many cases, students need guidance about how to think or how to approach a question, rather than solving a particular technical problem. One of greatest gifts a researcher can give to a budding colleague is to show them how they think. Frequently, the student will seek to emulate the adviser, which underscores the importance of excellent graduate courses; with some advisers, close research collaborations are even more effective. It is also extremely important for students to learn how to present their results, both in talks and in writing. For some people, the process is easy: they are ready to present a result as soon as they have it; for others, writing is a separate process, sometimes a difficult one.

Exercises, homework, and such deserve a separate mention. Some graduate students benefit from them immensely, and appreciate discussing the results. Others will do lots of exercises from books, but prefer to do it on their own. And a small (but non-negligible) subset dislike any type of exercises, and pick up the necessary background as needed for their research projects. Here, again, flexibility is the key.

A few suggestions:

- Think about the timeline: is your student making good progress? Keep the DGS informed if there are serious problems.
- Communicate with your student and indicate your expectations.
- Help your student learn how to write. This is hard work: read your students writing, and give detailed critical feedback.
- Make your own plans (travel, leaves) known to your student so that they can plan accordingly.
- Find ways to connect your student to colleagues in the field. Send them to conferences, or to visit your collaborators; help them find funding for this. When the time arrives, help them find writers of recommendation letters.
- In order to help your students finish in a timely fashion, help them plan ahead and

monitor their progress starting as early as possible.

Student. First and foremost, you are the center of the program. Ideally, by the time of your graduation you are an independent researcher, a worthy peer to your colleagues in the field. One of most frequently encountered mistakes is learning to be *a student* instead of learning to be *a scientist*.

Take initiative. Ask your adviser for guidance but also explore on your own. When you learn something (from a course, a book, a discussion – whatever) make sure that the knowledge stays with you. A great way to test your understanding of a theorem, a paper, or an algorithm is to try to reconstruct it a few weeks after you have learned it. If you fail, it generally means that you failed to understand it in the first place. If this happens frequently, something is wrong: what is the point of learning something that you will forget in a week? Analyze the problem and fix it.

Your adviser is a resource that should be used. Have frequent meetings (formal or otherwise), ask questions, agree on your respective expectations. Do not be afraid to report roadblocks and challenges you encounter (e.g., you are stuck with the proof of a lemma, or an approach you are pursuing does not seem to work, etc.). Your adviser might just know how to deal with the situation – and those are often the times when you learn the most. Generally, interesting results are not obtained on the first attempt.

While rare, friction between a student and an adviser can occur. In this case, the DGS acts as a mediator between the student and the adviser, unless the DGS is the adviser. In the latter case, the department chair acts as a mediator. If the student feels that the cooperation with the adviser is not working out (or does not wish to work with the current adviser for some other reason), changing the adviser might be in order. This is possible, though clearly undesirable – especially in later stages of the Ph.D. program. If a student wants to change the adviser, it is the students responsibility to find a new one.

Personal or medical problems that affect your course of study can arise as well. The University has specific rules for dealing with many problems of this type, and the rules are (generally) reasonable, and designed to help the student. If you find yourself in this situation, you are encouraged to discuss them with the DGS and/or your adviser, or with any of the several offices Yale has for this purpose. Remember, we are here to help.

Part of your training as a scientist involves learning how to teach, and two semesters of teaching are required. For any teaching you do after that, you will get a small salary (in addition to your stipend), and it is entirely voluntary. As usual, there are certain rules governing this process (generally, you are not supposed to teach during the first year of the program, etc.), and, as usual, the rules are reasonable. Take this part of your education seriously. It is worth doing well, might be important to your career, and can also be a source of enjoyment and satisfaction – if you do it well.

Sexual Harassment. This is inimical to any kind of teaching and learning, and should not happen in any form or shape. But if it does (or if the student feels that it might be happening), below are some of the resources available to a student. In case of need, do not hesitate to use them!

Title IX Coordinators. Michelle Nearon, Ksenia Sidorenko and Matthew Tanico are the Title IX coordinators for the Graduate School. Conversation with any of them will not initiate a formal complaint without the student's expressed consent.

More information: provost.yale.edu/title-ix/coordinators.

SHARE Center. Located on the first floor of the Yale Health building, the SHARE (Sexual Harassment and Assault Response & Education) Center offers a variety of confidential and, if desired, anonymous support services to any member of the Yale community dealing with sexual misconduct of any kind. SHARE has a new support group specifically for graduate and professional school students.

More information: sharecenter.yale.edu.

Mental Health & Counseling. Students can make an appointment with a therapist or seek urgent care by speaking with a 24/7 on-call therapist at Yale Mental Health & Counseling.

Chaplains Office. Members of the Yale community can speak confidentially with chaplains at the Yale Chaplains Office, even if they do not identify with a particular religious practice. The chaplains, who may represent a variety of spiritual traditions at Yale, are a great resource for students who may be initially reluctant to seek support from a therapist or psychiatrist.

More information: chaplain.yale.edu.

Yale Police Department. A student wishing to report an incident to the police may call YPD at (203) 432-4400. Sgt. Cristina Reech, the Sensitive Crimes and Support Coordinator at the YPD, will assist victims and investigate cases of sexual violence, harassment, assault, violence against women, and other crimes of sexual misconduct.

University-Wide Committee. The University-Wide Committee on Sexual Misconduct is the disciplinary board that addresses claims of sexual misconduct. It assists individuals with the process of filing a formal complaint.

More information: uwc.yale.edu.