Advising in the Computer Science PhD Program

February, 2019

The student-advisor relationship is one of the best things about being a PhD student. It gives each student an opportunity to learn directly from, and be mentored by, one of the great minds in the field, in a fashion personalized to that student's needs. Students with good advising relationships are likely to be happier, learn faster, and produce better results.

This document sets out the expectations for advising in the Stanford Computer Science PhD program, both for students and faculty. Advising can vary significantly from professor to professor, and many different styles can be effective, so this document does not prescribe a particular approach. Instead, it discusses the various elements of advising and the issues for students and faculty to consider. Students can use this information to select the best advisor for their needs, and students and advisors can work together to design a relationship that works best for them.

The purpose of advising

Graduate school is a time of significant change for students. Before graduate school, students live in a highly structured course-oriented world where they mostly follow directions. By the time they receive their PhDs, students have transitioned to a very different world consisting of independent and self-driven research. There are no classes to guide students through this transition; this is the role of advising. Advising provides personalized teaching about how to choose research projects, how to carry them out, how to present the results, and how to behave in a proper professional fashion. Advising helps students develop academic and professional skills, and it prepares them to be competitive for future employment. Advisors also offer advice on many other topics, such as teaching, choosing a career, or general life issues.

Aligning with an advisor: rotations

Finding the right advisor is one of the most important tasks for incoming graduate students, and the first year of the PhD program is designed to give students and faculty the information they need in order to make good alignment decisions. Almost all students align with an advisor by the end of their first year.

The alignment process is driven by students. Students should begin thinking about advisors as soon as they are admitted to the program. Ideally, an admitted PhD student will already have one or more potential advisors in mind before deciding to come to Stanford. Most incoming students use the rotation program to learn more about potential advisors. During each quarter of the first year, a student works with a particular professor; students select the faculty they would like to work with and approach those faculty to ask about rotation availability. Over the course of a rotation the student learns about the professor and his or her style of research; at the same time, the professor learns about the student. At the end of the quarter, both the student and the professor are in a better position to decide whether they can work together effectively. Faculty are responsible for offering alignment to students; they can do this at any point during the year. Students can accept an alignment offer at any time, but they typically wait until the end of the third rotation to commit to a particular professor.

The rotation process works best when both students and faculty are proactive and transparent. Students should plan rotations as far ahead as possible, in case faculty are constrained in their rotation slot availability. Students should also be proactive in making sure that faculty have alignment slots available

before rotating. Faculty should be transparent with students about how many CS students they expect to align with in the current year and how they will make alignment decisions. At the end of each rotation, faculty should give students clear feedback on the prospects for alignment. Faculty should make alignment offers as early as possible in the year; ideally, this will happen immediately after the end of the student's rotation, in order to minimize uncertainty for students and allow them to plan their remaining rotations better. Students should not be required to decide on alignment offers until the end of the third rotation, in case they find another advising relationship that will work even better.

In addition to providing a vehicle for meeting potential advisors, rotations also provide a great mechanism for learning about research areas outside the student's area of focus, and for meeting additional faculty and students. However, it's important for students to have at least one firm alignment offer before considering "experimental" rotations.

Working together

There are many different styles of advising that work well. This section discusses various aspects of the advising relationship and how they vary from professor to professor. During the rotation process, students should explore the style of each potential advisor and use that information, along with the advisor's research interests, to identify the advisor with whom they will have the most productive relationship.

Meetings. Regular face-to-face meetings are essential to a healthy and productive student-advisor relationship. The frequency and length of these meetings varies between advisors, but weekly meetings are common. The meetings are typically informal, with the student describing recent progress and issues, interleaved with comments from the professor and related discussions. Making time for student meetings is one of a professor's most important responsibilities. One way to ensure that meetings occur is to reserve a regular meeting slot on the advisor's calendar; it's easy to cancel or abbreviate a meeting if there are not enough issues to fill the designated slot. In addition to individual meetings, many advisors also meet with their students in other settings, such as weekly group lunches.

Engagement. The level of advisor involvement in student research varies dramatically among faculty. Some faculty are relatively "hands off" and prefer to engage at a high level, leaving the details to the student. Other advisors take a more "hands on" approach, learning about the student's project at a greater level of detail and offering more detailed guidance. In some cases advisors work hand-in-hand with students, such as by reading student code or writing code alongside students. It is not unusual for advisors to be more engaged and prescriptive during a student's early years but step back gradually over time, so that by the time a student graduates he or she is working more independently.

A professor is more likely to engage deeply with a student if the professor has a strong personal interest in the student's research. Sometimes a student's research interests diverge from those of their advisor. If a student in such a situation wants to have a highly engaged advisor, then the student may need to either switch advisors (see below) or switch to a project that excites their current advisor.

Control. Some advisors give their students complete control and view the advisor's role as purely supportive: "you are free to do whatever you want; if you have questions or need help, I will try to assist." At the other end of the spectrum are advisors who take the phrase "research assistant" literally; they assume that students will help carry out the research and offer input, but the advisor will make most of the important decisions. Most faculty lie between these two extremes, where each party in the relationship has certain obligations to the other. For example, faculty may need help from students to meet obligations associated with funding that supports the students.

Individual vs. group. Students can work either alone or as a member of a group. Being part of a group brings several benefits, such as having other students to talk with and being able to attack larger problems. Senior students in a group can help to mentor new students. On the other hand, groups often

impose responsibilities; for example, new students may be expected to serve as "apprentices" for senior students, and students may have to give up some flexibility in choosing projects in order to support the overall goal of the group.

Financial support

The expectation within Computer Science is that faculty ensure financial support for their advisees as long as the students are making reasonable academic progress. Some students already have external support through fellowships; for those who do not, faculty typically provide RA-ships or a combination of RA-ships and assistance in finding suitable CA-ships. An advisor may require students to apply for fellowships.

Progress and feedback

One of the most important roles of an advisor is to assess the student's progress and provide constructive feedback. An advisor should help each student to understand his or her strengths and weaknesses, and work with the student to capitalize on strengths and improve in areas of weakness. If faculty do not volunteer feedback, we encourage students to ask for a written review from their advisors. The advisor should take time to think about the student's strengths and weaknesses and then write a few paragraphs describing them; the advisor should provide the student with the review, give the student an opportunity to read it, and then meet with the student to go over the review, answer questions, and discuss ways to make improvements.

Co-advisors

It is not unusual for students to have multiple advisors. When this happens, it is usually driven by the student's interests. There are many ways to manage co-advising relationships; the parties involved should decide on the parameters for the relationship by answering questions such as the following:

- How do the advisors share advising responsibilities? Is one advisor the "primary" advisor and the other a "secondary" advisor, or are they co-equals?
- Does the student meet separately with each of the co-advisors, or together with both?
- Who will support the student?

Changing advisors

Sometimes it turns out that a student's initial advisor is not the best choice. This typically happens because of a divergence in research interests or a conflict in style. Students should feel free to change advisors when situations like this occur: it is better to switch to the right advisor than to keep working with the wrong one. There is no stigma associated with changing advisors. It is up to the student to drive the process of switching advisors by approaching other faculty.

Resolving problems

Like all relationships, student-advisor relationships are imperfect; there is rarely an exact alignment between the needs and interests of the professor and those of the student. When conflicts arise, the best way to resolve them is for the student and advisor to discuss the conflict and work together to find a mutually agreeable solution; as in other kinds of relationships, listening and compromise on both sides are keys to success. If a student cannot reach a suitable solution to a problem, or if a student is uncomfortable discussing a problem with their advisor, there are several people in the department who would be happy to meet with the student and help to find a solution. Some good people to talk with are the PhD Program Director (currently Prof. John Ousterhout), the department chair (currently Prof. John Mitchell), and the PhD Program Officer (currently Jay Subramanian).

Faculty departures; startups

If a faculty member leaves the department, they are expected to help mitigate the impact on their students. For students close to graduation, it is common for a departing advisor to continue supporting and advising the student through graduation. For students earlier in the program, it may make more sense for the student to find a new advisor.

If a faculty member starts a company and asks some of their advisees to join them, there is a potential conflict of interest between the professor's responsibilities as advisor and as startup founder. Students should not feel obligated to join their advisor's company. If a student does decide to get involved with the startup, they must discuss this arrangement with the PhD Program Director to ensure that there is a proper separation between the student's participation in the company and their academic work. Faculty are typically required to submit a Conflict of Interest Management Plan; they should make these plans available to students so everyone knows where the boundaries are.

Students without an advisor

Occasionally a PhD student beyond the first year will find themselves without an advisor, either because they did not align after rotations or because an existing advising relationship has ended. As soon as a student realizes that they will be without an advisor, they should notify the PhD Program Director, who will work with them to devise a plan for finding an advisor as quickly as possible.