

Stanford | ENGINEERING

Graduate Programs in Computer Science

The Stanford Computer Science Department welcomes you to apply to its two graduate programs: a MS in Computer Science program designed to give you exposure to the frontiers of computer science and prepare you for work in industry, and a PhD in Computer Science program designed to train you as a researcher and open doors in both academia and industry.

We've put together this packet to help you get a better sense for what these programs look like and to offer advice and input on how best to apply for them. We've solicited input from many of our current graduate students in the course of putting it together, and we hope that you find it useful!

Feel free to visit the CS department's website at cs.stanford.edu to learn more about the department, our faculty, our courses, and our graduate programs. And if you have any questions or would like to get some advice, please feel free to reach out to us! We're happy to help out.

Computer Science Department Graduate Admissions
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Stanford MS in Computer Science

Interested in a career in software engineering? Want to dive deep into the field and see why it's so exciting? The Stanford Computer Science Department's Master of Science (MS) in Computer Science program may be a good fit for you!

Our MS is open to students of all backgrounds. Some of our students studied computer science as undergraduates and are interested in exploring the field in more depth. Many of our students graduated with a degree in a totally unrelated field, discovered that they were interested in computer science partway through their undergrad, and wanted to get a more formal introduction to the field. And many of our students found themselves interested in a career change and decided to see what all the excitement was about. We're excited to have such a diverse crowd of students here, and we'd like to welcome you to apply to the program.

Our master's program allows you to specialize in a number of different areas of computer science. You can study artificial intelligence and gain experience with machine learning, computer vision, or speech processing. You can explore software systems and learn the concepts and techniques underpinning the Internet, operating systems, and programming languages. You can study theoretical computer science and study the limits of efficient computing and modern approaches for algorithm design. Or you can choose to combine any two of our ten concentrations into a program that best suits you.

Our MS program typically takes about two to three years to complete. If you majored in computer science as an undergraduate, it's reasonable to expect that the program will take less time, since you'll be able to jump straight into more advanced coursework.

The MS in CS is designed as a terminal degree and after completing the program most of our students go on to work in the software industry as software engineers, data scientists, or product managers. The MS program is purely coursework-based and there's no research requirement. That said, some of our students do get hooked on research during their time in the program go on to pursue a PhD in the field. If you're already excited about the idea of doing research in computer science, we'd actually recommend directly applying to our PhD program – the MS isn't required!

Unlike the PhD program, which provides funding through the duration of the program, tuition is required for the MS program. To help offset this, many of our MS students serve as teaching assistants (TAs) for our courses or as research assistants (RAs) in the department. TAs and RAs can cover up to the full cost of tuition in any given quarter and additionally provide a small stipend. Due to our location in the heart of Silicon Valley, many of our students do part-time internships over the summer (and year-round). And finally, according to a 2015 survey, the median starting salary of our graduates was \$117,500.

Stanford PhD in Computer Science

The PhD program is the best fit for students who are interested in doing research in computer science for at least several years, and perhaps even for a career. It is important to know that if you think you want a PhD, it is often a good idea to apply directly to PhD programs from your undergraduate program, and it is **not** required to complete an MS degree before applying for PhD programs. Like our MS program, the PhD program is open to students of different educational backgrounds. An undergraduate degree in computer science is not required.

If you are admitted to our PhD program directly from undergrad, you will spend the first part of your PhD education completing a set of breadth requirements to give you exposure to a wide array of topics in computer science. These requirements are more flexible than those from the MS program and give you the leeway to focus on topics you think will be most useful down the road. Once you've completed these breadth requirements and passed your qualifying exam, the department can award you an MS degree for your efforts. Being enrolled as a PhD student carries benefits such as funding (free tuition and a small living stipend) that the typical MS student does not have. You'll also use that time to begin forming a relationship with an advisor and formulating research ideas.

Back on the topic of funding, you should know that most Computer Science PhD programs in the US provide full funding – that is, **the school pays you** to be a student, rather than vice versa! In exchange, you do research work for your adviser. Usually this is just the work you need to do anyway for your own dissertation, but sometimes includes other tasks. Keeping this in mind can help you understand the best way to approach the PhD admissions process. Undergraduate admissions and MS admissions are fairly similar in that applicants are evaluated by a committee and those collectively deemed the best will be admitted. Most PhD admissions processes operate more like an employment hiring process – individual faculty members are in a sense looking to hire research assistants and will take a much more individualized look at the applicants for not just overall excellence, but also fit for a particular niche. (Stanford's PhD admissions process also solicits input from the general faculty and takes other factors into account, such as your intended area of concentration.)

That said, at Stanford you are not locked in to a particular adviser, or even research area, right away. Instead, our Computer Science PhD program is organized with a first-year rotation system, where you will have the opportunity to work with several different research labs on a quarterly rotating basis, in order to find the lab with the most mutual interest between you and the faculty adviser.

Our PhD program typically takes about five or six years to complete. Due to our location in the heart of Silicon Valley, many of our students do part-time internships over the summer. According to a 2015 survey, the median starting salary of our PhD graduates is \$133,500.

Applying to Graduate Programs

The application to our MS and PhD programs (and many other similar programs across the US) consists of four main parts, which are

- your undergraduate transcript and resume,
- standardized test scores on the GRE (and TOEFL, if you aren't a native English speaker),
- three letters of recommendation, and
- a written statement of purpose outlining your background and what you intend to do.

When we look over your transcript, we're trying to get a sense of what classes you've taken and how well you've done in them. Obviously, you should try to do as well as you can in your coursework. If you aren't majoring in computer science, we would recommend trying to take as many CS courses as you reasonably can, both so that you can get a better sense for what those courses are like and so that we can get a better sense of your demonstrated abilities.

With regards to standardized testing, again, it's always better to score well on these tests than to score poorly. We typically consider the standardized tests to be more of a *negative filter* than a positive one. That is, we're unlikely to admit anyone purely on the merits of their standardized test scores, though we may pass on an applicant whose standardized test scores are low enough to cast doubt on their abilities.

The three letters of recommendation that you submit will be one of the bigger parts of your application, so it's worth taking the time to select your letter-writers carefully. Ideally, we'd like recommendation letters from someone who has experience working with graduate-level CS students (for example, a CS professor or a CS instructor). Strong recommendation letters typically come from someone who knows you well and can compare you against other applicants. For example, a recommendation letter from a professor who says you're in the top 5% of students across ten years on the job will likely carry a bit more weight than a recommendation letter from a PhD student in a lab who thinks you were one of the best people they ever worked with.

Finally, there's the statement of purpose. In all of the other materials included in the application packet, we can get a good *indirect* read on who you are. We've seen some of the work you've done, gotten a sense of your academic performance, and heard from people who have worked with you before. The statement of purpose is your chance to tell your own story. What interests you about the MS program? What do you hope to accomplish in it? Are there any specific domains where you want to make a difference, and why? And is there anything about your life's story that you think we should know about?

Advice for Recommendation Letters

Long-term advice for getting good recommendation letters:

- **Meet your professors.** Large classes are asymmetric: you'll know your professor, but unless you make an effort to meet them, they probably won't know you. Most professors appreciate it if you ask questions after class or in office hours that demonstrate you're engaging with the material. This can help you get into research projects down the line. Plus, if you ask that professor for a recommendation letter, they might have more to say than the generic "DWIC" (see below!)
- **Build a track record of CS courses.** If you didn't study computer science as an undergraduate, we recommend taking some CS courses before applying. This will help the admissions folks get a better sense of your academic performance, and it'll give you a chance to see what the field is all about! If you've already graduated, you have the option of taking individual CS classes from Stanford through our SCPD program. Check with your employer and see if they'll help sponsor them.
- **Take project-based classes.** Project courses let you dive deep into a particular problem and often give you a chance to interact closely with faculty members, who can then comment on the specifics of your work in recommendation letters. In many cases, it looks better for a professor to comment on some specific techniques or insights that you developed working on a project than it to hear you generically did well in a course.
- **Try your hand at research.** Research projects are a great way to learn about the field and to form relationships with professors. Professors can often write detailed letters about the work that you did in a research project – the quality of the insights that you had, your work ethic, etc. – at a level they generally can't get from classroom interactions.
- **Look for REU options.** Many schools have summer research opportunities (often called REUs) open for undergraduates. This is a great way to spend a summer doing research, to travel to other universities, and to meet faculty members you wouldn't normally get the chance to interact with. Plus, if you're thinking about applying to a PhD program some day, you'll get the opportunity to see what different schools and programs are like.
- **Get involved with teaching.** Some schools let undergraduates to get involved in teaching. These programs are a great way for you to learn way more about the course topics than you ever might have thought imaginable, and they often offer opportunities to work closely with instructors or professors. Sometimes, teaching positions have official end-of-term evaluations that a professor can point at in a recommendation letter.
- **Build relationships with multiple faculty members.** If possible, try to work with more than one faculty member. This will help you get to see different perspectives on research, learn cool ideas from multiple subfields of CS, and – relevant here – will make it easier to get multiple strong recommendations.
- **Find an accountability partner** If you're looking at the above list and feel a bit nervous about taking some of these steps and getting out of your comfort zone, it can be really valuable to have a friend be your "accountability partner" and help you follow through with these steps. Plus, you can then turn around and do the same for them!

Short-term advice about how to get the most out of your recommendations:

- **Avoid the “DWIC Letter,” if possible.** Let's suppose that you took a large lecture class from a professor that you haven't had much contact with outside of that course. If you ask that professor for a recommendation letter, you might end up just getting a letter detailing your performance in that course and not much else. We call these letters “DWIC Letters” (**Did Well In Class**). Given that whoever is reading your application already has your transcript, a letter that just says you did well in a course doesn't add much to your application, even if it's from a well-known professor. That being said, given that you need to submit three recommendations, you might find that you need to ask for a letter from a professor that doesn't know you very well just to get up to the total. That's fine. You just want to be sure that you don't end up with two or three generic DWIC letters.
- **Help your letter writers.** Professors work with lots of students. When asking for a letter of recommendation, it's often a good idea to provide your professor with a refresher of how you interacted with them and what you accomplished. Offering a copy of your transcript and your most recent resume is a good first step, and if you've already written your statement of purpose, feel free to include that as well. If you're asking for a letter from someone who you've worked with extensively, it's perfectly reasonable to mention a few specific points you'd like them to focus on, such as your projects, your contributions to research projects, etc. For professors you don't know as well, feel free to remind them that you were the person who stayed after class that one time to talk about topic X or that you chatted with them about Y and Z in office hours.
- **Be strategic with industrial recommendations.** If you've developed a good working relationship with someone you worked with in a technical, professional, non-academic setting (such as a software internship) and think they can speak highly of you, you may want to consider asking them for a recommendation letter. However, if you do, you may want to help them focus the letter on skills relevant to graduate schools. For example, you may want to ask them to compare you against other people they've worked with who have gone through academic programs like the one you're applying to. Similarly, you may want them to comment on skills that correlate well with academic success (being a fast learner, taking initiative, asking questions strategically, etc.) in addition to skills that work well in business (for example, working well with customers.)
- **Be careful about non-technical recommendations.** You may know someone who can comment on your character in a non-technical sense. For example, you might have volunteer experience in your community, have worked with a religious organization, etc. While you can ask people in those groups for recommendations, keep in mind that they may not be able to comment with authority on your technical abilities or preparation for the MS or PhD programs. We suggest only including recommendation letters from sources like these if you believe they would highlight something significant about your past experience or abilities that would otherwise not be clear from your application.
- **“Freeze” recommendations if you're delaying your application.** If you're interested in applying to graduate programs, but want to take some time before doing so (for work, for other obligations, to travel, etc.) it's a good idea to ask your letter-writers to *write* – but not *submit* – their recommendations before you leave. That way, when you officially ask for the letters, the writers won't have to think back across many years to remember the interactions you had.

Advice for Your Statement of Purpose

Your statement of purpose is your chance to talk about your reasons for applying to graduate school and what you hope to get out of it. Here's some advice about crafting an effective one.

- **Talk about why you, personally, are interested in studying computer science.** As mentioned earlier, the statement of purpose is the only place in your application where your own voice will come through. Use this opportunity to explain why you're excited about the field. If you studied computer science as an undergraduate, what is it specifically that's motivating you to continue onward to study it in more depth? If you didn't study computer science as an undergraduate, how did you first get exposed to CS, what excites you about it, and what do you hope to get out of the program? Avoid talking in vague generalities, if possible – after reading a huge stack of applications that all talk about how exciting AI is going to be in the next ten years or how much computing has changed society, it's refreshing to see something more personal!
- **Include specifics, but be sure to do your homework.** When applying to any graduate program, it often helps to include in your statement of purpose about specific courses you'd like to take, specific programs you'd like to be a part of, and specific professors you'd like to work with. However, be careful about doing so based on a quick read of that program's website. Confirm that the classes that you're talking about have a good reputation in the school and that the programs you're interested in are still active. Make sure that the professors you'd like to work with are still at the school and have active research programs. As much as it helps to include details that show that you've done your homework, it hurts to include details that show that you haven't actually given things that much thought.
- **Pretend you're writing for a friend.** A lot of people find it uncomfortable to write a statement of purpose talking about how great they are and highlighting their accomplishments. If that happens, one technique that many of our own MS and PhD students have recommended is to pretend that you're writing a statement of purpose for a good friend of yours rather than yourself. How would you advocate on their behalf? Which of their strengths and accomplishments would you focus on, and how would you help them structure a great narrative?