

What graduate schools want

When graduate schools are admitting students (M.S. or Ph.D.), they are trying to answer one question from your application materials: "Does this person have the potential to conduct scientific research?"

When I review applications, I look at three things:

1. prior research (published or unpublished);
2. letters of recommendation; and
3. personal statement.

If you've already done research and published it, then you've answered the question for the admissions committee. If you have unpublished work, submit it with your application, and someone from the field will judge the quality of the work. If you don't have any prior research, don't lose hope. You can still get in, because schools are trying to judge *potential* to do research. [I didn't have any research papers when I applied to Ph.D. school.]

Masters-only tip: If the school lets you select thesis or coursework as a preference, select thesis. Selecting coursework signals the admissions committee that you're not interested in research! But, just selecting thesis is not enough! Your personal statement needs to convince the admissions committee that you actually want to get a thesis *in some research topic*, rather than just take more classes.

Helpful books

Most of the books out there give bad advice on getting to graduate school.

The only one I've seen that gives pragmatic, realistic advice is [Graduate School: Winning Strategies for Getting in](#) by Mumby. The most important advice from this book is to get in touch with your potential advisor *before* you apply.

If you're looking for advice on whether graduate school is for you, whether to get a master's or a Ph.D., how to apply, and what to do once you're in, I recommend [Getting What You Came For: The Smart Student's Guide to Earning an M.A. or a Ph.D.](#) by Robert Peters. This book is brutally honest.

Letters of recommendation

When letters of recommendation come from active, well-known researchers in your field of interest, a sentence in your recommendation like, "I've supervised her on a research project, and I have witnessed and believe in her potential to do research," counts for a lot. Recommendations like, "This student took my class and got an A," can't really help the admissions committee discern your research potential. Doing a supervised independent study on some research topic is a great idea, because you'll get a fantastic letter of recommendation out of it.

When you ask for a letter of recommendation from a professor, don't ask them if they can write a letter of recommendation. Of course they'll say, "yes," to that. Ask a professor if they can write a *strong* letter of recommendation. This provides them a way to say "no," and saves you the embarrassment of a crappy recommendation letter.

Provide your recommenders with all the necessary materials: pre-addressed stamped envelope, due dates and your application materials. Send email reminders and check with schools that they've received recommendations.

Also, talk to a professor at your school in the field in which you plan to do research. Ask them to which schools you should apply for that field. At this point, they should contact professors at those schools in these areas, let them know you're applying and give a candid assessment of your abilities. These behind-the-scenes recommendations are priceless.

Personal statements

Personal statements should be short (one page), and **anything important** like the name of **Professor X** should be in bold. "Personal statement" is a terrible name for this document, because it confuses applicants. Use this statement to answer the following question in essay form: "Why should we, the admissions committee, believe that you, the applicant, have the potential to do research in field X?" and "What kind of research could you see yourself doing and why?"

A personal statement should not cover your childhood experience with science, computers or math.

A really good "personal" statement will talk about projects you've worked on, any publications that resulted and include citations to relevant research articles from the field.

You should treat the personal statement like a letter to the professor at the top of your preferences list, because there's a reasonable chance that's what it is.

What if I don't have a publication?

You can still get into grad school without publications; it's just harder. You have to convince the person reading your application that you have the *interest, experience and potential* to do research.

Showing interest

To show interest, you need to do your homework. You should start reading research papers in your field of interest, and be able to comment on them intelligently in your application. If you can read a particular professor's research papers and comment on them *intelligently*, this counts for a lot when that professor reads your application.

Showing experience

If you have experience on a research project with a professor, this will come across in the recommendation, but you should also describe the project in your personal statement. What was the goal of the project? What was the core technical challenge? What were the key insights to the solution?

Showing potential

In my experience, the most important character trait in research is not intelligence, but self-discipline. Brilliance helps, but it's not necessary. Success in grad school is 20% luck, 20% intelligence and 50% hard work. I never figured out what the remaining 10% is.

Many research problems take months of day-long toil to solve. I probably average one publishable solution to a research problem every two months. That means I spend 59/60 days---a whopping 98% of my time---failing. On top of that, many good venues will accept only 1 in 6, or even 1 in 10, of the submitted papers. Getting your research out to the community will be a struggle, because even if you're brilliant, you have to be able to explain your idea in terms that researchers outside of your narrow specialization can understand. So, if you want to prove that you have potential, prove that you have the fortitude to take on the system.

Do the math

There is way too much randomness in the grad-school admissions process. Many excellent applicants will be rejected for reasons totally apart from their research potential: they selected the wrong potential advisor, or their personal statement was too long, or their application was read later in the process when reviewers are exhausted, or no one even bothered to read it at all.

Recognize that acceptance rates, even at "lowly-ranked" schools hover around 10%. At "top" schools, acceptance rates will be in the low single-digit percentages. If you only want to go to a top grad school, then you're going to grad school for the wrong reason, and the odds of you getting in are low. You should go to grad school because you want to do research, and you don't need to go to a "top" school for that.

At top schools, virtually all applicants are qualified, which means that your probability of getting in is roughly the same as the acceptance rate. Assuming a 5% acceptance rate, if you apply to 10 "top" schools, your probability of going to grad school is $(1 - 0.95^{10}) = 40.2\%$. If you *really* want to go to grad school, then the odds are that you'll end up disappointed if you take this strategy.

If you apply to ten "top" schools (5% acceptance rate) and ten "regular" schools (10% acceptance rate), then your probability of going to grad school is $(1 - 0.95^{10} \cdot 0.90^{10}) = 79.2\%$. This is a lot better, but it still feels a little low to me.

Decide ahead of time on the probability you'd like to get into grad school, and compute the appropriate mixture of "top" and "regular" schools to which you should apply.

What doesn't matter

GPA? I don't care if it's 2.0 or 4.0. I won't even look at it. The school you went to? I'll judge you the same whether you went to Nowhere State U or a top-ten school. Transcripts? Never seen one. GREs? Irrelevant. Where you work/worked? Unless it's a research lab, it's not important. I don't think these items have much predictive capacity as to whether or not someone can complete a Ph.D.

A word on GPA cut-offs

I discovered through feedback that some schools (including Utah) have a GPA cut-off. I think GPA cut-offs are absurd. Of course, GPA cut-offs are not hard. In practice, there is a way to override them, but it probably requires a professor going to bat for you and getting the right bits flipped in the university bureaucracy. So, if you have a low GPA, mention it after you've piqued a professor's interest, and ask if you think it will be a problem during the admissions process. [One of Utah's Turing award winners was a "special-case" admit for grad school because his GPA was below the cut-off. We're glad we didn't reject him.] If I really like you, I'll go to bat for you.

Ten application tips

1. **Contact a faculty member you'd like to work with.** Email them a month or so before you apply. [*Please read my [guidelines on how to send email](#).*] Tell them you were considering applying, and you're curious about the research opportunities available in the field. Comment intelligently on some research that faculty member has done. Attach any research you've done, and briefly summarize your research interests. That faculty member can then make sure your application receives a thorough review. Bear in mind that professors receive *lots* of form-letter spam from prospective students. It's painfully obvious when the email is form-letter spam, and most professors will summarily discard it.

Send a short follow-up email in December/January so they remember to tell the admissions committee to watch for you!

2. **Be brief.** Even "lowly ranked" schools will receive hundreds or even thousands of applications for a few dozen slots. Most applications are skimmed first, and read only if something catches the reviewer's eye. **Bold-facing** items can help catch a reviewer's attention. There simply isn't time to read long-winded applications.
 - Short bullet points
 - Make it easy to digest
 - Your application

[But, please, make your bullet points grammatically parallel.]

3. **Choose your area of interest/preferred faculty carefully.** Applications are reviewed by the faculty in the area for which the prospective student states an interest. If you choose this poorly, the right person will not see your application. Reviewers also get annoyed

when there is a mismatch between area preference and faculty preference. At least skim the home pages of every faculty member. It's also a good idea to look for faculty with an active research program and current Ph.D. students. Faculty without funding can't easily admit students. New/pre-tenure professors are *especially* eager to find good graduate students, and sometimes they have start-up funding to use until they get a grant.

4. **Be different.** Don't talk about how you've been interested in the field ever since you were a child and that you wrote your first program/proved your first theorem at age eight. The admissions committee already knows that it's been your lifelong dream to become a scientist. (That's why you're applying.) Many personal statements start off this with this standard back-story, and it's a waste of space.
5. **Use quotes carefully.** A lot of personal statements start off with a quote. If you use a quote, make sure it's witty, relevant and one that the reviewer has never seen.

Do not misquote or misattribute a quote. (Also, Benjamin Franklin was not a U.S. president.)

Definitely do not *misunderstand* a quote and weave that misunderstanding into a narrative about why you want to go to grad school.

6. **Put up a personal/research home page.** Make it *professional*. Highlight any interesting projects you've worked on there. Remove all references to your political and/or religious preferences. (Clean up your Facebook/twitter profile, too.)
7. **Proof-read your documents.** This should go without saying, but having typos in your statements looks sloppy. If you're not a native English speaker, have a native English speaker proof-read your materials.
8. **Make your application look good.** I know this shouldn't matter, but I find myself putting more effort into well-typeset applications. I notice when applications use LaTeX (and use it well), too. Palatino, Computer Modern and Times New Roman are good fonts for applications.
9. **Choose your recommenders carefully.** Cultivate working relationships with your recommenders. This is the only way to get convincing recommendations out of them. (If you tell a professor you're interested in research after class one day, they'll have you helping out on a research project by that evening. Professors are always short on research manpower. Trust me.)

10. **Don't get a job.** Once you get accustomed to a real salary and you start putting down roots, it's going to be difficult to go back to being a student. You'll be living in a small apartment, working on demanding problems all day long and getting paid a subsistence wage to do so. This will be your life for four to seven years. The *least inconvenient* time to do this sort of thing is right after undergraduate school. I often tell undergrads pondering a Ph.D., "You're only dumb enough to get a Ph.D. once, so you'd better not let the moment pass you by."

Good examples

Names and specific details have been changed to protect anonymity.

- One applicant created a clean, well-designed page to showcase the projects he'd worked on. I could browse the abstracts of the projects, look at code, and each project included links to peer-reviewed papers. Even though the applicant had no peer-reviewed publications, I was convinced they had the caliber to do peer-reviewed research.
- I was about to put an applicant in the "maybe" pile, when I saw he'd led a 100km hike in the Himalayas. The kind of persistence it takes to do a 100km hike in the Himalayas is the kind of persistence it takes to do research. I moved the applicant to the "accept" pile.
- Usually, recommendations from industry are discounted, but one recommender from industry wrote a short, one-page recommendation in bullet-point form. The bullets were things like **Teamwork**, **Strengths**, **Weaknesses**, **Communication**, **Experience**, plus a sentence or two to back up each point. This let me see the information I needed immediately, and it boosted the applicant's chances.

What should I do if I've been rejected from grad school?

If you got rejected from everywhere but you followed my advice, contact me. I'll do my best to give you a candid assessment of why I think you were rejected and what you can do to improve your chances.

Keep in mind that there's a lot of randomness involved; don't take the rejection personally. If you're serious about grad school and academia, you're going to end up getting rejected a lot more. Improve your publication record and apply to more schools next time. Keep trying!

If you were working with a professor during the admissions process, contact them. There's actually a chance they forgot to ask the admissions committee about your application. (Professors are always juggling a lot of balls.) You might even find out the reason you weren't accepted was that the professor(s) that wanted you didn't have enough grant funding this year. That is, you may have done everything right, but were rejected for factors totally out of your control.