Figuring out if grad school is right for you and how to build a stronger application

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What to do next?
Options after graduation

• gainful employment 💰

• funemployment 😞

• grad school ¿

• professional school 🧕

• service programs 🧡
The grad school option

Two types of programs:

• MS/MEng degree: 1-2 years, either coursework-only or with a thesis, *usually self-funded*

• PhD: 5-6 years (including MS), coursework and research culminating in a dissertation, *usually funded by department and research advisor*
What program is right?

• “I want to learn more about X”
  → Class-based MS program

• “I want to work on a project involving new technologies that use Y”
  → Thesis-based MS program

• “I want to design new technologies to address problem Z.”
  → Ph.D. program
Upsides

• Exposure to cutting-edge engineering topics that haven’t made it to the undergrad curriculum

• More interesting jobs and networking opportunities

• Higher starting salary when you exit. For 2014:
  
  • BS national average = $62,300
  
  • MS national average = $72,600

• “A second chance”
Downsides

- MS/MEng programs cost money, TA/GA stipends are not great
- Delaying the start of your career / savings / paying off student loans
- Coursework and research can be more challenging than undergrad
- “A bad fit”
Topics for today

• Ingredients of the application
• Building a stronger application
• Evaluating offers
Application ingredients
The application

- Transcripts
- GRE (general)
- Personal statement / essay (s)
- Letters of recommendation

#1 rule: consider your audience…

the admission committee
Grades

• How well have you done in your core classes (including pre-reqs)?

• What electives did you take? Are they the right preparation for the topics you want to study further?

• Will you successfully graduate in time from the graduate program?

• What about extenuating circumstances?
• Can’t save you, can sink you.

• Math + Analytical are the most important

• Material is not too advanced! You can take it early.
Personal statement

• Why do you want to go to grad school?

• What are you interested in? Why did you major in engineering?

• What have you learned from your experiences? This is different than what were your experiences…

• Who might you want to work with? Why do you want to go to this school?
Letters of recommendation

Recommendation letters are a very important part of your application:

• provides insight into whether you would be a good fit beyond the numbers and generics

• admissions committee may know your letter writer

• letters can give more context to your activities
Who should your recommenders be?

1. Professor with whom you did some research

2. Professor for a *relevant course* where you did well
   Supervisor (pref. with a Ph.D.) from an internship

3. Non-academic or non-research supervisor
Building a stronger application
Making the most of your time

1. Get involved in research:
   - Summer: WINLAB, internships at research labs, summer REU programs, individual research
   - Semester: Aresty Center, individual research w/ professors or labs

2. Choose relevant courses, especially electives

3. Document/share side projects (e.g. on github)
Research programs

Some research opportunities come through summer or semester/year programs:

- Well-defined research question or project
- Work with professor or grad student(s) or in a group project
- Funding (modest) available, so limited number of spots.
Internships

Summer internships are often about development but some are more research-oriented:

- National labs (Sandia, Livermore, Los Alamos, etc.)
- Academic-affiliated labs (Lincoln Labs, Draper Labs, etc.)
- Companies that do R&D work for the government (SRI, Galois, etc.)
Individual research

The most common way to get involved in research is to work with a professor or their lab on one of their ongoing research projects:

• get exposure to the research process

• get a chance to learn things and try things outside of class

• challenging because it’s on you to keep going
Getting involved in a research project

1. Look around at faculty homepage and their research interests or recent publications (see also Google Scholar)

2. Try to read the abstract/intro of a paper:
   - What real-world issue this paper is trying to address?
   - What kind of work is involved? Programming? Designing circuits? Lots of experiments and comparisons? Proving theorems?

3. If it seems interesting, email the professor.
How *not* to email

Dear professor,

I hope you are doing well! My name is [REDACTED] and I am very interested in doing research in your exciting lab. Please let me know if you have time to meet with me.

Sincerely,

[REDACTED]
A checklist

👍 Send an email to that professor specifically
👍 Mention why you are generally interested in research
👍 Mention a specific paper/work that you tried to read. Explain what you understood from it (and/or also questions)
👍 Make a suggestion for a research topic/area
👍Provide some times where you are available
Dear Professor Sarwate,

My name is [REDACTED] and I am a sophomore majoring in ECE. I am taking probability this semester and am enjoying it quite a lot. I wanted to get a chance to use what I learned in a non-course setting and I thought doing a research project would be a good way to do that. I was thinking that I might also want to go to grad school in the future.

- specific address and reasons for research interest
I saw from your homepage that you work on applied probability. I tried to read your paper on “High Dimensional Inference with Random Maximum A-Posteriori Perturbations” (https://arxiv.org/abs/1602.03571) but it was a bit challenging for me. I googled “Gibbs distributions” and they seem to be about physics, but I wasn’t sure what that had to do with image segmentation (in Figure 1). It sounded interesting though, and I was wondering if you had a project related to that where I could contribute.

- specific work and indication of effort
Example, part 3

If you have time to talk about this or other research opportunities, please let me know! I am generally on Busch campus Monday, Tuesday, and Friday, and am free before noon or after 4:40.

Sincerely,

[REDACTED]

- suggestion of times
Showing your interest

The goal, as always, is to see things from the other person’s perspective. You want to indicate a genuine interest in doing research:

- you’re not “fishing”

- you’ve put a little thought into why you want to do research

- you’re willing and able to push yourself to read something (or try something) outside of class

- you’re mindful of other people’s time
After you apply
A view from the other side

Application committees generally start reviewing applicants in January:

- *Committee asks*: is this student going to succeed in our program?

- *Professor asks*: is this student a good fit for our lab? Are they interested? Do they have the right background?
Types of admission offers

Funding is often available only for PhD students. If you are (possibly) interested in a PhD, don't apply for MS only!

• departmental fellowship: no teaching/research responsibilities, tuition waiver, monthly stipend, possible additional funds

• teaching assistantship: usually TA for one class each semester/quarter, tuition waiver, monthly stipend

• research assistantship: offer to do research with a specific professor or lab, tuition waiver, monthly stipend

• partial tuition waiver or scholarship

• no funding: you have to pay for tuition and fees
External fellowships

Several opportunities for external funding:

• National Science Foundation Graduate Research Fellowship Program (NSF GRFP)

• National Defense Science and Engineering Graduate Fellowship (NDSEG)

• Hertz Fellowship

• Others…
Evaluating offers

• Funding level indicates how competitive they think you are within the program: solid funding at a lower ranked school is better than no funding at a higher ranked school.

• Many schools have visit days where you can get a sense of the “lab culture” and “department culture.”

• Location, location, location: people have different preferences!
Final thoughts
Do some self-reflection

Use your time in undergrad to see if you would be interested in grad school:

- What program fits your professional goals?
- Do you like doing research? If so, what part?
Build a strong application

Go into the application process informed and ready:

• Get your coursework to line up with your future goals.

• Contact potential letter writers earlier rather than later. Ask for their advice!

• Look through department websites to see if the program or professors are a good fit.