Graduate school: Why, What, & How?

+ Supplement Info (email)

Today's Presenter (3rd version)
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1st version
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2nd version
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Questions?

- How many of you are considering pursuing a PhD?
- How many of you are considering pursuing a MS, MA, MFA, etc.?
- How many of you are considering some other grad degree – MD, JD, etc?
- How many plan to join the workforce following your Bachelors?

Comments on today's seminar

- Focused on students who go from BS/MS to PhD, but remember there are other paths to a PhD.
  - **Caveat**: in spite of PhD programs existing, not every field requires one for advanced instruction and/or research (e.g. dance)
  - **Takeaway**: if you have a specific interest, learn your degree options
- Seminar has facts mixed with thoughts from previous presenters, which also includes my own (*in italics*)
  - **Caveat**: may be at odds with other advice you have received!
  - **Takeaway**: talk to others! (especially at programs of interest)

Outcomes of BS *vs.* MS *vs.* PhD
(or BA vs. MA vs. Phd)

Outcomes of BS *vs.* MS *vs.* PhD *(or BA vs. MA vs. Phd)*

- An individual holding a Ph.D. will typically make 20% more than someone with a master's degree.
- The unemployment rate for of Ph.D. holders is less than 3%;
  - *Similar for other types of professional degrees (MD, JD, etc.).*
- There are limited opportunities for jobs in college instruction, or in research, for people lacking Ph.Ds in their field.
  - *Especially true in STEM, but may not be the case in other fields*
- A Ph.D. can lead to preferential treatment with regards to promotion and project assignment.
  - *My experience: it can also make you "over-qualified" for some industries*
- A Ph.D. enables its holder to work in academia, to work in an industry related to their field, or even to begin their own business.

Outcomes of BS *vs.* MS *vs.* PhD *(or BA vs. MA vs. Phd)*

- An MS, MA or PhD may put you in a position to **create knowledge**.
- A BS/BA may put you in a position to conduct research, but **typically working for someone** with a MS, MA or PhD.
  - *Unless you work in an industry that does not "value" an advanced degree!*
- A PhD allows **you to set the course** of a research lab!
- *All of the above requires ambition and independent thinking!*
- ***Food for thought:*** *"America produced more than 100,000 doctoral degrees between 2005 and 2009. In the same period there were just 16,000 new professorships."*
  - *https://medium.economist.com/why-doing-a-phd-is-often-a-waste-of-time-349206f9addb*

Outcomes of BS *vs.* MS *vs.* PhD *(or BA vs. MA vs. Phd)*

- **Corporate research and development** (**7 of 9** in Dr. Wirth's class, ***2 of 4*** *out of my graduate lab*)
  - Exxon, PPG, DOW, Intel, AkzoNobel, *Lockheed Martin, DePuy Orthopedics*….all hired PhDs to develop new technologies.
  - Sherwin Williams, PPG, Lubrizol, PolyOne all in Cleveland – more in Akron.
- National Laboratory (**1 of 9** in Dr. Wirth's class - EPA)
- Consulting practices
- Academic job (**1 of 9** in Dr. Wirth's class (@CSU) – this is typical, even coming from "best" institutions, ***2 of 4*** *in my graduate lab(@CSU & NJIT)*)
- Entrepreneurial endeavors
- Policy jobs, Think tanks
- High-level administrative positions (Typically later in career)

Applying for a MS, MA & ***PhD program***

Applying for a MS, MA & ***PhD program***

- **PLAN AHEAD**
- Most STEM programs do not require MS degrees prior to applying for PhD program (this is called **direct entry**).
- Many MA programs result in an area-specific degree:
  - MA in History
- Some programs are field-specific:
  - Masters of Social Work
- **So many options…**@CSU's College of Urban Affairs:
  - MPA, MUPD, MS in Urban Studies, MA in Environment Studies, MA in Nonprofit Administration and Leadership
  - JD/MA dual degree program OR a PhD in Urban Studies and Public Affairs

Applying for a MS, MA & ***PhD program***

Academic evidence

- **Transcript**, GRE
- **Recommendation letters**
- Portfolio

Research experience

- Resume
- **Recommendation letters**
- Publications

Demonstrated potential

- **Evidence of leadership**
  - ***Reach out to labs/programs that may interest you!***
- Other experiences and extracurricular activities

Ability to collaborate or work with others

- **Recommendation letters**
- Statement of purpose and/or a personal statement
- Interview questions

Ability to multi-task

Creativity, writing ability

- Writing sample
- Statement of purpose and/or a personal statement
- Portfolio

Applying for a MS, MA & ***PhD program:*** Research Experience

- **A research experience is just as much for you as it is for your PhD application.**
  - **“Applied work” outside the classroom may be equally as beneficial for some MA programs**
- This is a very important qualification, particularly in STEM disciplines.
- Showcase your work outside the classroom *no matter what it may be.*
- If you have had the opportunity for longer research, it is more advantageous to mention 1-2 semester(s) of research than to mention 8 weeks of summer only work

Applying for a MS, MA & ***PhD program:***
The GRE

If your GPA is low, you will *have* to address it in your cover letter and statement of purpose.

- You may wish to focus on your GPA within your major.
- You may wish to focus on your "upper level GPA" (excludes your freshmen or freshmen and sophomore years) (***I remember doing this***).

The following approaches may compensate a low GPA:

- **Excellent reference letters**
- **Good research experience** (*Once more, showcase your research very well!*)
- A convincing statement of purpose
- A good GRE score, particularly a good Subject GRE score
- Research experience at the institution to which you are applying
  - ***Again, talk with professors where you may want to go!***

Applying for a MS, MA & ***PhD program:***

The GRE

General GRE

- **Verbal reasoning:** Tests the ability to analyze and evaluate written materials and synthesize information obtained from them (Scored from 130-170 | 2 sections of 35 minutes each)
- **Quantitative reasoning (STEM):** Tests basic mathematical skills and the understanding of elementary mathematical concepts (Scored from 130-170 | 2 sections of 40 minutes each)
- **Analytical writing:** Tests critical thinking and analytical writing skills (Scored from 0-6 | 2 sections of 30 minutes each)

Subject GRE **(Available in 7 Different Areas)**

- Biochemistry
- Biology
- Cell and Molecular Biology
- Chemistry
- English Literature
- Mathematics
- Physics
- Psychology

Applying for a MS, MA & ***PhD program:***
The GRE

- **You may take the computer-delivered test once every 21 days, up to five times within any continuous rolling 12-month period (365 days)**
- **Score reports**
  - **On test day (free for 4 reports)**
    - Not to send reports
    - Send
      - Most recent
      - All
  - **After test day ($27 per score report)**
    - Most recent
    - All
    - Selected one
- **GRE scores are valid for 5 years**

Applying for a MS, MA & ***PhD program:***

The GRE

- Take the GRE in your junior or sophomore year. Imagine preparing for the GRE during your senior year...course work, undergraduate research, writing personal statements and preparing grad school applications.
- Take the diagnostic GRE as a ballpark indicator of your future scores
  - *www.review.com* & *www.kaplan.com*
- Two bad GRE scores will indicate a trend; don't take the test a second time unless you are going to be better prepared than you were the first time.
- Let recruiters know if you plan on taking your GRE again.
- Ask recruiters about the GRE scores for their program (*this will tell you a lot*)
- Don't report unless it is good.
- A good Subject GRE score may help if you are changing disciplines, or if your GPA is not so good.
- A good GRE score in general will help if your GPA is not so good.

Applying for a MS, MA & ***PhD program:***
Your transcript

- Those reviewing your application will be examining your transcript's *trend*.
- You should do the same. If your GPA is low, you should be able to explain what drove it down and why.
- It will be even better if one of the faculty members writing on your behalf can address that issue in their letter.

Applying for a MS, MA & ***PhD program:***
Letters of Recommendation

Note: This is considered the most important of all application materials (STEM biased advice!!)

- **Ideal Order of Preference:** Faculty member who has supervised your research > Supervisor who has seen your direct work with clients in practicum or internship experiences > Faculty member with Ph.D. > Faculty member > Anyone else
- Your Discipline Faculty Mentor (DFM) and Non-Discipline Faculty Mentor (NDFM) can be your references
- Professor who taught you classes, preferably upper level classes, may be other references.
- Letters from advisors, graduate assistants, teaching assistants, or research assistants *will not be considered seriously.*
- A letter from someone who directly supervised your undergraduate research is okay, but I would still ask the faculty supervisor to write a supporting letter.
- If you are applying to top schools, it is not a bad idea to ask the letter writers to attach their own CVs.
- Industry letters tend to be weak. You may have to let them know exactly what you would like them to highlight in the letter.

Applying for a MS, MA & ***PhD program:*** Letters of Recommendation

- Ask: “Would you be able to write me a strong recommendation letter?”
  - ***Personal experience: I have been asked by students for a letter, been honest with them about what I would say in the letter, and they ultimately decided to ask someone else*. They didn’t bother to ask the above question!!**
- Provide your resume and a paper/project that the faculty recommender awarded you an A.
- It is not a bad idea to give them a little blurb about what you would like them to include
- Give your letter writers a folder of documents with a picture (*maybe not necessary*)
- Give your letter writers sufficient time to write (*the day before will not result in a strong letter*).
- Letter writers can talk about your low subject GRE or GPA.
- Do not send more than the maximum number letters!!!
- www.interfolio.com
  - ***Hiring by committee is challenging!***

Applying for a MS, MA & ***PhD program:*** Statement of Purpose

- The first third of a statement of purpose should focus on your educational achievement and academic interests.
  - Mention your research experience.
  - Highlight your skills.
  - Explain your career goals.
  - Do not overemphasize the instrumentation.
  - ***Remember that the beginning of a SOP is very important!***

Applying for a MS, MA & ***PhD program:*** Statement of Purpose

- The second third of a statement of purpose is where you sell yourself.
  - What is impressive about you? You should mention that you are a first-generation low-income student (FGLI) and/or that you are from a group underrepresented in higher education (URM).
  - Explain any gaps or discrepancies in your academic records.
  - If you have worked a lot during your college years, explain this as well.
- The last third of a statement of purpose is your conclusion.
  - Outline your future plans.
  - **Mention faculty with whom you would like to work. (*Have you met any faculty?*)**
  - Explain why you like the institution to which you are applying.

Applying for a MS, MA & ***PhD program:*** Statement of Purpose

- **In your conclusion, make sure to incorporate your interest in the specific qualities of the institution to which you are applying.**
- Address what *they* want in the statement of purpose; it can vary by program and by discipline.
- Mention topics that interest you, when you became interested in them, and why.
- Explain how have you learned about your field of interest (classes, reading, seminars, work, etc.)
- **STEM advice: Mention at least two research members at the institution to which you are applying. *Do not say that you want to work with them.* Say that you want to work with researchers *like* them. Strengthen your statement further by reading recent publications by these people and mentioning that you have read them.**
- It is okay not to have clear idea as what you want to do. *Do not make things up.*
- *Do not exceed the maximum length! Translation: applicant can't follow directions.*

It is very important to customize this part of the SOP.

Applying for a MS, MA & ***PhD program:*** Your Resume

- **Almost all applications are online, but just in case….**
- If you are making physical copies, use plain white paper.
- Use a 12 point, legible typeface, 1” margins, and 1½ spacing
- Do not use any contractions.
- *Carefully* check and double-check grammar, spelling, and punctuation; *do not rely on spell check.*
- Be aware that many Ph.D. programs will require a Curriculum Vitae (CV) as opposed to a resume.

The CSU Writing Center will be happy to help you in preparing a resume.

Applying for a MS, MA & ***PhD program:***
Your Portfolio

- Resume
- Research papers
- Projects
- Group projects
- Lab reports
- Other significant graded work
- A picture of yourself (either on the outside or inside of the cover)
  - ***I never did this, but it can't hurt.***

Remember to make all the suggested corrections on your reports.

Applying for a MS, MA & ***PhD program:***
Rankings Matter (kinda)

There is probably not much difference between the #3 program and #11 program – but there a difference between the #11 program and #45 program - Check US News and World Report and **NRC Rankings. (*counter: my school wasn't even ranked*)**

Sites where students can generate their own rankings of graduate schools:

- https://www.phds.org
- https://collegescorecard.ed.gov/
- http://graduate-school.phds.org/
- http://www.petersons.com/Default.asp?ShowTab=gr

Apply, at minimum to 10 schools – **CAST A WIDE NET (*unless you know what you want*)**:

- **Top 3:** Your miracle choices; do not self-select out of these
- **Bottom 3:** Schools to which you don't want to go, but which you are prepared to accept
- **Medium 4:** Solid choices to which you should gain admission. **Your DFM may be a valuable resource (This was VERY important for *both mine and* Dr. Wirth's situation – more on that later).**

Your list ***should depend*** on your grades, your GRE score, and your ECA.

Acceptance to and Choosing a PhD program (STEM biased)

Acceptance to a PhD program:

Offer Letter

Most programs now will send out offer letters in December – February. The letter (hopefully) will contain **the amount** and **conditions of your stipend**. Engineering programs are typically in the ~$20k - $30k range. You will have until mid-April to make a decision on the offer.

Choosing a PhD program

This is one of the most important decisions that you will make (up to that point). For PhDs, your career is almost always dictated by **where *and/or for whom* you did your PhD** (unlike your BS).

Graduate School Visitation: Most departments (~top 30) now hold visitation weekends for all accepted students. ***If you can afford it, go!!!***

These weekends can be **essential** to choosing the right graduate program.

Choosing a PhD program: Factors

1) **Number** and **Quality** of **potential advisors** determined from visitation weekend. May change if advisors are assigned prior to acceptance deadline.
2) Being comfortable with the culture and location – including the faculty, graduate students, and city.
3) Other resources, i.e. – how are other STEM programs ranked, how much collaboration is there?
4) Graduate placement
   - ***I come from a small school, but everyone out of my lab has a good job***

Choosing a PhD program:
Advisor Selection

- Pick someone that you could form a healthy working relationship with – this may not be someone that works exactly in the area that you thought you wanted – which is OK.
- How soon should you identify them? Seminars vs. Research rotations.
- Changing your advisor (not easy).
- Changing schools (not easy).
- Advisor's academic vs. personal reputations – **talk to students**!
- Future relationship with advisor.
- ***Personal: I picked my advisor over the school***

Choosing a PhD program:
Culture of Program

- You will more than likely be spending a majority of each day of your early and mid-20s in a single institution with similar people.
- **YOU NEED TO LIKE WHERE YOU ARE.**

Choosing a PhD program:
Other resources at University

- Academic resources – other programs in related fields, people that you could work with (but are not your advisor), core research facilities
- Professional resources – seminars, etc…
  - ***My school lacked these resources***
- Personal resources – Offices, campus facilities, **active graduate student associations**

Choosing a PhD program:
Placement of Graduates

- Where do most graduates go to work? Certain programs have strong ties to corporate or academic labs – does this fit your plan?

Choosing a PhD program:

Questions to ask on Visitation (Supplement Info)

- Talk to everyone – faculty, students, staff

Doing a PhD:

Dr. Wirth's story

- BS ChemE at SUNY Buffalo, Overall GPA ~3.78, Engineering GPA >3.9, Doesn't remember his GRE
- Multi-year research relationship with two well-known Colloid Scientists **(letters)**
- Very highly involved with student chapter of AIChE **(letter from dept. chair)**
- Internship as a researcher at local company
- Did not know what a PhD was until late in my junior year – **didn't really know where else to apply besides SUNY Buffalo.**

My story

- BS ME at University of Denver, Overall GPA ~3.5, junior & senior year GPA >3.9, Don't remember my GRE (but it wasn't terribly high)
- Multi-year research relationship with an emerging biomechanics researcher **(letter)**
- Student athlete for two years
  - Multiple research projects after
- Internship at local orthopedics research company
- Did not know what a PhD was until my senior year
  - **Didn't decide to do a PhD until after my MS!**

Doing a PhD:

Dr. Wirth's story

- Applied to **Michigan**, **Princeton**, **Carnegie Mellon University**, SUNY Buffalo, CWRU, MIT, Harvard Physics, UPenn.

(**Accepted & visited**, Accepted & did not visit, Wait listed/rejected)

- Probably should have applied to 3-4 more places – especially outside of my region.
- Picked the lowest ranked program (**of the 3 realistic options**) because he **felt CMU had the most options for potential advisors and he fit very well into the department's culture.**

My story

- After my MS, I applied to **University of Denver & University of Washington**,

(**Accepted & visited**)

- Probably should have applied to more places – especially outside of my comfort zone.
- Picked the lowest ranked program (**of the 2**) because **I knew I worked well with my advisor & thought I would have a better overall experience**.

Doing a PhD:

Questions?