

Session 5: Succeeding in Graduate School

Thursday, November 9, 2023, 7pm ET

CSGRAD4US & mentoring
program

Computer and Information Science and Engineering Graduate Fellowships



CRA-WP
Computing Research
Association
Widening Participation



CRA-E
Computing Research
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Education

Learning Objectives

- Developing your research skills
- Defining your own success
- Managing expectations and adviser-advisee relationship
- Ways to be productive and balanced
- Strategies for growing a support network
- Common questions

Your Research Path includes ...

- Developing strong research skills
- Choosing graduate courses
- Revisiting
 - Choosing a research area, an advisor, and a research topic
- The research process and milestones

Relevant now!

Helpful when writing the statement and communicating with possible advisers.

What Research Skills Do You Already Have?

Technical

- Programming skills
- ?

Soft Skills

- Time management
- ?

**Enter into the chat: 1 technical skill and 1 soft skill
you already have (ideally related to your research interest)**

Essential Research Skills to Develop

Background & related work

- Performing literature search
- Reading papers critically
- Summarizing existing work

Tools & techniques

- Finding and learning needed technical material
- Discovering appropriate tools and techniques for topic
- Use of specific tools and techniques

Data collection, analysis, and vis

- Mathematical argumentation
- Experimental design and data collection, including validation
- Generating and processing data
- Performing *appropriate* analysis and visualization of data

Communication

- Paper writing
- Presentation creation and delivery
- Research conversations, including asking/answering questions
- Managing advisor interactions
- Managing group dynamics

Ways of Developing Research Skills

- **Background and related work**
 - Textbooks provide foundational skills
 - Find textbooks used at schools strong in a research area
 - Literature search
 - [CRA-W/CDC "Identifying related literature" Exercise](#)
 - Critically reading a research paper
 - [CRA-W/CDC "Critically reading a research paper" Exercise](#)
 - [Griswold's "How to Read an Engineering Research Paper"](#)
 - Shaw's [Organizing Your Research and Developing Your Research Skills](#)
 - Create annotated bibliography of papers read
 - [Monmouth University's "Creating an Annotated Bibliography"](#)
 - Consider using something like BibTeX



Ways of Developing Research Skills (2)

- **Discovering and learning tools and techniques**
 - Analyze related work for tools, techniques, input sets, data collected
 - Analyze related work for experimental framework
 - Find online tools/communities and textbooks
 - Find workshops or tutorials covering material

Ways of Developing Research Skills (3)

Basic skills to improve efficiency

- [Missing Semester of Your CS Education](#)
 - Shell
 - Shell tools and scripting
 - Editors (vim)
 - Data wrangling
 - Command-line environment
 - Version control (git)
 - Debugging and profiling
 - Metaprogramming
 - Security and cryptography
- Master LaTeX beyond essential features and use Overleaf for collaborations

Ways of Developing Research Skills (4)

- **Communication**
 - Attend talks by outside speakers and critique
 - Attend practice talks to hear improvement suggestions
 - Practice elevator talk with peers
 - Join public speaking group (e.g., [Toastmasters](#))
 - Present posters of your work
 - Try approaches for planning agenda for advisor meetings (e.g., topics, analyzed data, etc.) and establishing next steps

Choosing Coursework

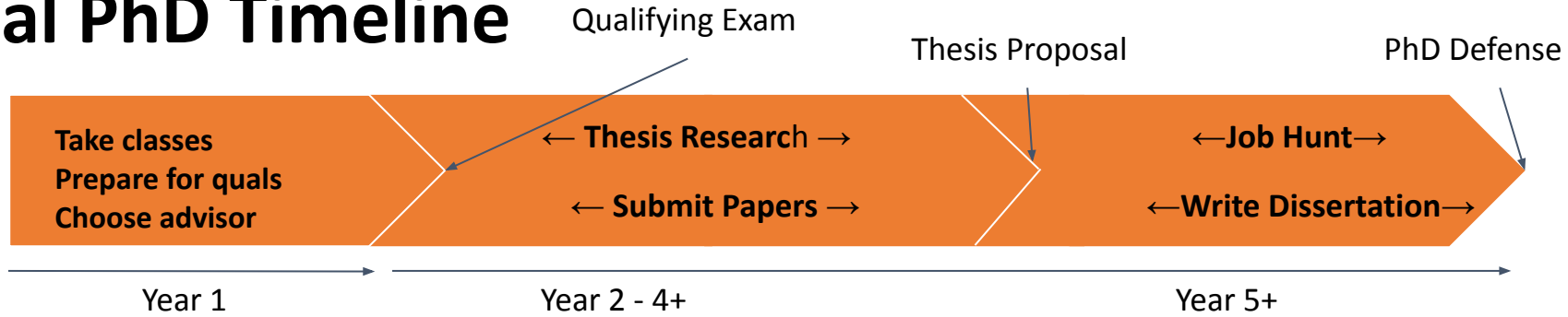
- **Courses may serve different needs**
 - May be required
 - Course requirements vary greatly
 - May develop skills
 - May develop your knowledge of content related to your research area
- **Ugrad vs. grad vs. research courses**
 - Graduate: more independence expected, less guidance given, learning background material on your own
 - Research: more student initiative expected, problems may not have known solutions, some students produce research results

How To Choose Courses?

Courses ...

- your adviser recommends
- in an area you are interested in
- taught by potential research advisor
- that teach you about research process
- that include a research project
- in a closely related research area
- that teach you skills
 - May be in another department (e.g., statistics)
 - May be non-technical classes (e.g., writing or speaking skills)
 - May be non-credit course (e.g., language course)
 - May be to gain interdisciplinary knowledge

Typical PhD Timeline



Many programs define success by ability to achieve milestones:

- Complete course work
- Pass qualifying exam
- Thesis proposal approval
- Pass PhD defense

Generally fixed and program-wide

Do you and your advisor agree on the timeline?

But Research Milestones Vary

Details and timelines of required milestones vary by school.

For example, the qualifying exam may be

- Entirely course based
- Oral or written examinations in multiple areas
- Writing and presenting a paper that synthesizes research in an area related to several papers provided to you
- Presentation of your own research

Departmental descriptions can be messy to parse.

Research is the focus of your PhD

It is a journey into the unknown.

You will encounter ill-defined problems.

How will you know when you are successful?

What does success look like?

What Does Success in a PhD Program Look Like?

Different ways to measure success in your PhD studies.

Need to satisfy at least three entities:

1. Program requirements
 - course work, qualifiers, proposal, defense
2. Your Advisor (and your PhD committee)
 - expectations for each student (within PhD and beyond), research deliverables, group-level goals
3. You need to feel good about your work & learned skills
 - personally satisfying, aligns with career goals, work/life balance

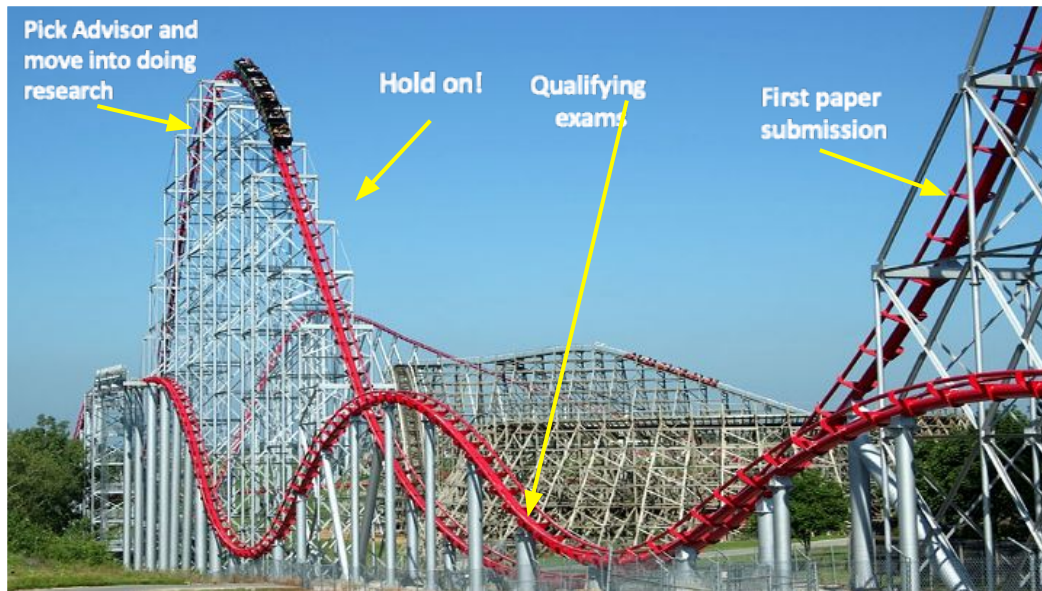
Agreement Critical



Highs and Lows of a PhD can be Rollercoaster

Stay focused!

Draw on your support network for advice and motivation!



Managing expectations: Advisor's wants

What do advisers expect?

- Research output (common: expect k papers in top venues)
- Work hours
 - expect PhD students in lab during core hours
 - expanded hours as needed to meet deadlines
- Meeting/group culture
- Checklist for graduation (accomplishments, skills)

Impact:

- What does my day-to-day look like?
- When do I graduate?

Managing expectations: Your Needs

What do you expect from/during your PhD?

- Career goals
 - R1 Faculty position, 4-year college position, faculty teaching position in R1, industry researcher, government lab, and more
- A mentoring/advising approach that matches your personality and background
- What kind of feedback do you need?
- Constraints on time
 - Family responsibilities, health, graduate within g years

Communicate effectively!

Communicating Your Constraints

- Clearly explain outside commitments/responsibilities
- Alert advisor of disabilities/health issues if they impact work
- Try to find and propose creative solutions to arising problems/changes
- Exploit flexibilities that arise in academia
 - Example: I am not available from 4pm-8pm, but will get back online once kids are in bed
 - Example: I get migraines so my workspace cannot have bright light

Interacting with your Advisor

- Common to have weekly (or bi-weekly) one-one meetings
 - Prepare appropriately. May include sending an agenda, maintaining a research notebook, report on progress/reasons for lack of progress
 - Some advisors are more hands off and want to meet once a month or semester
 - Need to be more self-directed about monitoring progress
- At semester boundaries or after completing a milestone, consider longer term outlook

Adviser-Advisee Relationship: Reasons for problems or concerns

- Mismatch in styles
 - e.g., micromanager, distracted/absentee advisor, irreconcilable difference
- Lack of communication on expectations and limitations
- Lack or perceived lack of research progress
- Change in your research interests
- Change in the advisor's interests or responsibilities (e.g., becomes chair/head)

How to improve the relationship with an adviser?

- communicate, be honest, propose/ask constructive solutions

How to know if there is a problem

- Annual review
 - explicitly stated there is an issue with your performance
- Advisor stops interacting with you
 - subtle, often confusing
- Things are not going well for you
 - unhappy, stress out, etc

If there is/seems to be a Problem ...

Recovery is possible.

Relationships take work.

- have the difficult conversations necessary to build/restore the relationship
 - put it all on the table
 - tell them you recognize something is wrong
- ask to switch to a different project/topic
- do an internship for a different direction for a few months
- reach out to other members in the department
- acquire a co-advisor/mentor

It is possible to change advisors

- A difficult decision.
- If there are few faculty in the research area, it may mean changing the area.
- Sometimes changing adviser is the right thing to do.
- Make sure you know the style of advising of the new adviser.

Possible Impact

- likely to change your research topic somewhat
- can slow down immediate research progress
- may result in a change in your funding source (for RAs)
- new adviser may have different expectations
- may make you happier (could make you more successful)



Work/Life Balance

- Your PhD work should be a major focus of your time and energy
- But it should not be the only thing you do
 - This is not a healthy lifestyle...you will eventually burn out
- Stay engaged in outside activities that allow you to recharge
 - Physical activity: run/walk, biking, swimming, dancing, yoga
 - Culture: books, music, movies
 - Social: special interest clubs/groups, spending time with family/friends
 - Relax: Schedule regular breaks (daily/weekly/monthly following academic schedule)

Prioritizing Your Time

- Learn when to say no
 - Pay attention to norms
 - Think about opportunity costs
 - Negotiate
- Identify what you might want to take on /volunteer for
- Ask for help: Don't be shy

Building Your Support Network

- The PhD journey is difficult...you will need support
- Actively assemble a team of people who aid in your professional development and provide guidance
- You want some diversity in this team (expertise, seniority, backgrounds).
 - Your advisor (obviously)
 - Other mentors at your institution and beyond (includes CSGrad4US)
 - Advocates in your research community
 - Peers at your institution and beyond
 - Friends/family for moral support

Networking: Assemble Your Squad

- Make sure people in your field know about your research
 - Will evaluate your work on more than one occasion
 - Get informal feedback early
- Peer networking
 - Cross--pollination of ideas (may help with nuts and bolts issues)
 - Future collaborators (and friends)
- Conference etiquette
 - Must read: [Ten simple rules for attending your first conference \(Kelly Shaw et al\)](#)
 - Seek out people you don't know; introduce yourself
 - Practice your elevator speech

Remember your successes! Not just setbacks

Assume everyone will fail on something on the way to success.

- Setback is part of doing research
 - If everyone knew it would succeed, it wouldn't be an interesting result
 - Research stalls or doesn't pan out
 - Good papers are rejected
- Best Cure
 - Remember it happens to everyone
 - Keep track of your big and little successes
 - Move TODO items to the DONE list and celebrate

Last Nugget

- Grad school is fun
 - Some of your best memories will be from there
 - Make friends for life (faculty and students)
 - The freedom of exploration is unparalleled
- If you love what you do, you'll enjoy it
- Make sure you love what you do!
- Have fun!
- Keep pushing the boundary!

Common Questions (1)

Will I still have access to the CSGrad4US resources and mentorship next year, when I plan to apply?

- Yes to resources.
- If you have established a relationship with your coach, they are most likely willing to continue to help

When to reach out to faculty whose research I am interested in?

- before you apply (send email; some will reply, some may not)
- after you applied, but no decision (send email; an interested faculty will look at your application)
- after you have been accepted (will reply with high probability)
- after you have received a rejection (more complicated; start any question with grad office staff)

Common Questions (2)

I am applying now. What could go wrong?

- not admitted to a school you want to attend
- no admissions

- not having an adviser in the chosen research area
- adviser/advisee problems
- not finding a research problem that leads to progress and a dissertation
- realizing that you don't like research

- personal challenges that impact being a student

Common Questions (3)

- **What does NSF expect?**
 - be a full-time graduate student in a CISE PhD program
 - participate in evaluations throughout your PhD
 - annual progress survey
 - other surveys
 - can get an MS on the way to the PhD
 - funds do not have to be returned if no PhD is received

Common Questions (4)

Issues with the department

- Adviser should be representing you on issues related to requirements.
- Departmental graduate office is another valuable resource on solving problems.
- Other sensitive issues? Many departments have an ombudsperson or similar

Common Questions (5)

Tips on how to survive on a PhD student budget?

Any other income/side job opportunities you'd recommend?

- take advantage of resources and access a student has for free/almost free (gym, library, entertainment, clubs, campus transportation, day care, ...)
- students have reduced fees for many activities beyond the university
- internships in summer; teaching in the summer
- 75% RA/TA appointments are possible
- college towns adjust to purchasing power of students (restaurants, services, etc)
- many grad students (re)-assess needs versus wants versus luxury

Your questions and concerns?

Please type one question or concern into the chat

Do not send until we tell you to

Final Thoughts

Grad school can be a transformative experience which opens many new possibilities.

- Go in with an open mind and do great work!

Thank you for your participation, questions, and comments throughout the mentoring program.

Relationships you have built through the CSGrad4US program are part of your professional network.

Good luck!

**Next group session:
March 7, 2024 at 7PM ET**

Note: office hours will continue through February -
check schedule for exact dates