Graduate School Fall 2016

Sibel Adali

Graduate Skills seminar Fall 2016

- Graduate Skills Seminar, 1 credit course
- Co-taught by S. Adali and M. Zaki
- Wednesdays, 10 AM in DARRIN (DCC) 239
- Check for full schedule at:
  - http://www.cs.rpi.edu/~sibel/graduate_school/
- Passing criteria:
  - Attendance (at least 6 out of 8 classes)
  - Class participation (sufficient participation makes up for lost classes)

Graduate Skills seminar Topics (tentative schedule)

Date	Topic	Speaker
8/31	Graduate school, choosing an advisor and graduate life	Sibel Adali
8/31	Fellowship opportunities	Alice Brussard, Office of Graduate Education
9/14	What is research?	M. Zaki
9/21	Writing papers	Fran Berman
10/12	Reading research papers	Stacy Patterson
10/19	Giving good talks	Elliot Anshelevich
11/9	Career paths after graduate school	Bolek Szymanski
11/16	Writing proposals	Jeff Trinkle
TBD	Graduate student panel	TBD

Welcome to graduate school

- Congratulations to be accepted to Rensselaer. You were chosen because you excelled in your studies.
- Rensselaer is a school with outside reputation in Computer Science research
  - Many world famous researchers – all speakers of our seminar for example
- Computing profession is one of the hottest in the world
  - Jobs are everywhere
  - Jobs are ever changing
  - Biggest buzzwords all refer to CS based jobs: big data, AI, etc.

Why go to graduate school?

- You want to solve big and important problems
- You love to be creative and want a lot of independence and control over the choice of problems you address
- You want to make important and long-lasting contributions to the field
- You would enjoy being an expert on a particular area in computer science
- Starting salaries for Bachelor's degrees are high; starting salaries for M.S. are often higher
- Your chosen career (e.g., professor or research scientist) requires it

How is graduate school different?

- Your main emphasis is RESEARCH (especially in PhD)!
  - Everything is secondary (e.g. take courses that will help your research)
- Almost all your coursework in CS, upper level courses
  - Much more demanding intellectually even if looks like less work on paper
- Time is more flexible, lots of "free" time
  - You must motivate yourself to do the research work that will help you succeed
  - You must plan your time to accomplish other tasks (classwork, teaching assistanships)
  - You must also leave time for life, more on that later…

Typical MS (research)

Time	Goals
Year 1	Find an advisor and pick a research area Take courses to prepare you to do work in your research area Start reading research papers and learn/tinker with ideas relevant to your particular topic
Year 2	Start to try your own ideas, create new algorithms and write programs to try out your ideas (with your advisor's help) Write a report (thesis) of your own ideas that includes a justification of why what you did was NEW Try to send your work to a conference

Typical MS (project)

Time	Goals
Year 0.5	Find an advisor and pick a research area Take courses to prepare you to do work in your research area
Year 0.5-1.5	Start reading research papers and learn/tinker with programs relevant to your particular topic Write a program to specifications of advisor (above and beyond any work you have done in BS) and deliver a working product with good documentation

Typical PhD

Time	Goals
Year 1	• Find an advisor and pick a research area • Take courses to prepare you to do work in your research area and take qualifying exams
Year 2	• Complete qualifying exams, continue taking courses to prepare you for research • Start reading research papers in your area and work on research qualifier/survey paper • Publish at least one publication by the end of year 2 or earlier
Year 3	• Identify your actual research topic • Some more classes • Continue to publish • Write and defend your research plan: candidacy
Year 4-5	• No more coursework, nothing but research • Publish, both conference and journal • Write and defend your thesis

One hour on this planet is 7 years on Earth
Great!
I'll do my PhD here

Illustrated guide to PhD

See PDF

What do you get after PhD?

- You will now be called a "Dr."
  - It is a big deal, it takes a lot of work!
- You will have written your first book!
  - You will get lots of ideas when you start to look at your own body of work in solving a unique problem
  - Amazing professional growth in looking at a problem at depth and a research field broadly
- You have made a contribution to the science!
- You have met many people in your field, both at RPI and in conferences, you are part of a bigger family!
- Many job opportunities available only to PhDs will open in industry and academia

How to get there?

- Listen to lots of advice
- But, find what works for you
- And, seek help when you need to

Picking an advisor

The single most important decision

Properties of a good advisor

- Advisor works in a field of interest for you

… though be flexible in defining your interests

- You can get along with the advisor

… you can talk to them and your working styles align

- Remember:
  - You really cannot do research in an area foreign to your advisor

  … exceptions are possible but rare
  - Often you cannot just propose your own topic of research either

  … funding issues, effort it takes advisor to learn enough in your topic to guide you

Do your work before talking to your potential advisor

- Understand the type of research your advisor engages in
  - Prof. websites are ridiculously out of date, go to Google Scholar instead
  - Look at recent papers, he/she may have switched areas
  - What type of research: theory, application, or both?
  - Do not assume you will do the same thing as in one of the papers, it will likely be completely different within the same area
  - If you can, talk to students of the advisor
- Find out if they have funding

Talking to a potential advisor

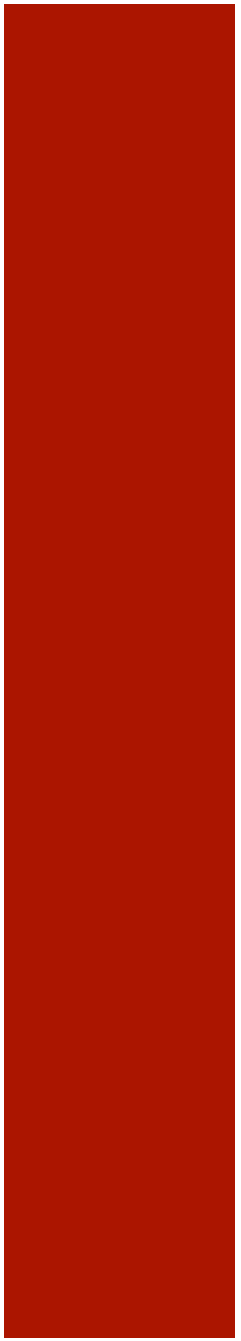
- There are as many advising styles as advisors, all conversations will be different
  - Some will pick you immediately and give you a project
  - Some will give you a project on a trial basis
  - Some will tell you to wait because of funding situation
  - Some will tell you to take some courses and see how you do in them
  - Some will say no, they don't intend to take new students
  - Others?
- Remember this is not about you necessarily, there are many external criteria at work at the same time

Changing advisors

- If you feel that your choice of advisor is not working, consider switching advisors.
  - It's a delicate process, so be careful.
  - Understand that this will delay your graduation.
  - There can be conflict, but it can be managed if it is clear that both parties will end up with a better situation than before and damage will be controlled.
  - Seek help from graduate program director (i.e. me)

Working towards PhD (and MS thesis)

It is all about research



Remember: research is the **heart and soul of a PhD program and MS thesis**

- Your research is your responsibility, not your advisor's: take charge
  - You should be doing research on a daily basis
  - Trying to solve your research problems should keep you awake at night (i.e. you are mentally engaged)
  - Your advisor will make suggestions, try them and many more. Always go to your advisor with more than she/he suggests and ideas/opinions

Research by its definition is working on some problem with no current solution

- You are the first person to do it, so there is no one else who knows how to do it
- There is no guarantee that what you are working on will actually work. In fact, FAILURE will be common:
  - Paper gets rejected!

  … Learn from it, it is very useful information of what you must do to improve work
  - Your idea does not work!

  … What can you learn from it to decide what to try next?
- Many scientific discoveries started by looking at what does not work as useful information.
- Also, remember to celebrate successes. Many often forget that.

Ethics

- Research and publications revolve around trust
  - Trust between you and your advisor
  - Trust between you and the scientific community at large
- Make sure you are truthful about what works and what does not work
  - Do not hide the limitations of a result, but work to improve it
- Do not reveal private information given to you
- Learn about ethical considerations for doing human subjects research
- Reviewing a paper for a conference means you will see unpublished work of others
  - Do not use the ideas in this work in your own work!

Life work balance

Still valid at graduate school and a great place to learn how to achieve it

Seek a balance in your life

- Always be doing research, but…
- You will have to take classes and do well in them so that you have the necessary knowledge to succeed in your PhD and in your career afterwards
  - Give enough time for courses, but remember they are secondary to research
- You have other responsibilities, like TA duties or RA tasks
  - You cannot change the schedule of these tasks to match your needs
  - Professors and other students are depending on you
  - Your performance reflects on you, your advisor may not pick you up if they hear you are a bad TA
- But, it is also important to be happy, at a personal level, in order to be successful in graduate school. Put aside time for life outside of school and research.

Personal Life

- Personal happiness will allow you to deal with the most common frustration of graduate school: FAILURE.
- It is also important to have **hobbies** to keep balance.
- Hobbies that keep you mentally (chess, arts, etc.) and/or physically (sports) fit are often beneficial to your work as well.
- During graduate school (especially during PhD studies) you might meet **your partner in life** and/or **start a family**: these are times to cherish.
- **Word of advice on a *very personal matter*:** think carefully before deciding to delay personal life decisions (getting married, starting a family, etc.) because of graduate school.
  - Find out what policies are available to help you

Time Management

- A journey, not a destination…
  - Always seek better ways to manage time
  - Look around for presentations and ideas, find what works for you

- Learn to communicate with your advisor, TA supervisor and instructors about a problem of your before it affects them
  - Be flexible: Any paper deadlines are coming? You have to attend a wedding?
  - Do not hesitate to ask for help if you need it and work with the interested person to find a solution

Preparing for professional life

You are a student, but also a professional in training

Advice on general work ethics

- Never miss meetings
- Always show up on time
- Take notes, you will forget what is said
- If you are not sure of something, just ask. Do not nod and then show up next week completely unprepared for that thing.
- Share your understanding of what needs to be done.
- In RESEARCH, go the extra mile. Do more, try more, think about the results before you talk to your advisor.

Prepare for the life after school

- What are your professional goals?
- Industry: software development
  - Keep programming skills sharp!
- Industry or academia: research
  - Do ground-breaking work, publish in top places and often, network in conferences
- Academia: teaching
  - Research is important, but also build a teaching portfolio: head TA, design assignments, volunteer to guest lecture, seek advice to improve your teaching skills, etc.

Welcome and good luck!

- Many thanks to slides by:
  - Petros Drineas (Graduate Skills Seminar, Fall 2015)
  - CRA workshops on Graduate Skills:

  http://cra.org/cra-w/resources/resources-from-past-events/

- I am always available to help or advise, but my advice is always secondary to your advisor's.
- Check my office hours and graduate skills slides on my website:

  http://www.cs.rpi.edu/~sibel/