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/](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)

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

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

<table>
<thead>
<tr>
<th>Time</th>
<th>Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 0.5</td>
<td>Find an advisor and pick a research area</td>
</tr>
<tr>
<td></td>
<td>Take courses to prepare you to do work in your research area</td>
</tr>
<tr>
<td>Year 0.5-1.5</td>
<td>Start reading research papers and learn/tinker with programs relevant to your particular topic</td>
</tr>
<tr>
<td></td>
<td>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</td>
</tr>
</tbody>
</table>
## Typical PhD

<table>
<thead>
<tr>
<th>Time</th>
<th>Goals</th>
</tr>
</thead>
</table>
| 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/