Making the Most of Your Time in Graduate School at Rutgers ECE

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Rutgers, The State University of New Jersey

February 10, 2016
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You are a varied group!

images courtesy Wikimedia commons
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- Think you want to do research?

images courtesy Wikimedia commons
Wearing different hats

You have different roles and tasks

- **Student**: take classes, learn fundamentals, expand thinking
- **Teacher**: get a deeper understanding by explaining it to others
- **Researcher**: explore concepts beyond the classroom

(images courtesy Rutgers, themetapicture.com, Wikimedia commons)
The point of this talk

- Reframe your time here in terms of objectives.
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- Get yourself out of undergrad mode: professionalize!
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- Acknowledge challenges and pitfalls.

image courtesy Wikimedia commons
This talk

1. Understanding your objectives
2. Professionalization
3. Starting the research track
4. Staying on the research track
5. Getting help when you need it
6. Recap
Developing goals
What’s the point of graduate school?

Why are you here?
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• to get a (better paying, more interesting) job
• to build/design/engineer something new
• to learn more
• family expectations
• nothing better to do
• was good in school, seemed like the next logical step
Why engineering?

Why study engineering?
Developing short and long term goals

It’s important while in grad school to think in terms of short and long term goals:

- **Short term**: I need to...
  - Write a conference/journal paper.
  - Secure an internship for the summer.
  - Finish a course project.
  - Pass a qualifying exam.
  - Learn how to review a paper.

- **Long term**: I want to...
  - Become an expert on $X$.
  - Figure out how to apply my research to another field.
  - Get good at giving presentations.
  - Change fields/areas.
Organizing your goals/objectives

**Tip:** try to make a list of your goals and categorize them into long and short term.

The AAAS has a tool called myIDP for *individual development plans*:

http://myidp.sciencecareers.org/

This is more aimed for PhD students, but may be helpful in figuring out your own goals.
Challenges or obstacles in setting goals

There are a lot of constraints on the goals that you set. It’s important to recognize these constraints – you can use them to refine your goals!

image courtesy Wikimedia commons
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Staying engaged

Part of setting goals is to re-engage with those goals:

• Set aside time to explore and reconnect with what made you interested in engineering.
• Periodically reevaluate if your goals have changed (they will!) and how you are doing.
• Find others who can help support you in those goals.
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Professionalizing
Thinking about the long game

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- training in *critical thinking*
Managing your time

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image: Wikimedia commons
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Prof. Sannuti’s reminder: structure your time, even small intervals.

image: Wikimedia commons
Ways to develop professionally

Grad school is a time to start the process of professional development:

- building a network of contacts,
- improving your visibility,
- developing your communication skills

Important things to learn: **ethics** and **professional norms**.

images: Wikimedia commons
Grad school is a great place to meet people and “network”

- Attend talks and lectures on topics beyond ECE.
- Join the Rutgers and ECE Department LinkedIn groups
  https://www.linkedin.com/in/
  rutgers-electrical-and-computer-engineering-dept-b36a6396
- Check out technical meetups on meetup.com and other sites.
Pitfalls in building a network

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• misrepresenting your experience (grader $\neq$ TA $\neq$ lecturer!)
• becoming all networking and no substance
Getting a public image

• Make a website so people can find you.
• Get a github/bitbucket/gitlab account.
• Practice your programming skills – learn something other than MATLAB.

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The good thing is that these skills can be learned.

images: Wikimedia commons
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- Put yourself in the reader’s shoes: writing is often a form of teaching.
- The biggest problem in writing is not grammar, it’s unclear thinking.

image: Wikimedia commons
The writing process

• Make your own deadline a week before the “real” deadline.
• If you want feedback, make sure you give a draft early.
• Writing a draft of something is better than nothing.
• Writing is 99% editing.
• Don’t be afraid to ask for help! Ask someone who is a better writer than you, or even a professional service.
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The technical paper is an opportunity:

- practice writing
- develop some research skills
- learn more about a new technical area.
Learning how to present

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Like writing, this is a skill you build over time and with practice.

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- Writing: consider a course in the writing program
Interested in research?
Basic advice if you’re interested in research

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- Keep on top of current technology developments: IEEE Spectrum, blogs, etc.
- Read papers/seek out information on your own. Find something that interests you!
Controversial statement

Wanting to “learn more” is a bad (only) reason to pursue research.
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Tip from Prof. Jha: read PhD comics and think long and hard.
How does funding work for graduate students?
Research and funding

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- If funded, I can pay for an RA (funding success rate: $< 20\%$).
- If not, then have to wait until next round.
Some qualities that professors look for

- "self-driven"
- "a quality writing sample (class report, undergrad/MS thesis)"
- "demonstrates that they can code efficiently"
- "looks for additional references on their own"
- "actual interest in the real-world application/technology"
- "took my class, worked hard, and got an A"
- "attends research seminars"
- "has done work beyond classwork"
- "unorthodox, a bit crazy perhaps"
- "is focused on research but still does well in classes"
- "not afraid to ask critical questions/discuss ideas"
- "willing to dig deep, discover open questions"
- "comes back for a second meeting in a timely fashion"
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- “attends research seminars”
- “has done work beyond classwork”
- “unorthodox, a bit crazy perhaps”
- “is focused on research but still does well in classes”
- “not afraid to ask critical questions/discuss ideas”
- “willing to dig deep, discover open questions”
Some qualities that professors look for

- “self-driven”
- “a quality writing sample (class report, undergrad/MS thesis)”
- “demonstrates that they can code efficiently”
- “looks for additional references on their own”
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- “comes back for a second meeting in a timely fashion”
Finding an advisor

Common errors one encounters in first meetings:

- “I am interested in X, will you give me a project on X?”
- “Do you have funding for me next semester?”
- “I see that you work on X. Can you teach me more about X?”
- “I see that you work on X. Can you teach me more about Y ≠ X?”
- “I would like to do a special problems with you on topic Z.”
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When talking to a potential advisor...

Put yourself in the (potential) advisor’s position: are you sending the right signals?

- Have you “done your homework” by actually trying to read about their research?
- Are you actually interested in the topic?
- What ideas/skills/qualities can you bring to the table?
- Do you have an idea of what your long-term goals are?
- Do you make appointments, show up on time, take notes, and follow up?

“If acting a certain way would get you fired from a real job, then it’s probably a bad idea to try that in a Ph.D. program too.”
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Preparing for a meeting

Some guidance on having a more successful meeting:

1. Look at the websites of professors whose general area of research interests you.
2. Pick at least one representative (and somewhat recent) paper and try to understand what it is about.
3. Try to get a feel for “what research effort was needed to produce the paper. Did it require chip fabrication, board assembly, software development, simulations, or certain math methods? Is this the type of work you would look forward?” (Prof. Yates/Prof. Pompili)
4. Come prepared with some questions about the research. What was interesting and why? Did you understand why the work was important? Can you see some area in which this work might be interested?
5. Did you see some other paper (either from searching in IEEExplore, ACM Digital Library, ArXiV, or elsewhere) which seemed related?
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- I already have $n$ students. Do I have time for $n + 1$?
- Is this student a “good fit?”
Staying on the research track
Research is and is not a job

- (Not a Job) Professors do not "hire" an GA/RA to do a job.
- (Not a Job) An RA should ideally further your own research.
- (Job) An GA/RA should behave professionally and meet deadlines, and communicate openly and clearly.
- (Job) Success is like "earning a promotion": it takes initiative!
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Maintaining successful research

Some tips from Prof. Pompili and Prof. Yates:

- Strive to go beyond what your advisor asks for.
- Don’t rely on your advisor to do what you can do yourself.
- Be prepared for meetings.
- Trust your advisor.
- Distinguish between feedback and criticism.
- Know your advisor’s expectations.
- Don’t be afraid that somebody else has your same idea.
- Broaden your horizons.
- Measure your performance relative to your international academic community.
Organizing your research

There is almost infinite advice on this topic, but here’s a taste:

- Software tools: learn \LaTeX{} and best practices, Mendeley or Zotero for organizing research papers, Dropbox for backups, \texttt{git} for code development and version control.

- Keep a research journal to keep track of progress. Document daily work with enough details! (Prof. Dana)

- Follow ArXiV or other sources of new research progress: be the one to tell your advisor about a relevant paper you saw, not the other way around.

- ABR: Always Be Reading

- ABW: Always Be Writing

Your advisor or fellow students may also have useful tips!
Taking care of yourself
Adjusting to a new place is tough
Adjusting to a new place is tough

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- Adjusting to a new country/language.
- Managing interpersonal relationships with other students, faculty, and family.
An example: self-care is important!

- Don’t sleep at your desk, sleep in your bed.
- Nothing is more important than a good night’s sleep.
- Healthy diet and exercise are important, too.
- The bad habits you get now are hard to abandon later...
- Eventually you become too old for all-nighters and cramming.

image: Wikimedia commons

contributed by Prof. Lindqvist
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Don’t forget to ask for help

Images courtesy Rutgers
Don’t forget to ask for help

• Try to communicate about your concerns with others.

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- Try to communicate about your concerns with others.
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- Make sure you have some balance in your life outside of school.

images courtesy Rutgers
A short recap...
Understanding new systems

Navigating new systems is challenging:

• New location, new bureaucracy, new rules, new language, etc.
• Keep your priorities in mind. Revisit them and check-in.
• Know what you know and what you don't know. Ask for help!
• Work on developing a professional self: this is a process!
• Learn how to manage your time and plan.
• Understand what you need to work on and take initiative.
• Try to put yourself in the other person's shoes.
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Don’t just listen to me

Don’t just listen to this advice, find other advice out there!

- http://jcs.biologists.org/content/121/11/1771
- http://vlsicad.ucsd.edu/Research/Advice/index.html
- http://vlsicad.ucsd.edu/Research/Advice/technologyAndCourage.pdf
Good luck!