

Research Tools and Methods for the Mathematical Science

Lecture 0: 10 Lessons I Wish I was Taught Before I Started a Research Career

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[http://www.maths.adelaide.edu.au/matthew.roughan/
Lecture_notes/ResearchToolsCourse/](http://www.maths.adelaide.edu.au/matthew.roughan/Lecture_notes/ResearchToolsCourse/)

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Proof by Plausibility: "It sounds good so it must be true."

Being a graduate student is like becoming all of the Seven Dwarves. In the beginning you're Dopey and Bashful. In the middle, you are usually sick (Sneezy), tired (Sleepy), and irritable (Grumpy). But at the end, they call you Doc, and then you're Happy.

Ronald T. Azuma [Azu03]

Admin

1 Please fill in student list

2 Expectations

- ▶ attendance is mandatory (records will be kept)
- ▶ there will be no grade assigned, just a pass/fail
- ▶ to pass there will be some tasks you must perform
 - ★ small assignments
 - ★ participation in class

3 12, 1 hour sessions.

- ▶ 11 will be “lectures”, but with lots of time for discussion
- ▶ 1 will be 3 minute thesis competition

4 Course materials

[http://www.maths.adelaide.edu.au/matthew.roughan/
Lecture_notes/ResearchToolsCourse/](http://www.maths.adelaide.edu.au/matthew.roughan/Lecture_notes/ResearchToolsCourse/)

but just follow the links from from my home page to “Research Tools and Methods for the Mathematical Sciences”

Philosophy of the course

The underlying philosophy of the course is to teach the *soft* part of research methods. Most courses on methods focus on things like

- how to conduct an experiment
- keeping lab books

Here we want to deal with things that arise in mathematical sciences where the main research tool used to be a blackboard (but we don't see too many of them anymore).

A few more issues:

- lectures should be more like discussions
- lectures will be pointers to get you started
 - ▶ I won't teach
 - ★ how to do your actual work
 - ★ how to do maths, or stats
 - ▶ filling in the details will take the rest of your life
- all materials will be online

Why are we doing this?

The Lord of the Rings: an allegory of the PhD?

http://danny.oz.au/danny/humour/phd_lotr.html

We'd like you to have a better time.

Will you use this stuff?

- Future researchers
 - ▶ You are going into a hard, competitive field
 - ▶ You will be in a global competition with people who never work on anything except their research, and who could care less about your X (where X is your latest excuse).
 - ▶ We are trying to give you a leg up
- Future practising mathematicians
 - ▶ The course is oriented around research, but most of the lessons are true for any technical person

Why me?

- (I was) postgraduate coordinator when this started
- (I was) recently promoted, so I am the bunny
- I have a tendency to argue with people about these things
- On the plus side: lots of citations
- Thanks: people who helped a lot
 - ▶ Tony Roberts
 - ▶ Jono Tuke
 - ▶ plenty of others had some input though

Outline

I have subtitled these lectures “10 Lessons I Wish I was Taught Before I Started” because it is precisely that.

- 1 Interacting with others
- 2 Writing
- 3 Writing for the Mathematical Sciences
- 4 Programming for Mathematical Sciences
- 5 Good practice with code and data
- 6 Backups and revision Control
- 7 Ethics and Responsible Research (in the Mathematical Sciences)
- 8 Templates for common tasks
- 9 Getting a job at the end
- 10 Mathematics as an Art
- 11 Elevator talks or 3 minute thesis competition

P.S. I learned after choosing my title, that coincidentally a very similar title was used for an essay with a similar theme [Rot97] some time ago, but we'll go into some more detail.

Your input

Who are you? Let's go around the room.

What do you, as students, want to get out of this course?

Summary

- We're just getting to know each other

Assignment

Not this week. But in general:

- Weekly task
- Tasks are meant to be pretty light weight
- No marks, but if you fail to do too many, you will fail the course
- 2 weeks to complete: due **before** lecture!!!!

Further reading I



Ronald T. Azuma, "*So long, and thanks for the Ph.D.!*" a.k.a. "*Everything I wanted to know about C.S. graduate school at the beginning but didn't learn until later.*", 2003, <http://www.cs.unc.edu/~azuma/hitch4.html>.



Gian-Carlo Rota, *Ten lessons I wish I had been taught*, Notices of the AMS **44** (1997), no. 1, 22–25, <http://alumni.media.mit.edu/~cahn/life/gian-carlo-rota-10-lessons.html>.