Teaching and Mentoring Students

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Teaching

- A reality check:
  - College students are challenging to teach
  - You should be interested in teaching or you should not be at university
  - The problem with teaching
    - You must do an adequate job in your teaching to achieve tenure
    - If you spend too much time on your teaching and not enough time on your research, you will not achieve tenure
  - You can never spend enough time on teaching a course to 'get it right' the first time

Teaching
Joys and Woes

- Excitement at "seeing students get it"
- Learning new concepts
- Deepening your own understanding as you explain something
- Seeing connections between different ideas
- Inspiring intellectual curiosity and achievement in students

- Dealing with administrivia
- Writing and grading tests
- Dealing with cheating
- Dealing with irresponsible students (e.g., late assignments)
- Trying to keep "fresh" while repeatedly teaching the same course
- Working within the constraints of undergraduate academic life

Teaching Undergrads

- Put syllabus, assignments and course notes online
  - Be clear about course deliverables and timetables
- Try to intersperse bouts of interactive learning in lecture (i.e., avoid *droning Powerpoint syndrome*)
  - Do extra examples at the board with the help of the class
  - Hand out problems at end of class to present at beginning of next class
  - Call on students by name and learn a few new names each lecture
- Keep your office hours and be respectful of your students
- Take attendance in large lecture classes (pass a sign-in sheet)

Teaching Undergrads

- Warn if you need to miss class for research travel; offer makeup classes
- Be a strict and fair grader
- Teach the same course several times to refine your notes
  - But do not reuse tests or programming assignments
- Ask to team teach with a senior faculty member known to be a good teacher
  - Observe course practices (e.g., what to do about late or missing assignments? How the material is organized?)
- Sit in on courses in your university's teaching center

Teaching Graduate Students

- Ask to teach courses and seminars in your area
  - Facilitates attracting students for research
  - Combine your research with your teaching through course projects
- Important goals
  - Encourage independent, critical thinking
    - May encounter foreign students not use to the American style of Q/A in the classroom
  - Teach scientific method: hypothesis and validation
  - Teach good communication skills -- in writing and speaking

Mentoring Undergrads

- Need well-defined, limited research project with easy to track progress towards a goal
  - Keep project off critical path for research group
  - Choose a student whom you have taught
  - Pair undergrad with a grad student for initial acclimation to lab environment
  - Include undergrad in *all* lab activities
  - Encourage undergrad to consider graduate school
- Can get funding
  - NSF-REU, CRA-W Distributed Mentor project

Mentoring Grad Students

- It can be great
  - You create disciples for your work
  - You learn from them (new ideas and perspectives)
  - They help you keep up with the ever-increasing literature
  - They can link you to colleagues in your dept and in industrial research labs where they do internships
- It can be awful
  - Weak students can take lots and lots of time (and sometimes money) with no payoff
  - It is hard to know when to give up on a weak student -- consult with others

How to mentor well?

- Build a research group as a supportive learning community
  - Have students help one another
    - Make students understand that their fellow grad students are a resource for them
  - Hold weekly group status meetings so all students are acquainted with what the others are doing
  - Hold weekly research reading group meetings
  - Do social activities as a group (e.g., lunches)
  - Be there to advise your students on their studies and expect them to aid you when you need help
- Explain what a PhD is

How to mentor well (1-on-1)?

- Meet regularly for at least 1 hour/week
  - Make a research plan and check progress
  - Be flexible when research ideas need to be redirected
  - Make sure the student is very interested in the research project
- Work on a small research project with a student, before committing to work with her/him as your PhD student
- Make sure the student can read and evaluate research literature in his chosen area

How to mentor well (1-on-1)?

- Build necessary research skills
  - Encourage your students to write paper submission drafts and to work with you to edit them
    - Have students take a technical writing course if needed
    - Always practice presentations with your students
      - Even your presentations should be constructively criticized by the research group
  - Have your students help with program committee and journal paper reviewing
    - Never without reading the paper yourself
  - Allow your students to help with proposal preparation

How to mentor well (1-on-1)?

- Maintain high standards
  - Show students what is expected and how to achieve it
- Care about your students
  - Take them to conferences and workshops
  - Introduce them to senior researchers and other students in their cohort
  - Help them in their job plans
- Enjoy watching your "intellectual children" rise in the profession

Have fun!

- Enjoy teaching and mentoring. This is why we chose to be at University