

So You're an Advisor – Now What?

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Who benefits from good advising?

- **Student:** Gets the information and help he needs to make informed decisions about his education, his career and his life.
- **Department:** Good advising retains majors and can attract majors to the department.
- **Institution:** Good advising recruits students to the institution.
- **Profession:** Mathematics majors are declining nationwide (down 23% from 1992-99). Good advising can help to reverse that trend.
- **Advisor:** Being a good advisor won't get you tenure or promotion but can be the extra bit that puts you over the edge. Besides, it's fun and satisfying and one of the places where you can truly make a difference.

How do you become a good advisor?

Be Prepared

- **Know the basic graduation requirements, including**
 - Math: required courses, number and level of elective courses
 - Technical courses: required courses (sciences, computer science), and number and level of technical electives
 - General education requirements
- **Know the extra stuff**
 - Add date/drop date
 - How to handle drops/changes to audits, etc. after the deadlines
 - Which math classes should be taken when
 - Which are the toughest classes and when they should be taken
- **Know where to go to get the answers**
 - Advising handbook
 - Math majors handbook
 - Undergraduate coordinator of advising or a colleague who does a lot of advising
 - Course catalog
 - On-line resources
 - Counseling center
- **Before your appointment** with the student, look over:
 - Student's transcript or degree audit
 - Your notes on student from previous sessions
- **Be on time** for your appointment

The First Meeting is Key: *You can't give good advice to somebody you don't know.*

- **Questions to ask:** (And be prepared for “I dunno”)
 - What are your plans for after graduation?
 - When do you want to finish?
 - Is summer school a part of this or do you have other plans for your summers?
 - Are you doing or thinking about a double major?
 - Are you doing or thinking about a minor?
 - How are you doing in your current classes?
 - Math classes. Do you like them?
 - Other classes. Do you like them?
 - Are you working? On or off- campus? Studies show that off-campus jobs have been correlated with lower academic performance but on-campus jobs do not have this correlation.
 - Do you have any special interests?
- **Things to tell them about:**
 - Which math classes are key. Sketch out how the math major course plan works.
 - Your departmental and university tutoring resources.
 - Special opportunities (e.g. Study abroad, research, including summer REU's, internships, co-oping,)
 - Career/grad school opportunities
 - Math clubs and contests
- **Help them prepare a plan-of-study** for remaining undergraduate years (See the sample plan on the last page.)
 - List courses needed to graduate in math
 - List other courses needed if the student has another major, a minor, etc.
 - Make a table, with headings for each semester and/or summer schools that the student has left, blocking out semesters for study abroad, co-oping, etc.
 - Put in the courses in the appropriate places
 - Look at the final picture to see if it makes sense.

Students Change Their Minds: Subsequent Meetings

- **Go over the questions from the first meeting.** Expect some changes.
- **If your student is a freshman or sophomore, make sure you find out how he's doing in his math classes.** The transition from lower level calculus and differential equations classes to proof-based classes is a tough one. It's made easier if your school has a class that deals with that transition, but it's even more important to find out how the student is doing in that class and how he likes it. In particular, he should take that class sooner rather than later, because success or failure in that class is one of the best indicators he has about whether he likes math. It also affects how you should be advising him. If he's not doing well and/or doesn't like it, maybe you should be advising him to find another major. If he's doing very well, that changes your advising too (see the next section).

- **If your student is an upper-level student, you need to consider her plans for after graduation.** If she's planning on grad school in math, then her electives need to be chosen with that in mind; if she's thinking about a job, then it's important that her math courses and her technical electives be useful for the kinds of jobs she has in mind. Be prepared to make suggestions.
- **Re-do the plan-of-work.** Yes, you do need to do it all over again.

Job or Grad School? *Remember!*

- **It's HIS Decision**
- **It's YOUR Job to:**
 - Provide the information.
 - Give suggestions
 - Provide a reality check, if needed

Suppose He Wants a Job?

- **Tell him about the possibilities.** There's all sorts of information available on the web (see the appendix for URL 's). In particular, there's a good set of profiles on both the MAA and the SIAM web sites. Another source that's likely to resonate with your advisee is a list of previous math grads from your school, together with the jobs they've accepted, and a list of companies that have hired your math grads. If your department doesn't have such a list, suggest starting one and make sure it goes on your department web site.
- **Show him how to prepare.** He should
 - Pick useful electives, both in math and other relevant areas. If he's a strong student, suggest tougher classes and perhaps graduate level classes.
 - Consider adding a minor or even a major. Areas to think about include computer science, statistics, a physical or biological science, engineering, economics, etc. The profiles can be helpful here.
 - Consider doing an internship or co-oping. Internship possibilities may come through your Career Planning and Placement Center or through your department. In addition, see the appendix for some sites that list available internships. Co-oping gives the student significantly more experience but takes more time. If your advisee has to take very many "fall-spring" sequence classes, co-oping can definitely interfere with scheduling so be careful here.
- **Help him with the job search.** Tell him about
 - The Career Planning and Placement Center. Your center will set up job interviews and may well provide workshops on resume preparation and developing interview skills.
 - Alumni contacts.

- The MAA, AMS and SIAM web sites. The MAA site has some useful tips on looking for a job and the AMS and SIAM sites have links to companies that may be hiring.

Suppose She Wants to Go to Grad School?

- **Go over the possibilities.**
 - Does she want to go on in math or in a different area?
 - Does she want to get a Ph.D., a master's or perhaps the 5 year BS/MS degree? How you advise her depends on the degree she wants to get. If she's not sure about going to grad school or wants to spend minimal time getting an advanced degree, the 5 year BS/MS degree might be a good option. Students doing double major may also do the 5 year BS/MS degree while they're finishing up their other major. However, if she wants to do a Ph.D. or master's degree, it's probably best to go to a school other than her under institution. Most students benefit from encountering a different environment and the chance to build their network.
 - Tell her about the schools that are out there and how they're ranked. The NRC rankings of math grad schools was published in the December, 1995 issue of the *Notices of the AMS*.
 - Tell her about financial support. A surprising number of students are not aware that math grad students generally are supported financially by assistantships and fellowships.
- **Show her how to prepare.** She should
 - Take stronger classes and probably some grad classes, if available.
 - Do research either at your school or at an REU. A combination of in-house research and REU is particularly helpful.
 - Consider doing a special program such as the Budapest Semesters in Mathematics, Math in Moscow or the MASS program at Penn State. By the way, REU's and special programs are well-known for getting students fired up about math in a way that generally doesn't happen to students that just stick with their home institution.
- **Help her with the grad school search.** You should start advising her in the second semester of her junior year or earlier about
 - **GRE's.** She needs to know that she will have to take both the general GRE's and subject GRE's. While general GRE's can be taken at her convenience, the subject GRE's are scheduled in November or December, unless she wants to do a practice run in April before she starts applying to schools.
 - **School rankings.** Go over the rankings with her again (you might want to do a reality check here).
 - **National Fellowships.** Stronger students should be urged to apply for NSF, DoD and other national fellowships. Even if the student doesn't receive a fellowship, the process of applying for the fellowship is similar enough to a lot of grad school applications that the work is not wasted. Make sure they're aware of the deadlines, since the NSF deadline is significantly earlier than the grad school deadlines.
 - **Loan her your copy of *Assistantships and Fellowships in the Mathematical Sciences*.** It's free from the AMS.
 - **Who to ask for letters of recommendation.** She should ask for letters from teachers who

- Are in her field *and*
- Know her and think well of her *and*
- Have taught her in an upper level class and/or grad class *or*
- Have mentored her in research *or*
- Have taught her in a special program

Point out to her that it's ok and, in fact, it's a good idea to ask the teacher if he can give her a good recommendation.

- **Help her decide where to apply.** She should
 - Pick 5-7 schools to apply to, including one or two that will be tough to get into, three that she's got a decent chance to get into and one really safe school. (Remember the reality check!)
 - Talk to other faculty about schools that are strong in her areas of interest, particularly if they're familiar with the schools. Previous grads that have gone to those schools are also good sources of information.
- **Help her decide where to go.** Urge her to visit all schools that have accepted her. She should talk to the faculty, particularly potential research advisors, and definitely talk to the other grad students to see how they feel about the school.

What if:

- **You have a really strong student?** (*Came in with a lot of AP credit, getting mostly A's, particularly in math classes, doing very well in beginning proof classes.*)
 - Be prepared to suggest special opportunities such as research, particularly summer REU's, study-abroad (Budapest Semesters in Mathematics, Math in Moscow), the MASS program at Penn State, etc. (See appendix for URL's)
 - Suggest stronger courses (honors sections, graduate courses, etc). Maybe she doesn't need a pre-requisite, maybe she can skip a required class and take a higher level analog. If you're not sure, ask a colleague and, in any case, make sure that the person in charge of advising in your department is willing to back you up.
 - Get the student thinking about grad school if he hasn't thought about it. Help him get the best preparation he can (see special opportunities, stronger courses). Tell him about financial support for grad school such as assistantships and fellowships.
- **You have a really weak student?** (*Getting C's and D's or worse, particularly in math classes, having a really hard time with the beginning proof classes.*)
 - Find out why he wanted to be a math major. Usually he was good in math in high school so he decided to do math in college, but didn't have a clue what he was getting into. Talk to him about possible careers for math majors and see if that interests him. If it does, maybe that will be enough to focus his energies on his math courses so he can do reasonably well in them. If not, maybe he should switch majors. Be prepared to help him identify other possible majors.
 - If she decides to stick with her math major, help her find courses she will find useful AND interesting AND doable.
 - Help her identify her special skills that, along with her math major, will get her a good job after graduation.

- **Your advisee comes in and says:**
 - “I’m really having trouble in this math class.” Try to find out where the problem is. If it’s just a question of not understanding something in the course then suggest:
 - talk to your teacher
 - use the tutoring resources

But if the problem is deeper, then maybe you have a weak student. See above.
 - “I hate this course; can I drop it?” (and, of course, it’s after the deadline). Check out your school’s procedures and, if you’re not sure how to handle it, ask your more experienced colleagues.
 - “I’m failing all my classes; I can’t sleep at night and I’m falling asleep during the day.” This practically screams DEPRESSION. Depending on how willing the student is to talk about his problems, be prepared to listen and keep the tissue box handy. In any case, you need to get him to the Counseling Center, because this kid almost certainly needs professional help and you’re not it.

- **You’re asked for a letter of recommendation.**
 - **Be honest with the student.**
 - If you can write a good letter, say so.
 - If you can’t write a good letter, explain why not (tactfully) and help her find somebody else who could write a good letter.
 - But realize: writing a good letter depends on what she’s applying for. You might not be able to write a good letter for somebody applying to grad school at Princeton but could if he was applying to a lower ranked school. You might not be able to write a good letter for someone applying to grad school in math but could if she wanted to get a job.
 - If you’re going to write a letter, ask for a resume. It can be very helpful filling in holes in your knowledge of the student, particularly if you go over it with him and ask him to explain stuff you’re not familiar with, such as jobs or extra-curricular interests.
 - **Be honest in your letter.**
 - Push the strong points.
 - State the weak points but put them in perspective.
 - Do comparisons but if the student comes off badly here, you probably shouldn’t have agreed to do the recommendation. See above.

- **Your advisee doesn’t take your advice.** That’s OK. It’s her life. Besides, it’ll get you used to dealing with your teenage kids when you have them.

Other Bits of Advice

- **Keep Records.** Keep for each student
 - Transcripts
 - Letters you’ve written for the student
 - Resumes
 - List of awards won
 - Information on post-grad career

You might also consider compiling a spread sheet that contains basic info on your students, such as graduation date, majors, minors, awards, study abroad info, REU info, job or grad school info, etc. This information is invaluable when you need to write those letters of recommendation or provide information to current students about alumni contacts. Pointing out your advising successes can also be useful to you when you come up for reappointment, tenure or promotion.

- **Enjoy the Payoff! When**

- **Your advisee comes in and says:**

- “I got into: Budapest Semesters, _____ REU, _____ grad school! Thanks so much for telling me about it and encouraging me to do it!”
- “I got that job/internship! Thanks for that recommendation.”
- “I’m graduating this semester and thanks for all your help. I’ve really appreciated it.”

Congratulate him and shake his hand. Then feel really good about yourself. You’ve earned it.

- **And for sure:**

Go to Graduation! That’s your chance to

- Congratulate your students and advisees
- Remind them to keep in touch
- Meet their parents. And be ready for some more compliments here. Parents really appreciate somebody looking after their kid and helping him out.

Useful URL's

Advising:

Cornell University advising page: <http://www.arts.cornell.edu/stu-adv/fachndbk/sec2.htm>

The Mentor (an advising journal): <http://www.psu.edu/dus/mentor/>

National Academic Advising Association: <http://www.nacada.ksu.edu/>

Careers for math majors:

<http://www.maa.org/students/career.html>

<http://www.ams.org/careers/>

<http://www.siam.org/careers>

<http://www.awm-math.org/career.html>

<http://www.amstat.org/careers/index.cfm?fuseaction=main> Careers in Statistics

<http://www.BeAnActuary.org>

<http://www.acm.org/membership/career/careerline.html>

<http://www.informs.org/Edu/Career/booklet.html> Careers in Operations

Research/Management Science

<http://stats.bls.gov:80/oco/ocos043.htm> From the U.S. Department of Labor,

Occupational Outlooks Handbook for Mathematicians

Internships:

<http://www.math.purdue.edu/~rcp/Internships.html>

<http://www.research.att.com/academic/>

http://www.acm.org/member_services/career/internship.html

<http://www.research.att.com/academic/>

<http://www.ams.org/employment/internships.html>

<http://www.jhu.edu/~gifted/jobs/>

Special Programs (semester):

Budapest Semesters in Mathematics: <http://www.stolaf.edu/depts/math/budapest/>

Math in Moscow: <http://www.mccme.ru/mathinmoscow/>

Mathematics Advance Study Semester: <http://www.math.psu.edu/mass/>

Special Programs (summer):

NSF REU's http://www.nsf.gov/home/crssprgm/reu/reu_search.cfm

NSA's Summer Programs <http://www.nsa.gov/programs/employ/csp.cfm>

St. Olaf and Carleton Summer Program for Women <http://www.mathcs.carleton.edu/smp/>

George Washington Summer Program for Women: <http://www.gwu.edu/~math/spwm.html>

Summer Institute in Mathematics (Puerto Rico) <http://cuhwww.upr.clu.edu/~simu/>

Research Opportunities (SIAM) <http://www.math.unh.edu/~siamug/intern/summer.html>

Summer Opportunities (MAA) <http://www.math.unh.edu/~siamug/intern/summer.html>

Fellowships and Scholarships:

NSF <http://www.ehr.nsf.gov/dge/programs/grf/>

DoD <http://www.asee.org/ndseg/>

Gates <http://www.gates.scholarships.cam.ac.uk/>

Rhodes <http://www.rhodesscholar.org/>

Goldwater <http://www.act.org/goldwater/index.html>

Graduate Record Exam <http://www.gre.org/>

Sample Plan-of-Study

The following Plan-of-Study is for a student we'll call Roger. In Spring, 2004, let's suppose Roger was taking our Introduction to Proof class and having some difficulty with it, as well as taking third semester calculus where he was getting an A. Roger was also taking first-semester physics and really enjoying it so he decided to add physics major. My usual procedure for doing a Plan-of-Study is to list the remaining courses Roger would need to complete his degree and make a table with headings for each of the semesters and summer sessions he wants to attend. So for him, the list of courses looked like:

Math: differential equations, modern algebra, linear algebra, math analysis I, probability-statistics sequence, 4 math electives (note that two of these four electives needed to be partial differential equations and numerical analysis, because of physics requirements).

Physics: second-semester physics, modern physics, mechanics I and II, electricity & magnetism I and II, quantum mechanics I and II, thermal physics and a physics lab course. (Note: mechanics I and II, electricity & magnetism I and II, quantum mechanics I and II are all Fall-Spring courses and modern physics, thermal physics and the physics lab courses are only offered in the spring.)

Technical requirements: computer science, chemistry, technical writing course

Humanities/social sciences: history, literature, philosophy/religion/art, science/technology/society, 2 social sciences, another humanities/social science.

Additional: 2 physical ed classes.

Fall '04	Spr '05	Fall '05	Spr '06	Fall '06	Spr '07
diff eq	mod physics	lin algebra	math anal I	num anal	math elec
mod alg	chemistry	probability	statistics	math elec	quant mech II
2 nd sem phys	therm physics	mechanics I	mechanics II	quant mech I	physics lab
comp sci	part diff eq	elec & mag I	elec & mag II	sci/tech/soc	social science
history	social science	literature	phil/rel/art	tech writing	hum/soc sci
	PE		PE		

We notice that everything fits. The humanities/social science classes are flexible for scheduling purposes but the physics courses are laid in stone. The core required math courses are completed by the end of the junior year, leaving room for the math electives in the senior year. The main problem I have with this schedule is that there's very little flexibility other than in the elective courses in math and the humanities/social sciences. If Roger wants to do research, he will probably need to do it in the summer and if he wants to extend the research into the fall, he'll probably need to take some summer school classes. In any case, there's very little room for any exploration.