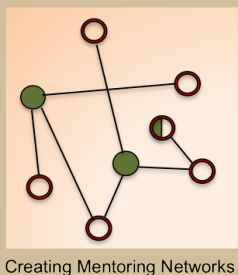


# E-MENTORING NETWORK IN THE MATHEMATICAL SCIENCES



Creating Mentoring Networks

*Providing Mentoring to underrepresented groups in the Mathematical Sciences*  
Undergraduate \* Graduate \* Postdoctoral \* Faculty

October 2011

Should I apply to graduate school? What is a good strategy?

Planning a successful 2nd year in graduate school

This is my last postdoctoral year! Job seeking strategies

Five things to do before your tenure review

Should I apply to graduate school? What is a good strategy? We asked Erika T. Camacho, Stephen A. Wirkus, Dagan Karp and Dr. Robin Wilson to offer their advice.

**EK & SW:** While graduate school is a very enriching experience, it is also a very intensive learning environment where your life might seem to be at a halt. To persevere and succeed in graduate school you have to have an internal drive powerful enough to not allow anything to distract you or turn you away from your educational goals. It is also important to recognize the times in graduate school when you should spend nearly 100% of the time studying and how to beat times of stress. Therefore, in deciding whether to apply to graduate school you really need to think about a few questions.

- What do you hope to accomplish by going to school for approximately 5-7 more years? Can you accomplish this through another venue other than graduate school, and if so, why not follow that path?
- How deeply do you want to obtain a graduate degree in the given field/area of study?
- Are you ready to commit and give 100% to this goal?
- Are you passionate about learning and ready to devote (at a more intensive level than what you did in undergraduate) 5-7 more years of your life to fully embed yourself in a very intensive learning environment?
- What are your long-term goals in life (this includes personal, career, and professional goals)? Think in terms of our entire life as many careers define our life style, what we do every day (including on breaks and summer), and who we are.

After answering these questions if you are still not sure about it, talk with faculty advisors and mentors (both in your institution and in other institutions), graduate students that you might know, and others.

Once you have decided to pursue a graduate degree, there are a few things you should do to make an informed decision and have the best chance of successfully completing a graduate program that is right for you and in line with your long-term goals. Selecting a graduate program is not just about what specific areas/fields/disciplines they offer or how recognized the program/institution is (i.e., where it ranks in comparison to other programs/institutions) but it is mainly about whether it is the right fit for you. The ultimate goal is to attend a program that you can see yourself successfully graduating from and getting the most of your graduate education.

## Narrowing your list of graduate schools

- *Application deadlines.* The deadlines are rarely flexible and may be as early as Dec 1 (or earlier) or as late as Feb 15. Submit your application by the deadline that will allow your application to be considered for financial aid from the departments/school.
- *What is the structure of the program that best fits you?* Some programs are very structured, while others are very flexible. Know yourself and the type of program from which you would benefit the most.
- *Check with your department first when getting basic information about different graduate programs/schools.* Schools will often send recruitment information to your department. Check for postings and information outside your department office.
- *Are there more than just one faculty member with research interests that appeal to you? What happens if you want to switch departments?* There are numerous instances of students “knowing” what they want to do when they enter graduate school but changing their minds within the first few years either because of conflicts with an advisor or change of interests. There should be enough diversity in the research interests of the faculty (both in the department and in related fields) and, ideally, enough flexibility to switch departments if you should find it

necessary. Ask your current faculty for their opinions and advice because they might/probably know something about the department and schools that you are considering.

- *Can you picture yourself living there for the next several years?* If you are accepted into a Ph.D. program, it will likely take 5-7 years to complete the program. It's important that you feel comfortable living there during those years. Some universities are in big cities, while others are in small towns.
- *Where do the graduates of the program work – industry or academia? How large is the department and what is the success rate of the students in the program?* All of these are very important questions to ask and you should do your best to find the answers before committing to any program or before accepting any offer!
- *Apply to at least three schools.* You should be realistic in your choices of schools but you should have at least one “long-shot”, one “safety”, and one “probably at the right level.” Probably having an additional two to three “at the right level” schools is a good bet because you never know when budget cuts or other unfortunate situations that are out of your control might make a “sure thing” a complete disaster for your application. If you are serious about attending graduate school, it is good to apply to five, six, or seven schools.
- *National fellowships.* A graduate fellowship is a grant that is awarded to you that you don't have to repay. Fellowships typically cover your tuition, medical insurance, and give you an annual stipend of \$12,000-\$30,000 to cover your books, academic and living expenses. There are numerous fellowships available and an online search will often help with this process. The National Science Foundation, National Physical Science Consortium, Hertz Foundation, and National Institutes of Health have fellowships for students. Several opportunities are listed in <https://sites.google.com/site/mathmentoringnetwork/home/resources>.

### **The application process**

- *One to three page statement of purpose.* Many departments will not meet the student face-to-face before deciding whether to accept them. The statement of purpose is where you show them who you are and it should focus on the academic side of you! Why do you want to go to graduate school? Why their program? What research have you done? If you haven't done research yet, what makes you think you want to do it? What do you intend to do with your degree? Briefly explain setbacks that you've had and how these have helped you grow academically and personally. Try to highlight the positive aspects of your academic record and instances that have shown your mathematical maturity. You should rewrite your statement at least 3 times before asking an English professor/lecturer to read it and critique it. You should also have at least one faculty member in your department critique it.
- *Importance of recommendation letters.* Make sure to ask the faculty if he/she can write you a *strong* letter of recommendation. Also be sure to ask well in advance of any deadline, give them a copy of your statement of purpose, a resume, and a list of relevant courses taken and grades received in these courses. Schools typically require three letters of recommendation and you should request at least two of these letters from math/science/engineering faculty who can comment on your academic potential and capabilities in the field/discipline to which you are applying. Give each recommender a list of all the places where they need to send letters along with the corresponding deadlines. Also, send them reminders 7 days prior to every deadline. Your recommenders should be your biggest supporters—remember to thank them after all the deadlines have passed and to keep them informed of your decisions and progress.
- *Application fees.* Expect to pay between \$50 and \$100 for each application. If this is a hardship, contact the individual department and request a fee waiver.
- *Graduate Record Examinations (GRE) general and subject tests.* Although countless statistics show almost no correlation between test scores and success in graduate school, almost all schools still require the GRE and many want you to perform well on this test. If you are required to take the test, make sure you do so in time for scores to arrive at the school before their application deadline. It is worthwhile to prepare for the GRE by obtaining the general test and relevant subject test books and studying diligently from them.
- *Applications.* Most applications are available online. Be sure to submit everything that is requested because incomplete applications will not be considered. E-mail the relevant departmental contact (often the administrative assistant of the department/program) to make sure your application has been received and is complete. Be aware of the application deadline!!

### **Choosing between schools that have accepted you**

- *Financial Considerations.* Most students in Ph.D. programs in mathematics, science, and engineering do not have to pay for their education. Financial support in the form of teaching assistantships, research assistantships, and graduate fellowships (or scholarships) allow many students to focus on their studies by providing a tuition waiver and a stipend for living expenses. Any type of support should be promised *in writing* and will likely be contingent upon “satisfactory progress” in the given program. Make sure that the funding isn't for just one year after which time you will be left to fend for yourself. Graduate school is hard work and you will need to focus your

energy on it and not on where the money will be coming from to finance your graduate studies.

- *Visit the school.* Some schools will require an interview and you should do your homework beforehand! If there is no interview, you should still try to visit the school, if at all possible. Plan in advance with the department so that you can meet some faculty and graduate students in the department. Sometimes departments have funds to help offset the costs of your visit but you should ask ahead of time.
  - Prepare a list of questions that you want to ask. For starters, ask some of the questions that helped you narrow down your list. How large is the department? How many students are in the incoming class? Are the course requirements rigid or flexible? Are there “qualifying exams” and, if so, what is the success rate? Can you take an upper division undergraduate course before taking the graduate course, if you feel you need the preparation? If so, will any of these courses count toward your degree?
  - Find out who you are meeting with beforehand and get some information on each individual (especially about their research interests) from the web. If you are visiting a faculty in a particular lab with whom you may be working, ask questions that you think will help you figure out if it is a good match for you.
  - Meet with some graduate students in the department. This is the time when you can ask questions from students who are currently experiencing the program—they can often give you the inside story of the department and how smoothly and friendly things are. The graduate students in your department will likely be your friends for the next several years and will offer support during your time there.
  - Take 15-30 minutes at the end of the day to write down some notes on your visit. Include both objective information (such as students take three courses each semester for the first two years) and subjective information (such as the grad students really seemed friendly and not as stressed as I expected). This will help in comparing schools when it comes time to make a decision.
- *Get input from your faculty.* Do not let anyone push you in a direction you don't want to go, but getting advice is important and faculty (especially those that wrote you letters of recommendation) are often very willing to talk with you about the schools to which you've been accepted. They collectively have a wealth of experience and want to help you make the best decision for you. Sometimes you may get conflicting advice but just remember that everyone is viewing your situation from their own perspective—you are the one that knows you best.

**DK:** Entering a graduate program in mathematics is an adventure like no other. Some of the best times of my life were during my graduate years. And like anything extremely rewarding, math grad school is extremely challenging. Once you earn a graduate degree, no one can ever take it away from you. And a graduate degree in mathematics opens many doors both in industry and academia.

Applying to graduate school is expensive and time consuming, and I recommend applying to as many schools as you can afford (in time and money). Applying to 15 schools is a reasonable target. I would apply to five dream schools, five solid schools, and five schools to which you think you have a high chance of being admitted (but never apply to a school that you are not interested in). Here are some other concrete suggestions:

#### Spring Semester Junior Year

- Consult with professors and develop your list of graduate schools during the spring semester of your Junior year. Make a spreadsheet containing the names of each school, their application deadline, and other pertinent information.
- Also, take the GRE during the spring semester of your Junior year.

#### Summer

- Write a draft of your personal essay during the summer between Junior and Senior years. Remember to be as specific as possible in your essay. Everyone applying loves mathematics and finds it beautiful. Why are you personally applying? Are there particular results you find interesting and would like to learn more about?

#### Fall Semester Senior Year

- Ask professors for letters of recommendation at the \*beginning\* of your senior year. For each professor, give them a copy of your unofficial transcripts, your draft personal essay, and a complete list of institutions with deadlines and specific letter instructions. An email works best for the latter, with links to electronic submission sites. If any schools require paper letters of recommendation, give pre-addressed and stamped envelopes to all your recommenders.
- If you can, get at least one letter of recommendation from a professor \*outside\* of your home institution.
- Retake the GRE if you would need to improve your score.
- Remember to apply to the NSF and/or all other scholarships and fellowships you may be eligible for.
- Send reminder emails to your letter writers in advance of their deadlines.

**RW:** The decision to go on to graduate school in mathematics can be a difficult one. For some, it's a chance to fulfill a lifelong dream of becoming a professional scientist working in industry, government or academia. For others it is an opportunity to pursue something that we are passionate about, but may not be sure of what the career path afterwards will hold. Whatever the case, before you make the decision to pursue a graduate degree in mathematics, make sure that the subject is one that you are very passionate about. If you don't enjoy what you're studying in graduate school, and I mean *really* enjoy it, then it will be harder for you to make it through when times get tough during coursework, preliminary and qualifying exams, and writing your dissertation. If you are sure that pursuing a graduate degree in mathematics is right for you, then you should start doing some research on what type of program you would like to attend. The answer to this question can depend on a lot of factors. While you're doing your research, here are some things to keep in mind:

**Questions to ask about choosing the right grad school for you:**

- Do you want to be in a large school or a small school? What is the student to faculty ratio?
- Who are the faculty? Who are the potential thesis advisors in an area you like? (*very important!!!*)
- What is the community of graduate students like in the department? Do they like the program? Do they work together? What level of students are they?
- What is the breadth and depth of the program? What areas is the program strong in and what is the range of areas of expertise of the faculty?
- What are the research interests of the faculty? What are some of their recent publications?
- What are the graduation rates of the department? Do most of the graduate students they admit graduate with PhD's? Masters degrees? What do they go on to do after they graduate?
- What is the qualifying exam/preliminary exam process? What subjects are the exams in, how many chances? What happens if you don't pass? Can you still leave with a Masters degree? (Ask for copies of old exams. You can also find these online.)
- What are the requirements for a Masters Degree? Can you earn a Masters degree on your way to a PhD?
- What kind of financial support do they provide? Teaching Assistantships? Research Assistantships? Fellowship? How many years of support is guaranteed? Are all of the students guaranteed support upon admission?
- What is the teaching load for graduate students? Are there opportunities to teach their own classes? What training is provided for graduate student teachers and teaching assistants?
- How long do students take at this university to graduate with their PhD?
- What organizations are active in the department and on campus that support graduate students?
- Prowl the web!!! Look at universities websites and find the math department home page.
- Visit: sit in classes, check out housing, meet grad students, meet faculty, meet staff, check out the town.
- Send out at least 6-8 applications, and make sure to ask about fee waivers. (You can also get fee waivers for a lot of schools by visiting their booths at graduate fairs, such as the one at the upcoming [SACNAS](#) conference).
- Talk to the graduate students. Are they happy? What are their favorite classes? Who are their favorite faculty members? Is the first-year graduate student culture a collaborative one or is it more independent?
- If you are not sure if you are prepared for a four-year PhD program, or if a PhD program in mathematics is right for you, then you can also consider enrolling in a terminal Masters degree program as well. (But remember, it's more likely to get your education fully funded as a PhD student!)

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Planning a successful second year in graduate school. *Ivelisse Rubio and Ricardo Cortez offer the following suggestions.*

**IR:** I was once told that the one who succeeds in graduate school is not necessarily the most intelligent person; it is the one that has the discipline and perseverance to overcome different types of "obstacles": courses, qualifying exams, research and writing the thesis.

Although the structure of each graduate program is different, most of them require students to pass or at least attempt qualifying exams by the end of their second year. Passing these exams should be a priority. This means that while you are taking courses, you should be preparing for the exams. It is important to not isolate yourself, other students will be also preparing for the exams and you can form study groups where you share examples of old exams and discuss problems.

During the second year, you can also start to explore possible areas for your future thesis research. If possible, take courses that can give you a better understanding of the areas that are of interest to you. Talk to faculty that work in those areas. Attend departmental seminars where you can learn about current research topics and talk to other



graduate students that are already working on thesis research. Ask questions about possible advisors like: *How many students has he/she graduated in the last five years? How much time does she/he dedicate to their students? Does she/he advice students about grants and job opportunities?*

But, again, your priority is passing your qualifying exams! Then, after passing your exams, you will have the enthusiasm and energy to continue to the next step! You cannot get tired! It is a long distance obstacle race! And you will get to the finish line!

**RC:** Typically, the first year in graduate school is a transition time for most students. Students have to get used to a new university, new set of colleagues, and an entirely new way of studying mathematics that requires a new way of managing time. By the end of the first year and partly into the second year, students usually organize their Ph.D. exam schedule and other events that can make a successful second year in the graduate program. The goal for the second year should be to finish all Ph.D. exams and all coursework associated with the program. Sometimes students get overwhelmed by looking ahead at all the requirements to finish the Ph.D., including written and oral exams, courses, teaching, finding an advisor, and writing a dissertation.

It is more manageable to set goals for the second year and focus on those, rather than looking ahead at all the upcoming years together. If the student has passed all written exams and essentially completed all course requirements by the end of the second year, this would qualify as a successful second year. This will place the student in a position to choose an advisor and begin dissertation research during the third year of graduate school and be on schedule to complete the Ph.D. in 4-5 years.

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This is my last postdoc year! Job seeking strategies. *By Dagan Karp and Ricardo Cortez*

This is the time of the year when Postdoctoral researchers in their last year of their appointment begin to look for a permanent position as a faculty member or as a researcher or at a teaching college. Given that the job market has been tough in recent years, it is crucial to do an excellent job on the things you control (and not stress over the things you cannot control). These include: networking and preparing your application materials. The application will generally include a cover letter, a CV, and written material consisting of a research statement, copies of articles, and a teaching dossier (statement of philosophy, evaluations and samples).

Make sure the application is put together in a professional manner and looks organized. Every part of it should be easy to read and to follow. Imagine you are the one having to read 200 applications and can only spend a few minutes reading each one. To stand out, your application must show that your research is original and significant, and that your teaching is effective and thoughtful. It should be apparent that you will be a good colleague.

A good cover letter is personalized to each institution, mentions in the first paragraph what position you are applying for and how you learned about it. The second paragraph should discuss your background and qualifications (and how they match the ad you responded to). Finally, offer to submit additional information and let them know how to get in touch with you (if you will be at a major conference or in the area, etc.).

Your research statement should be about 5 pages long. Longer versions are likely to be ignored! Start with a bird's eye view of where your research fits within the larger picture; then give a *medium-scale* description of the projects you have worked on (to be understood by a mathematician who is not in your area of research). Then you can get more specific by listing your previous research and your current projects (be clear about what is old and what is new). End the statement with a research plan that indicates how to extend the projects you are working on and how your work leads to new projects. This has to be exciting and have potential for success while being credible.

If you are interested in teaching at a liberal arts college, perhaps the most important document in your application is your teaching dossier. If you don't have a dossier, create one. It should contain your teaching experience (descriptions of all courses you've ever taught), a description of your evaluations (a summary in the body, and copies attached in an appendix), your teaching philosophy, descriptions of any outreach you've done, and a list of your teaching awards, if any.

Many of us would like to think that our work speaks for itself, but the reality is that jobs often come about from contacts that you or your advisors have. For this reason, network as much as possible. Tell everyone you know that you are looking for a job (specifying the type of position you want). When you meet people and discuss possible jobs, follow up with an email. If you say you will send material to somebody, do it immediately. Ask your advisor to make phone calls. Make sure your complete applications were received. Use Mathjobs and other sites.

A good resource is [http://www.vpul.upenn.edu/careerservices/gradstud/resources/PhD\\_sme\\_academic/](http://www.vpul.upenn.edu/careerservices/gradstud/resources/PhD_sme_academic/), from the University of Pennsylvania Career Services office.

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## Five things to do before my tenure review! *By Herbert Medina*

The years leading up to the application for tenure and promotion to associate professor can be stressful and anxious for many. Aside from working very hard on your research and in the classroom, the keys to reducing this anxiety and stress and also maximizing your chances for a successful tenure application are 1. clarity and 2. preparation.

During the first year of your tenure-track position, you should have conversations with your department chair, dean and departmental colleagues to get as much clarity as possible about the expectations for tenure and promotion at your institution. It is possible that department chairs and deans will not be so forthcoming with this information, because tenure and promotion requirements are not merely checkboxes, but be proactive with your questions to get a sense as to whether, for example, it is expected that you have  $x$  or  $x + 2$  publications at the time you apply. Also get a sense of the quality-of-teaching expectations that your institution has. Departmental colleagues may be more forthcoming so conversations with them should also prove very fruitful. After all, your departmental colleagues will vote on your promotion and tenure so having a sense from them as to what their expectations are for junior faculty is very important.

Once you feel that you have a sense of the expectations, write them down and share them informally with your colleagues and department chair. That way, they can tell you whether your interpretation of what was communicated to you meshes with the real expectations. Again, it'll be hard to "pin down" anyone to get them to tell you that exactly  $x$  publications in journals ranked  $y$  or higher in your field will be enough for promotion and tenure, but if you share with them something that is way off, they'll be able to steer you back to a more realistic set of expectations.

Now that you have some clarity, let's address the preparation of material for your application for tenure. This also should start during your first year in a tenure-track position. At first, this entails simply keeping your CV up to date (with publications, conference presentations, workshop participations, etc.); keeping a file (electronic and paper) of all the syllabi for your courses, sample exams, etc.; keeping data on your teaching evaluations; keeping letters from peers who have reviewed your teaching; keeping a list of all the university committees on which you have served; etc. In summary, you always want to have an up-to-date summary of your work as a faculty member.

In regards to the evaluation of your teaching, it is important that you have (at least) yearly peer reviews of it. This may already be the culture/requirement at your institution, but if it is not, ask at least one colleague to visit one of your classes at least once per year. (It should be different colleagues in different years.) They should write evaluative letters that should go to you and your chair and that you will become part of your tenure/promotion application. Without peer-reviews of teaching, the rank and tenure committee will have only student teaching evaluations as the evaluative instrument to help it assess your teaching, and this may be inadequate (especially if your teaching evaluations are below average). There is lots of information on effective peer review (for example, [http://uwf.edu/CAS/partners/documents/Peer\\_Review\\_Protocol\\_ASEE04.pdf](http://uwf.edu/CAS/partners/documents/Peer_Review_Protocol_ASEE04.pdf) is a good resource for peer review) but there is likely already faculty/resources at your institution to help you with effective peer reviews.

So now it's time to prepare your tenure and promotion application. What should you do? Finally, the five things that you should do (in no particular order).

1. **Take a look at the application of the last member of your department who successfully applied for tenure/promotion and use his/her application as a guide for the preparation of yours.** This should especially be the case with the narrative portion of the application. Your narrative will of course be very different than his/hers, but that last successful application will give you a sense of the topics covered, emphasis, what not to include, etc.
2. **Get clarity from your institution's rank and tenure committee as to the format of your application, and explicitly follow that format.** A promotion and tenure application is not the place to "get creative" or "artsy." Assemble an application that adheres to the prescribed format as much as possible.
3. The application process will almost certainly involve the solicitation of external letters from people in your field who can speak to the quality/relevance of your research. These individuals are usually chosen by your department chair after s/he has consulted with you. **Make a list of at least five people whom you could suggest to your department chair to act as external reviewers at the time of your application.**
4. Applications for promotion and tenure usually are due in the middle of the fall semester. That means that you should spend part of the previous summer working on the narrative portion of your application and on assembling the supporting material for it. **Schedule in your calendar at least two weeks of time to exclusively work on these tasks.**
5. Stay positive as you prepare your application. **Take the point of view that applying for tenure and promotion is your opportunity to "tell your story."** It is your chance to inform colleagues in your department and

institution as well as your chair and dean about the wonderful things you have been doing as a faculty member. Take the opportunity to tell a compelling, good and interesting story. If you have the attitude that, "Why the heck are the making me do this," then that will come through in your narrative and application, and you may end up producing an application that comes off as standoffish and defensive.

Promotion and tenure review are part of the "trade" for faculty (and whether we like it or not, it's not likely to change anytime soon) so be ready to navigate this aspect of the trade by being informed and prepared. If you have done good work (both teaching and scholarship) in the years leading up to the time of application for tenure and promotion, and you have clarity about the process and have prepared for it, then it won't be long before you can write "Associate Professor" after your name!

## Reader Resources

E-Mentoring Network in the Mathematical Sciences is designed to address relevant questions that students, postdoctoral researchers and junior faculty may have regarding their own advancement in mathematics. Its goal is to reach as many readers as possible, especially those who may not have sufficient mentoring at their current institution. We publish mentors' opinions as provided in order to stimulate discussion. We hope you will be active in this process.

The topics addressed in this publication are kept relevant by requesting suggestions from readers. Please send mentoring topics to [mathmentoringnetwork@gmail.com](mailto:mathmentoringnetwork@gmail.com) and look for responses in future issues.

Visit <https://sites.google.com/site/mathmentoringnetwork/> for more information, resources, older issues and more.

Follow us on [Facebook](#) for additional conversation and in-between-issues mentoring.

Do you find this publication useful?

Send your feedback to [mathmentoringnetwork@gmail.com](mailto:mathmentoringnetwork@gmail.com) to help us improve this publication. If you are a mentor and would like to contribute to a future issue, we would like to hear from you.

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