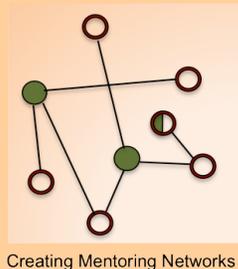


E-MENTORING NETWORK IN THE MATHEMATICAL SCIENCES



Creating Mentoring Networks

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

September 2012

Leveraging my REU work during the academic year

Making the best out of my first year in grad school

What should my CV look like at the end of my postdoc?

Is the third year review useful?

Leveraging my REU work during the academic year *By Rebecca Garcia and Ricardo Cortez*

Many undergraduates out there participated in a summer research program this past summer and the experience is still fresh in your minds. If you enjoyed the topic and would like to find ways to continue doing related work, there are some possibilities that you can pursue.

Continue working with your REU mentor. Sometimes, the summer project goes so well that the report you wrote could be turned into a publishable paper with some additional work. In this case, the REU mentor and other participants will likely be interested in taking the extra steps to send the article to a journal. Ask your mentor if this is the case and offer to work from your own institution during the academic year. This is a little tricky if the authors are not in the same institution but one can arrange for Skype meetings (or something equivalent).

Take a research course. Ask in your department if there is a course designated for undergraduate research where you can work with a faculty member and receive credit for it. Not all math departments offer this but it can be a good way for you to find a faculty supervisor that is familiar with the topic of your REU and can help you define some extensions of that work that would satisfy the course requirements while allowing you to continue doing research. This is something that you can write on your resumé as another research experience.

Undergraduate thesis. If your math major requirements include a capstone course involving a project or if you are in an honors program that requires a thesis to graduate, you can ask the faculty member in charge to let you work on a problem related to your REU topic. Faculty usually like this because the background you have on the topic will likely result in a much better thesis than if you had to start a new subject from scratch. This option may be more relevant to seniors.

Do it for the love of math. Even if there is no mechanism for you to continue doing research started in your REU for credit, you can ask a faculty member familiar with the topic if they would supervise your research during an academic semester. For additional support, you should let your faculty supervisor know about external grants like the NSF-sponsored CURM that provide some funding for conference travel and student stipend. In addition, some universities have programs and scholarships that encourage undergraduate research, like the McNair's Scholars Program. Ask in your department if there are programs like this within the university and get in touch with their office.

Making the best out of my first year in grad school *by Juan Doe and Colette Patt*

My first year in graduate school was a time of transition. I felt excited about being in a new environment and wanted to do well. Right away, at the beginning of the first semester, I was faced with the fact that my usual study habits were not adequate any more. Several things were totally different from my days as an undergraduate. For the first time I was taking only math classes and I was spending all day doing math. The pace was faster than I anticipated and my study habits had to be adjusted to keep up. I used to like trying the problems on my own before discussing them with other students; now, I couldn't do that if I wanted to finish all my assignments in time! The first adjustment was to learn to *work in groups* in a way that was beneficial to all of us. This implied accepting that I couldn't do everything in time on my own. Of course, even if the assignments were a group effort, in the end I made sure I knew all the details of each problem.

I knew it would be tough for me because I was a graduate student at a top research university while I had been an undergraduate at a lower-tiered school. So, I decided to take some upper division honors classes during my first semester in graduate school. Frankly, I thought this would be a disadvantage; that it would set me back. It turned out

that *knowing that I would have a difficult time was an advantage* over other new graduate students who were sure they were definitely good enough for the top research university and had to find out later (the hard way) that they were not as prepared as they thought. The reality was that about 90% of the new graduate students had similar difficulties during the first year.

As an undergraduate, I could put off work or studying until the last minute. In graduate school, this was not an option. I had to learn to find time for everything I needed to do. My second adjustment was to *learn to manage my time* so that I could get all my work done and still have some time for life outside school. I scheduled soccer games and then I'd go back to math. I would make time to go to free concerts, and then go back to math. In fact, exercising about 30 minutes per day (walking or jogging) is really important to reduce stress, maintain physical health, and emotional well-being. There were opportunities for me to get involved in other activities that were important to me, like teaching in programs for high school students and becoming an officer in student societies. I had to learn that my first year in graduate school was not the best time for those activities. There would be plenty of time later in graduate school for them, but not during the first year. I had to *learn to think more long-term* about my interests and know that I could do everything I wanted to do at the right time, but I could not do too many of these things at the same time.

I also learned that the time I spent studying sometimes did and sometimes didn't feel satisfyingly productive. It sometimes felt like ideas and learning were happening really fast for me, but sometimes I felt like I was just plodding along and not getting enough done when I was studying. I learned that the important thing is to keep working. No one gets through all the material at warp speed every time they try to learn something new, or work on a homework assignment, or prepare for an exam. I learned that *direction matters more than pace* and to keep moving forward with my work, even at those times when it seemed like slow going.

The simple task of going to class got a makeover too. I developed an attention span for the entire class, took good notes, asked questions in class (which took some courage and turning off part of my shy personality), and made sure I read the relevant sections of the book. Sometimes I managed to read ahead of the class. I went to the professors' office hours regularly to make sure I wasn't missing anything. I would call this adjustment *a new classroom attitude*.

At first I was not always sure about how to talk to professors or sometimes other students. They seemed to know more than I did. I realized that sometimes people can be competitive in the way they interact, or just aren't particularly friendly. Sometimes people can even seem rude, or perhaps either they or I felt awkward with each other for some reason. I looked around in my department and in graduate student organizations on campus for people I could talk with comfortably. I also took chances talking about math or life as a math student even with people I was not always comfortable around in other ways. Sometimes that worked, and sometimes it didn't, but I realize now that all of these experiences helped me learn how to be a member of the math community. It is not always a perfect community-- nor is any community--but it's the profession I want to be in. Anyone who is in it, whether we like each other or not, is my colleague and we can learn from each other, so I call this *learning to be collegial*.

Finally, every first-year graduate student has to make time to get ready for an initial set of exams, called either preliminary or qualifying exams. In theory, learning as much as possible in every class will prepare you for the exams. In practice, I had to study an entire summer before I could pass this first set of exams (I didn't pass them the first time). I guess the lesson here is to do everything you can in your first year to pass your classes and pass the written exams and any other requirements of the PhD program. I used to feel overwhelmed with all the requirements of the PhD program until I learned to *worry about one requirement at a time*.

What should my CV look like at the end of my postdoc? by Ricardo Cortez

Here are some points to keep in mind as you go through your postdoctoral appointment. The goal of this article is to get you to think about what you need to do in order to be competitive at the end of your postdoc.

Take care of unfinished work right away. New postdocs typically have some unfinished work that stems from their dissertation or other previous research. It is important to take the time to finish any loose ends as soon as possible. The reason is that this work is nearly finished and should be submitted for publication right away. Good postdoc supervisors understand and will give you the time to do this. If the work involved your previous supervisor or other co-authors that are holding up the work for too long, talk to your postdoc supervisor regarding how to proceed.

Read, read, read. A new postdoc position often involves starting new projects in areas that might be slightly outside of your previous work. Any new project requires a thorough review of the literature in order to determine the current state of the research and the relevant open questions. Your goal should be to read so many papers that you become an expert on the subject.

Publication rate. The quantity is not as important as the quality of publications. However, there must be a balance between them, especially at the beginning of your career. It would not be a good idea to work your entire postdoc

tenure on a single publication regardless of how difficult the project is. The significance of any work usually becomes apparent over the years and is not available at the time you look for jobs. On the other hand, dividing a project into many publications, each of them representing a small increment of work, is not appropriate either. One goal is to learn from your supervisor what is the appropriate amount of material to submit for publication as a single article. A publication rate of about 2 papers or more per year is adequate for seeking faculty jobs.

Listen to advice. You should develop two types of relationships with your supervisor. One is as a collaborator and the other one as a mentor. As a collaborator, you should strive to meet and exceed your supervisor's expectations as the research projects develop. Always do the work you are expected to do by the next meeting and try to go beyond by following ideas that you had. The latter is especially important as you mature in research. Do not think of your postdoc as a 9-5pm job. As a mentor, trust your supervisor and be sure to talk with her/him often about your professional plans and career goals.

Develop independence. It is a good idea to develop new project ideas and keep notes on them. These will turn into the basis for new collaborations and/or individual projects that continue after your postdoc years. Ideas of new research projects involve doing some preliminary work on them, testing their feasibility, and discussing them with your supervisor (see next item). Independence also gives you the experience to be smart about the problems you choose to work on. It is important to identify significant problems early enough (before they become so popular that everyone in the mathematics world is working on them).

Write a grant proposal. Expect to write a first grant proposal before you finish your postdoc years. Your supervisor and other mentors should guide you through finding funding opportunities and writing successful proposals. It is not enough to have a good idea to pursue; it is necessary to show that the idea has a good chance of working out and advancing the knowledge in the area. For this reason it is important to have done some preliminary work on it. As a postdoc, one often does not have a large collection of projects to propose; however, keeping notes on new ideas over time will help you put together a good proposal.

Teach. Teaching experience is indispensable when looking for jobs. Many postdoc positions include teaching duties. One course per semester is adequate. If your postdoc does not include teaching, ask to teach at least one course per year so that you can develop experience in the classroom.

Go to conferences and network. It is difficult to overstate the importance of knowing people in your field. The best way to start developing a network of contacts is by attending conferences and presenting your work. Do not do this prematurely because your presentation must be as good as possible. When you go to conferences, do not just hang out with your friends; make an effort to meet more senior scientists.

Develop technical proficiency that gives you an edge. When you collaborate with other people, you have to carve a niche and bring something to the table. Your niche is what identifies you as a key (or critical) component of the collaboration.

Is the third year review useful? *by Anonymous contributor (proofread by Ken Ono)*

Most Assistant Professor appointments include a third-year review at the school (or college) level. In some institutions, there might be additional annual evaluations at the departmental level, but typically the third-year review is conducted by a *Promotions and Tenure committee* of the school. The purpose of the review is to provide feedback to the faculty member halfway through the tenure process. A useful review will include a letter to the faculty member that evaluates her/his activities in areas of research, teaching, and service. I have seen reviews that essentially say that the faculty member is doing well and to continue doing the same. While it is nice to get a pat in the back, this is completely useless. In that case, the candidate should ask to meet with the Chair of the department and ask for more specific comments.

A useful review will describe expectations in each of the three areas and will describe how the candidate meets, exceeds, or falls short of them. More importantly, the review will state ways in which the candidate can improve her/his performance by the time the tenure decision is made. A better review will not only comment on the candidate's performance (the function value) but also discuss the candidate's *trajectory* (the derivative of the function). In other words, two candidates with the same number and quality of publications can have different evaluations if one has fewer publications year after year while the other one is increasing the number of papers. In this case, the trajectories are different and the first candidate should be alerted to reverse the trend. The point is that if you extrapolate the trajectory to the time of the tenure decision, the candidate should look like an easy tenure case. The research area of evaluation should include comments on the publication record (quantity, quality and journal level), grant proposal and award activity, talks at conferences and seminars. The proposal writing activity is important because even if a grant has not been awarded yet, it is good to show that the candidate is applying. The teaching

area of evaluation should include comments on the quality of teaching, organization of courses, supervision of undergraduate projects/theses, supervision of graduate students, student advising and summer projects. The service component at the third-year review need not be substantial; departmental service is usually sufficient.

The bottom line is that the third-year review can be an important tool to adjust your research/teaching activities before tenure. The best reviews provide benchmarks and expectations and indicate where the candidate may be performing below expectations. The review should indicate the level at which the candidate is expected to perform by the time of tenure to be successful. If your review does not contain these points, talk to your Chair and ask for them.

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 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 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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