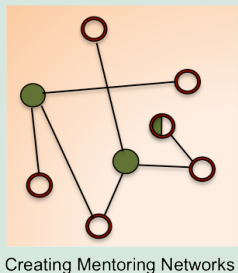


E-MENTORING NETWORK IN THE MATHEMATICAL SCIENCES



Creating Mentoring Networks

Providing Mentoring to underrepresented groups in the Mathematical Sciences

Undergraduate * Graduate * Postdoctoral * Faculty

May 2012

Things to keep in mind as you prepare to participate in an REU

Graduate students can increase their support network

What is MathOverflow and why should I care?

How to measure a successful postdoc position

Things to keep in mind as you prepare to participate in an REU *By Ricardo Cortez, Talea Mayo and Gina-Maria Pomann.*

At this time of the year, many of you have been accepted into a research program for undergraduates (which I will generically call REU even if it is not NSF funded) and you might be wondering what the experience will be like. You also might be thinking about the best way to prepare for it. Here are some ideas.

REUs are typically designed to give undergraduates a taste of what research is like. I don't mean "research" in the sense of going to the library and looking up information about a topic and writing it down (as in a research paper). I mean looking up as much information about a topic as possible so that you can attempt to solve a problem that nobody has solved before. Attempting to solve an open problem requires coming up with many ideas, trying them out, assessing them, and eventually coming up with new ones to try again. Most ideas will not work but they will give you insight into the next one.

Those of you who are about to attend your first REU program should know that it will be intense and difficult. While you may be used to going to classes on different subjects every day, the REU will be the first time that you spend the entire time doing math 24/7 and, more specifically, you will likely be thinking about a single problem for most of the time. This takes some getting used to and requires you to make a quick transition within the first 2 weeks of the program. You should also expect to feel frustrated at times. By definition, doing research means breaking new ground and developing something new. You cannot expect this to happen quickly or without trying many ideas before finding the solution. But remember, you only need one idea that works to solve the problem!

So far my comments might sound somewhat negative but the feeling you get when you solve pieces of the problem makes it all worthwhile. Once everything comes together, you will be proud of your accomplishment. In addition, the REU experience will help you decide if research is something you love or if it is not for you.

To address the title question specifically, I believe it is important that you prepare mentally to work extremely hard, to be open to new ideas, to learn to communicate mathematics, to listen to others' suggestions, and to remain determined to find the solution. If you are part of a group project, be sure to listen and respect your teammates' ideas and follow up on them. Collaboration always helps. If you want to prepare better, you can also contact the REU director ahead of time to ask if there is any material that you should read in advance. Talea Mayo and Gina-Maria Pomann are two former REU students who are currently in graduate school and both hold an NSF graduate fellowship. They give the following advice:

Talea: People get really stressed out about 'performing' and, consequently, they don't get the most out of the program. So, I think you should know that it is going to be hard, but you can/will still succeed, which is the whole point of doing an REU in the first place.

Gina-Maria: I would suggest going into the program with a completely open mind. Work as hard as you possibly can to learn as much as you possibly can because this is your one opportunity to figure out if research excites you. You don't know what research is until you are deep into it, and you can't get deep into it unless you work as hard as you can. It is alright to feel as though you are underprepared even if you have taken steps to prepare yourself in advance. You may also feel that other students are better prepared for the program. However, this is your chance to learn and to prove to yourself how well you can learn, not just how much you already know. Part of research is the ability to learn new concepts that will then be used to develop your own methodology. Never be afraid to say 'I don't know' or 'I don't understand' because that is your opportunity to have someone explain it to you. You will discover that others also need the explanation!

Graduate students can increase their support network *By Ricardo Cortez*

When you are about to finish your Ph.D. and start looking for jobs in academia or in industry, it becomes clear how important it is to know people that can put in a good word on your behalf. I used to think that the quality of someone's dissertation was the most important element in landing a job. In fact, the letters of recommendation and other informal recommendations are the key to getting an interview. The informal recommendations come about because potential employers talk to their friends and colleagues about prospective hires. For this reason, the more people "in the business" that you know (and who can say good things about you), the better. This brings me to networking. Graduate networking can open the doors to internships, employment and collaboration, and can even lead to grants and publications.

Conferences and workshops are excellent opportunities for graduate students to meet more senior researchers in their area. The key is to attend conferences with the goal of making new professional contacts that can eventually turn into lasting connections. You should go up to a person after they gave a presentation and express your interest in the topic. The point is to exchange information and, if appropriate, give them your business card. If you don't have business cards, get some now. When you approach potential contacts, tell them who you are and why you are interested in speaking with them. If you are a little shy, you might need more encouragement but force yourself to do it. It gets easier after a few times. When you return home, send them an email saying that you enjoyed meeting and talking to them. If you see them at another meeting later, go to them and introduce yourself again and remind them where you met.

My colleague Mac Hyman often suggests that you try to make 5 contacts per day at a conference. Put 5 coins in your right pocket at the beginning of the day. Every time you make a contact, move one of the coins to your left pocket. This will remind you of how you are doing. It is tempting to spend your time at a conference hanging out with your friends all the time, but this is not the best use of your time. Make your 5 contacts a day first, and then go out with your friends.

Things you should not do are to invite senior researchers that you just met at a conference to be your Facebook friends or your LinkedIn connections. You should also avoid putting them in uncomfortable positions, like going up to someone and saying *Do you remember me?*

There are many sites with networking information out there. Some of them are listed in [PhD Programs Online](#). Additional resources are found at the [AWM Mentor Network](#).

What is MathOverflow and why should I care? *by Dagan Karp*

What is MathOverflow? MathOverflow is an amazing resource that is changing the way mathematics is done in several sub-disciplines. It's an interactive website where people ask and answer research questions about mathematics. The URL is <http://mathoverflow.net/>

What is MathOverflow not? To get a better picture of what MathOverflow is, it may be helpful to distinguish it from other online resources. First, MathOverflow is not Wikipedia. It is not intended to be a comprehensive warehouse of facts. Also, MathOverflow is not a blog or discussion forum. It is designed for questions to be asked and answered, but not for extended discussions and threads. Also, it's not for open questions or homework: you wouldn't ask about the specifics of your Algebra homework in a seminar, and it is similarly inappropriate on MathOverflow.

How does it work? Anyone can ask and answer questions anonymously. Alternatively, users can also choose to create an account, and registered users accumulate reputation points for asking good questions or giving good answers. Reputation points are awarded by other users. So users run MathOverflow. Collectively we decide which answers are good and which questions are interesting.

Why is it useful? Have you heard the expression "I think this fact is known to the experts, but it's not in the literature?" MathOverflow is a great place to nail down such results. And questions are answered amazingly quickly - the average question is answered in a matter of hours. And these answers are provided from true experts, from hot new postdocs to Fields Medalists. MathOverflow is like a virtual seminar open to all mathematicians - a great way to share information.

Why should we all use MathOverflow? First, let me be clear. MathOverflow is not perfect. For instance, it specifically disallows discussion of MathOverflow (and pushes such discussion to a meta page). So it is not self-critical, which is inherently problematic. But users have great control. So, if sufficient users come to desire such (or any) content, they will make it so. Moreover, I personally love the democratizing effect of MathOverflow. The transfer of knowledge no longer takes place in conversations between experts behind closed doors; now such information is

publicly available. This is especially useful for people new to mathematics or new to a given field. And MathOverflow is only improved by use – the more people actively using MathOverflow, the better.

How to measure a successful postdoctoral position *by Anonymous contributor*

Postdoctoral positions come in many varieties. Most are 2 or 3 years long; however, there are some that are only 1-year positions. Due to the recent shortage of jobs, it is now becoming more common to do a second postdoc before moving to a permanent position. The goal of this article is to discuss the elements of a postdoctoral position that make it successful. From a research point of view, the successful completion of a postdoc can be measured by the publications resulting from the work and, perhaps more importantly, by the number and breadth of project ideas that the postdoc has at the end of the period. At the beginning of the postdoc, you usually have some loose ends to tie related to your dissertation work. By the end, you should have learned enough that you see how to take your current research in several promising directions. In short, you should be able to put together a five-year research plan based on extensions to current work. This plan can serve as the basis for a grant proposal that should be submitted around the time when the postdoc ends. Some people submit a proposal before the end of the postdoc, others do it right after. More generally, there are several activities that help you become more marketable for tenure-track jobs:

- Develop your own research program, including directions different from your advisors' research. Employers are looking for people that have their own research program and that demonstrate independence. Having authored papers only in collaboration with your PhD or Postdoc advisor sends the message that the senior researchers are driving the work. This does not mean cutting all ties with your advisors; it means that there should be new components of your research that you clearly lead.
 - Aim at submitting a grant proposal near the end of your postdoc. Showing that you can submit competitive proposals is very important. Of course, getting the grant is most important but it is normal to try two or three times before succeeding. Having enough new projects to write a proposal is a good measure of a successful postdoc experience.
 - Teach courses at various levels, if possible. Develop course materials that you can use later. Employers are looking for potential faculty members that have shown to be good teachers.
 - Be part of a PhD student dissertation committee. Supervise graduate and undergraduate students. This is important for two reasons: (1) it will give you crucial experience supervising student projects that are typical of faculty jobs, and (2) it will make your job application stronger.
 - Do not emphasize service. Your postdoc experience is not really the time to get involved in committee work or other institutional service that takes time away from your research. There will be plenty of time for that later and this type of service is not crucial for landing a job.
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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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