Graduate School Information Session in Mathematics

Agenda:

- C. Haddad will make presentation

- Jacob Goldberg (former Geneseo student, MS Applied Math Johns Hopkins) will make a short presentation and will be here to answer questions about the process, especially during and after grad school.

- Gabby Angeloro and Justen Geddes will be here to answer questions and give advice from their experience this year.

- Professor Bilgic will be here to answer questions about Statistics and Data Science
    - check out https://sites.google.com/a/geneseo.edu/teachings/career
- Please check the Outbox of O. Nicodemi for information on Math Subject GRE Prep for over the summer. You should begin studying for it this summer.

Organizations that Hire Applied Mathematicians

Examples of organizations, corporations, and research institutions that hire mathematicians and computational scientists:

- Government labs and research offices such as Air Force Office of Scientific Research; Lawrence Berkeley National Laboratory; Los Alamos National Laboratory;
- Oak Ridge National Laboratory; Pacific Northwest National Laboratory; and Sandia National Laboratories
- U.S. government agencies such as Institute for Defense Analyses Center for Communications Research, National Center for Computing Sciences; National Institute
- of Standards and Technology (NIST); National Security Agency (NSA); Naval Surface Warfare Center, Dahlgren Division; and the U.S. Department of Energy
- International government agencies such as the Defence Science and Technology Organisation, DSTO (Australia); French Alternative Energies and Atomic Energy
- Commission (changed name); and National Research Council Canada

- Federally funded contractors such as the Mitre Corporation; RAND Corporation; and the Aerospace Corporation
- Engineering research organizations such as AT&T Laboratories – Research; Exxon Research and Engineering; NEC Laboratories America, Inc.; Schlumberger-Doll
- Research; and IBM Research
- Computer information and software firms such as Adobe; Google; Kuberre Systems; The MathWorks, Inc.; Mentor Graphics; Microsoft; Mosek; MSC.Software
- Corporation; Palo Alto Research Center; Thomson West; and Yahoo Research
- Energy systems firms such as Lockheed-Martin Energy Research Corporation and the Schatz Energy Research Center (SERC)
- Electronics and computer manufacturers such as Alcatel-Lucent; Hewlett-Packard; Honeywell; IBM Corporation; Motorola Mobility and Motorola Solutions; Philips
- Research; and SGI
- Consulting firms such as Daniel H. Wagner Associates and McKinsey and Company

- Aerospace and transportation equipment manufacturers such as Boeing; Ford; General Motors; Lockheed Martin; and United Technologies
- Financial service and investment management firms such as Citibank; Moody's Corporation; Morgan Stanley; and Prudential
- Transportation service providers such as FedEx Corporation and United Parcel Service
- Communications services providers such as Clear Channel Communications; CenturyLink; and Verizon
- Chemical or pharmaceutical manufacturers such as DuPont; GlaxoSmithKline; Merck & Co., Inc.; Pfizer
- Medical device companies such as Baxter Healthcare; Boston Scientific; and Medtronic;
- Producers of petroleum and petroleum products such as Exxon Research and Engineering; Petróleo Brasileiro S/A/ Petrobras; Shell; and Chevron
- Academic institutions such as the Institute for Advanced Study; the Institute for Mathematics and Its Applications (IMA); and the Mathematical Sciences Research Institute (MSRI)
- Consumer products companies such as Procter & Gamble and Mars

Graduate School in Math or a Math-related Area

I will post this information sheet on my website, along with a folder of some useful information, and another Timeline at http://geneseo.edu/~haddad/grad.html

Keep an Open Mind

- Try to get advice from faculty (or former students) and follow it. We've been through this before ourselves, as well as, with former students.

- Keep your options open for as long as you can, especially if you are undecided!

- Consider

  Math, *Applied Math*, *Operations Research*, *Computer Science*, *Computational Math or Science*, *Scientific Computation*, *Statistics*, *Financial Math*, *Actuarial Science*, *Bio-Math*, *Math-Related* (*Engineering*, *Theoretical Physics*, *Economics*), *Math Ed (another presentation)*, *etc.*

- Begin by going online, searching for a school, program, or area. Look at the courses offered, degrees, and research currently being done by faculty (you will be working with one at some point).

- Consider more than one area and program, even within the same school
  - You may be able to get funding for one, and not the other.
  - You may be undecided at this time. You don't have to pick an area now, just a list of schools and programs.

- **Make yourself stand out from all of the other math majors who will be applying.**

  - Apply for a *Research Experience for Undergraduates (REU), Summer Math Programs,* or some kind of math research.

  - Try the Government: *NSA, DOD,* or *DOE*, etc.

  - Summer Program for Women in Math at GWU (may no longer be funded)

- Try a Directed Study this fall/next spring.

- Make sure you have done a math-related presentation, preferably at some conference, if you can. Ask faculty for help with this.

- Join the AMS, MAA (we offer free student memberships), AWM (you can get a free membership through Dr. Haddad-ask), SIAM (we are starting a student chapter-ask).

- Work in the *Math Learning Center* (MLC) or TA for a Math course (offer to do it for free if you have to, in order to gain experience!).

- Consider taking the *Putnam exam* or participating in the *Math Olympiad*.

- Think about a summer or semester abroad (particularly if it involves math), such as semesters in Budapest.

- In the fall, be on the lookout for information on conferences like *Nebraska Conference for Undergraduate Women in Mathematics*. Attend and present.

Download Aidan Murphy's Grad School Starter App

https://www.geneseo.edu/~haddad/grad.html

Make sure you have all of your "ducks in a row"

Courses/Skills

- *Math 325* (Real Analysis 2)
- *Math 326 (DE) and Math 345 (Numerical Analysis)* for applied areas
- *Math 333 (Linear 2) and Math 330* (Algebra) are good choices for **all** areas.
- *Maths 341 or 360/361* (Prob and Stats)
- *Computational* (not the same as programming*)/Software/Word Processing*
  - *Matlab/Maple/Mathematica*
  - *SPSS/Minitab/SAS*
  - *Excel/VBA*
  - *MS Word*
  - *LaTex*
- *Programming or Coding* (particularly if you are thinking applied or industrial math). Try to get as many of the following as possible
  - *Procedural Programming such as Matlab or C or R (e.g. Math 230)*
  - *Object-Oriented Programming such as Java or C++ or Python (e.g. Math 240 or Intd 121)*
  - *Functional Programming such as Maple or Mathematica*
- *Math 366 Foundations of Actuarial Science* (for actuaries)
- Try to maintain a good GPA in Math and related courses
- Talk to us regarding specific recommendations on different areas/schools

The more preparation you get here at Geneseo, the better off you will be in grad school. Getting the minimal number of courses in Math required for the degree is generally insufficient, UNLESS you have a minor in some related area, like CS, Econ, Bio, Physics, etc. Broaden your interests, and take a broad spectrum of courses. Go for breadth *and* depth, if you can.

Graduate Record Examinations *(ets.org)*

- Study for the GREs this spring/summer
  - General – like SATs (take Spring junior year?)
  - Math Subject
  - Test dates: https://ereg.ets.org/ereg/public/workflowmanager/workflow?workflowItemId=tcAvailability
- Sign up for both GREs, and take them. You can take the
- Focus on Calc 3.
- It's possible there will be some GRE review offered here in the fall for the Math Subject exam. Pay attention to e-mails from the department!

Please do **not** send in Math Subject GRE scores until you know what they are. It's worth paying extra! Be prepared to have a low score. Sending in low scores can hurt you.

Letters of Recommendation:

- Be prepared to ask for at least 3 letters of rec. (at least two in Math).
  - Ask if the professor believes they can write you a *good* letter. Make sure they understand what YOU want in a grad program and that their letter will support it.
- Provide
  - Transcript
  - Your statement of purpose (letter of intent, etc.)
  - Resume/CV (include jobs, intramural activities, sports, leadership positions, charities, etc.) Brag about yourself (in a nice way)!
- Give them at least a month (or two) to write the letters.
- Provide them with stamped addressed envelopes if you want them mailed it, or detailed instructions for sending them through the internet.
- Be prepared to waive your right to see the letter (it's a fairly standard practice).
- Gently remind them (again) to sent the letters in two and one week(s) before they are due.
- **Thank them, and for goodness sakes, let them know what the outcome is when you find out, even if it's negative!**

Selecting Schools

- Pick at least one or two really good schools ("pie-in-the-sky" schools)
- 4-5 medium-level schools (e.g. places where our students have had success getting in, and finishing)
- 1-2 safety schools
- Consider web rankings in *US News and World Report*, and *PhDs.org*.
  - Talk to students who have gone through the process, as well as, **faculty** if you need help deciding
- Talk to me or Professor Bilgic, and Professor Macula (NSF-GRF), or whoever is your favorite professor.

Applying

- Be sure to apply for the PhD even if you are unsure or know that you just want a Masters degree. You are **not** obligated to stay until you get one.

- ***Most grad schools in these areas have funding available for good grad students that include a stipend to live on and a waiver of tuition***. Be sure to ask for funding (anything they offer!). These things make the school think you are serious. You can always turn it down if you don't want it. You don't want to pay to go to grad school if you can help it.

- Apply to schools where our graduate students have been successful. Here is a partial list of places where our students have been accepted (most with support):

- **Binghamton University**
- Carnegie Mellon University
- Clarkson University
- **Claremont University**
- **Clemson University**
- **Cornell University (Bio-Stats, Applied Math)**
- Dartmouth College
- Drexel University (OR)
- Florida State University (Stats)
- George Mason University
- **Harvard (CS)**
- **Indiana University (Math)**
- Indiana Bloomington (Learning Sciences, OR)
- University Illinois Urbana-Champaign
- ***Iowa State (Math, Applied Math,*** *Bio-Math, Statistics****)***
- Johns Hopkins University
- Lehigh
- Louisiana State University (LSU)
- Michigan State University
- ***North Carolina State*** *(Applied Math, Operations Research, Bio-Math, Pure Math)*
- *Notre Dame*
- The Pennsylvania State University
- *Purdue University*
- **Rensselaer Polytechnic Institute (RPI)**
- **Rice University (Applied Math and Pure)**
- Rochester Institute of Technology (RIT) *Stats, App. Math Imaging Science*
- **SUNY Albany**
- **SUNY Stony Brook**
- **Texas A&M** (Statistics)
- University of Arizona
- **University of Buffalo (Math, OR)**
- University of California at Los Angeles
- **University of Colorado, Boulder**
- University of Colorado, Denver
- University of Connecticut
- University of Delaware
- University of Iowa
- University of Illinois Chicago
- University of Kansas
- University of Kentucky
- University of Minnesota (Math, math/math-ed)
- University of Michigan
- University of Maryland
- *University of North Carolina (Physics)*
- **University of Rochester (Math, Stats, Physics, Optics)**
- *University of South Carolina*
- ***University of Tennessee at Knoxville***
- Virginia Polytechnic Institute and State University (Virginia Tech-Stats and Biostats)
- Worcester Polytechnic

- Letter/Statement of Purpose/Intent:
  - All schools want a statement asking why you want to go to grad school in your chosen area.
  - You should tailor each letter to the school and the department
  - If you know of faculty or a specific area of research you find interesting, mention it.
    - Be honest about what you are interested in. If you are undecided, say so.
  - Ask faculty to proof read it and suggest improvements
- Supporting Documents
  - You have to arrange for faculty to write letters of recommendation (typically 3, at least two in math). It is your responsibility to ask faculty, give them all information on how/where/when to send letters.
  - You have to arrange to have transcripts of grades sent to the correct schools and departments.
  - You have to arrange to have your GRE scores (the subject one only if they are good) to the correct place.

After you have been accepted

- **Visit the School**: always try to visit the school if you can (many schools have funds to do so), and talk to the other grad students in the program *away* from faculty. Ask about how cutthroat the place is and how accessible are the faculty. You **have** to like the program, the people, the location, and the package offered (in that order!). Ask how long it typically takes to finish and whether they guarantee funding for that time period.
- **Funding and Tuition Waiver**: Most offer a teaching or research assistantship, and will waive tuition. The assistantship is typically enough to live on and you will get out of grad school with little or no debt! Ask what you have to do for the teaching/research assistantship. Ask when the qualifiers need to be taken. Ask if there are any computing requirements.
- **Acceptance Offer**: make sure that you accept the offer prior to their deadline.
- **Rejection of Offer:** If you are not attending, it is courteous to inform the school as soon as possible. Schools can then make offers to those on waiting lists if they know your position is free. You will hurt the chances of other Geneseo students if you do not.

- A note about acceptances (from a contact at Iowa State): *All programs set deadlines because they have to make replacement offers. The deadline should ideally be a week ahead and never less than 4 days (high pressure sales is a red flag). The advice to students is, when you get an offer, then you contact all programs that you prefer to the offer, tell them your deadline, and ask when you may expect to hear. If they can legally make offers and want you, they will try to meet the deadline.*
- Be patient!
- *It's ok to contact schools from whom you have not heard in order to tell them you have offers from elsewhere.*

- **Leaving:** later, should you find that you don't like the school you have chosen, you can always take the Master's degree and run, or apply to another school the following year. You are ***not*** obliged to stay there any longer than one semester or one year at the most. Remember, if you don't want to be there, they probably don't want you there, and likely can find someone better suited to take your place.

Timeline

Sophomore year:

- Start thinking about REUs in your sophomore year.
  - Make sure that you have the required background courses and skills necessary for your REU or undergrad experience of choice.
- Think about the Math courses skills you will need for Grad school

Junior year:

Fall and Winter

- Research REUs, Summers Abroad, Semesters Abroad, or other educational experiences. At the end is a list of some opportunities.
- Find an Internship program (NSA, actuary, industry of some sort?)
- Most are due in Jan or Feb (though NSA wants them in Oct.)

Spring

- Take General GRE (if you can)

- **Summer**

- Begin looking at schools on the internet.
- Begin thinking about GREs if you have not.
  - http://www.geneseo.edu/math/test_preparation
  - Think about taking them twice!
- Make sure you are taking the courses you need to be taking. Ask your adviser or other faculty for help in deciding. Many are degree- or program-specific.

Senior year:

Early fall

- Sign up for GREs and start reviewing for Math Subject GREs. Take them for the first time to see what they're like.
- Start talking to faculty about the schools you want to apply to.
- Get their advice.
- Start thinking about whom you want to ask for letters.

Mid-fall

- Narrow your list down to 10 or less.
- Begin working on your letter/statement of intent. Show it to faculty members!
  Start applying.
- Ask faculty now about writing letters of recommendation.
- Take the GREs
- Applications for *NCUWM* are due.

Late fall

- Take math subject GRE.
- Finish your "statement of purpose" and show it to some of your Profs.
- Finish your applications.
- Gather together your materials and give them to your letter writers at least one month in advance of the due date.
  - Include resume, transcript, letter of intent, waiver, instructions with a list of schools and websites, addressed, stamped envelopes, etc., and anything else your letter-writer asks for.

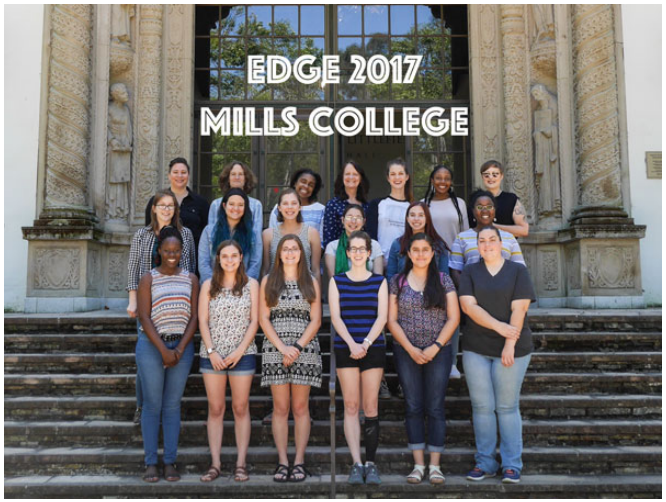
Jan-Feb

- Make sure all applications, transcripts, scores, etc. are in to the schools to which you are applying. Later, contact the school(s) or the organization(s) that sends them, and verify they have all of your information. Include unofficial copies of these things with your applications, as a precaution.
- Gently remind your letter-writers to send in their letters. Give them the deadlines and websites. You should provide any envelopes. They should be addressed and stamped. Don't make faculty look up the information!

March-April

- Wait. Sometimes school will make offers earlier than this, but don't panic if they have not.
- When you are accepted, ask about VISITING the campus. Often, there are institutional funds available for travel. (Come talk to one of us before you do it so we can prep you on what to ask.)
- Ask about financial offers if they have not made them with the acceptance letter.

- Consider applying to grad prep programs:
  - SMI (Cornell) http://www.math.cornell.edu/~smi/
  - EDGE (women only)
  - https://www.edgeforwomen.org



LINKS

Association for Women in Mathematics (AWM)
Career Mentoring Workshop (CaMeW)
Carleton College Summer Mathematics Program for Women
George Washington University Summer Program for Women in Mathematics (SPWM)
Mathematical Sciences Research Institute
PCMI Summer Program
Smith Center for Women in Mathematics

April

- Decide. Accept an offer. Kindly reject the rest.
- Contact schools that did no make an offer and ask if they now have one.
- Schools/prospective grad students must decide by April 15.

Other Helpful Information

Math Conferences

- Seaway Meeting – Upstate NY (October/April)
- Saint Lawrence Valley Mathematics Symposium – Potsdam area (Fall)
- Joint Math Meetings – *varies (January)*
- *NCUWM – Lincoln, NE (January/February)*
- GREAT Day- Geneseo (April)
- Hudson River Undergraduate Conference – Albany area (April)
- Applied Math Conference – Buffalo (April)
- Math Fest – varies (August)
- Look for local sectional meetings of the AMS or SIAM

Math Organizations

- MAA-Mathematics Association of America, maa.org
- AMS-American Mathematical Society, ams.org
- SIAM-Society for Industrial and Applied Mathematics, siam.org
  - Ask about the local student org
- AWM-Association for Women in Mathematics, awm.org
  - Join the local student org
- YMN-Young Mathematicians Network, ymn.org
- INFORMS-Institute for Operations Research and the Management Sciences, informs.org
- WEUSEMATH.org
- AMSTAT-American Statistics Association, amstat.org
- BEANACTUARY.org

Summer Resources for those going into the summer of their Junior year

- **Research Experiences for Undergraduates in Math**-this includes both theoretical and applied mathematics
  http://www.nsf.gov/crssprgm/reu/list_result.cfm?unitid=5044
- **The Mathematical and Theoretical Biology Institute**
  http://mtbi.asu.edu/

- **Park City Math Institute** has summer programs for math research and math education http://pcmi.ias.edu/summer-program/

- **Center for Discrete Math and Theoretical Computer Science**

http://dimacs.rutgers.edu/REU/
They have a US program and one in the Czech Republic this summer

- **GWU Summer Program for Women in Mathematics**

http://www.gwu.edu/~spwm/

- **VIGRE Vertical Integration of Research and Education**

http://www.math.utah.edu/vigre/ugrad/reu/index.html

Summer Resources for those going into the summer of their Sophomore year

The Carleton College Summer Mathematics Program for Women
http://www.math.carleton.edu/smp/

Summer Resources for those going into a Graduate Program

- **EDGE** http://www.edgeforwomen.org/
- **SMI (Cornell)** http://www.math.cornell.edu/~smi/

Others

- **National Security Agency -** has summer internships for undergrads, grads, and faculty in math and related areas-***due in October***
  - http://www.nsa.gov/careers/opportunities_4_u/students/undergraduate/index.shtml

- **Mathematics Advanced Study Semesters (MASS) at Penn State** http://www.math.psu.edu/mass/

Others (cont.)

- http://geneseo.edu/~haddad/grad.html:
- http://grad-schools.usnews.rankingsandreviews.com/best-graduate-schools/top-science-schools/mathematics-rankings -Choose a specialty.
- http://mathaware.org/profession/data/annual-survey/groups_des
- http://www.phds.org/
- http://worldranking.blogspot.com/2009/07/top-mathematics-doctoral-programs.html
- http://www.math.psu.edu/users/curm/
- **We use Math video:** http://www.youtube.com/watch?feature=player_embedded&v=aYIv4jggQJc