ΣSUM TIMES

February 2003

MLRC and Math Lounge

Where: Old Falvey, 2nd Floor
(near the Writing Center)

Hours: Sunday 6:30 – 9:00 p.m.
Monday – Thursday 1:00 – 5:00 p.m.
and 6:30 – 9:00 p.m.

Phone: 519-MLRC
Voicemail: 519-5193
Web Address: www.villanova.edu/mlrc
For additional information contact:
Nakia Rimmer 519-7823

IRON MATH Competition

The success of last year's Prime number Battle between Iron Mathematician Ed Milliner and undergraduate (now alumnus) Chris Pilman has IRON MATH fans asking for more. This year's battle promises to be even bigger and better as a three person undergraduate team will face off against two Iron Mathematicians.

Which undergraduates will have the courage to battle the Iron Mathematicians? All is scheduled to be revealed later this semester. The surprise theme will also be unveiled at a later date. **Anyone interested in participating should contact Dr. Lupinacci at paul.lupinacci@villanova.edu or Prof. Santomas at john. santomas@villanova.edu**

ATTENTION: If you'd like to submit an article to the SUM times or have an idea or question for the Math Department, please contact the Math Office at **610-519-4850** or **math@villanova.edu**

Spring Semester Dates to Remember

February 28	Midterm
March 3	Semester Recess begins
March 10	Classes Resume
March 21	Registration begins for Fall 2003
April 2	Last day for authorized WX
April 12	Candidate's Day
April 16	Easter Recess begins after last class
April 22	Classes Resume
April 29 (Tues)	Follow a Friday class schedule
April 30 (Wed)	Follow a Monday class schedule
May 1	Final Day of Classes
May 2	Reading Day
May 3-10	Final Exams
May 17-18	Baccalaureate and Commencement

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It's Never too Early to Start…

Graduate School Search

1 **Narrow the field:** The great thing about being a math major is that there are many fields to which you may apply. There are the choices of Applied Statistics, Statistics, Mathematics, Applied Mathematics. Besides those choices there are also others; for example, I'm going into Biostatistics (applications of statistics to the health sciences).

2. **Degree Desired:** When looking at graduate schools, it is important to know the degree which you would like to receive because some programs only offer Ph. D programs or only masters programs. This isn't a commitment in any one direction; it just could be a limiting factor when determining which schools to apply.

3. **Selection of Schools:** After identifying your field of interest and your degree, you must choose the school. The process for determining which schools to apply began with an internet search of what schools actually had my field. Since my field is relatively new, there was a limited number of schools that had Biostatistics programs and even fewer that had Ph. D programs in that field. A helpful website for those interested is: http://www.petersons.com/GradChannel/ From this site, I was able to begin my search. Other informative sources for schools are your professors.

4. **Apply:**
   - **a.** Application Request: It is important that you get the application process started early in the fall because it will most likely take longer than expected. It was very easy to apply right online for a majority of the schools, but others you may need to have the schools send you an application.
   - **b.** Recommendations: Usually you need to have 2-3 teacher recommendations. One helpful hint here is giving the forms to your professors early, it will get one part of the process out of the way AND give your professors ample time to write wonderful things about you.
   - **c.** Resume and Personal Statement: These were the final parts of the application for me because I had a difficult time writing about myself. It is important that you're able to have a succinct statement of purpose that captures all of the great qualities about yourself.
   - **d.** Transcripts and Test scores: The directions usually vary among schools as to where transcripts and scores get sent or if you include them in your application.

5. **Relax:** After filling out the applications, it's finally time to relax and wait for the schools to contact you. You get to sit back and watch the acceptance letters come in.

bv Jeanine Matuszewski

Interested in doing something productive this summer???

Summer Mathematics Research Opportunities for Undergraduates

Not really sure what you want to do with your summer? Thinking about getting an internship related to mathematics? If you're looking for a constructive way to spend your summer, you may be interested in summer research opportunities for undergraduates. The National Science Foundation (NSF) funds a large number of research opportunities for undergraduate students through a program called REU (Research Experiences for Undergraduates). An REU Site consists of a group of about ten undergraduate students who work in the research programs of the host institution. Each student is associated with a specific research project, where he/she works closely with the faculty and other researchers. Students are granted stipends and, in many cases, assistance with housing and travel. Undergraduate students supported with NSF funds must be citizens or permanent residents of the United States or its possessions.

I know what you're thinking: why would I want to spend my summer doing math research? Well, there are several answers to this question. First, these programs offer undergraduates wonderful opportunities to participate in mathematical research that they might not have the chance to get involved with at their home institutions. They allow students to thoroughly explore certain topics and develop interests in various fields or applications of mathematics. Second, these programs are directed towards individuals who intend to pursue higher education. Graduate Schools might give your application a second look if they see that you have participated in a summer research program. Third, if you are unsure about whether or not higher mathematics is for you or not, these programs offer a taste of what graduate study will entail. Lastly, you will be compensated for your time, ie you will be PAID!!!

Still confused? Interested in getting more information about specific programs? This webpage lists all the REU sites for Summer 2003. Each link from this site takes you to a webpage detailing the structure and topic of each program. The links also offer information about dates, housing, stipends, applications, etc. http://www.nsf.gov/home/crssprgm/reu/list_result.cfm?unitid=5044

If you would like to get some additional information, there is a binder located in the Math Office, SAC 305, that has various announcements and applications for several of the programs listed on the site.

by Liz Lang

The Inevitable Job Hunt

With the Spring Semester well underway many people might be thinking about what to do at the end of the year or perhaps after Villanova. The summer is a great way to try out different opportunities so that you get a better feel for what you might want to do after graduation or even what you don't want to do. This all seemed very obvious to me; how to go about finding an internship/job was the hard part. In the end, my search was successful, but the following are some tips I picked up that would have helped me from the start.

- **It's never too early to write your resume**- Freshmen and Sophomores don't feel like you don't have enough experience to write a resume. Experience doesn't necessarily equal work experience. Highlight any classes or projects you may have worked on for school that would show a potential employer you have what it takes to be successful with their company. Depending on what you're applying for (i.e. research projects) coursework could be considered more valuable than other work. Extra-curricular activities also make a positive impression because it shows you have more of a life than just school. Everyone should have at least a rough copy of their resume written by the end of their Fall semester junior year because most companies begin looking for interns around February and March, but sometimes even earlier.

- **Have an objective**- This is tough because most of the time you won't know if you like something unless you've tried it out, but you still have to go into an interview with the attitude "this job would be perfect for me." Remember no one has to know that you might looking at two jobs completely unrelated to each other. The important thing is you give each employer the impression that his or her company is where you would like to be. This requires a little research on your part, especially if you don't really know much about the position you are applying for. While this can be a time consuming process it is extremely useful. I found that half the time I learned more about a specific job I realized it was something I would not want to do.

- **Don't depend on career services (or anyone else) to find you a job**- There are many resources around campus, take advantage of them for help or advice, but don't expect to be handed anything. Career Services will help you with writing your resume or how to prepare for an interview and they have tons of books on graduate schools, but they will not send your resume to any companies or set up any interviews for you. It is up to you to do this. Pay attention to emails sent to you by Trudy Pacella. The majority of her emails concern research and internship opportunities, so don't delete these before you take a moment to read them over. Your professors are another great resource. Many of them have work experience other than teaching and could tell you how a math degree has helped them. They also have knowledge of what recent graduates are doing and could fill you in on popular jobs.

- **Don't Panic or become discouraged by rejection**- Think of searching for a job, internship etc like a class. The important thing is to put your best effort into achieving your goals. If you do that you will be rewarded, even if it takes a couple of rejections. Remember, recruiters are generally good at picking out people they think would fit in at *their* company. Just because you weren't selected for a particular job doesn't mean you will be bad at everything and should give up trying. Most importantly, don't worry!! According to Career Services 2001 Placement Statistics, 97% of Science Majors were either full time graduate students or employed full time within a year after graduation, so there is a good chance you will go on to bigger and better things after graduation.

by Elena Geraci

Putnam Competition

Jeanine Matuszewski

The 63rd annual William Lowell Putnam Math Competition was held on December 7, 2002. Daniel Drabik (local defending champion) and myself represented Villanova in this year's competition. For those that aren't familiar with this test, it is claimed to be the 'world's toughest math test.' It is so difficult that in past years the median score was 1 point out of a possible 120. Each problem is worth ten points and partial credit is rarely awarded.

William Lowell Putnam started the first Putnam competition as a friendly math competition among colleges in 1938. It is given each year. For four or five months, a committee of three professors formulate the twelve problems. The test is broken up into two three-hour intervals. During each of these three hours, students are asked to 'complete' six problems. This may sound simple, but it is not. The problems are challenging. They do not ask the test taker to simply recall obscure theorems; they require a creative, mathematically-talented and quick mind to engage in them for a fixed period of time.

Although I've been told that this years test was "easier than the previous ones," I didn't find it that simple. I engaged in the problems for the six hours and probably did not get one totally correct. The point of this test is clearly not to get them all correct; it's to be challenged by the problems. It is quite the challenge. "No calculators, no notes, no mercy."

Dr. Feeman is the coordinator for the Putnam Competition. If you're interested in taking it or even reviewing some previous problems, contact him.

Courses for fall 2003!!

- **MAT 5500 –** *Topology* (Dr. David Sprows)

Topology studies the "essential" shape of geometric figures. For example, a circle has essentially the same shape as a triangle, but the figure eight is not "essentially the same" as the circle (there is a [pint on the figure eight which when removed leaves two disjoint pieces, no such point exists on the circle). This course will consider such topics as the classification of surfaces and aspects of embedding theory, i.e., the various ways of one geometric figure can be placed inside another geometric figure. It will be designed to give some of the flavor of one of the most important areas of math. As stated by the renowned mathematician Jean Dieudonne, "It may already be predicted without great likelihood of error that the 20th century will come to be known in the history of mathematics as the century of topology" (A Panorama of Pure Mathematics).

- **MAT 5900 -** *Seminar on Mathematical Modeling* (Dr. Bruce Pollack-Johnson)

In this course, we will study mathematical models and the process of solving real world problems using math models. The categories of models that we will focus on are those that involve optimization and come from the area of Operations Research, sometimes called Management Science (or Decision Science). We will study both deterministic and probabilistic models. Students will select an optimization problem from their own life, research the categories of models that could be used to solve that problem and techniques and theory for solving that type of problem, collect data and formulate one or more models, then solve/analyze their model, verify (double check) their results and validate (reality check) their model and solution, perform Sensitivity Analysis, try alternative models, estimate margins of error, and synthesize conclusions for their real-world problem. Students will make regular presentations about the type of problem they are working with and their own specific problem, and will write a draft and final report of their project. We will also try doing sample problems from the past from the Mathematical Competition in Modeling, hoping to generate one or more teams to compete in the Fall of 2004.
Prerequistes: Multivariable calculus, linear algebra (Probability and statistics helpful, but not essential).

- **MAT 2930** - *History of Mathematics* (Dr. Thomas Bartlow)

What is the origin of the quadratic formula? Is the Pythagorean Theorem really Pythagorean? What is Euclidean geometry? When was Baghdad the most important center of mathematical research? Was there a renaissance in mathematics? You can learn the answers to these questions and much more by taking history of mathematics. The course is primarily intended for people who plan to teach mathematics in high schools. For this reason the history of algebra, geometry, trigonometry, and calculus is emphasized. Also the course cannot normally be used as a math elective toward the mathematics major. However, an exception can be made with Dr. Styer's for students who write a substantial paper on the history of some undergraduate math topic.

- **MAT 4550 –***Math of Financial Derivatives* (Dr. Klaus Volpert)

This course is about financial derivatives, specifically option-trading. So, what is option-trading? Most people know about the trading of shares of companies, such as IBM, or commodities, like coffee or oil. But, there are many other things that are traded which are *derived* from shares and commodities. For example, the *right* to sell IBM-shares at a certain price sometime down the road. This right is called an option. Such options can be used for speculation, or, more often, as a kind of insurance or hedge against economic downturns. The question is, what is the worth of such a right? How much would someone be willing to pay for it? Over the last two decades the importance of financial instruments such as options has grown tremendously (it's a trillion dollar market now), along with the complexity of pricing them, and the need for powerful mathematics to master the market. In 1973, a method was proposed to find the value of options, which is now known as the Black-Scholes model and which forms the cornerstone of modern financial risk-management today. Scholes received the Nobel price in economics for it in 1997. In this course I would like to explore his ideas. The prerequisite for the course is the standard calculus sequence. Knowing some differential equations and some statistics would be very desirable, but it is not necessary. You are not expected to know anything about business. In fact, part of the course is dedicated to learning the basic tools of the trade, such as stocks and bonds, and to explore today's world of finance.

Courses for fall 2003 Continued!!

- **MAT 5920-001 –** *Cryptography* (Dr. Alice Deanin)

Cryptography has a fascinating social history as well as wonderful opportunities to apply a variety of mathematics from many areas. Some experience with any of statistics, linear algebra, abstract algebra, number theory, programming helpful. Prerequisites: One of the above or permission of instructor.

- **MAT 5920-002 –** *Mathematical Modeling* (Dr. William Fleischman)

The aim of this course is to explore the very rich interplay between the ideas of mathematical modeling and the study of disease in the history of civilizations. **Topics:** Dynamics of epidemics; mathematical models that capture aspects of these dynamics; epidemic and endemic phases; threshold effects; considerations of equilibrium and stability; control and regulation of diseases; what do epidemiological models say about control and eradication? Is what is good for the individual always good for the community? How hard must one work to eradicate a disease? Historical aspects of epidemiology; and interactions between ecology and epidemiology. **Mathematical Prerequisites:** A good grasp of the meaning and interpretation of the derivative; some familiarity with the basic ideas of systems of differential equations; confidence in the use of (high-school) algebra. **Biological Prerequisites:** Not much except fearlessness about reading and making some sense of non-technical material in a new discipline.