



Villanova Sum Times

March 2012



INSIDE THIS ISSUE:

Fall 2012 Courses	2, 3
Villanova Math Club	4
PI DAY!	4
How to put a VU Math Degree to Use	5
Job and Internship Info	6
Spring Birthdays	7
MLRC & Math Dept. Info	7
Pi Mu Epsilon Induction	7

Message from Dr. Norton



Dr. Douglas Noton
Dept. of Mathematics
and Statistics
Chairperson

Can I find a topic involving pi, proper theme for March fourteen impending holiday? Certainly! New is two computer guys' absurd pi digits list out ten trillion big ol' decimal positions! That's ridiculous! To generate Pilishy text I encounter trouble, a rather demanding job. Retaining narrative run affords quite a difficulty.

Okay, enough of trying to write in Pilish. (Look it up. Then check the previous paragraph.) The teaming-up of software written by an American graduate student of Chinese descent and hardware designed by a Japanese professor doubled the record of calculated digits of pi from 5 to 10 trillion last fall. (The final digits leading up to the 10 trillionth are 1989228675. That's 10 trillion AFTER the decimal point, in case you're counting. They actually went a little beyond that.) The main computation took 371 days on a specially-designed desktop computer, but approximately 180 of those days were down time due to various hardware failures. Roughly 44 TB of disk space was used for computation and another 7.6 TB for storage of the compressed output. I'm sure there are morals hidden in these details about cross-cultural collaboration, youth and experience, progress and down time, thinking vs. storage; I'll leave them to you. Meanwhile, Happy Pi Day, Happy Spring, and Happy Home Stretch to the Semester!

PI DAY

3/14/2012

Be There.

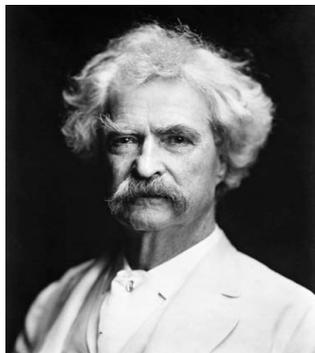
PI DAY BAKE SALE

WEDNESDAY—MARCH 14

11:00 A.M. TO 3:00 P.M.

DOUGHERTY HALL

— SEE PAGE 4 FOR DETAILS —



We could use up two Eternities in learning all that is to be learned about our own world and the thousands of nations that **have arisen and flourished and vanished** from it. Mathematics alone would occupy me eight million years.

~Mark Twain

A new government 10 year survey cost \$3,000,000,000 revealed that 3/4 of the people in America make up 75% of the population.

Fall 2012 MAT Electives:

MAT 4110 Combinatorics

CRN 22228 MAT 4110-001 MWF 9:30-10:20 a.m.—Dr. Paul Pasles

Combinatorics is the study of enumeration (counting) and related topics. Combinatorial questions involve the arrangement of objects into patterns: when do these patterns exist, and in how many different ways can they be constructed? The answers to such questions have relevance in computer science, biology, probability, and plenty of other subjects. This course covers permutations and combinations, counting methods, induction, the binomial and multinomial theorems, the inclusion-exclusion principle, and much more.

Prerequisite— MAT1505

MAT 4270 Numerical Analysis

CRN 22229 MAT 4270-001 MWF 12:30-1:20 pm—Dr. Charles Ashley

Numerical analysis is the study of computing approximations to mathematical problems. We study methods to approximate the roots of equations, derivatives, integrals, differential equations, and systems of equations to name a few. The methods often involve producing a sequence of approximations so questions of whether the sequence converges and how fast it converges are studied. This course will count as a math major's second analysis requirement. The software Maple will be used to help make our approximations, though students may use software if desired.

Prerequisite— MAT1505

MAT 4310 Statistical Methods—

CRN 22230 MAT4310-001 MW 4:30-5:45 pm—Dr. Elise Pasles

CRN 22231 MAT4310-002 MWF 10:30-11:20 am—Dr. Joseph Pigeon

CRN 22444 MAT4310-003 MWF 1:30-2:20 pm—Dr. Joseph Pigeon

This course is an introduction to data summarization and various statistical methods that will allow students to begin to build a toolbox of statistical techniques for handling data analysis. The class will study probability distributions that will serve as the foundations for these methods. The statistical methods that the class will study include point estimates, interval estimates and hypothesis tests for population means, variances and proportions, categorical data analysis, regression and correlation.

Prerequisite— MAT1505

MAT 4315 Applied Statistical Models

CRN information TBA (2 sections offered) —Dr. Paul Lupinacci

Simple and multiple linear regression, including prediction, correlation, model building, multicollinearity, influential observations, and model fit: ANOVA for designed experiments, including completely randomized, randomized block, and factorial designs; Time Series including linear time series models, moving averages, autoregressive and ARIMA models, estimation and forecasting.

Prerequisite— MAT4310

MAT 5110/7290 Topics in Geometry

CRN 22234 MAT 5110-100 6:15-8:45 pm— Dr. Alice Deanin

This course is required for students majoring in Math Education, and an upper level math elective for students majoring or minoring in mathematics, a math elective for the graduate math program. A college level course in geometry is required for mathematics teaching certification at the high school level in most states. However, there are no formal prerequisites, so interested students may use this for a core math course. We are meeting to explore and discuss geometry, in a very broad sense of the word and subject.

Prerequisite— MAT1505

MAT 4550: The Mathematics of Financial Derivatives

CRN 22232 MAT4550-001 MW 4:30-5:45 pm - Dr. Klaus Volpert

Financial derivatives have become an indispensable part in today's economy. Examples are stock options, oil futures, currency contracts, credit default swaps and much more. They are used for *compensation*, *speculation*, and, most importantly, for *risk management*. Since every company is exposed to some risk, there are few companies that do not deal with derivatives in some way. Hedge Funds often play the counterpart to the companies by investing in these derivatives and thereby redistributing market risks.

Financial derivatives are not uncontroversial. While former Federal Reserve chairman Alan Greenspan has called them *engines of the economy*, billionaire investor Warren Buffet has famously declared them *weapons of mass destruction*.

The challenge to the mathematician is to find a *fair price* for derivative contracts. In 1973, a mathematician, Fischer Black, and an economist, Myron Scholes, developed a successful model that has become the foundation for the whole theory and won them the Nobel prize in economics in 1997. Our goal is to understand this model, as well its extensions and refinements.

Prerequisite - MAT 2705



Q: What is
non-
orientable
and lives in
the ocean?

A: Möbius
Dick

MAT 5700 Math Statistics I

CRN 22235 MAT 5700-001 TR 10:00-11:15 am—Dr. Jesse Frey

Topics covered in MAT 5700 include probability, random variables, joint distributions, expected values, covariance, correlation, the moment generating function, Chebyshev's inequality, and important families of random variables. Students who are interested either in statistics or in actuarial science should strongly consider taking this course. There is a substantial overlap between the course syllabus and the syllabus for the first actuarial exam. This course in Fall 2012 will count as a second analysis course.

Prerequisites—MAT 2500 and MAT 2705

MAT 5900— Seminar—Cryptology

CRN 22236 MAT 5900-001 MWF 11:30-12:20 am—Dr. Amanda Knecht

Cryptology is the practice and study of techniques for secure communication in the presence of third parties. Classical cryptology was synonymous with encryption, the conversion of information from a readable state to apparent nonsense. The originator of an encrypted message shared the decoding technique needed to recover the original information only with intended recipients, thereby precluding unwanted persons to do the same. Since World War I and the advent of the computer, the methods used to carry out cryptology have become increasingly complex and its application more widespread. Modern cryptography is heavily based on mathematical theory and computer science. Applications of cryptography include ATM cards, computer passwords, and electronic commerce. Because of the heavy usage of math in securing communications, the National Security Agency is the nation's top employer of mathematicians.

In this seminar we will start with a historical introduction to cryptanalysis and then students will presentation more modern public-key cryptosystems including RSA, the Discrete Log Problem, and Elliptic Curves. Since this is a seminar, each student will select a project from a list the book provides, write a term paper and present their project to the class. The book we are using has a website, crypto-textbook.com. Check it out to see if this looks fun to you!

Prerequisites—MAT 3300 or MAT 3500

“Black holes
result from God
dividing the
universe by
zero.”
- Anonymous

Don't forget to make an appointment with your advisor prior to your registration date/time. All advisors have their office hours posted at their office.



There's a big calculus party, and all the functions are invited. $\ln(x)$ is talking to some trig functions, when he sees his friend e^x sulking in a corner.

$\ln(x)$: "What's wrong e^x ?"

e^x : "I'm so lonely!"

$\ln(x)$: "Well, you should go integrate yourself into the crowd!"

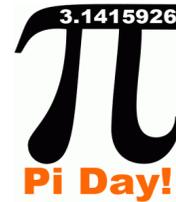
e^x looks up and cries, "It won't make a difference!"



If equations are trains threading the landscape of numbers, then no train stops at pi."

-Richard Preston

Math Club!



PI DAY BAKE SALE

WEDNESDAY—MARCH 14

11:00 A.M. TO 3:00 P.M.

The Math Club will be having a Pi Day Bake Sale on March 14th in Dougherty Hall across from the Italian Kitchen. The bake sale will be open from 11:00 am to 3:00 pm. All of the money we receive is being donated to The Starfish Foundation which was started by Villanova alum and math major Beth Awalt. This non-profit organization provides scholarships and guidance to high school students in extreme poverty who wish to continue their education. Your money can help encourage and inspire these students to reach their dreams. Stop by for a baked good and help The Starfish Foundation.

(See Beth Awalt's article on page 5)

For additional information on the Math Club, please contact
Jessica Carroll (Jcarro08@villanova.edu)

Faculty Advisor: Dr. Amanda Knecht
Jessica Carroll (President), Erin Cuddy (Vice President) and Thomas Caruso (Treasurer).

5 REASONS TO ATTEND A MATH CLUB MEETING

1. Meetings are a good place to see that mathematicians are people too.
2. Can fill your closet with a plethora of Math Club T-shirts.
3. You eat an irrational amount of pi on pi day.
4. Statistics show your love of math will exponentially increase.
5. We never mix drinking and deriving.

How I Put My Math Major Skills to Use in a Developing Country

By Beth Awalt, Class of 2009

Alright, so I'll admit- I wasn't your typical math major. While peers were studying Differential Equations, I was preparing for a service break trip. While teachers were discussing benefits of Maple in the corporate world, I was thinking about the next topic for my retreat prep meeting. But- do I regret being a math major? Absolutely not! I spent my first year after graduation (2010-2011) doing a year of service, an option growing in popularity for many recent college graduates. It may not be apparent that skills from being a math major would come in handy in Duran, Ecuador, but let me share the truth:

Patience. What other major than mathematics could teach you so much about patience? (Alright, I bet a few could). I'll never forget how many nights we spent figuring out complex math equations or word problems. That patience through the process came in very handy when I ran an after-school program for 40 underprivileged kids in the neighborhood.

Determination. Week after week, I saw many math majors attempting to understand difficult theories- and that edge to keep going, keep trying ... it sure is important. For my boys at the vocational high school, their difficult home lives and backgrounds made teaching English a challenge. But only with a little determination was it possible to teach the difference between present and present continuous to at-risk street boys!

Critical Thinking. It's pretty clear that a math major needs to understand a high level of thinking, what with even one class of Calculus. The Ecuadorian education system is quite different from what we're used to, so it was important for me and my co-workers to teach our after-school program participants about *why* $3x=6$ makes $x=2$ (yes, I did help with math homework sometimes!). We also tutored math at the vocational high school, reminding the boys *why* the answer is correct for factorial- and not letting them get into the habit of copying and memorizing!

Logic. I never expected all those word problems I did throughout college to be so useful! We spent many afternoons teaching kids how to analyze word problems, usually to figure out how many plantains they could buy at 3 cents a piece with \$.33. How much change would you have?

Hope. I saw a lot of hope in the skill of the Mathematics Department at Villanova- a lot of very bright students who I knew were going to do great things in life. I saw that same hope in the people of Ecuador- their resilience after difficult situations, their strength in tough times, their faith on doubtful days.

I hope this article encourages you to look at your Bachelor's of Science degree in a whole new light. For the seniors, I hope you at least consider one of the Post-Graduate Service options- there *are* a lot of math-related placements, especially in the teaching field! You never know what the future may have in store. Good luck!

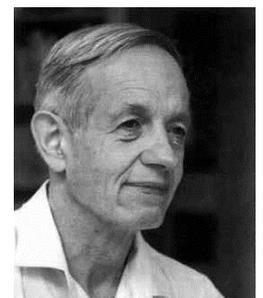
Beth is one of the founders of The Starfish Foundation established to provide scholarships and guidance to high school students in extreme poverty who wish to continue their education, encouraging and inspiring them to reach their dreams.



"There are no problems, just pauses between ideas."
-Brotherhood of Rose

Maths Teacher: Now suppose the number of sheep is x

Student: Yes sir, but what happens if the number of sheep is not x ?



"Everyone else would climb a peak by looking for a path somewhere in the mountain. John Nash would climb another mountain altogether and from that distant peak would shine a searchlight back onto the first peak."



NUM8ERS
YOU CAN COUNT ON US

UPCOMING DATES:

March 5- 11
Break

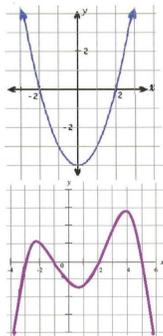
March 12-
Classes Resume

March 16-
Undergraduate Advising begins – make an appointment with your advisor

April 4-9
Easter Recess

April 10-19
Registration for UG

May 5-
Finals begin



villanova

math

Job and Internship Information

GREAT NEWS

Attention Math Majors looking for Internship Opportunities

The wonderful Math Department is working towards building an internship database. They have reached out to all Villanova math graduates since 2000 and received most of their contact information. We have a massive web of former Villanova math students in the business world and soon they will all be at your fingertips! Stop by the Math Office to review the listing of alumni.

Possible Internships include: Actuarial sciences, finance/insurance analysis, software development, consulting, and more!

Other opportunities to explore for Mathematics students:

Research Experience for Undergraduates (REU) Summer Programs

- www.ams.org/programs/students/undergrad/emp-reu

Assistantships and Graduate Fellowships

- www.ams.org/programs/students/undergrad/asst.pdf

Early Career Profile Network

- www.ams.org/early-careers/

Jobs & Careers

- www.ams.org/programs/students/undergrad.html

Office for Undergraduate Students (OUS) and Career Services are great resources for any students interested in job or internship opportunities. Information will also be posted on the new Dept. of Mathematics and Statistics at Villanova University page in Facebook. Students should also fill out a profile on LinkedIn (www.linkedin.com) to make other networking connections.

GoNOVA is a web-based career management system to help you manage your career development process. All undergraduate students have an account. Your username is your full Villanova email (ex: jane.doe@villanova.edu) and your password is your banner id.

Math Learning Resource Center

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

Hours: Sunday 6:30-9:00pm, Monday—Thursday 1:00– 5:00pm and 6:30-9:00pm

Phone: 610-519-MLRC

Voicemail: 610-519-5193

Web Address: www.villanova.edu/mlrc

Walk-in Tutorial Services ~ No appointment needed

Private Tutorial Service ~ 20 minute sessions ~ Call to set up appointment

CHECK IT OUT

**A VERY HAPPY BIRTHDAY
TO ALL OUR SPRING
BIRTHDAYS!**

Marilyn Belkin- March 16

Alice Deanin- March 24

John Santomas- March 26

Fritz Hartmann- March 29

Bob Jantzen- April 8

Paul Lupinacci- April 21

Michael Posner- April 24

Timothy Feeman- May 14



We're on the Web!

***Search "Dept. of Mathematics
and Statistics at Villanova
University" on Facebook to
like our page and get updates
on what's happening here at
VU!***

Mark your calendars —

Pi Mu Epsilon Induction

May 4, 2012 at 10:30 a.m.

Guest Speaker will be Dr. Katherine Socha (Math for America)

Topic: Sea Battles, Benjamin Franklin's Oil Lamp, and Jelly Bellies

**For any Comments or Questions
Contact:**

Department of
Mathematics & Statistics
SAC Room 305
Villanova University
800 Lancaster Avenue
Villanova, PA 19085

Tel: 610.519.4850

Fax: 610.519.6928

Email: math@villanova.edu

Chair: [Dr. Douglas Norton](#)

Staff: [Marie O'Brien](#), 610.519.4809

[Lorraine McGraw](#), 610.519.4850



THIS WEDNESDAY, MARCH 14TH