

The Sum Times

April 2016

Message from Dr. Norton

In or out like a lion or a lamb, March is certainly varied in its meteorological offerings. Will the high temperature be 80 or 50? Then within one short week we have the variety of Pi Day, the Ides of March, St. Patrick's Day, and the first day of Spring. Whew!



Dr. Douglas Norton
Dept. of Mathematics and
Statistics Chairperson

Just as I've always believed that February is shorter than the other months because we couldn't take a full month of what February dishes out, I suppose it's good that the semester doesn't begin until part of January is out of the way. One nice feature of the "Spring" semester is that its very name is holding out hope that Spring will eventually arrive. "Spring Break" may not actually feel like Spring, but at least it provides a Break. Easter holds that metaphor for coming out of the dead time of winter to the green of spring and the glow of summer. Even those not so mathematically inclined remind us of the inescapable ubiquity of mathematics by counting the days until breaks, counting the weeks until the end of the semester or even graduation. The real world (or its surrogate, graduate school) awaits our seniors, summer jobs and internships and classes await others, as the need to focus on present studies vies for our attention with this concern for the future, leading to our own internal versions of March Madness. Enjoy the remainder of the semester: each day will be a little warmer, the birds will fly back to serenade us between classes, the theorems will make more and more sense, and the epsilons will continue their inevitable march toward zero.

"Mathematics consists of proving the most obvious thing in the least obvious way." -- George Polye

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**"One cool thing
about
mathematics is
they don't have
to be able to
understand math
to see the passion
that makes it so
exciting to
them."
— Paul Pierce**



Request to follow
us on twitter! Our
twitter name is
VUMathStat.

Join the Math
Department's page
on **LinkedIn** to
connect with
alumni and
students and
faculty. This is a great way to
find out about internships and to
form a network!



Become a fan of
the **Department
of Mathematics
and Statistics
at Villanova
University** page
on **Facebook**.

Math Club

The Math Club at Villanova welcomes everyone from all schools and majors. The club has events throughout the entire year such as quizzo, career night, study parties, and movie nights. We host bake sales each semester to raise money for the Starfish Foundation, a non-profit organization founded by Villanova Math Major Alums, which provides scholarships and mentoring to youth living in extreme poverty in Ecuador. This year we will be hosting new events to increase faculty involvement, including "Teacher TED Talks" and Lunch with the Faculty. Through the Math Club, we hope to help students learn what the Math Department has to offer, while being an active member of the Villanova community.

Math Club Officers

Co-Presidents: Karolina Golabek
kgolabek@villanova.edu
Anna Lake
alake@villanova.edu
Treasurer: Elizabeth Leonard
eleonar5@villanova.edu
Social Chair: Ron Berna
rberna@villanova.edu
Social Committee: Meghan Carlock
mcarlock@villanova.edu

Math Club Dates

We are planning on having a Teacher Ted Talk sometime in March, as well as a trip to MoMath in NYC in April (paired with AWM), as well as possibly a Career Night in April.

Check your email and the board outside the Mathematics and Statistic Department for updates!

Mathematics Learning And Resource Center (MLRC)

Location: 211 Falvey Library

Phone: 610-519-MLRC (6572)

Dates: January 19 — February 25
March 7 — March 22
March 29 — April 28

Hours: Sunday 6:30-9:00pm
Mon.-Thurs. 1:00-5:00pm
& 6:30-9:00pm

Check out our web page at
www.villanova.edu/mlrc for more
MLRC info regarding Villanova
math course, tutoring schedules,
math links, and MLRC email.

If you think dogs can't count, try putting three dog biscuits in your pocket and then giving Fido only two of them.

~Phil Pastoret



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Fall 2016 MAT Electives

MAT 4310 — Stats Methods (Dr. Elise Pasles, Dr. Joseph Pigeon)

This course is an introduction to data summarization and various statistical methods that will allow students to begin to build up a toolbox of statistical techniques for handling data analysis. The class will study probability distributions that will serve as the foundation 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 4550 — Mathematics of Financial Derivatives (Dr. Klaus Volpert)

This course covers topics from Financial Mathematics, such as:

- The ins and outs of Mortgages and Loans
- Inflation and other Interest rates
- What are Stocks? Bonds? Options?
- A Random Walk on Wall Street
- Volatility of stocks
- the concept of Arbitrage
- Put-Call Parity;
- the Black-Scholes Model for Option Pricing
- Monte Carlo Methods for Option Pricing

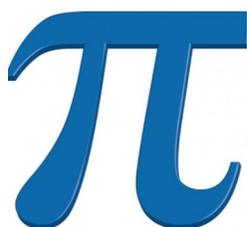
This course will be the prerequisite for one section of the Mat 5900 Seminar (on Financial Mathematics) in the spring of 2017. The course is also helpful in preparation for actuary exams FM and MFE.

MAT 5110 - Topics in Geometry (Dr. Paul Pasles)

In this course, we will cover plane and solid geometry, axiomatic systems, compass and straightedge constructions, symmetry, affine transformations, non-Euclidean geometries (hyperbolic, spherical, elliptic), and more. The course is aimed at math majors, education majors who plan to teach math, and graduate students. (It is cross-listed with MAT 7290) Prerequisite: MAT 2600.

MAT 5700 - Math Stats I (Dr. Yimin Zhang) (This counts as the second analysis)

The course covers the basic principles of the theory of probability and statistics. Topics include: probability, random variables, discrete and continuous probability distributions, important families of distributions, multivariate probability distributions, and functions of random variables. Prerequisite: MAT2500 & 2705



“I’m sorry to say that the subject I most disliked was mathematics. I have thought about it. I think the reason was that mathematics leaves no room for argument. If you made a mistake, that was all there was to it.”

— Malcolm X



MAT 5920-001 TOP: Coding Theory (Dr. Andrew Woldar)

It’s not hard to imagine a world without coding theory. Simply imagine a world bereft of all forms of digital technology, that is to say, no computers, no DVD or CD players, no mobile, cellular or gaming devices, etc. The problem arises due to physical limitations on circuitry and channel reliability. These cannot be avoided, and they manifest as inaccuracies in digitally transmitted information. Decades ago, when processors were capable of carrying out only a few hundred instructions per second, a computer (in the absence of coding theory) could run for perhaps several minutes before shutting down. Picture this same situation today, allowing for the fact that modern processors are capable of carrying out over 500,000,000,000,000 instructions per second. The machine would never even turn on. The reason it can, and does, is due to coding theory. In this course, we study the mathematics underlying the design and development of codes, starting with the more naïve early ones and moving progressively to the more sophisticated ones (for example, those used in the NASA Space Program).

MAT 5920-002 TOP: Monte Carlo Methods (Dr. Jesse Frey)

Monte Carlo methods are methods for answering questions by using random numbers. They are widely used in statistics, finance, the sciences, and many other fields. Students who take this course will learn how to design Monte Carlo studies, how to implement them using the statistical computing package R, and how to appropriately assess the error in Monte Carlo estimates. Specific topics to be covered include random number generation, Monte Carlo integration, the bootstrap, and Markov chain Monte Carlo. Each student will complete a course project that involves using Monte Carlo methods to solve some problem of interest. This course may be counted towards the statistics minor.

MAT 5920--003 TOP: Medical Imaging (Dr. Timothy Feeman) (This counts as the second analysis)

The CAT scan is a diagnostic tool that has become commonplace in twenty-first century health care. Yet how many people realize that the fundamental problem behind the CAT scan -- figuring out what something looks like inside just from external information -- is completely mathematical? This course will focus on the mathematics involved in the creation and analysis of CAT scans. Topics will include Radon and Fourier transforms (both continuous and discrete), convolution, sampling, filters, and approximate solutions to systems of equations. All of these topics will be discussed in context. Computer projects will explore how to implement basic image reconstruction techniques. We will use the open-source computing environment *R* throughout. (No prior experience with *R* is required). The required text for the course is *The Mathematics of Medical Imaging: A Beginner's Guide, second edition, by Timothy G. Feeman (Springer, 2015)*.

Fall 2016 MAT Seminars

MAT 5900 Seminar: Number Theory (Dr. Robert Styer)

Primes, divisors, Euclidean algorithm, congruences, Chinese Remainder, quadratic residues, ideas of Fermat and Euler, We begin with an overview of number theory for a few weeks, then we peruse unsolved problems in number theory and choose a problem to work on. Past math majors have chosen topics such as perfect numbers, happy numbers, Put or Take a Square Game, the IRS game, Gaussian primes, magic squares, multiplicative persistence, Egyptian fractions, the Kimberling shuffle, the Riemann hypothesis, You will give a series of short talks and write short paper drafts, until by the end of the semester you are ready to give an inspiring talk and turn in a practically perfect minithesis. An unsolved number theory problem is waiting for you to adopt it!

SAVE THE DATE!

Pi Mu Epsilon Induction

Friday, April 29, 2016 (Reading Day)

9:30 – 11:00 a.m.

Mendel 154

Guest Speaker: Dr. Eugene Fiorini

Topic: Beyond John Conway's Life

A look at some of the more interesting mathematical excursions, puzzles, and problems related to John Conway's work in such areas as combinatorial game theory, finite groups, knot theory, and recreational mathematics.



Dr. Eugene Fiorini recently assumed a new position as Muhlenberg College Truman Koehler Professor of Mathematics. He earned an M.S. (1989) and Ph.D. (1993) from the University of Delaware in External Graph Theory, as well as completing the graduate work for an M.S. in mathematics education, and holds a master's in Statistics from Temple University. For fourteen years he was a member of the Shippensburg University Mathematics Department where he also served as Chair of the University Scholarship Program, Associate Dean and interim Dean of the College of Arts and Sciences. He is the author of *Modeling Reality with Functions: Graphical, Numerical, Analytical*.



What did one
math book say to
the other?

Don't bother me.
I've got my own
problems!

Fall Semester Dates to Remember:

- Mar 23** (W) — Easter Recess Begins after last class
Mar 29 (Tu) — Classes Resume
Mar 30 (W) — Last Day for Authorized Withdrawal Without Academic Penalty (WX)
Apr 26 (Tu) — Deemed a Friday Class Day and follows a Friday schedule for UG Day only
Apr 27 (W) — Deemed a Monday Class Day and follows a Monday schedule for UG Day only
Apr 28 (Th) — Final Day of Classes
April 29 (Fri) — Reading Day
Apr 30 - May 6 (Sat - F) — Final Examinations (No exams on Sun. May 1)
May 9 (M) — Final Grades Due - (12 Noon)
May 13 -14 (Fri - Sat) — Baccalaureate and Commencement
June 24 (Fri) — Last day for submission of work to remove incomplete ("N") grade

Study Abroad

Interested in studying abroad? Stop by Villanova's Office of International Studies and meet with a member of the staff to learn about different opportunities.

Office of Education Abroad
 Middleton Hall, 2nd Floor
 (610)519-6412
 abroad@villanova.edu

If you would like to submit an article or have an idea for the SUM Times, please contact the math department at math@villanova.edu

For more information, visit their website at:
www.internationalstudies.villanova.edu



Registration



To All Students: Set up an appointment to meet with your advisor to prepare for registration.

Preparing for Registration

Meet with your Academic Advisor:

- Discuss your course options for next semester
- Receive your Registration PIN (a.k.a. Alternate PIN)

Registration PIN:

- Save it to your phone or email
- Changes each semester
 - Spring Registration PINs begin: sp _____ (four random numbers)
 - Fall Registration PINs begin: fa _____ (four random numbers)
- Take the time to test your PIN before your registration time begins

How to "Test" your PIN: Go to your *Student* tab → *My Schedule and Registration* → *Login to Register* –> Select the appropriate term → type your PIN

- If you enter the correct PIN, the system display your registration time appointment
- If you enter an incorrect PIN, you will receive an error message: *Authorization Failure – Invalid Alternate PIN*

If you feel you have the incorrect PIN, contact your Advisor or your Advising Center

Note: The system is "case sensitive." The letters are lower case.

Check your Registration Status

- link will display the following:
 - Date and time you can begin registering and the date and time online registration ends.
 - An alert if you have Holds on your account which will prevent registration
 - Link to *View Holds* is at the bottom of the screen
 - Your Academic Standing
 - Your Student Status
 - Your Class for registration (example: *Sophomore* class will not permit registration into courses restricted to Juniors and Seniors only)

Holds that prevent registration:

- (Holds most often seen – not a complete list)
 - Acad Integ Pledge – VPAA – student has not completed the Pledge
 - No Med Form – Call Health Center
 - No Social Security # on file – Bursar's Office needs this to complete tax forms for students
 - Bursar Registration Hold – student has a balance owing
 - Must Call Dean of Students
 - Financial Aid Hold – Call FinAID

Note: Hold can only be removed by the originating office

Search for Classes: The *Master Schedule Class Search* will allow you to search the semester's course offerings using various criteria. You can be as vague or as detailed in your search as you want. For example, you can search by just selecting an Attribute Type like Diversity Requirement 2.

When planning your schedule, be flexible and make notes of your options. Some sections may be filled and you will need to select a different time or teacher or course.