

Special points of interest:

- Message From the Chairperson
- Fall Semester Dates to Remember
- New Faculty Spotlight
- Student Math Organizations
- MLRC and Math Dept. Information
- Spring 2019 Math Electives and Seminars
- Student Spotlight
- Study Abroad and Registration Information
- eUSR Conference Info

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The Sum Times

October 2018

Message from Dr. Norton

"All things on earth point home in old October; sailors to sea, travellers to walls and fences, hunters to field and hollow and the long voice of the hounds, the lover to the love he has forsaken." Thomas Wolfe, *Of Time and the River*. Although we head to our new or familiar second home of Villanova in August, we are settling in by the time October comes: scholars to their studies, imaginations not bound by classroom walls, hunters of truth to field (and ring and group), lovers of wisdom to their own philosophia.

"O hushed October morning mild, / Begin the hours of this day slow. / Make the day seem to us less brief. / Hearts not averse to being beguiled, / Beguile us in the way you know. / Release one leaf at break of day; / At noon release another leaf; / One from our trees, one far away." Robert Frost, *October*.

"In the great silence of my favorite month, / October (the red of maples, the bronze of oaks, / A clear-yellow leaf here and there on birches), / I celebrated the standstill of time." Czeslaw Milosz, *All Hallow's Eve*. Do not let the rush of summer invade the hushed October morning. Let your beguiled heart lengthen the shorter days, captivated by the autumnal spectrum of beauty around you: friends, ideas, and the literal leaves. Let time stand still.

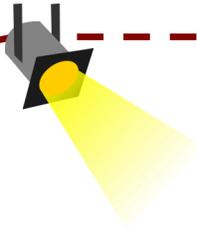
"I'm so glad I live in a world where there are Octobers." Anne, in *Anne of Green Gables* by Lucy Maud Montgomery. Be glad this October. Enjoy your break, but savor the second stretch of the semester.



Dr. Douglas Norton
Dept. of Math and Stats

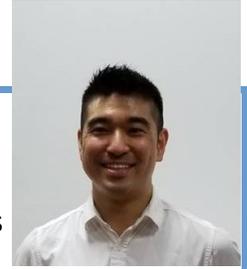
Fall 2018 Semester Dates To Remember

Oct. 12 (F)	Mid-Term
Oct. 15 (M)	Semester Recess
Oct. 22 (M)	Classes Resume
Oct. 26-28 (F-Su)	Homecoming
Oct 26 (F)	Registration Advising Begins
Nov. 2-4 (F-Su)	Special Olympics
Nov. 20 (Tu)	Thanksgiving Recess after last class
Nov. 26 (M)	Classes Resume
Dec. 14 (F)	Reading Day
Dec. 15-21 (S-F)	Final Examinations



New Faculty Spotlight

Peter Chi, Ph.D.



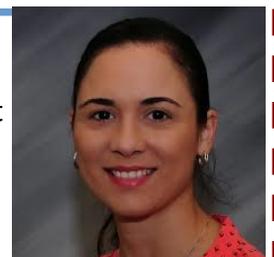
Dr. Peter Chi is a new Assistant Professor of Statistics at Villanova University, coming from previous faculty positions at Ursinus College and at Cal Poly, San Luis Obispo. He completed his Ph.D. in Biostatistics at the University of Washington in 2013, with primary research interests in statistical genetics and phylogenetics. He is also deeply passionate about statistics education and hopes to become more heavily involved in research in that area in the future. In his free time, he enjoys playing music (violin, trombone, and beginning guitar), ultimate frisbee, poker, exploring craft breweries and distilleries, and learning Mandarin Chinese and Taiwanese. A native of Delaware, Peter has been a casual fan of Villanova Basketball since high school due to its proximity, and is excited to join Nova Nation in full force!



Aaron DiFerdinando, M.S.

Aaron DiFerdinando was drawn to teaching because of his immense interest in learning. "Mathematics particularly stood out for me because understanding math allows you the opportunity to reveal hidden structures underneath the complicated and chaotic surface of the world," he explains. "Helping others has always been a passion of mine. I don't view myself as a teacher, but as an educator who sees the potential in every student and an individual who is determined and willing to go above and beyond to offer the type of quality education that each and every student deserves." Before coming to Villanova, Mr. DiFerdinando worked at the Lincoln Center for Family and Youth and continues to work at PA Leadership Charter School (PALCS) as a math teacher. He has stated, "I work with a great team of people who take all of our individual ideas and put them together to create the most engaging lessons and curriculum that can be offered to our students." Aaron received his Bachelor of Science in Education from West Chester University and his Masters in Applied Statistics from Villanova in May 2017. He currently teaches a course in Business Statistics at Villanova. In his free time, he likes to meditate and spend time with his family.

Marggie D. Gonzalez, Ph.D.



Marggie D. Gonzalez is pleased to join the Mathematics and Statistics department at Villanova this fall. Marggie was born and raised in Puerto Rico. In 2002 she received her B.S. in Mathematics Education, followed by a M.S in Statistics in 2005 from the University of Puerto Rico. She moved to Washington, DC in 2007 and worked for the US Census Bureau as a Survey Statistician. Following her passion, she received a PhD in Mathematics Education from North Carolina State University. Her research interests are how to better incorporate technology into the mathematics classroom at all levels, so learning is more meaningful for the students. Marggie loves hiking and in her free time enjoys a good cup of coffee while reading a book.



Vikram Kamat, Ph.D.

Dr. Vikram Kamat joined the Department of Mathematics & Statistics in Fall 2018 as a Continuing Assistant Professor of Mathematics. Vikram received his M.A. and Ph.D. in mathematics from Arizona State University in 2007 and 2011 respectively, specializing in discrete mathematics. His dissertation focused on extremal problems in finite combinatorial set theory which broadly involved finding upper bounds on and characterizations of systems of finite sets subject to certain structural constraints. Vikram has held postdoctoral positions at the Indian Institute of Science in Bangalore, India, University of Warsaw in Poland, and before joining Villanova, held visiting positions at Virginia Commonwealth University and the University of Richmond. His current research interests include algebraic and graph-theoretic generalizations of problems in extremal set theory, and also applications of these results to theoretical computer science, particularly design and analysis of parameterized algorithms for NP-hard problems. Outside of these academic pursuits, Vikram retains a keen interest in running, reading, jazz and world cinema.

Danielle Smiley, M.S.

Danielle Smiley is pleased to join the Mathematics and Statistics department at Villanova this fall and is excited to begin her career in higher education at such a wonderful institution. Danielle is a proud Pennsylvania native and her academic career helps show it. In 2009 she received her B.S in Mathematics from Albright College located in Reading, Pa and decided to keep venturing east to earn her M.S. in Mathematics from Bryn Mawr College. She is currently finishing her PhD, also at Bryn Mawr College, in the area of Harmonic Analysis, specifically, bounding oscillatory singular integral operators over Hardy Spaces. Other than her passion for mathematics education, Danielle has interests ranging from music and dance to running and hiking. When not on campus you can often find her enjoying a nice cup of coffee with a side of mathematics in one of Philadelphia's many coffee shops. Danielle looks forward to capturing the new experiences Villanova has to offer her and its students this year.



Le Wang, Ph.D.

Dr. Le Wang joined the Department of Mathematics and Statistics at Villanova University in 2018 as an Assistant Professor of Statistics. Le received her bachelor's degree in biology from Zhejiang University, China, in 2008. In 2011 and 2013, Le completed her master's degrees in biology and applied statistics at Villanova University. For her master's thesis in biology, Le studied how increasing atmospheric CO₂ and nitrogen eutrophication, through their direct and indirect effects on plants and microbes, influence peat decomposition in a salt marsh. Le completed her Ph.D. in biostatistics at University of Pennsylvania in 2018. Her research mainly focuses on developing efficient two-phase sampling designs in epidemiological studies and electronic health record based studies. She is also interested in developing statistical methods to correct for participation bias in genetic association studies and to correct for biases resulting from outcome misclassification through several past and current collaborations. In her spare time, Le likes music, Zumba, and board games. Le is excited to start her career back at Villanova and looks forward to the new journey.



Villanova Math Club

The officers of Math Club are excited to welcome returning and new Math Club members! This year, Math Club is under new leadership:

Co-President—Kellen Short kshort6@villanova.edu

Co-President—Saurabh Verma sverma@villanova.edu

Everyone is welcome to join Math Club - Math Majors and Minors, Liberal Arts and Sciences students, Business students, Engineering students, graduate students. **If you love math, are interested in it, need help with it, or simply want to meet new people**, then Math Club is the club for you!

Meetings will take place approximately every three weeks in the MLRC and will include snacks, discussions about classes and professors, as well as fun activities such as math-themed competitions. This year the Math Club is planning on organizing several events, for instance, **a professional development night, Quizzo nights, Teacher talks, Math in Movies night, Board game night, a T-shirt design contest, and more!**

For more information, contact any of the officers!

Association of Women in Mathematics

Open to anyone interest in math, supporting women in math, or wanting to meet new people! Meetings are held approximately every 2 weeks. We have field trips, guest speakers, a mentor program, service opportunities and host a breakfast on reading day.

For more information please contact: smccaffr@villanova.edu

Mathematics Learning And Resource Center (MLRC)



Phone: (610) 518-6572

Location: 204 Falvey Library

Hours: Sunday 6:30-9:00pm

Mon-Thurs 11:00am-5:00pm &
6:30-9:00pm

Dates: Sept 4—Oct 11

Oct 22—Nov19

Nov 26—Dec 13

Resources:

Free Walk-In Tutorial Service

Free Private Tutorial Service

Course Software Access and Support

Free Review Materials for:

Algebra II, Geometry, Trigonometry,
Probability/Statistics, Calculus I, II, III



Printer's down!



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Spring 2019 Electives

MAT 3305 Topics in Analysis – Dr. Paul Pasles

(satisfies 2nd analysis requirement)

This course picks up where MAT 3300 leaves off. Topics: Review of epsilon-delta proof and continuity from first semester; sequences and series of functions; pointwise and uniform convergence; the Weierstrass M-test; Abel's Theorem; Weierstrass approximation; integration; other topics depending on time and class interest.

Prerequisite: MAT 3300.

MAT 4270 Numerical Analysis – 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 at a math major's second analysis requirement. The software Maple will be used to help make our approximations, though students may use other software if desired.

Prerequisite: MAT 1505

MAT 4310 Stats Methods – Dr. Elise Pasles, Dr. Peter Chi

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: MAT 1505



MAT 4315 Stats Models – Dr. Le Wang

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: MAT 4310

MAT 5600 Differential Geometry—Dr. Klaus Volpert

What's a straight line? This sounds simple: it's the shortest path from point A to point B. But when our path is confined to a curved surface, it's not so simple: Here are some 'straight lines' (later called 'geodesics') on the surface of hollow pasta (picture courtesy of Dr Jantzen):



- So, can there be more than one straight line between two given points??
- What does it mean for two lines be parallel??
- If three straight lines form a triangle on a surface, is the sum of the angles at each vertex still 180 degrees? Always more? Always less?

As we'll see, questions whose answer we know so well from plane geometry (Euclidian) geometry, become really interesting when we ask them again for curved surfaces.

The answers are both beautiful and useful, as applications abound in computer aided design, fluid dynamics and cosmology, to name a few. In Einstein's relativity theory, for example, space itself becomes curved by the presence of mass, and light follows the geodesics of this curved space, explaining such phenomena as seeing a distant galaxy in four different locations at the same time.





“If at first you
don’t succeed
try two more
times so that
your failure is
statistically
significant”
- Unknown



MAT 5700 Math Stats I – Dr. Michael Levitan

(satisfies 2nd analysis requirement)

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. Prerequisites: MAT 2500 & MAT 2705

MAT 5705 Math Stats II – Dr. Jesse Frey

This is a course on the theory of statistical inference. Key topics include the law of large numbers, the Central Limit Theorem, point estimation, maximum likelihood estimation, consistency, sufficiency, interval estimation, sampling distributions, hypothesis testing, order statistics, and Bayesian statistics. This course should be of interest for any student who wants to do a graduate degree in statistics or who wishes to understand the theoretical foundation for the standard methods of applied statistics.

Prerequisite: MAT 5700

MAT 5920 Intro to Bayesian Stat Data Analysis – Dr. Al Marrero

Generally, at present, Bayesian statistics is only taught at the graduate level. This course gives Villanova undergraduates the opportunity to learn about this important area of statistics. The course is an introduction to the statistical data analysis from a Bayesian viewpoint. We assume no previous knowledge of Bayesian statistics. The course is intended to give the students a taste of what it is like to work as a statistician, doing statistical analyses and writing statistical reports. It is meant to be a practical, hands-on learning experience.



“Mathematics is the art of giving the same name to different things”

- Henri Poincare



MAT 5920 Data Science – Dr. Michael Posner

Data-savvy professionals are in high demand in businesses, public agencies, and nonprofits. The supply of professionals who can work effectively with data at scale is limited, and is reflected by rapidly rising demand and salaries for data scientists, currently rated the #1 job in the US in 2016. This course explores how real-world data from a variety of disciplines are gathered, managed, and used for making decisions or predictions. Core Topics will include data wrangling, visualization, multivariate thinking, text processing, data mining, ethics, and simulation-based inference. This course will introduce students to the statistical programming language R to accomplish these tasks. Prerequisite: any introductory statistics course (MAT 1230, MAT 1250, MAT 1430, MAT 4310, MAT 1313, or similar). Some computer programming experience recommended, but not required.

MAT 5920 Data Mining – Dr. Yimin Zhang

Technology advancements now allow companies to capture and store large amount of data in databases and data warehouses. With so much raw data, organizations urgently need tools that allow them to effectively sift through these enormous datasets and extract actionable information to help them optimize businesses. Predictive modeling is used extensively in businesses to identify risks and opportunities associated with a set of conditions from data. This course will focus on predictive modeling via learning how to use various data mining tools such as neural networks, decision trees, classification and prediction algorithms, etc. in the context of most common business applications. Students will be expected to use state-of-the-art industrial strength data mining software to analyze real-world data and make strategic recommendations for managerial actions. Prerequisite: MAT 4310.

MAT 5920 Graph Theory & Algorithms – Dr. Vikram Kamat

In this course, we will begin by defining, understanding and proving some of the fundamental properties of graphs. A large portion of the course will focus on studying and analyzing, in terms of correctness and running time complexity, the canonical graph algorithms designed to investigate the deeper structural properties of graphs. Connections to other fields in the mathematical and applied sciences will be regularly emphasized. In addition, students will also get a chance to use a computer algebra software such as Maple and its multiple packages pertaining to graph theory and combinatorics to discover and analyze various interesting and applicable facts about graphs. The theory of graphs has established itself as an important tool in fields like computer science, where it is used to model communication networks and flow of data, in operations research, where it is used to model and analyze optimization problems arising in various business applications as well as fields as disparate as linguistics, organic chemistry, biology and social sciences while continuing to emerge as a vibrant mathematical discipline in its own right.

Prerequisites: MAT 2600 or MAT 4110



Spring 2019 Seminars

MAT 5900 Financial Derivatives – Dr. Klaus Volpert

This is a seminar following the course MAT 4550 (Mathematics of Financial Derivatives). Because it is a seminar, there won't be much lecturing on my part. Instead, we will focus on projects and presentations by members of the class. The first presentation will be chosen from a book of case studies, to help everyone review the various types of derivatives, their idiosyncrasies and pitfalls. After that everyone will choose a mathematical topic from within the world of finance, and then present two times on that topic, plus write a summary paper. This topic should build on what was learned in MAT 4550.

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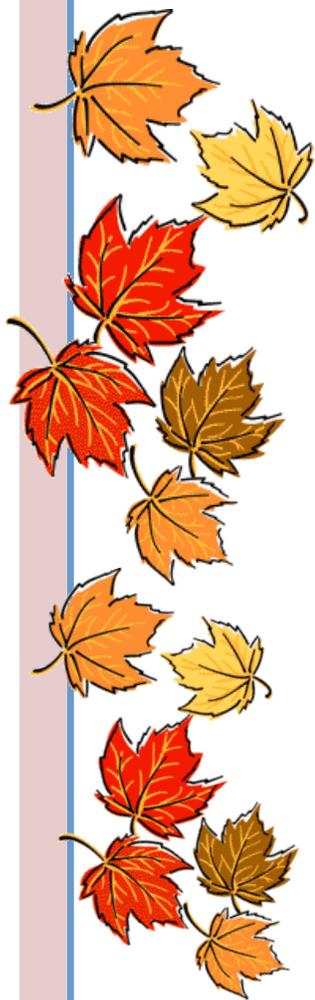
MAT 5900 Applied Linear Algebra – Dr. Tim Feeman

In our first course in Linear Algebra, we learn a lot about vector spaces and linear transformations, but we may be left at the end wondering, "What is this all used for?" Well, as I was once told by a mathematician working in digital photography for Kodak, "Linear algebra is for everything!" In this seminar, we will begin to explore some of the many real-world applications of linear algebra, such as: Markov processes, algorithms for creating ratings and rankings (e.g., of web pages, sports teams, colleges, etc.), least squares approximation, digital image processing, analysis of graphs and networks, digital file compression, the singular value decomposition, principal component analysis, QR factorization, latent semantic indexing (for search engine text retrieval), machine learning, and more.

Prerequisite: A first course in Linear Algebra, e.g., MAT 3400.

MAT 5900 Operations Research – Dr. Bruce Pollack-Johnson

Operations Research involves different kinds of discrete and continuous optimization problems. Examples of problem categories we will study include the Traveling Salesperson Problem (finding the shortest/cheapest way to visit a bunch of cities in a loop), the Critical Path Method (finding the shortest time a project can be completed in, and which activities are critical to finishing on time), the Assignment Problem (e.g., how to assign graders to professors to maximize compatibility of background to courses), the Diet Problem (what combination of food will meet your nutritional requirements at the lowest cost), Dynamic Programming (e.g., how to allocate study hours to courses for Finals to maximize average increase in GPA), the Shortest Path Problem (what's the shortest way to get from one point to another, like Google Maps does for you), and the Production Problem (e.g., how many of different types of candles to produce for a fundraiser to maximize total profit). Categories of problems not mentioned above that we will study include Linear Programming, Integer Programming, Network Problems, Nonlinear Programming, Inventory Theory, and Game Theory. Students will do a project from their own lives that uses one of the techniques we will study in the course. MAT 5900 Seminar: Unsolved Problems in Number



Student Spotlights



Katie Garcia and Alex Molino represented the Math Department at the Majors fair.



Dr. Styer's Topics in Geometry course used vases and swim floats (provided by Dr. Feeman) to better understand hyperbolic geometry. Photo credits: Emma Bernhard



With our senior, Lizzie Ryan, completing her studies a semester early, she will be passing the Blue Key baton to our Sophomore, Kathryn Lamb.



Supporting a Fellow Math Major

First year math major, Jessie Williamson, and her family need your thoughts, prayers, and support. A recently discovered serious health issue led to surgery, which will require ongoing treatment. Jessie is described as "brilliant, beautiful, and the kindest soul you will ever meet". Please consider making a [donation](#) of any size to support Jessie and her family during this difficult time. The entire Nova Nation is thinking of you. Thanks @novainsider and @novanationer for sharing and getting the word out.

Registration



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!

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

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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.

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REGISTER FOR :

RESEARCH CONFERENCE FOR STATISTICS (eUSR)

The 2018 **electronic Undergraduate Statistics Research conference**, hosted by **CAUSE (Consortium for the Advancement of Undergraduate Statistics Education)**, will be held this year on **Friday, Nov 2, 2018 from 9am - 4:30pm. We will be hosting a watch party in SAC 300 (lunch will be provided)**. The day includes statistics project presentations by students from around the country, plenary presentations by the winners of this year's US Statistics Project Competition, a keynote by Hilary Parker, Data Scientist at SitchFix, a panel on statistics graduate schools, and a career panel on statistics jobs in industry and government. Sign up to register [here](#)

“The essence of mathematics is not to make simple things complicated, but to make complicated things simple.”

- S. Gudder

