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The Sum Times



Dr. Jesse Frey

Dept. of Mathematics and
Statistics Chairperson

Message from Dr. Frey

Welcome to the Fall 2019 edition of the Sum Times! I'm excited to write to you for the first time as chair of the department. I'd like to tell you about some changes that have either already occurred or are in progress within the department. I also encourage you to read through this entire document to learn about upcoming events and the electives and senior seminars that are available in Spring 2020.

One change is that the department has added four new faculty this fall. All four are dedicated teachers, and they're also poised to make great contributions to the department in research and service. Dr. Peter Muller and Dr. Michael Tait are mathematicians, and Dr. Jiangtao Gou and Dr. Bright Nsowaa are statisticians. Please see the next few pages for more complete introductions.

Another change is that we've added a new course, Mathematical Communities (MAT 1000), which will be required for all Mathematics majors starting with the Class of 2024. The course is a one-credit-hour seminar where the goal is to create community among Mathematics majors while introducing students to internship opportunities, research opportunities, and possible career paths. The course also includes in-class activities designed to show how mathematicians actually do their work. The course is being offered this fall for new Mathematics majors and will be offered again for other Mathematics majors in Spring 2020. Please consider signing up!

One change in progress is that we are working to add a Statistics major. Our proposal has already been approved at the department level, and it is now being considered at the college level. The department continues to have our existing Statistics minor, which requires only four courses beyond those for the Mathematics major. Please see Dr. Yimin Zhang for information on the minor.

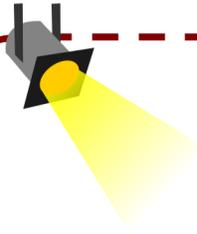
Another change in progress is that we plan to start offering one-credit and two-credit courses on topics like R programming and Maple programming. In the future, it may be possible for students to obtain one of their three-credit Mathematics electives by combining such courses.

I encourage you to stay involved this fall! The department has a full slate of colloquium speakers that you'll be hearing about, and there are also activities such as the Putnam Mathematical Competition in December and the visit by the Society of Actuaries (SOA) on November 12.

Good luck in your classes and everything else that you have going on! Thanks for being a part of our department!

Oct. 11 (M)	Semester Recess
Oct. 18 (M)	Classes Resume
Oct. 20 (W)	Mid-Term
Oct. 25-28 (F-Su)	Homecoming
Oct. 25 (F)	Registration Advising Begins
Nov. 1-4 (F-Su)	Special Olympics
Nov. 23 (Tu)	Thanksgiving Recess after last class
Nov. 29 (M)	Classes Resume
Dec. 10 (F)	Reading Day
Dec. 11-17 (S-F)	Final Examinations

Fall 2019
Semester
Dates To
Remember



New Faculty Spotlight

Peter Muller, Ph.D.

Dr. Muller is an applied mathematician with a passion for applications in biology and medicine. In particular, his main research area is in medical image reconstruction. He received his Ph.D. and Master's degrees from Rensselaer Polytechnic Institute and his Bachelor's degree (in math and French) from Fordham University. As part of his research, Dr. Muller has participated in the collection of data in labs and hospitals in addition to making images from that data. Beyond his medical imaging research, Dr. Muller has mentored undergraduate research in mathematical modeling in the area of epidemiology.



Jiangtao Gao, Ph.D.

Jiangtao Gou is pleased to join the Department of Mathematics and Statistics at Villanova University this fall. Before joining Villanova University, Jiangtao was an assistant research professor of biostatistics and bioinformatics at Fox Chase Cancer Center between 2018-19, an assistant professor of mathematics and statistics at CUNY Hunter College between 2015-18, and a postdoctoral research fellow in industrial engineering and management sciences at Northwestern University between 2014-15. He obtained his Ph.D. degree in statistics at Northwestern University in 2014, and his M.S. degree in computational mathematics in 2009 and B.S. degree in physics and mathematics in 2007 at Tsinghua University, China. Jiangtao has specific expertise in multiple testing procedures, experimental design, clinical trial, statistical computing, data mining, and quantitative research methods. During his spare time, he enjoys hiking, swimming, and aero model making.

Michael Tait, Ph.D.

Mike grew up in Wilmington, DE and received his BSc and MSc from the University of Delaware before getting his PhD at UC San Diego. Before coming to Villanova, he was an NSF postdoc at Carnegie Mellon University. His research interests include extremal and spectral graph theory, combinatorial number theory, and finite geometry. Any undergraduates interested in doing research in combinatorics should feel free to look at his website and/or chat with him about it. In his free time, Mike enjoys exercising (mostly running), food, and reading.



Bright Nsowaa, Ph.D.

I was born and raised in a small village in the Ashanti Regional part of Ghana. Kobeng is my beloved hometown. Growing up in Kobeng was challenging yet fulfilling. It was challenging because the entire community lacked basic amenities. But in the midst of our lack, my parents taught me value for work. I was taught to be compassionate, and to share the little things with my neighbors despite our financial and material circumstances. Another challenge was education or lack thereof; the environment placed an artificial ceiling on how much education one could receive. And for the most part the ceiling was successful because almost all the children in the village and its surroundings never went beyond junior secondary school (JSS), which is an equivalent of a middle school.

Despite the staggering statistics, I had an audacious dream to attend college. My dream was deemed unrealistic by many, but I found hope from a praying mother. It was my father who continuously and consistently breathed fresh air into my dream; he often told me to think beyond my environment. After excelling in JSS, I gained admission to a senior secondary school in a big city which propelled me to college. I completed my bachelor's in Mathematics at the University of Science and Technology in Ghana, and subsequently earned a Masters (MS) in Applied Statistics at Teachers College Columbia University. Additionally, I earned an Mphil and PhD in Measurement at Teachers College Columbia University.

I love teaching and mentoring, but I spend my free time watching sports and listening to political debates. I am a big soccer fan; Kumasi Asante Kotoko of Ghana and Real Madrid of Spain are my favorite clubs of all time. I enjoy watching baseball; I'm a huge fan of the New York Yankees. My Brooklyn Nets struck gold in the offseason - we are coming! I love football, and I'm a fan of the New York Jets. Finally, I enjoy watching good tennis and boxing.

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: kaustin5@villanova.edu

Mathematics Learning And Resource Center (MLRC)

Phone: (610) 518-6572



Location: 204 Falvey Library

Hours: Sunday 6:30-9:00pm

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

Dates: Sept 3—Oct 10

Oct 21—Nov 25

Dec 2—Dec 12

Resources:

Free Walk-In Tutorial Service

Free Private Tutorial Service

Course Software Access and Support

To learn more about the MLRC, visit
www.villanova.edu/mlrc

PAPER JAM!

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Spring 2020 Electives

MAT 4110 Combinatorics—Alexander Diaz-Lopez

Combinatorics is a fascinating branch of mathematics that applies to problems ranging from card games to quantum physics to the Internet. It is an area of mathematics that studies counting techniques. The main question here is the following. If we need to count something, can we do anything better than just counting all objects one by one? Throughout history, mathematicians have developed several counting techniques, many of which we will discuss in class. As counting is a common thread through different areas of mathematics, combinatorics naturally lends itself to connections with other areas of mathematics such as algebra, geometry, topology, and discrete math. In addition to the content of the course, you will be exposed to recent research about how to best learn mathematics. After discussing such topics, active participation -including presenting problems in class- will be expected. Please, come along for the ride!

Prerequisite: Foundations of Mathematics (MATH 2600)

MAT 4310 Stats Methods – Elise Pasles, Bruce Pollack-Johnson

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 4315 Stats Models – 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.

Prereq: MAT4310

MAT 4380 Data Science—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, rated the #1 job in the US over the past few years. This course explores how real-world data from a variety of disciplines are gathered, managed, and used for making decisions or predictions. This course will introduce students to the statistical software R, one of the most popular in data science practice. Some programming experience required (any language).

Prerequisite: any introductory statistics course (MAT1230, MAT1250, MAT1430, MAT4310, MAT1313, or similar course).

4600 Operations Research—Bruce Pollack-Johnson

The course covers various topics, including deterministic methods, mathematical optimization, linear programming, formulation and solution techniques, duality, integer linear programming, transportation problems, assignment problem, network flows, and dynamic programming.

Prerequisite: MAT 2705





“Mathematically speaking when you subtract the T from can’t all you have left is an apostrophe plus a better attitude towards success”



MAT 5400 Complex Analysis—Amanda Knecht (satisfies 2nd analysis requirement)

Why “get real” when you can get complex? The results of algebra, calculus, and geometry are all the more beautiful when viewed through a complex lens. In this course, we’ll study functions of the complex variable. We will cover Cauchy’s theorem, power series, Laurent series, and many more topics with the ultimate goal of proving the Fundamental Theorem of Algebra.

Prerequisite: MAT2500 & 2705

MAT 5500 Topology— Nathan Corwin

Topology is the study of shape. It is now one of the most active areas of research in mathematics. Topology grew out of geometry by relaxing the rules. At first glance, a circle and an ellipse look different, but by stretching a circle through a diameter line we can turn the circle into an ellipse. Thus, in some sense - a topological sense - they are the same shape. This course will cover point-set topology. We will start with studying sets and different sizes of infinity. We will then use familiar ideas of the real line and the plane to define the abstract idea of a Topology. From there we will try to formalize many intuitive ideas such as connected sets, continuous functions, and distance. Throughout the course, we will look at many different topologies and see that attempts to formalize seemingly obvious ideas sometimes allow strange and unintended consequences.

Prerequisite: MAT 2600.

MAT 5700 Math Stats I – 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.

Prerequisite: MAT2500



MAT 5705 Math Stats II – Le Wang

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: MAT5700



“Pure mathematics is, in its own way, the poetry of logical ideas”

- Albert Einstein

MAT 5910 Topics: Regression in Biostatistics—Paul Bernhardt

Statistics is the fastest growing STEM major and also one of the most in-demand job skill areas in the U.S. Biostatistics is an important subset of statistics that focuses on the analysis of data related to living organisms. In this course, we will learn several types of regression methods for analyzing medical and biological data, including multiple regression, logistic regression, survival modeling, and longitudinal mixed modeling. The study of these analysis techniques will be motivated by various real-world data sets and will involve working in teams to explore these data sets and discover powerful statistical methods. We will use the statistical software R, though prior programming experience is not required.

Prerequisite: MAT1313 or MAT4310



Spring 2020 Seminars

MAT 5900 Unsolved Problems in Number Theory– 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 your practically perfect paper. A number theory problem is waiting for you to adopt it!!



MAT 5900 Data Mining– Yimin Zhang

Technology advancements now allow industry to capture and store large amount of data. With so much raw data, organizations urgently need tools that allow them to effectively sift through these enormous datasets and extract actionable information from such data sets to help them optimize businesses. Predictive modeling is the process of developing models to better predict future outcomes by exploring its relationships with explanatory variables from historical data. It is used extensively in businesses to identify risks and opportunities associated with a set of conditions.

This seminar 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 applications in business. Students will select a project of their passion and interest with real-world data, analyze the data with data mining tools and make strategic recommendations for managerial actions.

Prerequisite: MAT4310 Stats Methods.

CATS
CATS
CATS



Congratulations on tenure and promotion to

Associate Professor: Dr. Paul Bernhardt

Congratulations on promotion to Senior Lecturer:

Mr. John Santomas

Congratulations on promotion to Assistant Teaching Professor and on completing Ph.D.: Dr. Danielle Smiley



ACTUARIES ON CAMPUS

The Society of Actuaries is coming to you!

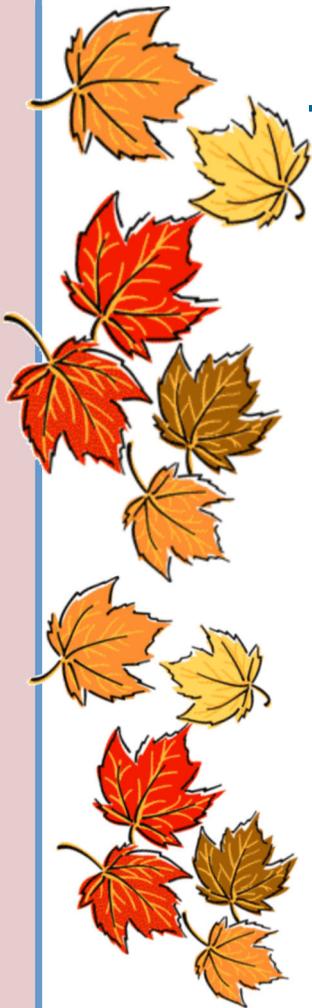
Villanova University

Tuesday, November 12, 2019

5:00-6:30 p.m.

Mendel 154

Learn about the actuarial profession and network with SOA staff and local actuaries. Food and refreshments provided!



Welcome to the New Department Chair, Dr. Jesse Frey

Beginning in the Fall 2019 semester, Dr. Jesse Frey succeeded Dr. Doug Norton as the Chair of the Department of Mathematics and Statistics at Villanova University. We are thankful for Dr. Norton's 16 years of dedicated service to the students and faculty of the department. While Dr. Norton will be hard to replace, we have no doubt that Dr. Frey is up to the challenge of leading one of the largest departments on campus.

Dr. Frey came to Villanova in 2005 after completing his PhD in Statistics at The Ohio State University. He was promoted to Associate Professor of Mathematics and Statistics in 2011 and to the highest faculty rank, Professor of Mathematics and Statistics, in 2015. Prior to Ohio State, Dr. Frey received an MS in Mathematics from The University of North Carolina in 2000 and a BA/BS in Mathematics, Physics, and History at Presbyterian College in South Carolina.

Dr. Frey brings a wide variety of qualifications to the position as Chair. Dr. Frey has previously held several substantial service roles in the Department, including the Graduate Director of the Applied Statistics Program and the Statistics Minor Coordinator. Of interest to basketball fans, perhaps, Dr. Frey has run the Department's "Least Squares March Madness" contest for several years. Dr. Frey is also an excellent instructor and communicator, consistently receiving excellent teaching evaluations from students. Finally, and perhaps most notably, Dr. Frey is a prolific researcher, with an expertise in rank-set sampling (a subfield within nonparametric statistics) and over 70 academic publications in high-quality statistics journals. Dr. Frey serves as the Associate Editor of two major statistics journals, *The American Statistician* and *Environmetrics*. In recognition of his research accomplishments, Dr. Frey received the 2015 Veritas Research Award from the College of Liberal Arts and Sciences at Villanova.

Most significantly, the Department of Mathematics and Statistics is pleased to welcome Dr. Frey as the chair because of his unwavering professionalism, his wonderful dry sense of humor, his natural ability to make those surrounding him better students, teachers and researchers, his dedication to making the department a welcoming and nurturing place for all. Please join me in congratulating Dr. Jesse Frey for his new role as Chair and in thanking him for his devotion to Villanova University's greater mission.

- Dr. Paul Bernhardt and The Department of Mathematics and Statistics

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

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

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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“Not everything that can be counted counts, and not everything that counts can be counted”
- Albert Einstein



If you would like to submit an article or have an idea for the Sum Times, please contact the math department!