

# MATH EM@TICS

“All the  $\nu$ 's fit to print”

Department of Mathematics | Ithaca College

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## $\nu_0$ : From the Desk of the Chair

The robins are hopping, the clocks are up an hour, and the Whalen Symposium is imminent. Spring is here! Many years have passed since the math department has had a department chair with a multisyllabic last name (let alone first name), but I assure you this is only temporary. Tom Pfaff will return from his well-earned sabbatical break after this semester.

So, what's new? Change is afoot in Williams Hall: Associate Professor Dan Visscher received tenure and a promotion, the math student lounge has a new look, the Mathematics Support Center attracts students

from across campus, and math posters are multiplying in the hallways. Students in the math club and faculty are engaging the community in math, students have competed in the international Putnam and COMAP math contests (no results yet), and our colloquium series is thriving.

If you are an alumnus or retired professor and haven't checked in with us recently, please do so! We'd love to find out how you're doing. You can reach us at [mathchair@ithaca.edu](mailto:mathchair@ithaca.edu).

*Ted Galanthay, interim chair*

## $\nu_1$ : Department Calendar

Mon, March 27	<b>Colloquium:</b> Matt Thomas (Cornell Statistical Consulting Group)
Thur, March 30	<b>Math Exploration Day</b>
Mon, April 10	<b>Colloquium:</b> Erin Griffin (US Air Force Research Lab)
Tue, April 11	<b>Whalen Symposium</b>
Mon, April 17	Pi Mu Epsilon Talk and Induction
Mon, April 24	<b>Colloquium:</b> Jerome Fung (IC Physics Department)

## $\nu_2$ : From the Math Club

At our math club, we engage in recreational mathematics and typically spend our meetings in a laid-back atmosphere, enjoying cookies and playing games. Additionally, we offer information about departmental volunteering opportunities and the chance to contribute to mathematical education in the Ithaca area. This year, we have visited a nearby middle and high school, LACS, twice to give interactive mathematical presentations to students. If you are interested in mathematics education or simply looking to have a good time, feel free to join us on **Wednesdays at 7 in Williams 310**. —James Belov, Math Club Co-Chair

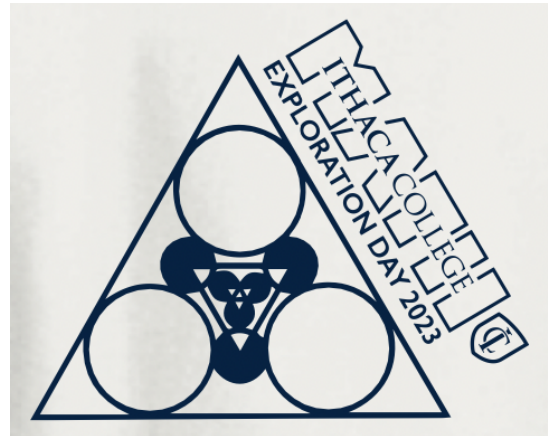
## $\nu_3$ : More Student Activities

On Saturday, October 29, students **Suryash Malviya**, **Surya Sharma**, and **Earth Sonrod**, and math faculty Emilie Wiesner and Ted Galanthay attended the Fall 2022 MAA Seaway Section Meeting at Siena College. Earth Sonrod presented his research, advised by Professor Osman Yurekli, in a talk entitled “Some properties of Fibonacci-Pascal Triangle.”

During four days in February, **Suryash Malviya**, **Samuel Smith**, and **Earth Sonrod** worked together to create and analyze a mathematical model to predict how a plant community would be affected by increasingly cyclic weather. They submitted their 25-page report at the conclusion of the 100-hour event on February 20. Earth noted that this COMAP Mathematical Contest in Modeling required the team members, comprised of one Math major and two

Physics majors, to be creative and communicate their mathematical ideas well. This unique opportunity provides students interested in mathematics and applied mathematics some real-world experience as they apply time-management skills, exercise effective delegation, and use their talents and skills to solve one of six interesting, open-ended problems. Students interested in learning more about this opportunity should contact advisor Ted Galanthay.

Juniors **Jay Barrett** and **Maddie Donaghy-Robinson** created and contributed designs for the 2023 Math Exploration Day t-shirt. Maddie is a dual major in Art and Mathematics, and Jay is majoring in Writing with minors in Mathematics and Graphic design.



**COMAP**



...get more department news and photos at:

 [Ithaca College Mathematics Alumni and Friends](#)

 [ic\\_math](#)

## ν<sub>4</sub>: Fall Courses

Registration for Fall 2023 courses is almost here! The descriptions below are for courses offered this coming fall that you might be interested in.

### **11200 Calculus II (4 cr.)**

**Prof. Conklin**

Calculus of functions of one variable. Topics include limits, continuity, derivatives, applications of derivatives (problems of motion, graphing, and optimization), antiderivatives, and an introduction to the definite integral. Functions covered include polynomial, rational, exponential, logarithmic, trigonometric, and piecewise-defined functions.

### **15900 Introduction to R (1 cr.)**

**Prof. Brown**

Interested in learning how to use technology to do mathematical problem-solving? Each week in this 1-credit course, we'll tackle a fun problem and see how to use programming to aid in the solution. We'll use the scientific programming language R, but the approaches we'll use apply to many programming languages.

### **18700 Applied Linear Algebra (3 cr.)**

**Prof. Visscher**

Linear algebra is a foundational organizational and computational tool for dealing with a lot of information all at once. It is used in many modern and growing fields, such as data science, machine learning, statistics, and computer science. This course is an introduction to the objects and tools of linear algebra, with an emphasis on applications. We will study vectors, norm, and angle; linear independence and orthonormal sets; their applications to document analysis; clustering and the k-means algorithm; matrices; left and right inverses and solving matrix equations; QR factorization; least-squares and model fitting. Computation, both operationally and its relationship with real-world problems, will be central to this course.

### **21100 Calculus III (4 cr.)**

**Prof. Moore**

This course is an extension of the ideas and tools of differential and integral calculus to 2 and 3 dimensions, with a view toward further generalizing to *even higher dimensions*(!). We will study the geometry of vectors and some of the structures of a vector space, and develop calculus tools for studying number- and vector-valued functions of multiple variables. If you like calculus, physics, stretching your mind to visualize mathematics, or some combination of these, then this course is for you!

### **21600 Statistical Analysis (3 cr.)**

**Prof. Weinberg**

We are surrounded by data! We interpret these data to draw conclusions and make decisions about politics, health, education, and many other subjects. The heart of statistics—and the main focus of this course—is drawing inferences about populations based on data in samples. This course is designed to help you decide how to collect and organize data, how to use computer simulation techniques to draw inferences and make decisions based on your data, and to explore the mathematical underpinnings of the statistical theory. The course will culminate in a statistical study that you design and implement, including obtaining a sample and writing a technical report.

### **24600 Intermediate Statistics (3 cr.)**

**Prof. Geteregechi**

With every passing day, the world around us is getting increasingly complex. People are discovering relationships among variables that were previously thought to be unrelated. What this means is that society needs people with the right knowledge and skills for understanding the complexities of the world that we live in today. This course will introduce you to various multivariate analysis techniques that will boost your statistical knowledge. You will also learn about methods that do not rely on specific distributions like the normal distribution as well as other useful techniques like bootstrapping. All these will be done with the use of the popular environment R.

### **26200 Ethnomathematics (3 cr.)**

**Prof. Yürekli**

Ethnomathematics investigates the connections between mathematics, culture, historical traditions, and sociocultural roots. By examining mathematical concepts that arise from various world cultures, it recognizes the contributions made by non-Western societies to the history of mathematics and explores mathematical

thinking that goes beyond traditional Western mathematics. This course aims to familiarize students with the role of mathematics in diverse societies and how it intersects with other fields such as history, linguistics, fine arts, and architecture. Furthermore, it highlights how underrepresented groups can build self-confidence and cultivate an interest in mathematics by exploring their cultural heritage.

**30300 Abstract Algebra (4 cr.)**

**Prof. Wiesner**

Abstract Algebra emerged from the study of many different mathematical questions: studying number systems, solving equations, understanding symmetry. Mathematicians have found that these different questions have much in common, and progress has been made on them by generalizing and abstracting. This has led to the modern field of Algebra. In this class, we will focus on one piece of this story: the algebraic structures known as groups.

To study this field, we will take an inquiry-based learning (IBL) approach: we'll work through a sequence of tasks that lead us on a tour of important concepts and examples, engaging us in rich mathematical thinking along the way.

**34800 Data Science with R (3 cr.)**

**Prof. Maceli**

Modern data science brings together programming, statistics, and mathematical skills to understand the world. The course focuses on data visualization and modeling, while also covering topics related to data management and programming in the R environment. Students use theory together with programming and statistical methods to develop the capacity to create new and unique models, visualizations, and/or solutions in data-based multidisciplinary investigations into problems from a variety of fields.

**36200 Modern Geometry (4 cr.)**

**Prof. Visscher**

*Equations are just the boring part of mathematics. I attempt to see things in terms of geometry.*

—Stephen Hawking

Geometry, as a subject, has a long history: people in the ancient Indus Valley and ancient Babylonia were using triangles in 3000 BCE, and Euclid wrote his Elements around 300 BCE. So the adjective “modern” might be considered somewhat relative. We will use it to indicate different approaches to geometry that have influence, application, and connection to many parts of the mathematics curriculum studied in current secondary and higher education: axiomatic systems, Euclidean geometry from synthetic and analytic points of view, non-Euclidean geometry, and geometry as a study of invariants.

**39700 Junior Seminar (1 cr.)**

**Profs. Maceli and Yürekli**

Junior Seminar in Mathematics is a course designed for college undergraduates who are interested in conducting research in mathematics. This seminar will provide students with the opportunity to work closely with a faculty mentor on a research project in an area of mathematics of their choice. Through this seminar, students will develop the skills necessary to conduct independent research in mathematics, including literature review, problem formulation, proof construction, and mathematical modeling. They will also gain experience in presenting their mathematical findings to a wider audience, including their peers and faculty members.

In addition to individual research projects, the seminar will include group discussions and presentations on various mathematical research topics, as well as training sessions on mathematical writing and presentation skills. The seminar will also provide students with the opportunity to network with other undergraduate mathematics researchers and potential graduate school advisors. At the end of the semester, students will present their mathematical research findings at a public seminar. This course is an excellent opportunity for students to gain valuable research experience in mathematics and prepare for future academic endeavors in mathematics or related fields.

**48000 Connections in Advanced Math (3 cr.)**

**Prof. Martinez**

In this course we will explore symmetry. A desire for symmetry is “hard-wired” into our brains: it represents balance and cohesion. When considered rigorously, the ideas of symmetry form a beautiful mathematical framework. We will apply mathematical thinking to the idea of symmetry to develop the concept of symmetry groups and learn about the only possible ways in which symmetries can appear in an object.

This course will draw on a wide variety of mathematics, so it is a great way to get a sampling of a few different IC math courses in one place! The pictures will be beautiful and so will the math. Prerequisite: One 300-level course in mathematics with a grade of C- or better. Email [mmartinez@ithaca.edu](mailto:mmartinez@ithaca.edu) if you have any questions about the class or the prereq.

### $\nu_5$ : What's the Problem... with Professor Brown

Our local ice cream stand sells two flavors of sundaes: chocolate and vanilla. The total number of sundaes sold this week is 10% higher than last week. The number of chocolate sales increased by 5% and the number of vanilla sales increased by 20%. What fraction of this week's sales were vanilla sundaes?

Send complete answers to Professor Brown at [dabrown@ithaca.edu](mailto:dabrown@ithaca.edu). Those submitting correct answers will have their names printed in the following newsletter. People who correctly solve all problems from Volume 4 of the newsletter will receive a special prize at the end of the year.

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*Solution to Prof. Brown's previous problem:*

The centers of the basketballs form a square-based pyramid with base length of 24cm and vertical edge length of 24cm. With a little geometry, we find the pyramid height is  $12\sqrt{2}$ cm. The base of the pyramid is 12cm above the floor and the top of the upper basketball is 12cm above the top of the pyramid. So, the ant will be  $24 + 12\sqrt{2}$ cm above the floor.

*Honor role* (solvers from Issue 2): Michael Avanesian (student), Earth Sonrod (student), Teresa Moore (faculty member)

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*At last I said,- Lincoln, you never can make a lawyer if you do not understand what demonstrate means; and I left my situation in Springfield, went home to my father's house, and stayed there till I could give any proposition in the six books of Euclid at sight. I then found out what demonstrate means, and went back to my law studies.*

—Abraham Lincoln, quoted in *The Independent*, 1864