MATHEM@TICS

"All the ν's fit to print"

Department of Mathematics | Ithaca College
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ν_0: From the Desk of the Chair

It's always exciting to start thinking about courses for the next semester, and this newsletter lists all of the math courses available. With that said, here is something else students should consider: summer internships and summer research experiences (the acronym REU - research experience for undergraduates). I understand that next summer feels far away, but finding and applying to summer internships and REUs takes time. Here are a few resources to get you started:

- Check out our first semester newsletter (https://tinyurl.com/3zbev664.) There, you can see what some of the math majors did last summer.
- If you're unsure about the value of a summer internship or REU or how to get one, here's an excellent place to start: https://tinyurl.com/ytafaxmb
- The AMS has a blog article about applying for REUs at https://tinyurl.com/662bw89s.
- The IC Career Services website offers a page dedicated to internships: https://tinyurl.com/33db63yc

Summer internships and REUs are gratifying and valuable opportunities to have when applying to graduate school or looking for a job after graduation. Get started on learning more and eventually getting one of these opportunities.

Tom Pfaff, chair

ν_1: Spring Courses

Registration for Spring 2024 courses is here! Below is a list of courses the Mathematics Department is offering this spring that you may be interested in along with a description provided by the professor teaching the course.

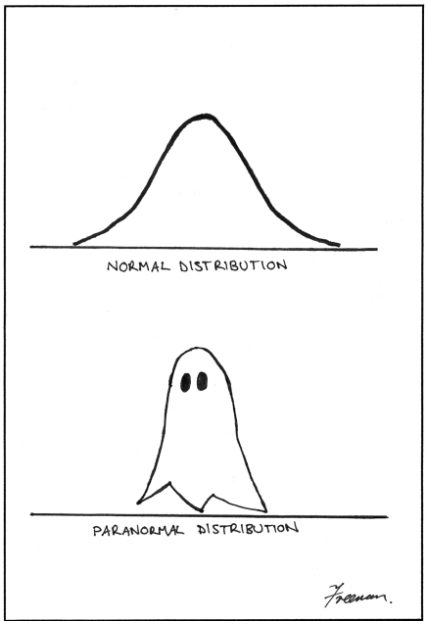
11200 Calculus II **Prof. Yürekli**
Continuation of calculus of functions of one variable. Topics include differential equations, including slope fields, numerical solutions, and separation of variables; evaluation of integrals and antiderivatives; applications of integration; improper integrals; series, with an emphasis placed on power series.
4 cr; MWF 1-1:50, T 1:10-2.

16100 Math and Society **Prof Visscher**
Mathematics underlies many ubiquitous tools as well as open questions in today's society: algorithms that decide what we see online, arguments about the fairness of voting district maps, data and analytical methods that allow companies and governments to infer information about people. In this class, we will investigate mathematical contributions to issues of importance in society—and particularly with an eye toward the question: what does it mean to use math ethically? The class will be structured around readings, discussions, group activities, and an open-ended cumulative project dealing with the interactions between math and community.
3 cr; MWF 2-2:50.

16500 Quantifying Sustainability **Prof. Wiesner**
How do we meet the needs of the present without compromising the needs of the future generations to meet their own needs? This is the fundamental question of sustainability. Quantitative information

is a key component of the problems and solutions available to us. In this class, we'll use simple mathematical tools to help us better understand the issues, make more informed personal choices, and weigh in on society-wide policy. Most of class time will be focused on small group work and class discussion; the class draws students from across campus, so this is a great opportunity to engage with other disciplinary perspectives. In a final project, students will have an opportunity to dive deep on a sustainability project of particular interest to them.
3 cr; TR 2:35-3:50.

ν_2: Probability Ghost Stories



-Matthew Freeman

16700 Math and Art **Prof. Martinez**
We will learn how math and art intertwines through investigations in symmetrical art and perspective drawing. We will break down the mathematics behind art and consider what makes art interesting and beautiful. All that will be pulled together to create your own mathematical art pieces. No art experience (or skill) is needed for this course!
3 cr; TR 9:25-10:40.

19100 World of Math **Prof. Moore**
In this 1-credit pass-fail only course, we delve into mathematical problem-solving, mathematical language and the basic structures of mathematical proof. We'll explore what we think makes something mathematical and how mathematicians approach problems. You will also get to know some of the department faculty.
1 cr; T 10:50-12:05.

21400 Differential Equations **Prof. Galanthay**
n this course, you'll learn how to analyze, both quantitatively and qualitatively, mathematical equations that describe change. Can you predict the future in chemical systems? Can you discover systemic shocks in ecological processes? You'll engage in mathematical modeling activities, and you'll learn how to write equations of motion. You'll study first-order and second-order systems of ordinary differential equations.
3 cr; MWF 10-10:50.

22000 Math for Childhood Education Prof. Weinberg
Most of us know how to do things like multiply fractions. If you wanted to multiply 2/3 $\times$ 5/7, you would multiply the tops and bottoms: 2$\times$5 and 3$\times$7. But why does this give us a correct answer? Why does this make sense? Although most people are familiar with how to subtract whole numbers or multiply fractions, many of us don't really understand why they work. In this class, we use Martian number systems, Schwarzenegger fractions, and method you and your classmates come up with to explore our number system and ideas of arithmetic.
3 cr; MWF 11-11:50.

22100 Data Analysis with ArcGIS **Prof. Pfaff**
Add a spatial competent to data and what do you get? Stats on maps. Using Esri's popular ArcMap software we explore how to graph and analyze spatial data. Adding the spatial competent focuses our attention on where; Where will bald eagles be found in Crater Lake National Park? Where should a tornado response center be located? Where should wood be harvested? .
3 cr; TR 1:10-2:35.

23100 Linear Algebra **Prof. Weinberg**
Linear algebra is about many things. It's the study of systems of linear equations—things like $2x + y = 3$. It involves thinking about systems of linear equations in terms of vectors and matrices, so it's about abstraction. It focuses on looking for patterns in relationships between vectors and matrices and explaining why the patterns exist, so it's about making conjectures and explaining your reasoning. Most importantly, it has hundreds of interesting and creative

applications: Have you ever searched for something on Google? Watched a computer-animated movie? Thought about how to move traffic through a city? Wondered how to make sense of sectors of the economy? Linear algebra can help you solve all sorts of problems! This course is open to—and encouraged for—students of all majors.
3 cr; MWF 9-9:50.

24000 Statistics with R **Prof. Weinberg**
Real statistical analysis requires technology. This course is an introduction to doing statistics in the R scientific language and will build upon introductory statistical knowledge.
1 cr; M 12-12:50.

24600 Intermediate Statistics **Prof. Galanthay**
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. In this course, you will continue to learn how to apply scientific inquiry and statistics to answer questions as you learn various multivariate analyses techniques that will boost your statistical knowledge. You'll use the computational software R to analyze data.
3 cr; MWF 12-12:50.

29000 Interactive Graphics **Prof. Pfaff**
Interactive and animated graphics are the future of displaying data on the internet and the future is here. We use the scientific programing language R and explore ways to create interactive and animated graphics. Experience with R or strong programming skills are expected.
1 cr; W 3-3:50.

30500 Introduction to Analysis **Prof. Visscher**
Real analysis studies the behavior of real numbers, sequences and series, and real-valued functions. We will work with topics such as convergence, limits, continuity, smoothness, differentiability, and integrability; investigating both the questions of "what actually is a real number?" and then "how does that lead to the fundamental results that we learned in calculus?" In the process, we will study how to harness and use the notion of infinity through the quantifiers "there exists" and "for all"—two phrases that have the remarkable ability to make complicated ideas precise. Ideas from topology and dynamical systems will also make an appearance.
4 cr; MWF 11-11:50, T 10:50-11:40.

ν_3: Math Club

During our first math club meeting, we played a guessing game involving various mathematical concepts and performed a (mathematical) magic trick with a deck of cards. In our next meeting, we organized a movie night and watched the movie "Interstellar." At both events, we enjoyed delicious cookies that Professor Osman brought.

Our next one is scheduled for November 1st. We're planning to have a game night.

Nina Kiria, Math Club Secretary

31600 Probability **Prof. Galanthay**
Probability theory is a mathematical framework that lets us reason effectively when we are confronted with uncertainty. In this class, you'll use ideas from many different areas of mathematics, such as Calculus and combinatorics. You'll apply and improve your skills in logic and problem-solving too.
3 cr; MWF 1-1:50.

33100 Numerical Analysis **Prof. Visscher**
In your mathematical training, you have learned powerful methods to solve equations, plot graphs, evaluate integrals and derivatives, solve differential equations and do matrix calculations. These exact methods are great when they work, but the real world often gives non-"textbook style" problems that are not so analytically tractable. What we need in such situations is not only a way to numerically approximate a calculation, but also an analysis of how close our approximation is. Numerical analysis is a revisiting of areas math that you have already seen, but with the attitude of learning efficient ways of getting numerical answers to problems to high degrees of accuracy. Since the advent of computers, numerical

analysis has been one of the most important areas of applied mathematics.
3 cr; MWF 10-10:50.

ν_4: Mathematics Colloquium

MONDAY, 10/23 at 4:00 PM
Williams 320

"Knot for Everyday Purposes "

David Freund, Cornell University

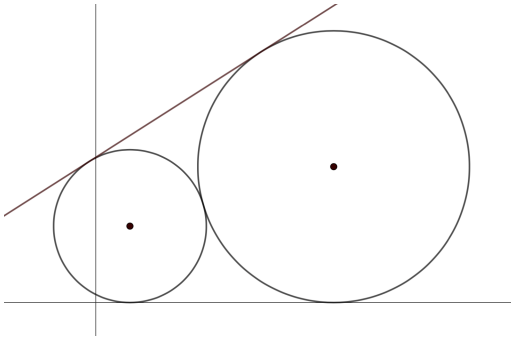
Abstract: Knots are a part of our everyday lives, from twisted strands of DNA, to shoelaces, braided hair, and the inevitable tangle of computer cords. Mathematics offers an insight into the structure and complexity of everyday knots and provides tools to tell them apart. Starting with pieces of string, we will explore the study of knots and how it ties together various fields of mathematics. No background knowledge is assumed.

39810 Research Experience in Math Profs. Maceli & Yürekli
Students actively participate in mathematical investigation and exposition, working collaboratively on research questions. Review of relevant literature and research methods will be incorporated. Students are required to present their findings both in writing (consistent with the standards of the discipline) and in public presentations.
3 cr; TR 10:50-12:05

49800 Math Capstone **Prof. Weinberg**
This course is the culmination of your math program!, with the option to continue work on a capstone project in Capstone II next fall. In Capstone I, we reflect back on the math major and on your ICC experience. You also work on developing a project proposal for Capstone II (if you plan to continue on in that course) or doing a complete, but smaller scale project in Capstone I. If you are debating whether to take Capstone I in your Junior or Senior year, stop by and we can talk over your options.
1 cr; M 3-3:50.

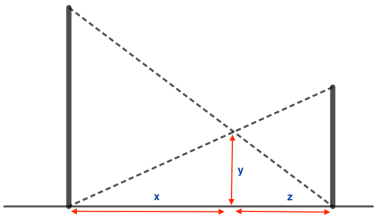
ν_5: What's the Problem... with Professor Brown

The circles C_1 [center (4,9), radius 9] and C_2 [center (28,16), radius 16] share a common tangent line with positive slope; see image. Find the y-intercept of this tangent line, expressed as a fraction $\frac{a}{b}$, and justify your answer mathematically.



Send complete answers to Professor Brown at dabrown@ithaca.edu. Those submitting correct answers will have their names printed in the following newsletter. People who correctly solve all problems from Volume 5 of the newsletter will receive a special prize at the end of the year.

Solution to Prof. Brown's previous problem:



We are trying to determine y. Note that the triangle formed by the left post and the ground connecting the two polls is congruent to the triangle with sides y and z. Therefore, the ratio of the sides of the two triangles are equal: $\frac{z}{y} = \frac{x+z}{1000}$. Considering the other poll, we get another set of congruent triangles, resulting in the equation $\frac{x}{y} = \frac{x+z}{600}$. Then $\frac{x+z}{y} = \frac{x+z}{600} + \frac{x+z}{1000} \Rightarrow \frac{1}{y} = \frac{1}{600} + \frac{1}{1000} \Rightarrow y = 375$.

Honor role (solvers from Issue 1): Caitlin Worth (alum); Austin Ruffino (alum); Jim Linsky (alum); Earth Sonrod (current student); Jay Barrett (current student); Joe Mahoney (alum); Jon J Bancone (alum); Sarah Wrzos (current student); Ted Galanthay (faculty)

Connect with us online!

Ithaca College Mathematics Alumni and Friends

ic_math

- *Did you hear about the ghost who became a logician? He studies Boo-lean algebra.*
- *What do you get if you divide the circumference of a jack-o-lantern by its diameter? Pumpkin pi.*

Editor: Emilie Wiesner