

MATH@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

The academic calendar can seem strange at times. As I write this we not only haven't had a frost but really not even a cold night. Yet, you are now faced with choosing courses for the spring semester. It is as if winter doesn't even exist. This edition of our newsletter highlights math courses for the spring semester, which we hope will help you in planning for the spring. Don't be shy if you want further information about a spring course and stop by the office of the

faculty teaching a course you might be interested in. Also, make sure you sign up for an appointment with your advisor.

One other bit of news: We now have a LinkedIn group, [Ithaca College Mathematics Alumni and Friends](#). As you are future alumni this group is also for you and provides you with a place to ask questions of our alums. So, join the group.

Tom Pfaff, chair

ν_1 : Spring Courses

Registration for Spring 2022 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

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

Prof. Pfaff

R is a scientific programming language used in many companies to analyze data to help make decisions. This course is an introduction to using R and does not require any previous programming experience.

16100 Math and Society

Prof. Weinberg

What is math? Does it only exist in thought, or is it in the world around us? Are we born with a capacity to think mathematically, or is math a language we have to learn? Is zero even a number? And what about infinity? Does everyone think about math in the same way or does it depend on the culture in which you're raised? Come explore these questions and more in Math in Society.

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.

19100 World of Math

Prof. Brown

In this 1-credit pass-fail only course, we delve into mathematical problem-solving and get to know the department faculty. We'll also explore a variety of non-standard mathematical topics such as cryptography, fractals, and logic puzzles.

21400 Differential Equations

Prof. Brown

What do Usain Bolt's 100-meter dash, intracochlear drug delivery, and fish harvesting have in common? They can be modeled by differential equations and completely understood by analyzing these models. In this course, we introduce differential equations as a tool for modeling real-life phenomena. We will use a modeling approach to motivate the mathematics we need and we will employ a dynamical systems approach to analyze the models.

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 – 2×5 and 3×7 . 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.

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?

24600 Intermediate Statistics

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 analyses 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 known as R. Effort will be made to help you review material that you may have forgotten and that is needed to understand the concepts in this course

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 programming language R and explore ways to create interactive and animated graphics. Experience with R or strong programming skills are expected.

30500 Introduction to Analysis

Prof. Visscher

What are real numbers and how are they tied to the powerful notion of convergence? In this class, you will learn how to make arguments and write proofs using the tools of bisection, nested intervals, and iteration in the analysis of real numbers and functions. You will study quantifiers ("there exists" and "for all") and their remarkable ability to make complicated ideas precise. Ideas from topology and dynamical systems will also make an appearance. Fourth hour meetings will be in small groups, so Tuesday class time may be flexible.

31600 Probability**Prof. Thomas**

Probability lets us understand uncertainty, provides a mathematical foundation for statistics, and gives you the tools to decide when to buy lotto tickets. By understanding and using tools like distributions and combinatorics, we can calculate likely outcomes and pull together ideas from geometric series to integrals.

33100 Numerical Analysis**Prof. Conklin**

Throughout your mathematical journey you've learned powerful methods to solve equations, plot graphs, evaluate integrals and derivatives, solve differential equations and do matrix calculations. These methods are great for humans when they work, but they don't always work and you have to use approximate methods. These approximate methods are also very important for when you have to do calculations very quickly and need to hand off the heavy lifting to computers. 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.

39810 Research Experience in Math**Profs. Martinez & Yürekli**

This class is the "choose your own adventure" of math classes! Students will (with the guidance of your professors) find a mathematical topic to explore. You will ask questions, make conjectures, solve problems, and learn what you want to learn. Research students present their work at the Whalen Symposium and even have the option of presenting at the local MAA Seaway Conference. If you want to talk about project ideas with Megan and/or Osman before signing up for the class, please drop by one of our offices in the 311 pod!

ν_2 : What's the Problem... with Professor Brown

A somewhat strange lottery sold 10000 tickets numbered 0000 to 9999. Those holding a ticket in which the digits sum to 18 win a pumpkin. Those holding a ticket in which the sum of the first two digits equals the sum of the last two digits win a bicycle. If the ticket satisfies both conditions then the holder doesn't get anything. Will they give out more bicycles or pumpkins? Be sure to provide an explanation.

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 3 of the newsletter will receive a special prize at the end of the year.

Solution to Prof. Brown's previous problem:

The sum of the interior angles of a quadrilateral is 360° .

$$\begin{aligned} \angle A + \angle B + \angle C + \angle D = 360 &\implies \angle A + \frac{\angle A}{3} + \frac{\angle A}{5} + \frac{\angle A}{7} = 360 \\ &\implies \frac{176}{105} \angle A = 360 \\ &\implies \angle A = 360 \cdot \frac{105}{176} = \frac{4725}{22} \approx 215^\circ \end{aligned}$$

Honor role (solvers from September): Walter Hannah '06, Earth Sonrod (current student), Austin Ruffino (current student), Joe Mahoney '93, Donny Tang '05, James Linsky '74, Michael Avanesian (current student).

ν_3 : Math in the News

A few recent articles about math in the news.

Quanta Magazine: [The Simple Math Behind the Mighty Roots of Unity](#)

New York Times: [The Godmother of the Digital Image](#)

Washington Post: [Coronavirus vaccines work. But this statistical illusion makes people think they don't.](#)

Why won't you ever see $\int 2e \, dz$ on a calculus exam?
—D.V.