

## UNDERGRADUATE MATH SEMINAR

The seminar this week will be back in its usual time slot.

**DATE:** **Thursday, February 14**

**Time &** **12:30pm** – Refreshments in **Bailey 204**

**Location:** **1:00** – Seminar in **Bailey 207**

In this seminar, we are pleased to welcome **Professor Cynthia Curtis, Union class of 1987**, back to his alma mater. After graduating from Union, Professor Curtis earned her PhD from Yale University. From there, she spent time as an Assistant Professor at Princeton University, and ultimately joined the faculty in the math department at **The College of New Jersey**. For more information, you can read a recent profile of her online at <https://mathstat.tcnj.edu/2017/01/14/cynthia-curtis/>



Cynthia Curtis, '87

In this week's seminar, Professor Curtis will present the following talk:

**Title:** **Using Linear Algebra to Understand Knots**

**Abstract:** Knots are prevalent in nature, and the study of knotting is important in diverse areas such as DNA, bonding of molecules, and statistical mechanics. Understanding knots has been fundamental within mathematics to our ability to understand three-dimensional spaces.

In this talk we use linear algebra to generate polynomials which help decide whether two given knots are different. This is a surprisingly hard question! The polynomials can also help us know when to look for hidden symmetries in the knots. The first knot polynomial we introduce was found by James Waddell Alexander II in 1923. We then discuss new polynomials arising from research with undergraduates Vincent Longo, Alyssa Springstead, and Hoang Cao at The College of New Jersey.

## HRUMC – Saturday, March 23, 2019 at Smith College: Sign-up Now!

The 26<sup>th</sup> Hudson River Undergraduate Mathematics Conference (HRUMC) will be **Saturday, March 23<sup>rd</sup>** at **Smith College**.

The HRUMC is a one-day mathematics conference held annually each spring, attended by students and faculty from colleges and universities throughout New York and New England. It was founded by four colleges, Siena, Skidmore, **Union**, and Williams, with the goal of providing undergraduates with the experience of attending and/or presenting at a professional mathematics meeting, and was designed primarily with the student in mind. It is the premier regional undergraduate mathematics conference after which several others have been subsequently modeled nationwide.

The conference features short, 15-minute talks *primarily by students* and faculty, as well as a longer invited address by a noted mathematician.

- If you are interested in presenting a talk (based on summer research, a thesis, a project or problem you enjoyed, etc.) contact a math faculty member to sponsor it. You will then need to submit an abstract by **Friday, March 8** via the conference website, [HRUMC](#), linkable from the Union Math Department website -> Activities -> HRUMC -> Abstract Submission
- **Henry Cohn** of **Microsoft Research New England** and **MIT** is this year's keynote speaker.

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**Interested in attending HRUMC?** If you would like to go to this year's HRUMC, please email **Professor Paul Friedman** ([friedmap@union.edu](mailto:friedmap@union.edu)). Transportation to/from the conference might be limited, but we will do our best to accommodate all interested students. (There is **no charge** for attending the conference, and breakfast and lunch will be provided at the conference.)

## Spring '19 Petitioning Process Begins this Coming Weekend

Believe it or not, it is time to start thinking about Spring term courses!

**Petitioning:** Petition course signup runs Saturday, February 16 – Tuesday, February 19 via [webadvising.union.edu](http://webadvising.union.edu).

**The following spring math courses require a petition: Math 130, 224, 332, and 448.**

**The Courses:** The full course schedule is online at [WebApps](#). Course of particular interest to math majors and minor, beyond the standard Calculus and Differential Equations courses, include

- **Math 199** is the department's "bridge course," intended to help students make the transition from computationally oriented courses to more theoretical proof-writing courses. It is a **required** course for all math majors and minors that is *usually* taken after a student has taken Math 115.
- **Math 224** (Geometry) is a course in transformation geometry, studying and classifying the distance preserving functions, called isometries, of the plane. It is a course that is appropriate for students coming straight from Math 199. Additionally, as rudimentary transformation geometry is now included in the Common Core in middle and high school math, this course is wonderful for students considering teaching as a career.
- **Math 332** (Abstract Algebra 1) is a beautiful course that generalizes what you know about algebra in the integers and real numbers to a more abstract setting. The main objects of study in this course are groups, rings, and fields. This course is required for the major. The prerequisite for this course is one of Math 219, 221, 224, 235, 248, or 257.
- **NEW COURSE! Math 334 (Partial Differential Equations)**. Analytic and numerical methods will be introduced to examine the solutions of elliptic, parabolic and hyperbolic types of PDEs. Real-world examples and applications include signal, image and video processing, medical imaging, heat conduction, wave traveling, and so on. Prerequisite: MTH-234 or permission from the chair.
- **Math 448** (Differential Geometry). Calculus meets Geometry! A study of curves and surfaces in 3-space. Topics include arc length, curvature, torsion, the Frenet trihedron, the first and second fundamental forms, normal curvature, and Gaussian curvature. The prerequisites are Math 117 and 340. Students pursuing honors in the major should strongly consider taking this course.

**And don't forget Statistics!** This spring, **two** statistics courses are being offered:

- **STA 164** (Strategies of Experimentation)
- **STA 364** (Big Data Analytics)

## Problem(s) of the Newsletter – February 11, 2019

**Last week's problem:** Congratulations to **Khoa Ngo The '22** for solving last week's problem. You may view a solution to the problem at the newsletter sites in Bailey Hall.

**This week's problem:** Math 128 students – give this a shot! Kimmo rolls two, fair, six-sided dice. Letting the product of the dice be  $P$  and the sum  $S$ , he then solves the equation  $x^2 + P = Sx$ . He records both solutions, recording the root twice if it happens to be a double root. What is the expected value of all the solutions he finds? (I.e., what is the average value of all the roots if he does this repeatedly?)

**Professor Friedman** ([friedmap@union.edu](mailto:friedmap@union.edu)) will accept solutions until midnight Friday, February 15.