



Spring 2022

# Newsletter

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## Putnam Competition



Among the NC State University contestants who participated in the Putnam Competition, Etienne Phillips (left) and Everett Meekins (right) and Jarod Schneider placed in the top three (Jarod Schneider not pictured).

The Putnam Competition Club is a weekly, problem-solving club based around preparation for the prestigious William Lowell Putnam undergraduate math competition. The Putnam Competition is hosted once annually in December and top scorers in the competition have included a number of respected researchers. Achieving a good score is often a resume booster!

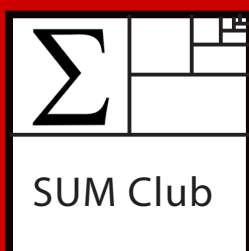
The test is broken up into two parts, each with six questions and 3 hours given per section (with a one-hour lunch break in between). Each problem is graded out of 10 points, so you can earn up to 120 points on the exam -- however, only 8 people have ever achieved this feat. The median scores on the test are typically either 0 or 1. Partial credit can be earned on questions, but only sparingly, and significant progress must be made towards a solution.

During the Putnam Competition Club meetings, held every Tuesday 5-7pm in SAS 4201, we are motivated by solving interesting competition problems and developing problem-solving skills and mathematical knowledge. A typical meeting involves everyone working on trying to solve a problem -- either collaboratively or on their own -- and writing up solutions for practice. No prior competition experience or vast mathematical knowledge is necessary to participate and succeed, as the club is built around developing the necessary skills!

## Newsletter contacts

Annamarie Leske  
Nicholas Gawron  
Etienne Phillips

[ncsusumclub@ncsu.edu](mailto:ncsusumclub@ncsu.edu)



# Say Hello to New Faculty!

We recently had the chance to talk to newly hired Math faculty and they answered some questions for us:

## How do you like to be addressed by students?

Professor  
-Dr. Peter McGrath

Dr. Ji  
-Dr. hangjie Ji

Professor Laura (with Spanish/Italian accent)  
-Dr. Laura Colmenarejo

Jianping or Dr. Pan  
-Jianping Pan

Andy  
- Dr. Andrew Sageman-Furnas

Stepan or Dr. Paul  
- Dr. Stepan Paul

As they are used to do.

-Dr. Jacopo Schino

Dr. Manion  
-Andrew Manion

## What Courses are you teaching?

### What are your hobbies outside of math?

Music - I am a trumpet player.  
-Prof McGrath

Spending time outside with my family enjoying the great NC weather  
-Prof. Andy Sageman-Furnas

407 right now, graduate combinatorics next year  
-Prof Laura

Calc I; Theory of Numbers  
-Dr. Pan

MA 242, MA 513 (this year), MA 555, MA 753 (next year)  
- Dr. Manion

MA 103, 225, 242, and 425  
- Dr. Paul

Manifolds (555), Differential Geometry (755), Calculus III (242)  
- Prof. McGrath

## What has been your favorite part about being at NC State?

I'm looking forward to continue researching and interacting with students. Also, I really like the math building, SAS, and I enjoy a lot walking to my office every morning. - Prof. Laura

Getting to know the students and other faculty members.  
-Andy

"All the bricks, of course!" -Dr. Paul

The supportive mathematical environment—I enjoy talking with others about math. - Dr. McGrath

I prefer Chalkboards:  
Prof. Laura  
Dr. Paul  
Professor McGrath  
Dr. Schino

I prefer white boards:  
Andy  
Dr. Manion  
Dr. Pan

I prefer iPads:  
Dr. Pan

# Math Puzzle Page

## Determinant Tic-Tac-Toe

In Determinant Tic-Tac-Toe, Player 1 enters a 1 in an empty  $3 \times 3$  matrix. Player 0 counters with a 0 in a vacant position, and play continues in turn until the  $3 \times 3$  matrix is completed with five 1's and four 0's. Player 0 wins if the determinant is 0 and player 1 wins otherwise.

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$3 \times 3$

A matrix Player 0 will want to avoid if they want to win.

## How to Win?

One Important Question to Consider:

Can Player 0 win if 1 starts in the center?

Can Player 0 win? if so, how?

Does Player 0 always win, if they play Optimally?

## Fun Facts About the Question

This was actually a Putnam Question in 2002!

There is a partial solution online via Google.

Short Answers without a proof: It does not matter,  
Yes(from Qu3),  
Yes

## SUM Club

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2021 Sum Club Integration Bee!

The Society for Undergraduate Mathematics (SUM Club) is a student organization for students with a passion for mathematics. We connect math undergrads and provide students with academic and professional development, leadership, and service opportunities. This is accomplished through social and outreach activities, presentations at meetings, career events, and other college- and university-wide involvement. Open to any student, math major or otherwise, we meet on the first and third Thursday of every month to get to know one another, do math puzzles, play games, learn together, and perform outreach. The club hosts undergraduates, graduate students, and professionals to share their experiences and knowledge. SUM Club supports the Raleigh community through participation in programs like Service Raleigh and Washington Elementary Math and Science Night. We hope to continue to create a strong undergraduate mathematics community. We would love to have more people involved! Email us at [ncsusumclub@ncsu.edu](mailto:ncsusumclub@ncsu.edu) with any questions or to be added to our email list.

## MIC Club

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The Mathematical Insights Club (MIC) aims to foster an environment where undergraduate students can delve deeper into the field of mathematics. We will discuss undergraduate research, interesting papers, and math history. MIC is a platform for students to share their math interests. Each month two students give a short informal presentation on something they have found interesting, whether it is their own research, a published article, a fun problem, or math history. Come to MIC and advance your ability to discuss mathematics and give your CV a boost! We hope to see you there! [mathematicalinsightsclub@ncsu.edu](mailto:mathematicalinsightsclub@ncsu.edu)

## Sports Analytics Club

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The Sports Analytics Club at NC State is a student-run, student-driven club which brings together undergraduates, grad students, and faculty who are interested in the quantitative analysis of sports. We enable members to work on individual and group research projects under the guidance of grad students and our faculty advisors. In addition, we play fantasy sports and prediction contests together. Email [sportsanalytics@ncsu.edu](mailto:sportsanalytics@ncsu.edu) if you would like to join our email list.

## Stat Club

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If you are interested in statistics or related professions or just want to meet and socialize with other statistics lovers, come join Stat Club. The purpose of the club is to expose people to the endless applications of statistics and what a career in statistics really looks like by bringing in guest speakers from industry and academia. This is also a great way for members to network with industry professionals, NCSU faculty, and other statistics majors. Our meetings also consist of workshops to hone your marketability when applying for internships and opportunities. If you have any questions or want to be added to the mailing list please email us at [statistics-club@ncsu.edu](mailto:statistics-club@ncsu.edu). We hope to see you all soon!

## Math Honors Program

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In the year 2021, we want to congratulate the new students who joined the Math Honors Program include **Erick Boniface, Soren Davis, Jordan Jackson, Madhusudan Madhavan, Etienne Phillips, Emi Planchon, Andrea Stancescu and Jenna Varnell**. Currently we have 33 students active in the Math Honors Program. Lately about 16% of math graduates complete the Math Honors Program and nearly 85% of those students go on to excellent graduate schools or find great jobs. In the past, schools they have attended include Berkeley, Princeton, Stanford, MIT, Cornell, NYU, UCLA, Cambridge and many other top universities. Math honors students have received 25 NSF Fellowships AND 3 DoD Fellowships for graduate school as well as 9 Goldwater Scholarships, 1 Churchill Scholarship and 3 Gates Fellowships. Besides taking a number of challenging advanced Mathematics courses, Math Honors students also do research in Mathematics either at NC State or at a summer REU Program (Research Experience for Undergraduates) nationwide. More than 38 students have participated in a study abroad program focusing on Mathematics via the BSM Program (Budapest Semesters in Mathematics) or the MiM Program (Math in Moscow Program).

Participation in REUs, BSM, MiM and doing undergraduate research in mathematics has helped greatly the success of honors students getting accepted into numerous excellent graduate schools. Dr. Min Kang is happy to talk to any student interested in undergraduate research opportunity in Mathematics. Feel free to email her at [mkang2@ncsu.edu](mailto:mkang2@ncsu.edu) for further information or look at the program page:

<https://math.sciences.ncsu.edu/undergraduate/undergraduate-programs/math-honors->

For those who have interest in working as a researcher after graduating, participating in undergraduate research is a great asset. However, many students don't know how to locate or search for undergraduate research opportunities. An unofficial list of some undergraduate research opportunities and relevant internships can be found at [https://go.ncsu.edu/sum\\_club\\_research](https://go.ncsu.edu/sum_club_research)

## Advanced Mathematics Courses

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### DSC 495 Courses

Have you wanted to gain new and valuable experiences in the field of data science? DSC 495 courses could be a great fit for you to achieve your goals. The Data Science Academy at NC State is offering 18 1-credit courses this upcoming semester; most have no prerequisites at all and are open to the entire university. (Note some courses require basic programming experience.) Some of the course offerings include: Clustering Data Through Machine Learning, Intro to R/Python, & Data Science for Sustainability. To see a full list of course offerings refer to:

<https://datascienceacademy.ncsu.edu/courses/upcoming-dsa-courses/>

### MA 493 (Special Topics): Mathematical Foundations of Data Science

Instructor: Dr. Mansoor Haider

This new course will cover foundational mathematical concepts fundamental to data science and data-driven mathematical modeling. The course content was developed by a team of departmental faculty and will include the following topics: basics of machine learning, unconstrained optimization, neural networks and overfitting, parameter estimation and sensitivity analysis for mathematical models, and an introduction to topological data analysis. Some familiarity with MATLAB will be beneficial for students taking this course. Note that this course is an acceptable advanced math elective for MA/AMA majors.



## Announcements

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### COS Ambassadors

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The College of Sciences Ambassador Program is a volunteer student organization that serves to represent the college to alumni, donors, prospective students and the community.

We are pleased to inform you that the College of Sciences (Sciences) Ambassador program has opened applications for motivated individuals who wish to assist the College and Departments with recruiting, retention and community involvement.

The application process is simple! Please fill out the application located at 2022 Sciences Ambassador Application, which should include your uploaded resume and attend one of the scheduled information sessions. The application deadline is **Friday, March 25, 2022 by 11:59pm**.

#### Information Sessions:

Join us for information sessions (attendance is required at one session). Ambassadors will be in attendance to answer any questions (Zoom links below):

**Thursday, March 10, 2022 from 4:30 PM to 5:30 PM via Zoom**

**Tuesday, March 22, 2022 from 5 PM to 6 PM via Zoom**

\*\*If you cannot attend an information session, you can watch the Recorded Information

\* The application is lengthy and time will need to be allotted to complete and reflect on some things required.

Interviews will take place from April 4th through the 8th for those selected to interview.

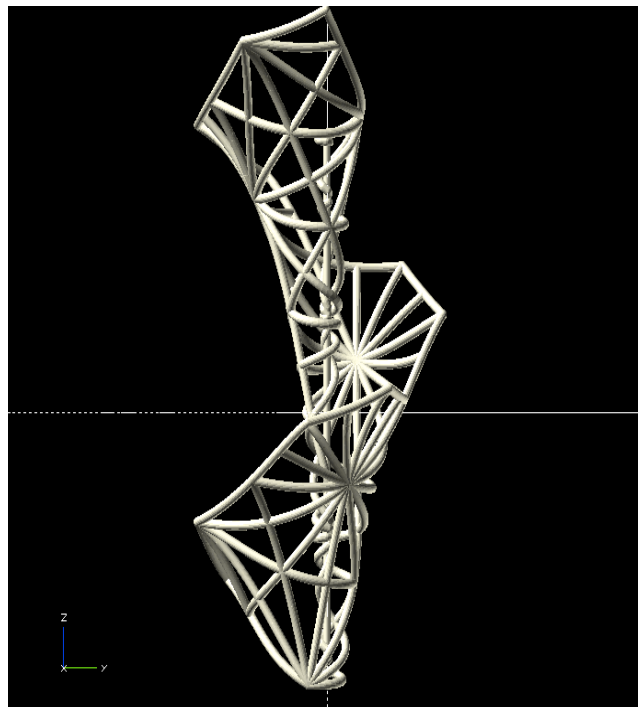
#### If you have any questions, please contact the advisors:

\***Dr. Jamila Simpson - jrsmith@ncsu.edu**

\***Betsy Alexieff - ewalexie@ncsu.edu**

### Undergraduate Research Openings!

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Dr. Stepan Paul's visualization!

Students interested in undergraduate research involving surface geometry, origami, and art/illustration can reach out to Dr. Stepan Paul ([sspaul2@ncsu.edu](mailto:sspaul2@ncsu.edu)) to talk about potential projects. Prerequisite mathematical knowledge varies by topic; relevant courses are MA 242, 405, 408, and 518.

## Association of Women in Mathematics Announcements



**AWM Hosts:  
Research  
Competition**  
Saturday March 26th  
9:30-2:00\*  
SAS 1102

**Prizes for Winners**

**Free Food**

**Open To Anyone**

**Sign Up Here  
By March 22nd**

Present your research in a **6 minute lightning talk** to our panel of judges. This is your opportunity to hone your capacity to effectively explain your research in a language-appropriate way to a non-specialist audience.  
**Awards will be distributed to the top contestants!  
Spectators Welcome!**

The graphic features a red background for the main title and date, with various callouts in grey circles. A QR code is provided for sign-up, with a red arrow pointing to it and the text 'Sign Up Here By March 22nd'. A trophy icon is next to 'Prizes for Winners', and 'Free Food' and 'Open To Anyone' are in separate circles.



## Sonia Kovalevsky Day

On April 9, AWM will be hosting SK Day in honor of Sonia Kovalevsky, the first woman to obtain a Ph.D. in mathematics. SK Day consists of a day full of mathematics-based workshops for middle and high school aged girls. The goal is to encourage young women to pursue STEM-based fields, specifically mathematics!

The AWM is actively seeking volunteers to help with the day's activities and are wondering. Volunteers are needed to help with morning check-in as well as to help run the workshops. While SK Day spans from **9:15AM- 2:00PM on April 9th**, we understand students' availability is limited and therefore are happy to make accommodations with volunteers! **FREE lunch** will be provided to all volunteers!

For anyone interested in volunteering, please email AWM's Social Chair, Annamarie Leske ([aleske@ncsu.edu](mailto:aleske@ncsu.edu)) with your **name** and **availability** on Saturday, April 9th.