

MATH EM@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

As the new chair of the math department, it seems I should start with a quick introduction before I get to the big news. I’m an IC alum (’90 but with an exercise science major), parent (’21, ’23, & ’25), and I have been a faculty member at IC for 20 years. Let me also say that it has been wonderful seeing the hustle and bustle in Williams Hall and across campus back this fall. We missed having the energy of students on campus.

Now for the big news. A recently retired faculty member has generously initiated an endowment to support experiential learning in mathematics with a priority given to undergraduate research activities. They have pledged \$25,000 by the end of 2022 to start this fund. At that point the math department will be able to draw interest of this endowment that will directly support math majors. My challenge to the IC mathematics family is to col-

lectively match this gift by the end of 2022, which will double the financial resources we have to support students. If you’d like to donate simply go to <https://alumni.ithaca.edu/mathematics-research-fund>.

As you will see when reading this newsletter, students in the math department are actively engaged in mathematics and the faculty are supportive of their interests. Seven of our students have written about their experiences doing summer research projects and internships. The two alumni profiles speak to high level of engagement faculty bring to working with students both inside and outside the classroom.

We are always interested in hearing from the IC math family so please drop me an email and say hello, tpfaff@ithaca.edu, or simply stop by Williams 212C.

Tom Pfaff, chair

ν_1 : Students Doing Summer Research and Internships

Ithaca College math students participated in a variety of math-related research projects and internships this past summer. Read about their projects here and talk with them about their experiences. (Perhaps at Math Club!—See the advertisement below.) Summer math opportunities are usually advertised during the winter; stay tuned for announcements through this newsletter and the department webpage, or talk with a professor about your interest.

Emma Anderson ’22 researched fractal trees this summer at the Ithaca College REU. She worked with faculty mentor Dave Brown and two student collaborators, Bianca Teves from Haverford College and Jack Krueger from Concordia St. Paul. Though there were many significant results found over the summer, perhaps the most interesting was that they were able to use a modified Koch Curve, similar to the one which generates the Koch Snowflake, to construct

the canopy of a fractal tree without using branches. They relied heavily on trigonometry and geometric series for this work and produced a 16-page paper summarizing their work. They were also supported by the other students in the REU who worked on projects with Dan Visscher and Ted Galanthay.

Over the summer, **Jake Brown ’22** participated in a remote REU hosted by the University of Connecti-

cut, with mentor Luke Rogers, from UConn, and co-researcher Melissa Wei, from Cornell. They worked on a project about finding spectral decimation functions for the spectra of sequences of Schreier graphs generated from self-similar groups. This project involved heavy use of linear algebra, abstract algebra, graph theory, and a small amount of real and complex analysis. They presented their results at a virtual conference hosted by UConn and other virtual REU programs, and are working on compiling their results for a journal publication.

Thu Thu Hlaing '22 worked on an applied math REU this summer at the Florida Institute of Technology with Jonathan Webb from the University of Idaho and her mentor Dr. Nezamoddin Nezamoddini-Kachouie from Florida Tech. The theme of the REU was statistical models with applications to geoscience and they focused on the impact of climate change on mountain glaciers. They worked with Landsat satellite images in Matlab to quantify how much glaciers have been receding. Then they ran different statistical models in R to discover any relationships between the changes of each glacier to climate factors. Thu Thu heavily relied on her knowledge of statistics from Intermediate Statistics and her skill of coding in R from her Data Science class. Thu Thu and Jonathan currently have a 30-page rough draft research paper, a finished poster and are working to be in the 2021 REU Symposium.

Martha Kemp Neilson '23 Is a Mathematics major and Data Science minor. She most recently interned remotely with BPAS Actuarial & Pension Services management firm located in Syracuse, NY. She worked with Senior staff on actuarial valuations used to negotiate plan renewals, plan administration, and learned to perform and update detailed excel calculations. A highlight of the summer experience was the annual company golf outing held in Syracuse at which she won the long drive contest.

This summer, **Lucy Loukes '22** completed an internship as a Product Intern for ICAT, a catastrophe insurance company based in Broomfield, Colorado. Throughout the 9 weeks, Lucy worked on project focused on the comparison and analysis of two modeling softwares used in the insurance industry, AIR and RMS. She used her previous knowledge gained from classes at IC such as Statistical Analysis and Intermediate Statistics to draw significant conclusions comparing the two softwares, and presented these

findings to the Executive Board of ICAT at the end of her internship.

This summer, **Joan Mattle '22** interned at Excellus Blue Cross Blue Shield in the Research Insights department. Her main project was to create a Power BI Dashboard to display the results of the Annual Provider Survey using visuals such as trendlines and bar graphs. She is currently interning in the VBP Finance & Analytics department. Joan is completing projects related to actuarial work and will be focusing on improving her skills in Statistical Analysis System (SAS) and Excel.

Antara Sen '22 worked on NASA's sample return mission, OSIRIS-REx, this summer through the Summer Scholars program at IC. Their advisor was Dr. Beth Ellen Clark, Chair and Professor in the Department of Physics and Astronomy. Their project entailed constraining the levels and history of space weathering on asteroid 101955 Bennu. They did this by using large data sets from the spacecraft and creating then averaging latitude maps to find latitudinal trends in various parameters. Finding values for parameters from spectral data was also an intricate process. Handling .fits datasets of this size (20,000 rows by 100,000 observations) using Python's AstroPy library was a new experience for Antara and taught them how integrated data science and Astronomy are.

ν_2 : Math Club

**MATH CLUB BOARD
GAME NIGHT!**

*Monday, Sep. 27th,
6PM, Williams 320*

*ALL are welcome! Snacks
Provided! Fun Guaranteed!*

*Bring your favorite game, or
play one of ours!*

ν_3 : Alumni Spotlight

In this issue, we start a new newsletter feature: interviews with IC math alumni. If you are a current or future student, we hope these will give you some perspective on your studies at IC and some inspiration for the future. If you are an alum yourself, we hope these give you a chance to reconnect or further connect with other IC math alumni. (Also, we'd love to interview you! Please email the chair at mathchair@ithaca.edu if this is something you might be interested in.) We hope you enjoy hearing below from Katie Ahrens '15 and Pat Cooney '07, '09 MAT.

Interview with Katie Ahrens

DV: Hi Katie. Welcome “back” to IC! (This interview is conducted by email, so the reunion is digital and asynchronous. . .) When did you graduate?

KA: 2015.

DV: What do you do now? How did you get from graduation to where you are now?

KA: After IC, I started graduate school at North Carolina State University. I interned at the National Security Agency (NSA) during the summers after my 2nd and 3rd years in grad school. The summer before I graduated, I did a summer research program at the Center for Computing Sciences (CCS) in Bowie, Maryland. I really enjoyed the work, and knew before I left to go back to school that I wanted to work there full-time when I graduated. I defended my thesis on March 4, 2020—I had the dubious honor of being the last in-person defense before the university shut down—and started full-time at CCS last August.

DV: What kinds of skills do you use in your job? How has being a math major at IC helped you in your career?

KA: I'm a math researcher, so most of the skills I use are, well, math! CCS has opportunities to work on a wide variety of problems, so I get to do all sorts of math and math-adjacent things. I program big computers, do data analysis, and work on theoretical problems with more of a pure math flavor.

Being a math major at IC absolutely helped set me up for success in my current job. Whether it's Python programming or proof-writing, I use skills on a daily basis that I first learned in classes at IC. IC also gave me an early preview of what my future career would be: Dave Brown and I started a research project dur-

ing my sophomore year, so I got to see early on what working on math research was like. I learned that it's ok to not be super sure what the right approach to a problem is; that place of uncertainty is both the fun and frustration of research mathematics.

Communication is also important at my current job, whether in it's in a formal setting like writing a paper or in an informal setting like explaining a new idea to a collaborator. The emphasis placed on writing and speaking in the IC math department really set me up for success—everything from giving talks at the Whalen Symposium to being frequently reminded that “good proofs have words in them” (looking at you, Dr. Moore) helped me develop in this area.

DV: In terms of intellectual intrigue and growth, is there a math course you took at IC that stands out?

KA: Is “all of them” an acceptable answer?? One that sticks out in particular was Tom Pfaff's class on applied math. We read Jared Diamond's book *Collapse: How Societies Choose to Fail or Succeed* and then used differential equation and modeling techniques to think critically about Diamond's arguments. It was the one of first times I really thought about math as a tool to look at the world, rather than as a purely theoretical or intellectual exercise.

DV: What was your favorite non-math course at IC? Why?

KA: Claire Gleitman's class on Dramatic Literature was life-changing. She introduced us to all sorts of incredible plays that I wouldn't have come across otherwise, including Tom Stoppard's *Arcadia*, which quickly became my all-time favorite play. It's a haunting, hilarious story about love, history, death, and (of course) math. There's a quote from one of mathematician characters that I had scribbled on the inside cover of my research notebook in grad school: “it's the best possible time to be alive, when almost everything you thought you knew is wrong.”

DV: What other interests (e.g., another major/minor, team or club, etc.) did you engage in at IC?

KA: I doubled-majored in English and minored in



piano, and I was really involved with the music department all 4 years. I also dabbled in a bunch of other stuff: I took a rock climbing class, tried to learn German, sang in the choir, did tae kwon do, played Humans vs Zombies, interned at a local book publishing company, and worked as a tutor.

DV: *What advice would you have for a current student interested in doing what you do now?*

KA: This is going to sound like a cliché, but it's im-

portant (and far easier said than done): don't get discouraged. Everyone learns math differently and at different rates, so don't worry if it seems like someone else is understanding a topic faster than you. Experiment and find out how you learn best, read books, ask questions (yes, especially the "stupid" ones), and keep at it. Even if it seems day-to-day like you're making slow progress, you'll look back a few years later and be amazed at how far you've come.

Interview with Pat Cooney

DV: *Hi Pat. Welcome "back" to IC! (This interview is conducted by email, so the reunion is digital and asynchronous. . .) When did you graduate?*

PC: 2007 (BS) and 2009 (MAT).

DV: *What do you do now? How did you get from graduation to where you are now?*

PC: I'm a math teacher; I was hired immediately and never turned in another direction.



DV: *What kinds of skills do you use in your job? How has being a math major at IC helped you in your career?*

PC: Mathemagic; I do upper level mathematics so I constantly use everything that IC has taught me. I also have authored 36 books with many collegiate math topics that I wrote based on classes that I took there and even dedicated the books to many IC math professors.

DV: *Can you say more about "mathemagic"? Is it something you reference often?*

PC: Mathemagics is something I learned from the Simpsons but is basically anything about math that I find exciting and want to share with others like $2=1$, non Euclidean origins, the hunter leaving his house then returning and you have to figure out the color of the bear and other fun stuff.

DV: *It sounds like you are also an author. How did you get into that? Is there a place that people can find your books?*

PC: After graduating I taught Bayes' rule and came up with its origin even though I had never been taught it and wanted to share it with my students. After this, alongside the birth of mathemagic, I made an outline for a proposed book but it took me eight years to actually write it. After this all the other books were born. All of the books are on Amazon under my name.

DV: *Do you have a favorite memory as a math major at IC?*

PC: I loved all of my classes but especially number theory with Tom Pfaff. Also, family meals and gatherings at local parks with the professors and community.

DV: *In terms of intellectual intrigue and growth, is there a math course you took at IC that stands out?*

PC: Honestly, all of them. There hasn't been a class that I haven't been able to relate to and refer to even 14 years after graduation.

DV: *Do you have any stories from the math courses you took at IC?*

PC: Marty Sternstein and Tom Pfaff were two of my most inspirational professors and each got a book dedicated to them for all they did to teach me. Of course I would never have become a math teacher if Margaret Robinson hadn't recommended me to it. Stan Seltzer made me laugh at how many fun things he taught me and that I thought he looked like Eliot Spitzer. Dave Brown changed my life with introducing me to fractals. The whole department was fantastic!

DV: *What was your favorite non-math course at IC? Why?*

PC: Death and Dying; it was an interesting course as part of my minor.

DV: *What do you remember about the course?*

PC: I wrote my final paper called “mathematically dying” where I looked at how various civilizations used mathematics to help create their practices of working with the dead, particularly the Egyptians. I also brought a snow ball to my roommate in the classroom and handed it to him haha.

DV: *What other interests (e.g., another major/minor, team or club, etc.) did you engage in at IC?*

PC: I was a religious studies minor. I also played soccer informally at the school and, if it counts, was a student manager at Terrace dining hall for 3.5 years.

DV: *What advice would you have for a current student interested in doing what you do now?*

PC: If you have any interest in mathematics, I would start by exploring the new and fascinating that the many math courses at IC offer. Even if you don't want to major in math, it still is worth your interest to take these courses.

DV: *Is there another question I should ask you?*

PC: How tall am I? Well, now that you ask, 6'8" probably the biggest of the giants with a math degree.

ν_4 : What's the Problem... with Professor Brown

The angles of a quadrilateral $ABCD$ satisfy $\angle A = 3\angle B = 5\angle C = 7\angle D$. To the nearest degree, what is the measure of $\angle A$?

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.

*Pandemic—
still
navigating,
but
now mathematics
modeling feels less academic.*

—D.V.

(Hint: count the syllables)