MATHEM@TICS

ν_0: From the Desk of the Chair

It's October! The trees are changing to beautiful reds and yellows in Ithaca. Campus looks great, but certainly is empty without you. It is great to have you joining us online and seeing the activity on the Discord server.

In one bit of news, after May 2021, I will no longer be chair. Beginning June 2021, Professor Tom Pfaff takes over in the big role and will do a great job!

Registration for spring is right around the corner, so be on the lookout for an announcement soon about courses we'll be offering. Otherwise, stay well!

Here's a mathy Halloween joke for you:

Did you hear about the vampire who became a logician? He studies Boo-lean algebras!

—*Prof. Dave Brown*

ν_1: Interviews with New Faculty

We welcomed two new faculty to the Mathematics Department this fall: Prof. Pete Maceli and Prof. Joash Geteregechi. I sat down with each of them (separated by screens and more than six feet of internet tubes) to conduct the following "e-interviews".

DV: *Welcome to Ithaca College and the Mathematics Department! We are looking forward to getting to know you and collaborating in teaching $\cup$ learning $\cup$ mathematics.*[1]

Please introduce yourself. What things are important to you?

PM: Hey my name is Pete Maceli and I am a mathematician. I was born and raised in Ithaca and recently returned upstate to my hometown after spending most of the last decade studying, teaching and living in New York City.

DV: *What brought you to Ithaca College?*

PM: I came to Ithaca College to teach statistics and for the opportunity to help grow the math department's data science program. As an undergrad I spent a summer at Ithaca College studying fractals as part of a NSF research program and that experience played a large role in my choice to pursue mathematics into graduate school and beyond. As it turned out, I was lucky enough to return to Ithaca College and am definitely excited to join the college community.

DV: *Conducting the semester remotely is a new experience for everyone, but I think especially for people that are just joining our community. What kinds of connections have you been able to make during this online semester?*

PM: In these strange times, I was lucky enough to be joining a department and college where I already knew several people quite well. Through the math club and department colloquium, I've also started to meet some of the math majors and other faculty.

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[1]The symbol $\cup$ indicates the union of two sets—i.e. $A \cup B$ is the set of elements in A or B (or both!).

That said, this early into my first semester I'm probably learning the most about Ithaca College from my students in the health science statistics classes I'm currently teaching.

DV: *One thing that I think distinguishes teaching at a liberal-arts school is the depth of the connection between scholarship and teaching. What are your scholarly interests? How do they interact with your teaching?*

PM: My mathematical research is in graph theory and algorithms. A graph is just a bunch of dots called vertices, together with lines called edges, joining certain pairs of vertices. The general nature of graphs lends them to efficiently model pairwise interactions amongst any set of objects, and so there are many important real world applications of graph theory in fields such as communications, economics, scheduling, data science, computer engineering and operations research. No matter what level class I am teaching, I always make it a point to share at least a glimpse of the beautiful and applicable mathematics we as mathematicians spend our research lives exploring. Additionally, I've have supervised several undergraduate thesis and modeling/data science projects on a range of theoretical and applied

topics, so if anyone reading this is looking to work on a capstone project or do a reading course please send me a note!

DV: *What was your favorite math course as a student? What is your favorite math course as an instructor?*

PM: My favorite math class as a student was an introduction to proofs class taught out of Michael Spivak's Calculus book. My favorite class to teach is multivariable calculus and someday I hope to teach a class in operations research and industrial mathematics.

DV: *Do you have hobbies or interests outside of mathematics?*

PM: I grew up and still enjoy playing hockey, skateboarding, swimming in the gorges and riding road bikes all over upstate New York and beyond. I also spend lots of time building useful as well as totally impractical things out wood and concrete.

DV: *Is there another question I should have asked you as part of this interview?*

PM: What's your favorite number?

19. Should probably say because it's a prime, but really it's because Steve Yzerman wore that number for the Detroit Red Wings.

DV: *Please introduce yourself. What things are important to you?*

JG: Thank you for having me. My name is Joash Geteregechi. A lot of people call me "Josh" instead of "Joash". So, I think it is important to say how my first name should be pronounced; you say "Jo-ash". I was born in the outskirts of Kenya's capital- Nairobi, but I was actually raised up in a remote village where I also attended my early years of schooling. While some people would view a remote village in negative light, for me, life in the village was so much fun and it actually shaped who I am today and the choices that I made for my career.

After spending several years in my comfortable village, it was time for higher education and that meant that I had to move to a busier and more crowded area. As expected, I had a lot of adjustments to make which made me loose most of my first year in college. I think having a session on "remote-city transition" during first-year orientation would have helped out a bit but, understandably, this was not available. After graduation, I was hired as a mathematics and chemistry teacher near the same village where I grew up. I had to go through another round of adjustments but this time round, it was much easier because, I guess, I had experience with the village life. I know of colleagues who grew up in busier cities and got hired in remote villages. What they went through was very frustrating to say the least. A lot of them ended up quitting. After teaching for nearly four years, I applied to Syracuse University's Ph D program in Mathematics Education and was accepted. I moved to Syracuse in August 2015 and completed the program in August 2020. And that brings me to Ithaca College.

DV: *What brought you to Ithaca College?*

JG: If I hadn't come to Ithaca, I would be working at a CUNY community college in the heart of New York City or at a State University in Boston area. As someone who loves quiet and less crowded places, you can imagine how frustrated I would be. I would be making a third round of adjustments, but I was lucky enough to get an opportunity to work at IC which is located in a less crowded part of the country. Although I am yet to move to Ithaca, in some sense I feel like life down there would be similar to what I am used to and like. This is not to say that there aren't any adjustments to make. There are plenty but the good thing is that they are not as stressful as they would be if I had to move to NYC. In fact, in December 2019, I spent a night at a friend's house in NYC in order to catch my flight from JFK to Kenya the next morning, but I could not sleep at all. I can't imagine having nights such as that on a daily basis. I guess one can eventually adjust but I think it would take me longer now than when I was much younger.

DV: *Conducting the semester remotely is a new experience for everyone, but I think especially for people that are just joining our community. What kinds of connections have you been able to make during this online semester?*

JG: Indeed, one of the challenges that I anticipated as a new IC member this semester was community building. However, I am happy to a major extent how things have turned out. Though online, the regular meetings that we have held have served the purpose of community building quite well with one-on-one zoom meetings (and email conversations) with colleagues being the most impactful. I feel like I have a network of people that I can reach out to up should I need help. I have adopted the same strategy with my students, and it seems to be working well. I have noticed increased class participation among students that I have had an opportunity to meet especially in office hours. Since this seems to be working, my plan is to meet as many students as possible. I have also had an opportunity to meet with five faculty members face to face thanks to the socially distanced get together meetings organized by Tom. My plan is to attend more of these as time permits so that I can meet as many colleagues as possible.

DV: *One thing that I think distinguishes teaching at a liberal-arts school is the depth of the connection between scholarship and teaching. What are your scholarly interests? How do they interact with your teaching?*

JG: Just like many instructors, I believe that the best way to learn mathematics is by doing mathematics. You do not learn by merely watching a video or reading the textbook. You need to take a pen and paper and try out some exercises and problems on your own. For instructors to help their students, it is important to understand how the students are approaching the problems and the thinking processes that the students engage in. Thus, my research interests are in the area of students' mathematical reasoning with a focus on two well documented forms of reasoning known as creative and imitative reasoning. For learning purposes, creative reasoning has been found to be better than imitative reasoning and lessens rote learning and frustration among students. Current research on forms of reasoning is mostly general in scope. with very limited studies on specific courses and/or topics. I am trying to investigate how instructors can design learning environments (tasks and facilitation) that foster different forms of mathematical reasoning for best outcomes in student learning. My research as described dictates most of what I do in my own classes as an instructor. For example, I try to use questioning and probing as a way to understand how students are thinking so that I can help them. Before doing this, however, I have to think of what tasks I can use to meet these goals. Not all tasks are the same. Some are better for student explorations and engagement while others are not. I have to make a decision on what tasks to use ad how to use them. A final plan to make is how to ask well measure questions while ensuring that I don't give away answers. I need my students to struggle productively so that in the end, what they learn may stick longer and can be recreated should they forget it.

DV: *What was your favorite math course as a student? What is your favorite math course as an instructor?*

JG: Graph Theory was one of my favorite math courses as a student. I really enjoyed the visual nature of the course and its several applications in areas such as Computer Science and Operations Research. As a teacher, I would say that my list of favorites grew even further as I learned more. However, I would say that I enjoy teaching any math course that focuses on application in real life. Courses such as business calculus, applied Calculus, Probability and Statistics, among others would fit the bill.

DV: *Do you have hobbies or interests outside of mathematics? Bonus: have your other hobbies or interests influenced how you do mathematics?*

JG: I am a big fan of soccer. I closely follow the European soccer leagues such as the English Premier League and the Champions League. We used to play soccer in the fields in the village where I grew up and several of us wanted to become soccer players. I did not pursue this dream because of an injury that I witnessed which left one of my friends permanently disabled. Nowadays, I play soft-tackle and no-pressure soccer with friends at various parks around Syracuse and I love it. Like many sports, soccer requires a lot of patience. However, soccer is special in the sense that you don't see a score every few minutes. In fact, you may have only a couple of goals or no goal at all throughout the 90 minutes of play. What that means is that as a player you have to be really patient and keep working hard and trying new things. In fact, one of the tactics in soccer when two teams are almost equally good is to wear out your opponent so that you score when they are beginning to relax or to take a breath. I think the patience in soccer is also applicable to the way I see and do mathematics. Sometimes, you need to be really patient and be ready to try new unfamiliar things in order to solve a math problem. The joy that comes at that moment you find a solution is akin to the joy you find when your soccer team gets a score.

ν_2: **Connect**

Students thought it would be great to set up a **Math Lounge Discord** that math majors/minors/enthusiasts can use to text each other about specific classes, seek homework help, study together, etc. So, Antara Sen created one, and the link to join is: `https://discord.gg/sd6HvSn`. Within Discord, there are different channels. Everyone is assigned roles depending on which classes they're taking. Having a role allows one to text within the private channels for each class. This way, people can speak to their classmates about work for the course (people who are not in a class will not be able to see messages sent in the class' particular private channel). Faculty (if they wish to join), tutors, TAs, and Math Help humans will have specific roles as well. If anyone needs help from them, @ them in the Math Help Channel (they cannot see messages in private channels for classes). The voice channels are open to all! Join in there to share audio, video, and/or your screen!

ν_3: **Colloquium**

Title: Teaching Geometric Congruence
Speaker: Priya V. Prasad, University of Texas at San Antonio
Time: Monday, October 12 at 4pm EDT
Location: Zoom

Abstract: Euclid and Hilbert both based their developments of axiomatic geometry on metric definitions of congruence, but current state standards (such as the Common Core State Standards for Mathematics and the Texas Essential Knowledge and Skills Standards) implicitly rely on an isometric definition of congruence. So how can teacher educators prepare future secondary geometry teachers to teach an axiomatically coherent geometry based on this definition? We developed a task using Taxicab geometry that can perturb students' internalized metric definition of congruence. This talk is based on work done with Steven Boyce at Portland State University.

ν_4: **Word count**

Counting has a long history in poetry. Some poems are characterized by a sequence of syllables—for example, the haiku counts syllables by line in a 5, 7, 5 sequence:

These five syllables
Are followed by seven more—
This makes a haiku.

You could also count the number of letters in a word—the following introduction starts off a famous decimal sequence:

Hey! I have a beard....

(Bonus if you can come up with a good word that should come next.)

Your challenge is to compose a poem of sorts with a corresponding count (of letters, or words, or syllables, or... iambs?) that yields some famous or identifiable (or possibly even interesting but obscure) sequence of integers. Send your submission to Prof. Visscher at `dvisscher@ithaca.edu` for publication in November's newsletter.

Former calc projects:
infectious disease models,
carbon emissions,

Ballot changing rates,
Fire breaks to stop forrest fires...
⚠ *Model with mask on.* ⚠

—D.V.