

UNIVERSITY OF IOWA MATHEMATICS DEPARTMENT NEWSLETTER

THE SUM TIMES

OCTOBER 2024

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COVER: JAZZ FEST, CAPTURED BY SHASHANK SINGH



GET INVOLVED



IF YOU'RE INTERESTED IN GETTING ACTIVE, HERE ARE SOME GREAT OPPORTUNITIES FROM GARRETT AND KEBBA:

VOLLEYBALL

In previous semesters some of us would play volleyball weekly (on Saturdays), and I would like this to become commonplace again! We currently have a groupme for people that are interested (I'd be open to starting a new group somewhere else if people would prefer), so if you want to be in the know, just let me know!

You are not expected to be good at the sport or have knowledge of it.

Just come with a willingness to play and a good attitude!

Hope to see many of you interested, Garrett

SOCCE R

We are excited to invite you to join us for a regular soccer game every Saturday at the University of Iowa Recreational Center. Details:

Day: Every Saturday

Time: 12:00 pm

Location: Campus Recreational and Wellness Center (2nd floor)
All skill levels are welcome, so whether you're an experienced player or just want to have fun, feel free to come by! Please bring appropriate gear and a positive attitude. We look forward to seeing you on the field!

Best regards, Kebba



GET INVOLVED



FOR YOUR MORE NERDY INTERESTS, CONSIDER THESE EVENTS

UIOWA PUZZLERS

If you enjoy solving logic puzzles or escape room games, you might enjoy puzzling! We're trying to build a team of puzzlers to participate in puzzling competitions like the MIT Mystery Hunt, Puzzle Rojak, and The Harvard CS50x Puzzle Day. Here's a link to our discord server if you're interested in participating:

<https://discord.gg/T3YuPx2h>. No experience with these competitions is necessary, and we guarantee that you'll have fun. See you soon!

-Nandita and Cole

hacky hour's happy hour



meeting_info.js

```
(function repeat(biweekly) {
  who('welcome to all');
  what('coding work hour');
  when('wednesdays 4-5pm');
  where('the green house');
  why('to chat, drink & code');
})();
# dates 9/4, 9/18, 10/2, 10/16, 10/30, 11/13, 12/4, 12/11
```



EVENTS



Tuesday, October 15: Chipotle Fundraiser, 4-8pm

The Math Graduate Board (MGB) will be hosting a fall fundraiser at Chipotle, 201 S Clinton St, Iowa City on October 15th. If you mention that you're participating in the Math Board fundraiser, part of your purchase will be donated to MGB funding. Please make sure you tell your students (present and former) to participate!

Friday, October 18: GLC meeting 10:30-11:30 B11

GLC meetings are a time to share what you've noticed going on in the department, pose questions you may have surrounding the mathematics graduate experience, and generally discuss topics pertaining to the mathematics department. We hope to see you there!

October 8-22: COGS Recertification Election

Did you know that before your union can bargain for stipend increase this spring, Iowa requires us to recertify our union?

Recertification is an online yes or no vote that takes place from Oct 8 - Oct 22. If you do not vote, it counts as an automatic no vote. We need majority yes votes to keep our union!

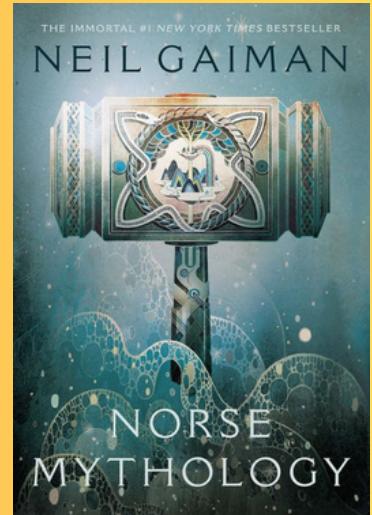
Friday, November 19: AWM Workshop, 11-12, 151 SH

The Association for Women at Iowa is hosting a grant writing workshop that is being led by the Grad Success Center. All Math graduate students are welcome to join us! We will be providing more information in the future!

GRAD STUDENTS RECOMMEND

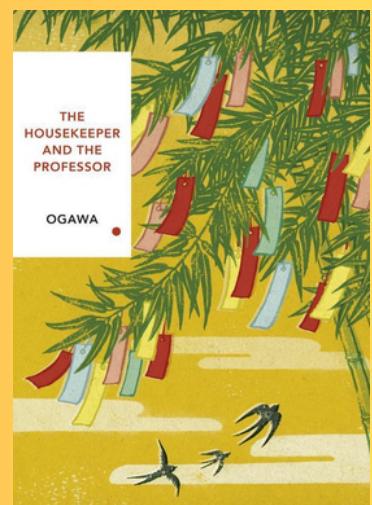
Kerry Tarrant Recommends:

- Norse Mythology by Neil Gaiman
- Clarkson's Farm on Amazon Prime



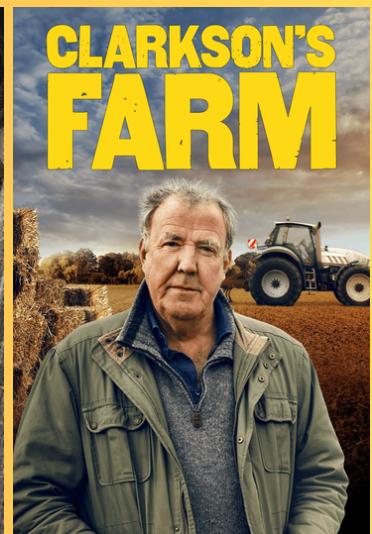
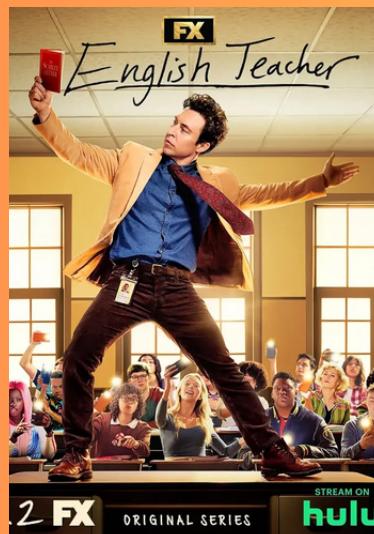
Evelyn Smith Recommends:

- Anathem by Neal Stephenson
- English Teacher on Hulu



Nandita Nair Recommends:

- The Housekeeper and the Professor by Yoko Ogawa
- Broadchurch on Peacock



PARIA'S SUMMER ADVENTURES

Paria Karimi, 3rd year PhD student, had a great time cat-sitting, visiting Iran, Philadelphia, and participating in the summer festivities in Iowa City. Here are some pictures of her adventures!



CONGRATS BLAKE AND HANNAH!



Blake Mattson, 3rd year PhD student, and his wife Hannah got married this summer on July 28th

MEET MICHAEL SAVVAS

- PARIA KARIMI KOUSALARI

Could you tell us a little bit about your research?

My area of research is algebraic geometry, which means studying geometric objects and shapes, with the primary tool being algebra. So, at the foundational level of the subject, it works with systems of polynomial equations. Now, of course, nobody wants to work with systems of polynomials in practice. So, there are other methods connecting to algebraic topology, differential geometry, and number theory, depending on what flavor someone's interested in. I am more interested in things related to vector bundles or sheaves - linear, enumerative questions about those things and some math that comes from string theory as a background. I mainly work over characteristic zero, so I'm not too interested in number theory. An overarching theme of my research is understanding enumerative questions related to vector bundles of certain geometries, specifically, Calabi-Yau manifolds.



Could you tell us how different your journey as an assistant professor versus a postdoc has been?

I will say that I cannot answer this question, really, because I've been an assistant professor for about a month. So, it's hard for me to say what's different right now. I can tell you, in terms of psychology, one thing that's obviously different is that you're less stressed. When you're a postdoc, you know what's coming down the line if you want to stay in academia. You have to go through a long process that's usually stressful. It creates a certain level of insecurity, right? Because you have to be productive to a certain extent. I mean, you cannot just take a year off, let's say. I'm not saying you can take a year off as a professor, but if something goes wrong, or you get stuck, or, you know, life happens - I don't have to worry the same way about what to do. There are other things that I anticipate, like administrative duties and committee work, which are more than when you're a postdoc.

You also have more agency. As a postdoc, you get to organize seminars sometimes, but you don't get agency over the future direction of the department. I mean, maybe you get some input when hiring for certain candidates, but it's not exactly the same. And, of course, there are more expectations in certain ways, but it's less stressful because you don't have to change your environment after three years. You get to plan for the long term, which is more fun because you also work on more interesting problems - you can take more risks. I don't know, for me, the biggest perk is not having to worry about what I do in two years.

PROF. MICHAIL SAVVAS

I forgot to ask, what made you interested in the field that you're working in?

That's a hard question to answer. If I were talking to a student - if you don't know what to do, or you like a lot of things, one thing you can think about is what's "trendy". I'm not saying it's right or wrong; I'm saying it's one consideration. I happened to like algebra and geometry, so it was natural for me to gravitate towards algebraic geometry. I liked vector bundles when I was young, so when I went to grad school, I pursued the same with my advisor. He's very broad. I did deviate, though. I thought I'd be an algebraic or symplectic geometer or something like that. Then I went to grad school, I took some classes, and then I went through this low-dimensional topology phase and thought I'd become a Teichmüller theorist. I took these classes about all sorts of Teichmüller spaces, laminations, and earthquakes. And there was a good group when I was in grad school. Mirzakhani was there. I talked to her a bunch and thought of her as a potential advisor, but then I went back to Algebraic Geometry. I won't say there was a particular reason; it's just what I gravitated towards.

What are you most excited about being an assistant professor here at the University of Iowa?

The easiest thing to say - converting people to geometers. Trying to build some kind of nucleus that's more algebraic geometry-oriented. It will take a few years and some recruitment. Expand the research scope of the department and improve the atmosphere. Maybe bring some money in; let's see. Other things I like to get involved in - teaching-related or other initiatives in the department. I'd like to make a meaningful addition to the department in some way. Maybe we standardize calculus syllabi or implement some kind of anonymous complaint form for the DEI committee. I don't know exactly, but something like that.

Do you have any advice for us grad students regarding research?

One piece of advice that you probably get a lot, and I think it's a good one, is to try to be broad. To try to learn about a lot of things in year one or year two. Even things you might expect not to like. It's good to see it once in your life, and then you can make a decision.

Part two, you should go to conferences and meet grad students your age - you can collaborate with them, and it's easy to work with them on something. Eventually, you'll have to find collaborators of your own. You also need to meet senior people. You're probably asking yourself, what do I have to tell this person? They're a professor at University X, they're an expert, and I don't have anything to tell them. But really, just asking simple questions is good enough. I'm not saying it's easy to do. It also depends on who you're talking to, how friendly they are, and what type of person they are. There are a lot of variables that don't depend on you. Try it at regional conferences, like the Western, Eastern, Georgia, or Texas conferences for algebraic geometry. I'm not sure if there's a Midwest conference yet.

Part three, as you grow even older, it's a good idea to have some kind of intentionality about what the goal is. The end of a PhD might look different for students who want to go into teaching, want to try to stay in an academic position or go to industry. A day will come when you're in year four or five of your graduate program, and you approach towards the future, and then it hits you that you're going to be out there, and you start becoming stressed. I would say don't be too stressed for the first four years because you'll probably be stressed for year five and six or seven.

PROF. MICHAEL SAVVAS

Your answer leads me to my next question: How did you decide between academia and industry?

I'll be honest with you, no. I never gave it a true second thought, maybe to my detriment. Things are changing now - I'm part of this new wave of pure mathematicians who are perhaps more open towards industry. Especially now when the environment is harder to navigate. It's hard because, ultimately, you need to make a bet on what your future will look like. Academia is a hard environment, so it's a labor of love in some way to be an academic. The good thing is that even if you don't consider other options early enough, you will have options; it's never too late. I'm an international, so immigration aside, which can be relevant, unfortunately. If you're an international student, you have to think about your future plans earlier than your American colleagues. That's a fact. You don't need to consider this very early, but the earlier you make the decision, the easier the path ahead will be.

Thankfully, my lack of consideration didn't hurt me, judging by the end result. I went through a horrible period - Fall 2020, after COVID hit, I was actually in the job market. At that point, I thought I wouldn't make it, which was very realistic because the market had collapsed. That was one of the worst periods to be applying ever. But I survived, and now I'm here. Strategically plan for what to do if your first choice doesn't work out.

Also, grad school is a forgiving time. If you want to take a summer off doing an internship when you're in grad school, it's a good idea. Even if you take three months off from your research, it won't hurt you in the long run. If you don't want to do that, that's also fine. There are many things you could be doing, from AI to the more traditional transition many math people make, which is finance.

Thank you Prof. Savvas!

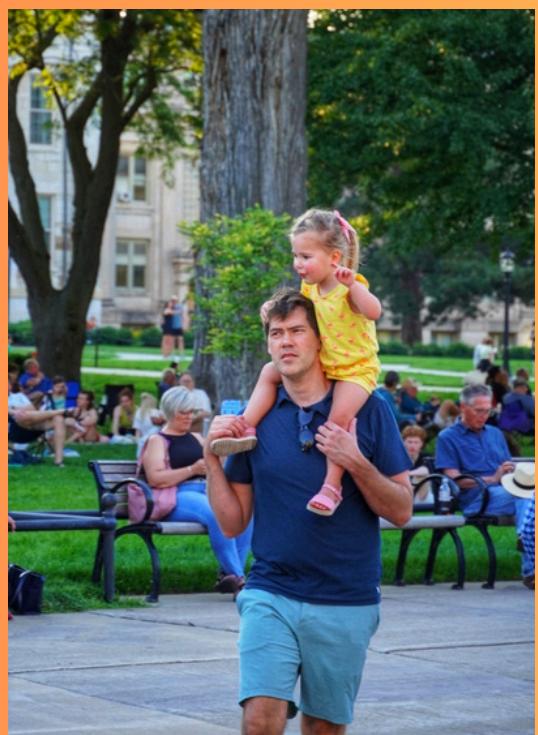
IOWA AS SEEN BY SHASHANK



Shashank Singh, 4th year PhD student, captured some great pictures of the Jazz Fest and 4th of July celebrations in Iowa. Along with the cover of this edition of the newsletter, here's a few of our favourite clicks.



UNIVERSITY OF IOWA MATHEMATICS DEPARTMENT NEWSLETTER



MEET LIZZIE BUCHANAN

- PARIA KARIMI KOUSALARI



Hi! Could you tell us a little about your research?

My research is in knot theory, mainly about positive knots, which are knots that have a diagram where all the crossings are positive. A lot of the time I'm thinking about fibered positive knots, which I don't know a ton about, but what I do know is that if you take the diagram, and then you do a certain kind of smoothing everywhere, you can make a graph that will always be a tree. A lot of what I do is see if knots with a certain kind of diagram are going to have this kind of property. We can distil that down to looking at a graph and then try to build a knot from it, and sort of going back and forth between things you could say for knots and the polynomials and then thinking about what kind of graph I could have associated to the knot. If you have two ways to associate a diagram with a graph, and both graphs are trees, you can see how much we can pull from the fact that this underlying graph is a tree, and how much that can force certain things to happen in the Jones polynomial or Alexander polynomial or in homology.

How did you get interested in this field?

I did a one-year program at Smith College, a post-bacc program for women, specifically for women who don't know if they want to do grad school, or want to go to grad school but graduated 10 years ago, or went to a weird school that doesn't have all of the math requirements. I did that program, and I really loved it. There I did a research project with Patricia Khan, who does knot theory and became very interested in knots.

Then I went to grad school and then had to spend multiple years getting through my required classes and passing all the exams and blah blah blah. And then eventually, I was able to be like "Great. Now, I can think about knots." And also, at the beginning of graduate school, it's like well, knot theory seems cool but what else seems cool? And then I didn't like anything else as much as I like knot theory, so then I started working on that. I was trying to say that a certain diagram of a certain knot family with a certain property was the smallest diagram you could have of that knot, which in general is hard. I had narrowed it down to either it's the smallest, or it has a diagram with exactly one fewer crossing. And if it did, then that diagram was either going to be almost positive or positive. That's how I started learning about positive knots because I was just trying to show that this other knot wasn't positive. I did that, but I couldn't rule out the other case. So I moved on from that and I've just been interested in positive knots and links since.

DR. LIZZIE BUCHANAN

How different has your journey been as a postdoc versus a PhD student?

I feel a little more confident about myself, having finished the PhD. And I think other people see me as more competent having finished my PhD. When I started graduate school, I was like, "Wow, I got into graduate school! I'm so smart", and then I started graduate school, and it was like, "Oh... oh dear." And then in graduate school I also had a lot of trouble, and I was worried I was gonna get kicked out of my program because I kept failing everything. I felt like some of my professors probably thought that I should just cut and leave, and I had a lot of really encouraging professors, so nobody told me anything negative. But then I felt like when I got my PhD, people would take me a little bit more seriously and maybe this is still like in graduate school when I first got in and was like, "Wow, I'm so smart." Hopefully not. One big difference is that I have done some stuff that people were like, "Yeah, that's worth doing, keep doing more." It feels a lot better to have accomplished that, and it makes me feel more confident than before. Maybe I'm wrong for thinking this, but I feel overall less stressed out in my postdoc than I did at graduate school. So maybe I'm doing it wrong or maybe I had an extra hard time because I really was close to getting kicked out for failing my exams. There was a time when I was always three months away from taking an exam and getting kicked out for a couple of years. That was very stressful, obviously. I'm glad I don't have to do any more exams.

Are there any courses that you're excited about teaching?

I am enjoying teaching the knot theory course right now. I'm having fun with it. Before starting the course, I was really worried - I didn't know what people were going to expect, but then I decided I'd just teach it however I wanted to teach it. If it's not complicated enough, whatever. They'll get over it. If it's too complicated, I'll slow down. The vibe is very different for a graduate course, and one that's not a required course, versus teaching calculus, which is required and the people don't want to be there. Sure, maybe people in our class don't want to be there either, but they don't have to in the same way that the calculus students have to. So I think that's easier. I hope that people feel comfortable. People are asking questions and they are good questions to have, and I like doing classes where you're exploring things deeply. I always have a lot of trouble paying attention in classes, so I like whenever possible when I'm teaching to have people doing things too.

Could you tell us about being a MOST fellow for MoMath Museum?

That is a program that the museum is doing to support women in math and sciences and also encourage younger kids to be interested in the same. So last summer, our cohort of 10 women met for the first time in New York, and we did some activities at the museum, and we did an improv class together, which was very funny and weird. Then they made us write the first five minutes of an outreach talk that you would give about a math subject to someone. That was a really good idea because the hardest part is getting started and so we're just making you get started while you're here in the room. The point was that each of us develops some kind of outreach talk and we're supposed to do it a couple of times in the year. So I am doing a talk at the library in November where we're going to talk about tri-colorability, like what we did at the beginning of my knot theory class. I'm gonna do coloring, and maybe we'll have those Twizzlers pull-n-peel things for tying up knots. My talk is basically saying this thing (knots) seems weird, and it's not like what you might think math classes look like. And that's just like a thought in the back of their head. Some people who think they can't do math might think, hey I don't get calculus, but I can do this. I think it's good to have areas that people of different strengths can approach.

DR. LIZZIE BUCHANAN

Do you have any advice for a graduate student?

Take time to talk to your friends, and vent to your friends, both who are in math, and who aren't in math, because those are good for different things. I was really glad that my colleagues at Smith all then went to different grad schools, so then I could talk to somebody who got what I meant about math grad school in general but wasn't at my particular school. Also with non-math friends, on the one hand, it seems like they make so much more money and have more free time, but really they don't have free time, and they have open-concept offices and have to deal with loud and annoying coworkers.

People say that you should have at least one hobby that you like to do - I never followed this advice, but I think it is good to do some kind of physical or non-math activity that you like to do. I like embroidery and knitting. A lot of people get really into weightlifting in grad school. Also, rock climbing and hiking.

Also, if you're having problems with things, let your advisors or mentors know so that they can help you. I think when you're starting you don't want to tell anybody because you feel bad and stupid, but from my understanding, it's way worse if they suddenly find out at the end of the year that you're doing badly in all of your classes. I was really lucky. My assigned first-year advisor worked with me one-on-one every week about stuff that I was learning in my classes, which was really helpful. I still took a long time and failed everything, but I think people were much happier to work with me because they could tell that I was taking it seriously. I was struggling, but I was following their advice. It's better than people just off on their own completely in the dark. Plus if they say that you never told them about your struggle, you could say "I sent you an email about this three months ago, and you never responded. That's your fault."

Any last words?

Oh! Go to conferences when you can and make friends there. I feel like I do conferences wrong because I have trouble paying attention when I don't really know what people are talking about. The first time at a conference I made friends with somebody, she invited me later to give a talk when she was a postdoc, and that was a good opportunity for me. She also invited me to a workshop, and then somebody I met at that workshop invited me somewhere else, and that's how it goes. And so making friends at conferences is good. If I feel like I have a friendship with somebody, then it's easier to talk math with them, which is my preferred way. I think the social networking aspect at conferences is very good.

Thank you so much!

Note from editors: We'd like to thank Paria Karimi Kousalari, 3rd year PhD student for conducting the interviews with Dr Buchanan and Dr Savvas. If the reader would like to conduct an interview for the next newsletter, please send us an email!

PUZZLE AWAY

- COLE HENGEL

Here's an example of the kind of puzzle seen in puzzle hunts. They are usually comprised of a title, (sometimes) flavor text, and pictures or text giving you all the information you need to come up with a solution, which is usually a word or a phrase.

I THOUGHT THIS WAS WORDLE!??

Dust	Tropical	Snow	Rain	Thunder
School	Bulletin	Ironing	Dart	Cutting
Artificial	Bright	Visible	First	Strobe
Starting	Focal	Vantage	Boiling	Data
Body	Public	Double	Mirror	Brand

Hint 1 (copy text to the right
and paste elsewhere to read):

Hint 2:

Hint 3:

Solution:

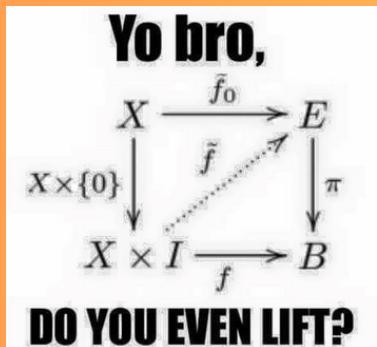
AND NOW, THE MEMES



← Replies X

Sciencekari Guru by Vivek Kumar Srivastava • 1 month ago
The most difficult part of proving a false statement is figuring out where to hide the division by zero

416 25



Showing off my research to undergrad students because they're the only people who don't realize someone better could have done it all in two weeks instead of four years

people with the time machine:



I am your granddaughter



Really?

mathematicians With the time machine:



Doubling the cube, trisecting the angle and squaring the circle are impossible, here's the proof



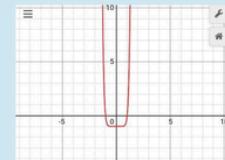
what the █ is a field

STOP USING COMPLEX NUMBERS

• Yes we get it, $i^2 = -1$. And?????

• "Trust me guys this order 10 polynomial has 10 roots" Like look at the graph is your brain malfunctioning???

• These are the ways people represent complex numbers:

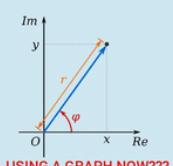


DOES THIS LOOK LIKE 10 ROOTS TO YOU?

$$i \equiv \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix} |z| (\cos \theta + i \sin \theta)$$

A MATRIX???

YEAH THIS MAKES A LOT OF SENSE

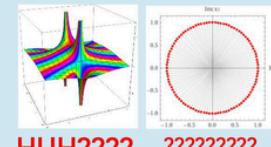


$$z = re^{i\theta}$$

BLATANTLY STEALING EULER'S FORMULA

$$a + ib$$

Ok this one actually makes sense



"Hi can I have $3i$ apples please"

"I am years old"

THEY HAVE PLAYED US FOR ABSOLUTE FOOLS