

Podcast
Women in Math: Episode 33
Interview with Dr. Nichole Schimanski

[Stringed music]

Naomi Grant: Hello. We are talking with Nichole from Galois. She's a . . . something . . .

Nichole Schimanski: . . . research engineer.

[Music.]

Grant: What does a normal day at Galois look like?

Schimanski: Depending on the day I'll come into the office or not. I like to work from home Mondays and Fridays, because I get some solid engineering time in.

Grant: What does engineering time look like?

Schimanski: Usually me on my couch with the computer on my lap, writing code in some language.

Grant: [laughs.] As someone going into computer science, what are the main programming languages you need to know? I've heard they keep changing.

Schimanski: Yeah. I do a lot of data-related work. So scripting in Python is pretty great for that, I think it's valuable. That's what I used at the last few places I worked, Python and R for visualizations. Data analysis and data science is mostly Python.

R has a lot of statistics libraries, but the language itself is not very fun. But I do appreciate the library of GG plot, it makes beautiful graphics. Everybody gets all excited about the data.

Grant: Haha. OK. So a normal day is you on your couch, coding?

Schimanski: Yep, coding. But recently it's been in Rust, which is a systems programming language, and Cryptol, which is a language that was made in-house. But not much Python lately. Lots of coding.

But in the office I have lots of meetings. I'm on several projects right now, and I'm also part of the engineering council that helps organize engineering resources in the company.

Grant: So that's like allocating things . . . ?

Schimanski: A lot of it has to do with relationships, between engineers within the company and supporting engineers to find projects, and have good workflows. I'm also involved in orienteering. Our orienteers help new engineers when they start out at Galois. It's like a buddy-system, they help the new employee get used to the unusual structure at Galois. They'll learn how to use the dishwasher [laughs], and how to be a good "citizen" within the Galois community.

Grant: OK, so when you say "unusual structure" . . .

Schimanski: It's not a hierarchy. Usually there are managers, directors, VPs, and presidents, and it goes up a line like that. Here we've got the engineering council, which plays the role of a director of engineering. But it's a group of people. We discuss topics and make decisions as a group.

Grant: That's cool.

Schimanski: Yeah. We also take information from all the engineers and represent engineering concerns on the council, and share information back with the engineers.

Grant: So back in school, what was your favorite math subject area? Were you a fan of the calculus series, or were you glad to be done with it?

Schimanski: I love math. I always loved math. My mom was studying to be an elementary and middle school math teacher. So she'd test different ways of teaching out on me, and I really loved it.

Grant: That's awesome! Wow.

Schimanski: I've loved math from a very young age. My favorite from undergrad may be group theory, I like abstract algebra.

Grant: Group theory, what do you do in that class? Like abstract algebra?

Schimanski: There's a lot of proving things. We talk about objects called "groups", made up of different elements with certain properties and relationships between them, it's like a game. You get to play a game.

Grant: Oh, that's cool.

Schimanski: You study properties, think about how things work together.

Grant: So I've taken linear algebra, probably my favorite so far. You get to explore different things in the math world.

Schimanski: You'll probably like group theory too.

Grant: Oh, OK.

Schimanski: There's a lot of similarity between linear algebra and group theory.

Grant: Were your parents pretty strict about grades?

Schimanski: No, I don't think they were clearly strict at all. Education was valued, my mom was going to college the whole time I was a kid. And through my adulthood. [Laughs.] So I could see that education had value in their eyes. But I was more strict about grades than they were.

Grant: That's the same with my family I think. Since this s women in math, what are some obstacles you've had to face? Have you noticed anything about being a woman in STEM?

Schimanski: No, I haven't noticed differences simply because I'm a woman. I know that I was surrounded by men at work and school. You know, I don't really notice the genders. We're all just people. [Laughs.]

Grant: Yeah, that's how I feel too. There are a few times where I'm like "..maybe that was?" But I don't know.

Schimanski: I'm lucky I've been surrounded by kind people my whole life.

Grant: You are from Oregon, right?

Schimanski: Kind of. We moved around a lot, so Washington and Oregon.

Grant: You said you moved to Alaska as well?

Schimanski: Yeah. I've lived there. I've also lived in Montana, Wyoming, and around the border of Idaho.

Grant: Have you been to Silverwood Theme Park?

Schimanski: Oh yes, I love Silverwood. I plan to take my son there.

Grant: How old is your son?

Schimanski: He's 11 now.

Grant: Has he been there before?

Schimanski: Yes, when he was a baby, so he does not remember it.

Grant: That's always so exciting with Garfield and Otie as the mascots. Did you know that?

Schimanski: I didn't notice that.

Grant: I remember Otie was walking around in a costume, but I guess we should get back to math.

[Laughs.] What is your dream job? Do you think you have your dream job?

Schimanski: I've had many dream jobs over the course of my life. For a long time I wanted to be a community college teacher. I had such an amazing experience as a student at PCC Rock Creek. I thought it would be fantastic to go back and be a teacher there, and help people and share my enthusiasm for math with people. I did end up doing that.

Then I discovered how fun programming can be, and computer science concepts. So I ended up going down that road. Programming and software engineering.

Grant: Where or how did you get into programming initially?

Schimanski: My stepdad is an engineer at Intel, so he had talked about this stuff over my head for my teenage years. So I knew that direction was possible. What really got me, I got curious enough about the cryptography things my stepdad talked about. I never understood it but I wanted to. So I started that road. One course required some knowledge of programming. So I learned Python over winter break.

I took that class, and it was amazing. You can solve so many problems. Things that on paper would take forever. But I could solve combinatorics problems in a flash.

Grant: So you learned Python on your own before the classes?

Schimanski: -ish. A little bit. Enough to get through the class.

Grant: So I guess there was a prerequisite you had to get through.

Schimanski: At the time I was in graduate school with a strong math background. It took me a long time, I hated computers and avoided them actively.

Grant: [Laughing.]

Schimanski: That was up until past graduating with my undergrad degree. But I got into a lot of graduate-level computer science courses because of my strong math background. I think the professors had some faith that I could pick the stuff up.

Grant: That's funny you hated computers, but now you're working at Galois.

Schimanski: Yeah, I had some pretty impractical notions. I really like nature, I thought I should be living in the woods. Hunting, gathering, that sort of thing. I thought computers were evil [laughing.]

Grant: I mean, you could live in the woods and still drive to work I guess?

Schimanski: Yeah. I do have a place now out in the country pretty close to the woods.

Grant: Do you have like a farm? Do you have animals?

Schimanski: Yes, but no animals. We just got the place this winter, so we are slowly moving up. I'm not sure if we'll have animals or not. I have a child and a job that take a lot of time. Maybe eventually.

Grant: Nice you can grow lots of plants.

Schimanski: Yes, and I have lots of kale right now.

Grant: Do you like to do the morning smoothies with kale in them?

Schimanski: I have done that before but right now we are **smoothied** out.

Grant: The thing about the kale smoothies is they get stuck in your teeth. Then you show up and start smiling and there's just all this green. [Laughing.]

Schimanski: [Laughs.]

Grant: If there's advice that you could give the audience what would be the main advice for like a young math major, or . . .?

Schimanski: Just stick with it, keep pushing yourself. You may hit lows but you can get through it. I've seen it myself over and over. It may seem insurmountable, like having a baby right before finals week. But you can do it. You can still be in graduate school with a baby at home.

I think that believing that you can do more than you might think. But, keep pushing. For math specifically, hang out in the tutoring center. Make connections with other people, with tutors or others. You can get different perspectives from just your professor's.

Grant: That's a good one.

Schimanski: I loved hanging out in the tutoring center, tutoring people.

Grant: Nerd! Math club has definitely increased my interest in math. Maybe I should hang out with the other nerds in the tutoring center.

Schimanski: Yeah.

Grant: Do you have any hobbies outside math?

Schimanski: You mean besides math puzzles? [Laughs.] I'm part of a scouting group called BPSA, the Baden-Powell Service Association. It's an all-inclusive scouting group with boys and girls and any gender. We do a lot of outdoor activities like using knives, tying knots, building shelters. Lots of camping.

Grant: Is that mainly summer?

Schimanski: We meet twice a month through the winter, and then do camping trips from May to October, all the families.

Grant: Is that with your son as well?

Schimanski: Yeah. I was leading the 8-10 year-old group, called the Timberwolves. My son is now moving up to the Pathfinders, the 11-18 year-olds. I'll be co-leading that group. Parents are the leaders.

Grant: That makes sense. Otherwise it would be a bunch of random people coming in.

Schimanski: Yes, but also adults are interested, even those who don't have kids. I get to be part of nature still.

Grant: Did you live . . . well you moved a lot. But were you always interested in nature?

Schimanski: Yeah. I liked hiking as a kid, and playing in the river. Playing outside. But I wasn't part of a scouting group at that time, so I didn't have the skills I now have as a leader. But I did spend plenty of time outside as a kid.

Grant: If you could have a really out-there job, like the FBI or something from the movies -

Schimanski: I've considered that.

Grant: - I have too. [Laughing.] Like CIA agent, "duh-duh-dum!" Or like a lion tamer, or ghost whisperer.

Schimanski: I think park ranger would be that one. I worked in Yellowstone National Park when I turned 18, I worked over the summer. And it was wonderful to live inside Yellowstone National Park and be surrounded with animals and geysers and plants.

Grant: Do park rangers just walk around and range?

Schimanski: I don't know a lot about that job. I feel kind of silly saying it's a dream job. I don't know what it would entail but I would want to live in a national park.

Grant: Yeah, if that's the main thing.

Schimanski: I know there are interpretive rangers, who share information about the park with guests. Then there are law-enforcement rangers, who are more like police officers in the park. There may be other kinds.

Grant: Like telling people not to touch the geysers?

Schimanski: Or the bison, yeah. Or giving speeding tickets.

Grant: Oh, OK. Just drive off into a geyser. [Laughs.] Oh that's not allowed?

Schimanski: [Laughs.] No that's not allowed.

Grant: Were you a pretty good student, like straight As?

Schimanski: Not always. Middle school wasn't so great. I wasn't so focused in middle school.

Grant: Me neither.

Schimanski: My first college class was statistics and I got a C.

Grant: Oh! [Laughs.]

Schimanski: From then on I hated statistics, I think more due to emotional issues that were involved, not the content. I then took a statistics course for scientists and engineers and there was a lot more math involved, but that was a while after that. I enjoyed it more.

My grades just improved over time. After I had my son I became very focused in class. I used to kind of goof off. But when I had my son I knew I couldn't just do it later. I had to be a mom when I got home. Then I had evening work teaching online classes. I had to be focused when he was in daycare and I was in class. I did much better with grades.

Grant: I was surprised in the notes that you said a child made you more focused. I thought it would be even more distracting.

Schimanski: Yeah. I learned how to partition my day very well.

Grant: Were you studying after your son went to sleep, and working?

Schimanski: Yeah. After I picked him up at 4pm, until bedtime at 7, we had our together time. Then I would do schoolwork if I didn't have regular work.

Grant: That's probably a pretty tiring busy day.

Schimanski: Yeah, you get used to it though. I'm surprised how humans can get used to things. Even if it seems extreme, it can become normal once it becomes a habit.

Grant: Yeah. It's like if someone isn't a math major, they might think it's really hard. I used to get bad grades and I even failed a math class in high school. But from the outside I thought it seemed so hard. But now I like math, most of the time. It always looks different from the outside.

Oh, what was your first job? Starbucks or Carl's Jr. or something?

Schimanski: I worked for my dad's job a few days, at a rental center for small equipment. It was under the table so I'm not sure it counts. The place rented jackhammers, tables and chairs, things like that. I worked at the front desk there during the summer, it was very scary but also fun.

I think my next official job was in Yellowstone at a restaurant.

Grant: I didn't know they had restaurants.

Schimanski: Yeah, there's restaurants and hotels in the park, and employees clean and make and serve food. For tourists.

Grant: Was it like a themed restaurant? Did you have to dress up as a bison? [Laughs.]

Schimanski: No, I don't remember that. I worked at a pizza restaurant, and a fine-dining restaurant. It wasn't really that good. [Laughing.]

I worked in the employee cafeteria for a little bit.

Grant: At Yellowstone? No one dressed up as bison? That's surprising.

Schimanski: No, no. But I did have to walk through herds of elk to get to work, and avoid bears to get to work.

Grant: Wow. Did you ever see a bear?

Schimanski: No, it's kind of funny I never saw a bear. Everybody else did. But I was never at the right spot at the right time. Or I was always at the right spot to avoid bears.

Grant: You literally walked through packs of bison?

Schimanski: Not bison, but lots of elk. I wouldn't really walk through if they were packed in, that's dangerous. So I had to be careful. In Alaska I had to walk around a moose mom and her baby, that was scary. They can get very aggressive when their babies are around.

Grant: Was the moose baby cute?

Schimanski: From afar.

Grant: From a safe distance. [Laughs.] OK. I think I have been to Yellowstone once when I was young. I don't remember much but I remember Old Faithful.

Schimanski: That's the famous one.

Grant: OK. Have you ever had interest in other STEM classes?

Schimanski: Yeah. For undergraduate I took physics courses at PCC from an amazing instructor. I loved her classes. When I went to Eastern Washington University I was a dual major, in

math and physics. But those were different teachers. And I realized the teacher had a big effect on my love for that subject.

Grant: A lot of people say physics is their least favorite.

Schimanski: At first it was algebra based, and I didn't like that. Then I took calculus-based physics at PCC, and I liked it better, it made sense. So I enjoyed that, and that instructor's perspective on physics. I loved math way more. It's just a bunch of fun puzzles.

Grant: So your favorite part about math is figuring things out then?

Schimanski: Yes. It feels like a fun puzzle. I don't even care if it applies to anything.

Grant: What was a discovery about math that got you very interested? Like a concept or something.

Schimanski: I remember learning about different numbering systems in fifth grade, that blew my mind.

Grant: Numbering systems?

Schimanski: Right, so instead of counting to 10 and then going to 11, you could do base 7. 1,2,3,4,5,6 . . . and then it goes right to 10. You can translate it from the numbers we're used to.

Grant: I remember talking about how the Mayan culture used a different base, like base 12.

Schimanski: Yeah, different cultures use different numbering systems and bases.

Grant: We have time in base-12. I've heard that's the best way to do things. But we won't change the whole world for that. We also talked about the Mayan numbers, they were lines and dots.

Or maybe that's not Mayan. But I thought that would be hard to code numbers that way. It could be really pretty though.

Schimanski: [Laugh.]

Grant: Oh, we could talk more about Galois, and what you do here? I know there's the election guard thing?

Schimanski: Yeah, I don't know about it, but it's a very active project. A lot of people here are working on that. I'm involved with data related projects. The last project was called Transparent Computing. That was a project where we tried to detect when an attacker attacked a computer, like got in virtually and was trying to steal your information. That ended last month. That was pretty fun. I dealt with a lot of data related to computers, processes, events and file names, things like that.

Grant: Do you mostly work from home? I know you have a lot of meetings here.

Schimanski: Yeah, I probably work a few days a month from home, on average.

Grant: Oh OK. So what other projects?

Schimanski: I was on a project this winter, where we created ways to evaluate neural networks, in a secret sort of way.

Grant: Sounds so cool.

Schimanski: Right. So you have your data and you don't want anyone to know the data, but you want to know the output of that neural network. So we created a network to keep it secret. You could evaluate this function with your data but no one would know what your data is.

Grant: So how are projects separated here? Are there end points?

Schimanski: There are a lot of independents here. You have a lot of choices here. Some people prefer one project at a time. Some projects last 6 months, some last 4 years. It depends on the contract.

I prefer more than one project. I discovered that 6 is probably too much.

Grant: [Laughing.] Sounds like too much.

Schimanski: It was pretty fun to be so busy for a while. Not in the moment maybe.

Grant: I notice I get really tired if I have a meeting somewhere, and then have to go to school or something.

Schimanski: Right. It's like context switching, you have to turn on another part of your brain.

Grant: Right. So right now how many projects are you working on?

Schimanski: Three. It's manageable. The projects sometimes come from the Department of Defense, DARPA which is their research arm. The Transparent Computing project was through them. There are other projects with industry clients or other companies.

We've worked with the Airforce and Navy. Some projects require top-secret clearance, or just regular clearance. I have regular clearance. I started here a year and a half ago. So I'm still learning about how we have changed here over time. We've grown a lot with a lot of new projects and employees in the last year and a half.

Grant: I always remember that it was founded in 1999, because that's when I was born. Haha.

Schimanski: Oh, I didn't even know that . . . I should know that. We celebrate Galois's birthday every year in October. We had trivia sessions.

Grant: That sounds so difficult. Oh, it was trivia with the company? I was thinking like math problems.

Schimanski: Oh, no. This year we will go for a weekend trip, to celebrate our twentieth year. Before here I worked at **Aerohive** networks. They sell access points and software to manage access points. It's for midsize to larger size businesses. I was a data scientist.

[Construction sounds.]

One project involved determining the location of customers based on their cell phones. Your cell phone sends a signal to look for network connections, regularly. So access points in the building would receive that information, then you can tell the location.

Grant: So how was that information used by the company?

Schimanski: Yeah. So, it would be used to determine the path of customers through the store. That information would be used for marketing.

Grant: That seems questionable.

Schimanski: Yeah. I didn't enjoy the company, but the people and technology were great. It was a pretty large company, but the data people were here in an office in Portland, the rest was in China and California. At one point they decided they didn't need us anymore. So they closed down our office and laid us off.

Grant: OK. So has Galois been your favorite company?

Schimanski: Oh, definitely. I love the structure here and the values. Joy at work is a value. Authenticity is a value.

Grant: And free food.

Schimanski: And there's kombucha on tap.

Grant: Isn't there beer on tap too?

Schimanski: [Laughs.] Yes. I haven't used it. There's also cold brew on tap. That's nice.

Grant: How experienced are people before they start at Galois usually?

Schimanski: I don't know for sure. But I think a lot of them come straight from college.

Grant: Like after their PhD?

Schimanski: Or bachelor's, or master's.

Grant: Really? I thought it was master's or above.

Schimanski: Well everyone is a software or hardware research engineer, that's the only partition now. We may change that based on need. You can come in as a software engineer if you have a bachelor's degree, and start working on projects like anyone else.

Grant: I guess it depends on your personal skill set and knowing what you need to know, like knowing the languages and how to code.

Schimanski: Yes. There are a lot of projects involving programming language theory, so people who had that in school can come on and start contributing right away.

Grant: I know the news was here recently, KGW. Was that exciting?

Schimanski: Yeah, I worked from home that day. Haha.

Grant: Oh that's so disputing.

Schimanski: HBO came by once.

Grant: For a Game of Thrones episode probably. [Laughing.]

Schimanski: Probably. [Laughing.] We've had a few times with cameras and photographers were around. You can see some of that on our website. Usually they line some people up for interviews. I was requested to sit at my desk and code in a language other than Haskell, which is popular here. I was working in Scala, so there was a cameraman watching me type. I deleted the code I had already written, and re-typed it for the camera.

Grant: Haha. So how many languages do you know?

Schimanski: I think I listed all of them. C and C++ comes up sometimes, I'm not great at it but I can read it. One project was implementing a post-quantum cryptography algorithm. It's for a digital signature that is supposed to work in the post-quantum world. So once quantum computers are a real thing, this algorithm should still be secure.

Grant: Sounds so fancy.

Schimanski: Yeah. So I implemented it in Cryptol, and there was already an implementation in C. I used it as a reference. I have heard a lot of grumbling about C and C++. But it's got uses too. I just use the languages that I need when they come up. I think Rust is a candidate to replace C implementations, but I don't know about all this stuff.

Grant: Do they keep changing? The popular languages that are used?

Schimanski: I don't know. I haven't been in the software industry for that long. I'm not super nerdy about this stuff, I just like solving problems. Give me a problem, and I'll solve it [laughing.]

Grant: What's an example of a problem you could solve?

Schimanski: I guess lately I've been taking algorithms written on paper or on a PDF, and turning it into a program that does what it is supposed to. So thinking about how to turn their words into code is one type of problem.

The puzzle of translating that into code that runs is fun.

Grant: OK, that's pretty cool.

Schimanski: So as an employee here, we keep track of the hours we work on a given project. If we attend a meeting, that has a different code too. At the end of the day, I have to fill in my time sheet and put the number of hours in each activity, and then submit it. This activity now is going to be a particular billing code. Haha.

Grant: Awesome! So you're being paid to be here. Galois seems like such an awesome company to work for.

Schimanski: I know. It's great. I have worked here more per day than at other companies. But also I've accomplished so much in a short period of time, repeatedly. I feel useful here.

Grant: That's awesome.

Schimanski: The last couple places, I felt people didn't know how to use my skills. They just needed a data scientist. I didn't have support or clear directions, it was just buzzwords.

Here there are so many projects, I can just jump in and solve a problem and move on.

Grant: And when you're not you can just play on the pinball machine or the Xbox?

Schimanski: I've never done that. I did play one video game, but I value interacting with other people here. I love the lunch room. I find it very exciting to have those conversations.

Grant: That seems awesome, you can just talk to people about common interests.

Schimanski: All sorts of things, yeah.

Grant: I've gone in there before and gotten math tutoring from John. I hear people just chatting in their free time about math. Then they were using the whiteboard and working out some problems. You can tell this is what they are meant to do.

Is this the job you are wanting to stay at? Or do you want to become President? That's the next step up, right? [Laughing.]

Schimanski: Definitely not that. I can imagine staying here for a long time. It's possible to work part time, like 80 or 60% time. I imagine at some point traveling around and working remotely could be good. Living in the woods.

Grant: So you still have that dream, OK. I know there are a lot of jobs in the security world, like the NSA.

Schimanski: Yeah, there's someone here who used to work for the NSA. They did Haskell programming there.

Grant: I know that John and some others came up with that language.

Schimanski: I think John played a large role in the evolution, but I don't know all the details. A lot of people are active contributors to the libraries for the languages. They are active in the community.

Grant: That's awesome. It's so nice talking with you. Thanks for agreeing to do this.

Schimanski: Yes, I was very happy to.

Grant: Now you can go play pinball? Or solve some problems, talk to people?

Schimanski: Yes. Thank you for doing this. I think it's helpful for people to see others who have gone down roads that are interesting to you. Before I got my PhD, I didn't think it was possible. I saw a woman who taught my topology class, who reminded me of myself, she was goofy like me. I felt like if she could get one, I could get one too. I think this podcast might help in that direction.

Grant: Thank you again.

[stringed music.]

[End of episode.]