

Evelyn Lamb: [00:00](#) Welcome to the Lathisms Podcast. I'm Evelyn Lamb. In each episode we invite a Hispanic or Latinx mathematician to share their journey in mathematics. Today I'm happy to welcome Ivelisse Rubio to the show. Thanks so much for taking the time to talk with me.

Ivelisse Rubio: [00:26](#) You're very welcome. You're very welcome Evelyn.

Evelyn Lamb: [00:27](#) Can we start with maybe you can tell us a little bit about yourself? Where you're working, your field, that kind of thing?

Ivelisse Rubio: [00:36](#) Sure, yeah I work at the University of Puerto Rico at the Río Piedras campus. I work in the computer science department although my formation is in mathematics. I do work and my research work is in number theory. I work with problems involved finite fields.

Evelyn Lamb: [00:56](#) Your degree is in applied mathematics right? Is this kind of applied number theory or have you drifted a little bit since you got your degree?

Ivelisse Rubio: [01:04](#) Maybe I will call it applicable number theory. No it's not applied number theory. It's applicable. Sometimes I do applications to coding theory and cryptography but it's mostly theoretical work.

Evelyn Lamb: [01:19](#) Can you tell us maybe a little bit about what kind of problems you might work on in that?

Ivelisse Rubio: [01:25](#) Sure. For example, we work on assistance of polynomial equations, which is one of the most important problems in mathematics. Trying to solve a system of polynomial equations but these equations are over finite fields and we try to determine conditions on the system to make sure that the system is solvable. That it guarantees that there is a solution. This can be applied to coding theory and to cryptography where coding theory is a theory that corrects errors in communication that occur accidentally. Cryptography is the area of mathematics that tries to hide information from intruders.

Evelyn Lamb: [02:11](#) Right so that's the applicable part of it.

Ivelisse Rubio: [02:14](#) Exactly.

Evelyn Lamb: [02:16](#) Backing up a little, what inspired you to become a mathematician?

Ivelisse Rubio: [02:20](#) Well I always enjoyed math and I was considering originally studying computer science and at that time, this was back in the early 80's, the computer science courses were taught in the math department, so I started taking mathematics courses. Actually that was the

degree. The degree had to be in mathematics. I discovered that I liked math much more than computer science so I stayed as a mathematician. I thought that I wanted to be a mathematics teacher at the beginning but then I started ... I was given the opportunity to work on research as an undergraduate which is a rare opportunity. In the 80's, it was a rare opportunity and I really enjoy this challenge of solving math problems. I decided that I was going to pursue then a masters degree. At that time, that was the highest degree offered in Puerto Rico. At that time, then I was still thinking that I'm becoming a math teacher, but then I focused more, I love the university so I wanted to start, to stay working at the university and for that, I needed to complete a PhD degree.

- Evelyn Lamb: [03:35](#) Did you do all of your education in Puerto Rico or did you come to the mainland US for that? Or go to a different country?
- Ivelisse Rubio: [03:46](#) No I did my Bachelors and my Master in Puerto Rico and that was the highest degree in Puerto Rico. So for the PhD, I went to Cornell University, but I waited about three years from when I finished my masters to work on the PhD because of different reasons. I thought that I was not well prepared. I thought that I didn't want to leave the island. I was not very good in communicating in English so there were many excuses not to continue to the PhD right away.
- Evelyn Lamb: [04:24](#) How did you manage to overcome maybe your internal worries about that kind of thing in order to decide to go pursue it?
- Ivelisse Rubio: [04:35](#) Well actually I think that the motivation came from wanting to do more things here in Puerto Rico and not being able to do more things because I was not prepared enough. I didn't have the background that I needed so it was actually more that the motivation for doing things that I needed the degree more than the challenges or the worries that I had. I had them when I was leaving but the motivation then was greater.
- Evelyn Lamb: [05:13](#) Were there people who encouraged or discouraged you from pursuing mathematics?
- Ivelisse Rubio: [05:19](#) I think that I have always been encouraged to study math. My masters advisor, Oscar Moreno, encouraged me to pursue a PhD. Everybody here at the University of Puerto Rico encouraged me to pursue a PhD and actually I got a scholarship from the University of Puerto Rico to do that. Then later on, doing the PhD, at the end of the PhD when I was working on the thesis, maybe I got discouraged a little because I was not focusing on my

research. I was involved in many other activities and my advisor told me that I had to decide if I really wanted to complete the PhD and that was a wake up call. I then set a deadline and worked really, really hard to get results by certain deadline and I was able to do it and completed my thesis and graduated.

- Evelyn Lamb: [06:22](#) Did you have mentors or other people that you looked up to in mathematics?
- Ivelisse Rubio: [06:27](#) Yes. I had many mentors. My first mentor was Oscar Moreno my master of research advisor at the University of Puerto Rico and also the University of Puerto Rico I received a lot of support from Pablo Negron, which was another professor at the math department. People that I look up to, Ana Quintero. She was the only Puerto Rican woman that I knew that had a PhD in a math related area and was active in research at that time. She was a good role model. Not only because of the preparation that she had and the research that she was doing, but also because she was doing that while being very active socially and culturally. It was very important to me.
- Ivelisse Rubio: [07:17](#) Then when I moved to Cornell University, I was always motivated by Bernd Sturmfels he introduced me to the area of Groebner Bases which was pretty new at that time. I received a lot of support from my PhD advisors. I had two advisors. One is Mos [Sweetler 00:07:36] and the other was [inaudible 00:07:37]. Then when I was finishing my PHD, I met Herbert Medina who was a mathematician that was at Cornell University starting a summer program. Then we decided that we wanted to and REU in Puerto Rico. Research experience for undergraduates in Puerto Rico. Actually we did. We got funding from NSF and NSA. In 1998, six months after I completed my degree, we started the summer in mathematics for undergraduates in Puerto Rico at one of the campuses of the University of Puerto Rico. That was the most rewarding experience that I have ever had.
- Ivelisse Rubio: [08:28](#) Then I did no research for five years. So I graduated and I stopped doing research. Then other people that were good mentors, specifically for working on research were [foreign language 00:08:46] and [foreign language 00:08:48]. They both encouraged me to work on research. [Cordell 00:08:52] was an inspired woman. She was very strong and very strong encouraging people to work on research. At some point she told me that if I wanted to do something for Latinos and women, I had to be an example for them. Being a good female, Latina female researcher. So they both inspired me to get away from the stereotype of women being teachers and Latinos working on outreach to also include research as something else that is not so traditional. Or maybe it's

not part of the stereotype. I love being a teacher and I love doing outreach, but their encouragement made a difference and I then decided that I was going to work hard to become a researcher, after five years of doing no research.

Evelyn Lamb: [09:51](#) Well I'd imagine that's difficult cause you're kind of pulled in so many different directions. It may be spread a little thin so it's very hard to decide exactly where you want to spend your time.

Ivelisse Rubio: [10:04](#) Actually yes, at some point I had to say no to things that I really like because as I said I love teaching. But if I wanted to be seen as a researcher, since there is a stereotype of women doing things related to education, I started to say no to things that I was asked to do, and dedicate myself for sometime to do research. I'm now doing a little bit of everything, but after some years I did that. As a researcher, I have been inspired by scit maps and married to a professor at Cedar Keys University and [foreign language 00:10:56] from Penn State, and my research partner Francis Castro and of course [foreign language 00:11:02] has always been an inspiration during all my math journey.

Ivelisse Rubio: [11:09](#) I had to somehow force myself to not do the things that I really like in order to develop as a researcher.

Evelyn Lamb: [11:25](#) Right and did you always know that you wanted to go back to Puerto Rico after you were finished with your PHD?

Ivelisse Rubio: [11:32](#) Definitely.

Evelyn Lamb: [11:34](#) So that was not a hard decision?

Ivelisse Rubio: [11:37](#) No, no, no. I was very, very, clear that the reason why I was doing my PHD and the reason why I was doing my PHD and I went to the US was because I wanted to come back and do things in Puerto Rico. Actually it related to a location no? Then I switched to the REU but that was the reason why I was there and as soon as I finished I came back.

Evelyn Lamb: [12:08](#) At this point, I assume the University of Puerto Rico does offer the PHD degree?

Ivelisse Rubio: [12:13](#) Yes.

Evelyn Lamb: [12:16](#) We're recording this a little under a year after Hurricane Maria. Of course that's something that's been on people's minds a lot for the past almost year. How are things at the University since that happened?

- Ivelisse Rubio: [12:32](#) Well, we are still recovering but we have learned to keep going no matter what. At some points we teach outside the classrooms because there is no power and then we teach outside, but I think that things are pretty normal right now. We have a lot of energy and we overcame that. I think that actually I'm more worried now about other type of hurricanes that are not national disasters that are coming to the university, like budget cuts and that type of thing. I think that's going to be a lot worse than the hurricane.
- Evelyn Lamb: [13:18](#) Okay I guess this is the beginning of hurricane season again though, so.
- Ivelisse Rubio: [13:23](#) Yes.
- Evelyn Lamb: [13:25](#) What advice do you give to students who are interested in a math career?
- Ivelisse Rubio: [13:29](#) I think that it's very important that Hispanic students keep working on mathematics. Also in computer science. Math and computer science are very important for the next generation so we need to develop more culture of math and computer science among our people. Yes to go is not an easy area to work on, but it's good to set high standards, to have high expectations, and to get out of our comfort zones, and just work really hard to achieve the goals. There is a lot of talent in the Hispanic community and we have just to discover that talent and develop it.
- Evelyn Lamb: [14:23](#) Are you particularly excited about any projects or initiatives that either that you've been involved in or not that help bring more Hispanic and Latinxs students to math?
- Ivelisse Rubio: [14:37](#) Yes definitely. The REUs, the research experience for undergraduates, are excellent for our communities. There is one that I was involved also in the creation and I'm very fond of. It's the MSRI op. That the mathematical sciences research institute undergraduate program at Berkeley. That's an excellent opportunity for undergraduates to work on research for six weeks during the summer and also to develop many other skills.
- Evelyn Lamb: [15:12](#) Right and I think at least one other person who's been on the podcast is also involved with that. Federico [Ardilla 00:15:19] and perhaps some other people as well.
- Ivelisse Rubio: [15:21](#) Yes, yes, yes. Federico is one of the directors now of MSRI.
- Evelyn Lamb: [15:30](#) Is there anything else you'd like to share kind of as an ending tid bit?

- Ivelisse Rubio: [15:36](#) Just as I said to work really hard. To have high expectations and not get discouraged if things do not go well. We have a different perspective to offer. We can see things from a different point of view and this is good. This is good because this gives a new approach to different problems and this actually has been very productive for me. When I face a problem that is new for me, I just go with a lot of intuition and some times I see things that other people don't see. So do not get discouraged and work hard. Keep going.
- Evelyn Lamb: [16:17](#) Definitely a good message for people whether they're interested in math or pretty much any other career.
- Ivelisse Rubio: [16:22](#) Exactly, exactly. Well math, the thing is, math is fun. Math is challenging in the sense that you have problems but you see patterns and then you're able to develop conjectures and then try to prove that they are true. That's the challenge is good. It's very good.
- Evelyn Lamb: [16:53](#) Well thank you so much for taking the time to talk with me this afternoon.
- Ivelisse Rubio: [16:58](#) Sure Evelyn. Thank you for inviting me.
- Evelyn Lamb: [17:03](#) Thank you of listening to the Lathisms podcast. It's produced by me, Evelyn Lamb, and made possible by [inaudible 00:17:09] grant from the mathematical association of america. Our music is [Vulvera 00:17:15] by La Floresta. Lathisms is an initiative to celebrate the accomplishments of Hispanic and Latinxs mathematicians. It was founded in 2016 by Alexander Diaz Lopez, Pamela Harris, Alicia Pleato Longarica and Gabrielle Sosa. You can find more information about the project at Lathisms.org. That's L-A-T-H-I-S-M-S dot O-R-G. Join us next time to hear from another inspiring mathematician.