

- Evelyn Lamb: [00:10](#) Hello and welcome to the Lathisms podcast. I'm your host, Evelyn Lamb. In each episode, we invite a Hispanic or Latinx mathematician to share their journey in mathematics. Today, I'm very happy to be talking with Luis Medina. Hi, how are you today?
- Luis Medina: [00:25](#) Very good, Evelyn. Thank you for having me.
- Evelyn Lamb: [00:28](#) Can you start by introducing yourself a little bit?
- Luis Medina: [00:31](#) Yes. My name is Luis Medina, I was born and raised in Puerto Rico. I got my bachelor's degree in 2003 from the University of Puerto Rico at Humacao, and my PhD in mathematics in 2008 from Tulane University. After that, I did a post-doc at Rutgers University, and now I work at the University of Puerto Rico Rio Piedras Campus as a professor in the mathematics department.
- Evelyn Lamb: [00:58](#) What were your early experiences with math?
- Luis Medina: [00:59](#) I do remember being good at math when I was a kid, however, I don't remember anything special about it. I guess the only clear memory that I have is that I loved to play with calculators. Especially in the aftermath of Hurricane Hugo. In fact, it was with a calculator that I learned about the existence of negative numbers. I did that accidentally. I knew that if you plot big numbers in a calculator, multiply them, then you get an error message, basically because the calculator just run out of space.
- Luis Medina: [01:38](#) So I became obsessed in trying to find error messages on a calculator. And I remember that I decided to plot something like three minus four with the hope of getting an error message, but the calculator returned minus one. I was disappointed. I was disappointed at first, and sort of confused. But it quickly made sense to me and I remember talking to my family about it, I was very excited.
- Luis Medina: [02:03](#) When I was in intermediate school, I remembered that a teacher told me that I was very good at math, and he encouraged me to be part of the school math team. I remember getting excited about the invitation and sharing the news with my mom. Neither of my parents went to college, and because of that, my mom was a bit insecure about helping my brother in our studies, but she was always looking for ways to help us.
- Luis Medina: [02:33](#) I remember that when I gave her the news, she drove me to a boot store near the University of Puerto Rico at Humacao, and asked an employee in the store to find me a book in

mathematics so that I can go home and practice. I remember being excited about that book and working on some problems. My mother also drove me to mathematics competitions, and was always very proud of me, so I remember those times very fondly.

- Evelyn Lamb: [02:59](#) And you said that one of your teachers encouraged you to join the math team. Did other teachers encourage you to keep doing math as you got older?
- Luis Medina: [03:08](#) Aside from that one, I don't remember one one being really specific about me pursuing a mathematics degree. I remember the counselor actually told me.... See, the thing is having encouragement when I was a kid who was not something that I had, my family didn't know what a career mathematics meant. In fact, I myself didn't know. Therefore, they didn't have words of encouragement for me when I was a kid, because we didn't know the meaning of mathematics degree. So basically I just heard about the usual professions, doctor of medicine, lawyer, engineer, the classic things.
- Luis Medina: [03:48](#) However, I started to show signs that I was good at mathematics and everyone surrounding me thought that I was going to pursue a degree in either engineering or accounting. In fact, it became a wish of mine to become a robotics engineer. However, when I was in high school, I learned that a degree in robotics engineering was not offered in Puerto Rico. And pursuing an undergraduate degree in the mainland was not possible from the financial point of view. So at that point I didn't know what to study, but I went to the school counselor, and I learned about the possibility of studying computational mathematics at the university of Puerto Rico at Humacao.
- Luis Medina: [04:28](#) And I actually got very excited about that, and told my mom when I went home. At first my mom was confused. She didn't know what kind of jobs opportunities were available for me with mathematics degree. But I shared the information that I got from the counselor, and she became the biggest fan. She was telling everyone that I was going to study mathematics, and she was also very defensive about it. Every time someone questioned my choice, she started a very long conversation about that.
- Luis Medina: [05:00](#) Later during my undergraduate career, I was encouraged by some professors to continue to graduate school. I decided to pursue a PhD in mathematics. And once again, my mother again was the biggest fan. So I guess the answer to your question is

when I was a kid, no, people did not encourage me to pursue a degree in mathematics. However, when I was a young adult, then yes, people did encourage me, and that includes family and professors.

Evelyn Lamb: [05:30](#) How did you get inspired to actually become a mathematician?

Luis Medina: [05:35](#) When I started my bachelor degree, my idea was to obtain my degree and then try to find a job. I was pursuing a degree in mathematics, but I didn't see myself as a mathematician, because I didn't know that that term existed. At the time, I thought that a degree in mathematics was just that, a degree. Later when you get a job, maybe you can start calling yourself a name specific to a profession, let's say actuary or statistician. However, during my first day at college, during the very first class, the professor wrote his name on the board and he put his title, doctor.

Luis Medina: [06:16](#) I was very confused and amazed at the same time. I didn't know that such thing existed. For me, doctors were those who study medicine. Then I took my second class and once again the next professor was also doctor, so I started to look for information, learning what needs to be done in order to become a doctor in mathematics? What was the meaning of that? Later during my undergraduate career, when I learned a bit more about research, went to conferences that had examples of mathematicians that I related to, then I was very inspired to become one. That became my North, unlucky for me, I didn't deviate from it. So I guess the initial spark was learning for the first time that you can actually pursue a PhD in mathematics.

Evelyn Lamb: [07:03](#) So you basically knew at that point that that's what you wanted?

Luis Medina: [07:07](#) Yes, definitely.

Evelyn Lamb: [07:09](#) What was the transition like moving from Puerto Rico to Tulane for graduate school?

Luis Medina: [07:15](#) It was easier than my undergraduate experience, in the sense that I'm a first generation college student, didn't have the necessary background. My mother was very sick when I went to college for the first time, so I had many challenges. So when I was an undergraduate, how can I explain that? See, my mother was extremely sick when I started my undergraduate career. My father was working two jobs in order to support my mother and

my brother. So at the beginning I didn't do very well. But then I had some mentors that allowed me to surpass all of that on.

Luis Medina: [08:11](#) Then when I went to graduate school, the situation was different, because I had the experience of struggling in my undergraduate career, because I already met the mentor that I wanted to work with at Tulane University, Victor Moll. Then the transition was a little bit easier in that sense. So my experience at the undergrad level was very, very hard. So the transition from undergrad to grad taught me to study more and to be more prepared.

Evelyn Lamb: [08:54](#) And what field of math did you end up going into?

Luis Medina: [08:54](#) I work at the intersection of number theory and combinatorics. At the beginning when I was doing my dissertation, it was mostly number theory, but now I work with Boolean functions. They are at the intersection of number theory and combinatorics. Technically I don't work on the applications of Boolean functions, I work mostly on the theoretical side of it. However, I do work on problems that are based on their applications, especially those related to cryptography.

Luis Medina: [09:20](#) If you want to be more specific, being focusing on how the recursive nature of what forms of some families of Boolean function can be used to obtain divisibility properties of them, as well as other numbers of theoretical and combinatory [inaudible 00:09:39] cryptographic attributes.

Luis Medina: [09:41](#) In principle, the definition of an explanation of some, which are the things that I do, they run at a [inaudible 00:09:48] rate, so you have to find ways to calculate them efficiently, and that's why I focused on the records of nature so that I can actually calculate them fast.

Evelyn Lamb: [10:00](#) You've mentioned a little bit that mentoring was very important for you in going through your education and starting in your career. Who are some of the mentors who really helped you?

Luis Medina: [10:11](#) Mentorship is actually very important for me, Evelyn. I've been very, very lucky to have several mentors in my career. Out of all my mentors, three have been very influential in my academic life. My first mentor is Dr. Ivelisse Rubio. She was my undergraduate mentor, and perhaps the one that had the most influence in my academic and personal life. I first met Ive in the year 2000 when I was pursuing my bachelor's degree in computational mathematics at the University of Puerto Rico at

Humacao. At the time I was struggling at managing my student life and personal life. I'm a first generation college student as I told you, and at the time my mother was very, very ill.

Luis Medina: [10:57](#) As expected, I was not doing very well at the beginning. However, I enrolled in the introduction to [inaudible 00:11:04] mathematic course with Dr. Rubio, and I loved it. Ivelisse was very charismatic during lectures. But what I remember the most is that she stressed many times during lectures, the importance of undergraduate research. I had no idea at the time what was the meaning of that, but I kept remembering that advice.

Luis Medina: [11:25](#) That particular semester, the semester in which I enrolled in her course, was not a good one for me, as for her course. And I was starting to think that college was not meant for me. However, since I enjoyed her course and her character, I decided to ask her if I can conduct research under guidance. I was very depressed at the time, my plan was the following. If her answer was no, then I drop out of college, but if her answer was yes, then I'd continue. And I'm a lucky guy because even though I didn't have the best record at the time, she said yes.

Luis Medina: [11:58](#) And that day was an inflection point on my undergraduate career. I got confidence, started to get straight A's, did undergrad research about [inaudible 00:12:07] REU, learned about grad school opportunities, learned about soft skills like networking, finally, I finished my degree magna cum laude, which was close to impossible given how low I started my on the graduate career.

Luis Medina: [12:25](#) My second mentor is Victor Moll. I first met Victor in 2002 at the REU that I participated in. I really enjoyed working under his guidance. And I decided that I wanted to pursue a PhD at Tulane University just to work with him. I made a great choice. With Victor, I learned how to think problems outside the box, how to select research problems, how to read and write research articles, the whole process of submitting them. Many things that are related to academia.

Luis Medina: [12:59](#) And Victor was also my mentor at the most critical point of my life, which was the passing of my mother. She passed away in the year 2006. That was weeks before the oral examination, which at Tulane is the exam that you take before entering into dissertation. So the support that I got from Victor through the down period was just exceptional.

- Luis Medina: [13:22](#) Finally, my third mentor is [Doren Seiberger 00:13:58]. I first met Doren in 2008. He was my post-doctoral mentor at Rutgers University. Doren and I interacted for only a year and a half. In fact, we only have one joint paper, but I absorbed so much knowledge from him during that short period. And today, many of the techniques that I use in my research are techniques that either I learned from him or are inspired because of him.
- Luis Medina: [13:57](#) So yes, you can see mentorship has been very important in my life, and every day try to emulate these mentors of mine.
- Evelyn Lamb: [14:08](#) And are there any particular lessons that you feel like you learned from your mentors that you're actively trying to use with your students?
- Luis Medina: [14:19](#) Yes, with Ive I learned to pay attention to the student to try to see if they have struggles that sometimes they don't share. Because at the beginning I was not sharing my struggle with Ive. It was later in my undergrad career that I shared that. So from her that's what I do. I try to understand them to see if something seems to be off, try to recognize what is the thing that is not working.
- Luis Medina: [14:47](#) From Victor, I got the idea of challenging the student. The idea of recognizing that solutions to several programs are not necessarily the usual ones, that the students sometimes can surprise you and have ideas that are new to you.
- Luis Medina: [15:08](#) From Doren, basically I got the idea of enjoying what I do. Doren is a mathematician that when you work with him you can see how much she enjoys his work.
- Evelyn Lamb: [15:23](#) And you've mentioned already some significant challenges that you faced, especially being a first generation college student and the illness and passing of your mother. How do you think you've been able to overcome those challenges?
- Luis Medina: [15:39](#) I think I was able to overcome the challenges because I had the support of my family and support of mentors. For example, as I said before, my father was working two jobs in order to provide for the family. So I was not forced to work, which is a huge plus. Also, for the most part, my brother took care of our mother, which is a very significant event in our life. In fact, that is someone who made a sacrifice, one that allowed me to be where I am today. I love my brother Carlos, and he's my brother, of course, I love him because of that, but I'm extremely grateful for all the sacrifices he did.

- Luis Medina: [16:17](#) At school, I had mentors like I've who was constantly challenging me, for example, getting me on the credit research problems, helping me with my scientific writing. She also taught me the importance of dissemination. She made me practice for every presentation, taught me how important that working is, and she helped me with funding opportunities.
- Luis Medina: [16:42](#) When it comes to graduate studies, I think my personal experience during my undergraduate study helped me a lot. The first year of my bachelor degree, as I shared with you, was very, very hard. So when I went to grad school, I remembered those struggles and I was determined not to repeat that. So I studied a lot in grad school, especially during my first two years, and happily I did very well.
- Luis Medina: [17:09](#) Research-wise, I learned many things related to research by emulating my thesis mentor, Victor Moll. Establishing my field research took me a bit more than anticipated. At the beginning I was doing research close to my advisors, which is very natural, but I was very conscious about it, I wanted some kind of independence. So I started to do some working in order to achieve that. However, it was not until I [inaudible 00:17:42] to Puerto Rico and met Dr. Francis Castro that I started to focus on Boolean functions. Francis and I had great chemistry, and we did a good job in research. And now exponential sums and [inaudible 00:17:55] transformations of Boolean functions are an integral part of my main line of research.
- Evelyn Lamb: [18:03](#) And do you have any advice for students who are interested in math?
- Luis Medina: [18:10](#) To the students that are listening to this, work very hard. Follow your passion, but be open to new things. Don't be discouraged by what life might throw at you. Life is not always easy, but it can be very, very rewarding. Do not be afraid of asking for help. You are not alone. Finally, do some networking and get involved in your field as soon as possible.
- Evelyn Lamb: [18:37](#) Well, thanks a lot for taking the time to talk with me.
- Luis Medina: [18:41](#) Yeah, thank you, Evelyn.
- Evelyn Lamb: [18:44](#) Thank you for listening to the Lathisms podcast. It's produced by me, Evelyn Lamb, and made possible by a Tensor-SUMMA grant from the Mathematical Association of America. Our music is Volveré by La Floresta. Lathisms is an initiative to celebrate the accomplishments of Hispanic and Latinx mathematicians. It was

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founded in 2016 by Alexander Diaz-Lopez, Pamela Harris, Alicia Prieto-Langarica, and Gabriel Sosa. You can find more information about the project at [lathisms.org](http://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.