Ryleigh Moore: Through this experience, I not only gained valuable information and experience in working with real-world experts on problems, but I was also able to learn what it's like to work in industry, in national labs, which is something that is hard to get without doing these experiences, these internships. So, having this opportunity is just really invaluable.

Speaker 2: This is the ORISE Featurecast, a special edition of Further Together, the ORAU podcast. Join your hosts, Michael and Jenna for conversations with ORISE research program participants and their mentors, as they talk about their experiences and how they are helping shape the future of science. Welcome to the ORISE Featurecast.

Michael: Good morning, and welcome to another edition of the ORISE Featurecast, a special edition of Further Together, the ORAU podcast. Today, we are talking about the National Science Foundation's Mathematical Sciences Graduate Internship program, and I'm so excited to have three people with me who have direct knowledge of this program, including one of the program participants. So, today we have with us Ryleigh Moore, Marissa Torres, and Jennifer Burnette, who all have different roles to play in the program. So, we're going to start with Ryleigh, who is a participant in the Mathematical Sciences Graduate Internship, and Ryleigh, if you'll introduce yourself and tell us a little bit about who you are.

Ryleigh Moore: Yeah. Well, thank you so much for having me on today. My name's Ryleigh Moore and I'm a fourth year PhD student in math at the University of Utah. I'm originally from Boise, Idaho. So, I did my undergraduate work at Boise State University and for my PhD project, I'm working on numerical solutions. So, solving math using a computer, of what are called high dimensional stochastic differential equations. And so, I am expected to graduate about a year from now, in May of 2022.

Michael: Okay, awesome. Marissa, tell us about you.

Marissa Torres: Hello. Thanks for having me. My name is Marissa Torres. I am a Research Engineer for the US Army Engineer Research and Development Center, the ERDC as it's called, and I'm specifically at the Cold Regions Research and Engineering Laboratory in Hanover, New Hampshire. I have a background in ocean engineering from the University of Rhode Island. Then I'm bringing those skill sets up to the Cold Regions Lab, to see if we can't merge coastal and cold regions research and provide solutions in Alaska and the Arctic.

Michael: Excellent. And Jennifer Burnette, welcome. Welcome again, I should say, to the podcast, because you've done this before in a different capacity.

Jennifer Burnet...: I have. Yeah. So, in this capacity, I'm Jennifer Burnette. I am the program manager for the NSF, we call it MSGI program for short. I manage basically all aspects of the program for ORISE, including the recruiting and outreach and corresponding with the mentors in particular. We have another person on our team, Holly, who Ryleigh probably interacted with a lot, that does a lot of our participant interaction as well. So, USACE is one of 15, I think, hosting facilities that we have with the program across all the DOE national labs and other federal labs, so excited to be here.

Michael: Awesome. Well, thank you. Jennifer, if you would, give us just a high level overview of what the MSGI program is.

Jennifer Burnet...: Sure. So, MSGI is sponsored by the Division of Mathematical Sciences at NSF and really their goal with this program is to take students who are pursuing their doctoral degrees in either pure math, applied math, or statistics and give them real-world lab experience. A lot of research often happens at the university level and those types of research environments. And so, the key to this program in particular is getting that more applied, real-world experience for the students. And as we all know, with 2020, that the COVID-19 pandemic presented a lot of challenges. Typically, we hope to have on-site internships for all of the students. In 2020, we did a lot of adjusting and I'm very proud to say that we successfully still placed 51 students in 2020, all virtual.

Michael: Fantastic. 51 students, that's great. Ryleigh, as one of those students, obviously it wasn't the experience you may have been prepared for in 2020, but sounds like you still have been getting a lot out of the program and has still been beneficial to you.

Ryleigh Moore: Oh, absolutely. Yeah. It was such a great opportunity to be able to be involved with the NSF MSGI program, and I just can't thank everybody enough. Marissa was an excellent mentor. I learned so much from her about what it's like to work with real-world data. We were able to study the ocean tide and how that plays a role in the quantification of storm surge, which is important for flood hazard assessments, for people that live on the coast. And so, this work I feel is really important for safety of people, as well as for helping improve different sorts of models in that area of research.

And so, through this experience, I not only gained valuable information and experience in working with real-world experts on problems, but I was also able to learn what it's like to work in industry, in national labs, which is something that is hard to get without doing these experiences, these internships. So, having this opportunity is just really invaluable.

Michael: Awesome. Ryleigh, I guess, first of all, how did you hear about the program, but on a broader level, how did you get interested in, not in only math, but then being able to apply it in the way that you're applying it in the MSGI program?

Ryleigh Moore: Yeah. So, I learned about the program because a few students from the University of Utah program that are older than me, did the program the summer before I did and they just had great things to say about their experiences. And so, luckily I was able to apply and was fortunate enough to be accepted. As part of the program, you try and pinpoint different projects that you might be interested in working on. And so, I was very interested in working in something on the coast or ocean, modeling or analysis. I've been lucky enough to do a smaller workshop that was about 10 days, the summer before I did the NSF MSGI program, where I studied ocean wave dynamics. Also, with the US Army Corps of Engineers. And so, whenever I saw this project with Marissa, I just was really excited to continue on that similar train of research.

In a bigger framework, I got interested in math because I had a lot of great teachers and professors all the way from elementary and middle school, high school. And then, in my undergraduate experience at Boise State, that just really encouraged me and motivated me to pursue math. And they helped me apply for the PhD program at the University of Utah in Salt Lake City. So, I just was fortunate that these instructors took the time to meet with me and helped me grow in my passion, because I've always loved math.

I wasn't always a math major though, in fact, I started out in computer science and then I moved to engineering and finally, one of my professors convinced me that math is a great field and I definitely agree, and I don't regret anything. So, now I'm working in numerical analysis, which is computer science meets applied math. And so, I think it's a perfect fit, and I feel fortunate to have found the right area for me.

Michael: Awesome. Those instructors definitely make a difference, don't they? If they can help shepherd you along, right?

Ryleigh Moore: They did, for sure.

Michael: Marissa, as a mentor, what does it mean to you to work with students like Ryleigh and other program participants that you have the opportunity to interact with?

Marissa Torres: Sure. So, that's actually a great question, since this was my first mentor opportunity in my professional career.

Michael: Cool.

Marissa Torres: So, Ryleigh was my first mentee. It was a learning curve for sure. Being able to explain a project from its very foundation, applying some skills and other leadership development skills and experiences that I've picked up in my short professional career, and just being able to try to apply it. In terms of, setting expectations between mentor and mentee, what the project is about, what we're trying to do, and also guiding someone who is entirely out of this field, through coastal-related problems.

And what I've noticed, and I really appreciate about this program, is I relied on Ryleigh's experience and expertise in math and statistics, to help me with my problems. That's an area that I had so much data, I didn't know what to do with it, and I relied on her to help me sort through some things, because I couldn't work on it 100% of my time, kind of thing. So, it was really wonderful to have her point of view and have her feedback on what it is that we're actually trying to do, and being able to interpret the results in a meaningful way. So, I learned a lot from it. I'm glad that Ryleigh did as well. I actually applied to be a mentor again for this program, for this year. And I'm hoping to take the knowledge and lessons learned from last year and be able to lead a second student through a similar project this year.

Michael: That's exciting. As a mentor, I'm assuming you had mentors in your own history, that you perhaps leaned on or learned from, to shape what it was like to be a mentor for Ryleigh?

Marissa Torres: You would think.

Michael: Okay, really?

Marissa Torres: Yeah. I'm just trying to think back, in my academic career, I didn't really have a go-to. I guess, I relied more on my, maybe on my peers, older graduate students, for different needs. I was like, "I'm having trouble with this. Could you help me with that?" So, I did have some, maybe among my peers, but I never felt a sense of mentorship with any of my professors or teachers, growing up. But in my short professional career, even now I'm noticing that all of your peers or your mentors in different ways, just being able to learn something from everyone you meet and whether that's good or bad in your personal opinion. But being able to then pick up certain skills and knowledge and apply that, and pass it forward, and pay it forward to the younger generation, is only something I've recently learned and had the experience to do.

Michael: Okay. Awesome.

Marissa Torres: Yeah.

Michael: Right, right. Ryleigh and Marissa, this is for both of you, what was your working relationship like from a day-to-day perspective? I mean, I'm assuming since all things pandemic separated the world, you weren't exactly working together, but you were working together, just together apart, as they say. So, how did that work?

Marissa Torres: Yeah. I knew this was going to be a virtual internship, so I did my best to set up a work plan that would make sure that we're in communication frequently. It's only a 10 week program. There's only so much that you can accomplish in 10 weeks. So, I made sure that we had meetings twice a week, one to discuss what our goals are for the week, one meeting in the middle of the week to discuss what progress we've made, what issues or challenges that we've been facing and of course, email or anything in between as needed.

And I tried to make sure that Ryleigh got exposure to our lab and meeting other people in our organization, to learn from them or figure out like what CRREL is all about, and the other types of research that is being done there. So, I made sure to set up seminars with her so she could learn from other people, what they're doing, learn from what my PIs, what my mentors were doing, kind of thing. Hopefully, that that was enough. We did what we could in 10 weeks, but that was the goal, to make sure that she got as much of a regular experience as she could in a virtual environment.

Jennifer Burnet...: That's wonderful to hear, as the project manager for this program, because that was a huge concern that we had, that interns would get placed with mentors who, not intentionally, may have not had enough time or weren't at the forefront of their minds. And they would look up and it would be two weeks in like, "Oh yeah, I need to check in with my intern. How is that going?" So, to hear a very robust, from my perspective, plan that you put in place to work with Ryleigh, that's great. I'm excited to hear that you did that.

Michael: I mean, two weeks isn't a lot of time, but it sounds like it was pretty packed, Ryleigh.

Ryleigh Moore: Yeah. I mean, I just give everybody involved a ton of credit. Whenever COVID first started happening and things started shutting down, I was really worried that this experience wouldn't be able to happen and-

Jennifer Burnet...: Oh weren't we, we were too.

Ryleigh Moore: Yeah. I just think everybody did an excellent job making the online experience very rich. And as Marissa said, we met twice a week, and she was always available over email or to jump on and chat if we needed to, about something. And so, I think that everybody made the best out of a difficult situation and I certainly got a lot out of the program. And so, I'm just grateful that we were able to work through unexpected things that popped up, like COVID.

Michael: Right, right. Ryleigh, what was the best part of your 10 weeks?

Ryleigh Moore: That's a great question. There are so many just great experiences that I had in the 10 weeks. I would say my favorite part of the internship was just having the opportunity to learn from Marissa, because my background definitely is not in coastal work or anything like that. But as an applied mathematician, it's important for me to interact with experts in other fields and help apply the mathematics that I know to their problems and to their models, so that we can try and improve together, the research that's happening.

And so, it's just a great opportunity to work with real experts to better understand other research fields that are happening and to try and help in the areas that I can. But beyond that, just the opportunity to meet lots of other people, as Marissa said, I was able to join in meetings with many different groups that were working in the lab, to learn about other research that was going on. And then, one of the biggest advantages to this program, I think, is as a PhD student, I work a lot with different kinds of mathematical theories and things like that. So, having the opportunity to apply the math to real-world data is something that is really beneficial from these types of experiences.

Michael: Awesome.

Jennifer Burnet...: So, I have a question, really quick, if you don't mind?

Michael: Yeah, of course.

Jennifer Burnet...: Has the experience you've had with Marissa, and it sounded like you did a little bit of other participation with USACE before. How has that changed your perspective maybe on what you're thinking for once you graduate and what kind of career you might be pursuing? And I may be jumping ahead here, but I'm very curious.

Michael: That was actually very close to my next question. So, you're good.

Ryleigh Moore: Thanks for the question. Yeah. I'm glad you mentioned that. Well, whenever I first started graduate school, I really was new to the idea of being a mathematician. I always enjoyed math, growing up, but it wasn't until my second year of college, if I recall correctly, that I really became a math major and I graduated in three years. So, that wasn't too long before I had to say, "Okay, I'm going to commit to applying to a graduate school." And so, I think through that experience, I always was under the impression that mathematicians usually teach at a university, maybe do research, but through opportunities like this program, as well as opportunities ... I was part of a Arctic expedition, where I went to the Central Arctic for about six weeks in September and October of 2019.

Jennifer Burnet...: That's cool.

Ryleigh Moore: And I deployed seasonal ice mass balance buoys that were used as part of researching the Arctic climate. The expedition is called the MOSAiC Expedition. It lasted an entire year and it's being hailed as one of the largest Central Arctic expeditions ever. And so, to be a part of that, to be a part of this internship, which was 10 weeks, which is an amazing opportunity to work with the ocean, which I'm really passionate about as well. And I've also been involved in some smaller workshops, doing research with experts in different areas.

Well, let me back up, I guess, I did a 10 week workshop in North Carolina where I worked with USACE as well on modeling ocean wave dynamics. And so, I guess through all of these opportunities, it's really shifted my perspective that in math, you can do tons of different things. Really, the world is open to whatever sort of research you want to do because you're able to interact with experts in other fields to gain the knowledge you need to do the research in those areas. And so, I think to answer your question, the programs like this have really broadened my understanding of what's out there.

And so, I'm planning on applying to all sorts of different jobs and opportunities to see what sticks, I suppose, and where I think I can have the biggest impact to help other people. And so, that may be in mentoring roles either in academia or industry, I may want to still teach, but I'm also very excited for opportunities in industry and national labs. And so, I wish I had a better answer for you. I'm sort of 50/50, on the fence about it.

Jennifer Burnet...: No, that's great.

Ryleigh Moore: Instead of probably like, "Yeah, I'm going into academia for sure," before I was able to take part in these sorts of programs. So, before I was able to take part in these programs, I was very set on academia. Now I'm definitely split because I think there are just so many opportunities in both.

Michael: Well, and I think that's great and I love that, that really is the story of the MSGI program, but really of all of ORISE's research participation programs, is you can see that you don't have to just chart one course to do anything. You can use the skills, and in this case, applied mathematics and all of that in any number of ways. And so, I love that you're about to graduate with a PhD, but you still don't know what you want to do when you grow up. I love that.

Jennifer Burnet...: And you have so many opportunities, which is great.

Michael: Right.

Ryleigh Moore: For sure.

Jennifer Burnet...: I loved hearing that. Thank you for sharing because that's one of the ultimate goals of the program is, you getting that exposure and seeing all the different opportunities that might be available at the labs or elsewhere.

Ryleigh Moore: Definitely. Yeah. Well, being part of this NSF MSGI program definitely, it was my biggest experience in terms of working with industry professionals on a real research project. And so, I think being able to be a part of this program was just eye opening to me, in terms of what's out there and all of the opportunities. And there's really great research going on in different fields and it just makes me excited, I guess, about the future.

Michael: That's wonderful. I probably don't even have to ask this question, but I assume you would recommend this program to others?

Ryleigh Moore: Yeah, no, absolutely. I would definitely recommend the program. I think that I'd recommend it for anybody. Even if you think that you know, you want to go into a certain field already, I think that taking the opportunity to work and to be a part of this internship is just very helpful, in terms of figuring out where your passions may lie and also, all of the different opportunities that are out there. So, I definitely recommend being a part of the program.

Michael: Excellent. Marissa, for you, similar question, would you recommend to others serving as mentors, not necessarily only for this program, but for other opportunities too? You mentioned earlier, you didn't really have a specific mentor you could point to you, but it might be helpful, now that you've got some experience under your belt, for other people to serve as mentors as well. Would you recommend mentorship to your fellow scientists and researchers?

Marissa Torres: Absolutely. That doesn't have to be through this program. I think it's important for every young professional, especially in a STEM field. It doesn't have to be engineering. It doesn't have to be math. It could be anything. Everybody should seek mentors and everybody should seek mentees. It's the paying it forward kind of pipeline there. I am very grateful and appreciative of being able to be a mentor in this program, of having opportunities to do it more than once.

Michael: Awesome.

Marissa Torres: I think, you just learn a lot from each other and being a mentor is about practice and having that back and forth, and learning from each other. So, I think I would definitely recommend it to anybody seeking to-

Michael: Awesome.

Marissa Torres: ... personal, professional development kind of thing.

Michael: For sure. Absolutely. Thank you for that. Jennifer-

Ryleigh Moore: Can I chime in on that first?

Michael: Absolutely.

Ryleigh Moore: Yeah. I think what Marissa said about seeking mentors and mentees. One thing that, that brought to my mind about this program is it helped foster my confidence in that area. And so, since this program, I've taken on mentoring some undergraduate students who are interested in going to graduate school. I've also helped mentor a student doing some research as well. And so, I think those are things that definitely, this program helped me think about more and see the importance of doing those sorts of things.

I've also gained another mentor. I was able to start doing a little bit of research with a professor from the Pathology Department at the University of Utah. And I think through this experience, I was able to see that I don't necessarily need to be an expert in different fields, to help with research. I can work collaboratively with an expert to help with models or different things that they're trying to develop. So, I just am very grateful that this program instilled more confidence into me, that I can be the math expert in the room and I can help other people with their research projects or their endeavors to go to graduate school, for example, with the undergraduate students that I'm trying to help.

Michael: The mentee has become the mentor. I love it.

Ryleigh Moore: Yeah, a little bit.

Michael: I love it. Jennifer, for students who are interested in this program and others, because we have countless others, what do people need to do to find out about it?

Jennifer Burnet...: Well, this program is pretty robust. So, we actually have a website, the easiest way to find it is just do NSF MSGI ORISE, and it's the first link in Google when you search it. There's not an application open right now. It'll open sometime in early fall of this year. We just finished ... Well, we're trying to finalize the internships for this coming summer, from the fall 2020 application. But if you're interested or people know someone who may be interested in applying to the program, it really is more niche than some of our other opportunities with ORISE. And I think a lot of that is on purpose because they do want to get those students who are focused in math to be able to get these experiences like Ryleigh has talked about. And so, that really is a strong focus for us, is just those students that are doing applied math, pure math, or statistics.

We do get a lot of interest from engineering students and some others pursuing similar doctoral degrees, and there are other opportunities within ORISE that we can point them to if they're pursuing that type of degree. But the website's great. It has the projects from last year, you can see we had 146 projects submitted from mentors across labs all over the country. So, that's a great perspective to see what might be available if you apply for this program and the types of projects that you could work on. And it really is A to Z, a lot of different types of projects. So, the program's pretty competitive. I think we have really strong applicants and strong mentors, and there's a reason mentors keep coming back. And we get some re-applying applicants as well, who have been previous participants, because they're so interested in continuing to benefit from the program.

Michael: Right. Wonderful. Well, thank you all so much for spending a little bit of time talking about the NSF MSGI program. I really appreciate your time today.

Ryleigh Moore: Thank you very much.

Michael: Jennifer, why don't you just go ahead and say, for this and all other opportunities, where can people go?

Jennifer Burnet...: Zintellect.com and it's spelled like Z intellect. That's the best way I can phrase it.

Michael: That's the best way to say it. All of our opportunities are there. So, if you're looking for one, go to Zintellect and find it. Thank you all so much. Have a great rest of your day.

Speaker 2: Thank you for listening to the ORISE Featurecast. To learn more about the Oak Ridge Institute for Science and Education, visit orise.orau.gov, or find us on Facebook, Twitter, and Instagram @ORISEconnect.