Faculty Spotlight with Dr. Madsen

We conducted our first faculty spotlight interview with Dr. Madsen, a resident of the 6th floor of Lincoln. His primary research interest, and what his PhD research involved, is representation theory. He is also interested in accessibility of math for disabled students e.g., blind students, and ways to help, although this is not a primary research interest. He also has a passion for making mathematics education as good as it possibly can be, but this is also not a primary interest as he does not find the process of dealing with statistics and surveys to be terribly interesting.

Dr. Madsen has always loved mathematics and recalled early memories of his childhood when he was first learning to multiply. He had a fascination with the idea of squaring or square rooting a number and treating it like a function. So for example, taking the square of 3 involves plugging in 3 to get 9, and taking the square root of 9 essentially reverses the function to get 3. He also thought that primes were cool and remembers learning about the unsolvability of the quantic polynomial in high school and being fascinated.

When he was younger, however, he wanted to be a fireman, as they are helpful people doing good for the world. He was also interested in becoming a lawyer and would go to the library to read law books, and even memorized some traffic laws. He loved the idea of there being a right and wrong, but realized that being a lawyer was more about being a stronger arguer than being absolutely right. Although there is some debate in mathematics (especially at a foundational level or within the details of proofs), it is far less controversial in his view.

Dr. Madsen also really loves problem-solving. He claims that at a fundamental level, you can always make sense of math – so much of it is by definition. It's still hard, but there is sense of thrill and excitement that comes from being given a new problem and trying to wrap your head around it, and a great sense of satisfaction from being able to solve it. He gravitates toward things that challenge him, and he likes exploring math with people.

As a professor at YSU, Dr. Madsen spends most of his time teaching, or at least preparing for lectures, lecturing, answering emails, grading, and helping students figure out how to use WebAssign. He does meet with students for various projects/theses and sneakily chooses to meet with them all on Tuesday when he has no classes to teach. But there is also a lot of stuff going on behind the scenes that students don't see, including the fact that many professors are on various committees – Dr. Madsen is part of the accessibility committee, for example. Sometimes professors will even help rewrite certain academic policies. Dr. Madsen sometimes finds this fun, and sometimes finds it boring. For him, research is also very limited, but during the summer he can catch up a lot (except for this summer, where he had to spend time preparing for COVID classes). That all being said, he likes how YSU divides his time. There are pros and cons, but he loves teaching and interacting with people and just talking about math. In fact, Dr. Madsen's favorite aspect of his job is just that it's math. He really loves math. Teaching and seeing people get excited about the subject is cool, but math itself is really cool.

Some fun hobbies that Dr. Madsen has outside of mathematics include playing with electronics, including breadboards, and messing around with musical synthesizers/techno music. He also plays the piano, but alas, between having a job as a busy professor and a family, he just doesn't have the time. If he were not a math professor, he probably would've been a high school teacher (more on that in a bit), but outside of math, he may have gone into electrical engineering or

gotten a PhD in Physics. He really likes music, but doesn't consider himself artsy enough to have seriously pursued that path.

As far as his story goes, Dr. Madsen studied mathematics in Denmark during his "undergrad" years – it was a little different for him in that he had a combined 5-year program that resulted in his master's degree at the end. He may have obtained a bachelor's on the way, but it was just part of the process. While he technically didn't have a double-major, he took enough courses in physics for him to feel that he was essentially a double-major. His original plan was to teach high school math at a local school (he had no education classes, but that is not a requirement in Denmark). Getting accepted to universities for grad school in Denmark is extremely competitive, so he was not planning on going that route, but he said that someone said he could do it. **Someone believed in him and it meant a lot**, so he decided to go that route.

He came to the United States and did his PhD work at the University of Oklahoma before landing a job at YSU, where he thinks his strong teaching experience helped him get the job. He thinks the atmosphere here is very welcoming, with a lot of friendly people, and the student engagement is great. Not all universities send students to conferences like we do, and he loves that. He loves being part of a student's change, from their first class with him in earlier mathematics courses to later classes after they have mathematically matured significantly.

Lastly, Dr. Madsen offered some advice on applying to grad schools. As any student who has started the process can attest to, it's very stressful and conflicting advice is constantly given. He says that you should ask as many people as possible, as people derive their opinions from very personal experiences, which means that you can have perfectly valid yet contradictory opinions on the matter. Getting more advice can only help. He also says that you should ask yourself some questions, such as what kind of math do you want to do? Pick some general subjects (e.g., pure math in algebra), but don't get too specific and obsess over a topic because once you are in grad school, the advisor you choose will strongly influence your topic anyways and you may change your mind on what you want to do. However, still try to pick a school that features a good number of faculty in that area so that you have a lot of choices for advisors.

Next, do not overly focus on the prestigiousness of a school. You want a welcoming school. You want a school with faculty who always have an open door, beyond their office hours. You want a school with students who support each other. Dr. Madsen knows some people who have left grad school because they just didn't like the people there; the people there weren't nice. Some environments are more competitive and feature students and/or faculty who might be more narcissistic. And make sure you know what you want out of life, at least to some extent. To succeed in some schools, academics must be your first priority in life. Dr. Madsen knew he wanted a family, so even though he loves math, he knew he had other priorities. That's not to say that you can't have both, but it is very hard, especially at some schools. So make sure you choose a school that's a good fit for you, personally.

Finally, once you are in grad school (if you choose that route), do not get discouraged. It is hard. For many students, this will be where they get their first B or C, or do "poorly" in some way. That is ok. Don't let this destroy or consume you. Let your motivation of the subject drive you to succeed.

While we would have loved to talk with Dr. Madsen more, we unfortunately ran out of time. We thank him for giving us his time and participating in this interview!