

The Women in Mathematics Directed Reading Program (DRP) builds an inclusive culture in Math

Women in Mathematics (WiM) pairs undergraduate women and people of underrepresented gender identities with graduate students on research projects to boost feelings of belonging and create pathways into research

Joline Cheng, an undergraduate in data science, was intrigued by mathematical research, eager for a chance to study topics in greater depth than her first-year courses allowed. Yet she was simultaneously apprehensive, feeling in need of “a stepping stone into that world.”

When she heard about the [Directed Reading Program](#) (DRP) offered through [Women in Mathematics](#) (WiM), it sounded like the perfect opportunity. The program gives undergraduate students (mentees) who identify as women or underrepresented gender identities the opportunity to work with graduate students of all genders (mentors) on a research project. While DRPs are run at other universities, Waterloo is unique in using the DRP to promote equity, diversity and inclusivity. The DRP is open to students of any year and has no minimum grade requirements.

Cheng was paired with J  r  my Champagne, a PhD student in Pure Mathematics, and together they launched an ambitious research project on *“palindromic continued fractions and transcendental numbers.”*

Cheng said that the program, which ends with a presentation to fellow participants, enhanced her math communications skills. “I have done many presentations before but a math presentation was something new,” said Cheng. “For a math presentation, the purpose is not to entertain as much as to teach people. This was an introduction to a whole new style of communication.”

Already, the experience is paying dividends for Cheng. It helped her land a competitive co-op job at Splunk, a San Francisco software company.

“I had the DRP on my resume and one of the interviewers for this position thought it was very cool,” said Cheng. “We connected over this DRP project and I got the job. I think employers find this type of experience impressive.”

History of the DRP at Waterloo

Success stories like Cheng’s are exactly what the DRP founders Ghazal Geshnizjani and Bertrand Guenin envisaged when they launched the program in Spring 2022. At the time, they were motivated to create a program that would encourage women and people of underrepresented gender identities to remain in STEM-related fields.

“Over the years, I've seen the impact that doing research with undergraduate students, particularly underrepresented gender identities, has on their interest and motivation to pursue STEM fields,” said Geshnizjani. “I feel like the DRP is one of the very simple things we can do to directly address the issue of inclusion. When students participate in the DRP, they feel they're a part of the community, that this is where they belong and that, if they want to, they can pursue a career in this field.”

Vani Singh, a statistics and actuarial science student and DRP participant, believes the program is achieving this goal.

“Historically, math is a pretty male-dominated field and, as women, we feel the imposter syndrome and sometimes box ourselves in,” said Singh. “The DRP is a great opportunity to pick up new skills and fuel your personal growth while working with other people in the same position as you. It is a very uplifting experience.” As a result of her positive experience in the program, Singh decided to pursue graduate studies.

The DRP originated in the mathematical department in the U. of Chicago and has become popular among many mathematics departments in the U.S., including Harvard, MIT, Princeton and Stanford. In Canada, McGill and Western both have DRPs. The DRP was introduced to Waterloo by Jennifer Zhu, a Pure Mathematics Ph.D. student who transferred from Texas A&M. Waterloo's program is distinctive in being the only DRP that is run faculty-wide rather than within a single department.

“Due to the unique culture of our faculty, we receive applications from Applied Mathematics, Combinatorics and Optimization, Computer Science, Pure Mathematics, Statistics and Actuarial Science,” says Yu-Ru Liu, a professor in the Department of Pure Mathematics and Director of WiM. “Some students choose projects from their majors, and others deliberately choose projects outside their comfort zone. Some graduate mentors also lead a project that is not directly related to their research. Hence, DRP also promotes interdisciplinary research.”

Unique mentorship opportunities for graduate students

The program also provides invaluable experiences for the graduate student mentors. Bertrand Guenin, a professor in the Department of Combinatorics and Optimization and co-founder of the DRP program, explains that graduate students don't have opportunities to supervise despite it being a major component of an academic career.

“If you're going to be a professor, then you should be comfortable and enjoy supervising students,” said Guenin. “The DRP gives graduate students the opportunity to see whether they like it.”

Yiran Wang, a PhD student in the Department of Statistics and Actuarial Science and a DRP mentor, was grateful for the opportunity to explore a supervisory role and believes the experience will prove beneficial in his future career.

“The DRP is a very good platform for you to improve your teaching, mentoring and communication skills,” said Wang. “Right now, I’m applying for postdoc positions. It’s wonderful to be able to include this experience in my cover letters and teaching statements.”

For J  r  my Champagne, the DRP was a way to get more involved with the community after the isolation of the pandemic while simultaneously trying something new.

“Because of COVID, I hadn’t had a lot of department participation and I was looking for ways to get involved a little,” said Champagne. “At this point in my PhD, I’ve been supervised a lot, so it was fun to flip the script and try it myself.”

Room for growth

After just a few years, the DRP founders can already see the positive impact the program is having.

“The mentees are coming back to us and giving us feedback about how it made them change their decision to pursue graduate school, for example,” said Geshnizjani. “It helps them decide which field they are interested in, and what part of mathematics they like to do. It is just heartwarming when you hear these stories.”

And the program is gaining in popularity. “Right now we receive way more applications than we can support,” says Liu. “It feels wrong to reject over 100 students who want to get research experience in one term. With more funding, we could make the program even more inclusive for women and people of underrepresented gender identities.”

If you’re interested in supporting the DRP, which is one of the WiM programs that help build a more diverse and inclusive community in the Faculty of Mathematics, consider making a gift to [WiM](#). Alternatively, consider joining the [Waterloo Women’s Impact Network](#). WWIN funding supports WiM, Women in Computer Science (WiCS) and the Centre for Education in Mathematics and Computing’s diversity programming.