Program in
Mathematical Methods
in the Social Sciences

2023-24
Year in Review

Northwestern
WEINBERG COLLEGE OF ARTS & SCIENCES
Program in **Mathematical Methods in the Social Sciences**

mmss.northwestern.edu

Director **Welcome Letter**

Jeff Ely

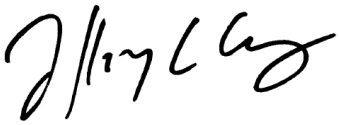
After 9 years in the role of Director of MMSS the time has come to pass the torch.

Reflecting on this past decade I am struck by the memories of so many inspiring students, engaging moments in the classroom and fun times just chilling at our regular social events.

Nicole Schneider and I joined the program in the same year with the goals of re-invigorating the Senior research experience, jump-starting our alumni outreach, and broadening representation among our students. I am happy to say that we have made big advances on all of these dimensions with even more progress on the horizon.

Our new Director is Ivan Canay, Professor of Economics and legendary MMSS Econometrics teacher. I know that Ivan is going to hit the ground running, maintaining and building on a program that has been one of the crown jewels of Northwestern's Weinberg College of Arts and Sciences.

Now I know what you are thinking, but don't worry: Nicole (the real Ship's Captain) is staying on as Program Coordinator and there couldn't be a better guarantee of continuity and vision. And for that matter I am not going anywhere either: I will still teach my beloved Advanced Game Theory class (until they drag me kicking and screaming) and I'll always be a resource to students navigating their way through our program and young alumni through their early careers.



Jeff Ely is the Charles E. and Emma H. Morrison Professor of Economics at Northwestern University

Year in Review **Fall 2023**

September—First Year Orientation: Welcoming the Next Class of MMSS Students

The MMSS program welcomed the Class of 2027 with an exciting **First Year Orientation** held during **Wildcat Welcome Week**. This meet up serves as the initial gathering point for entering students, helping them prepare for the challenging and rewarding journey ahead. **Program Director Jeff Ely**, **First Year Advisor Eric Schulz**, and our dedicated **Peer Advisors** gave a mix of high-level goals and tactical advice.

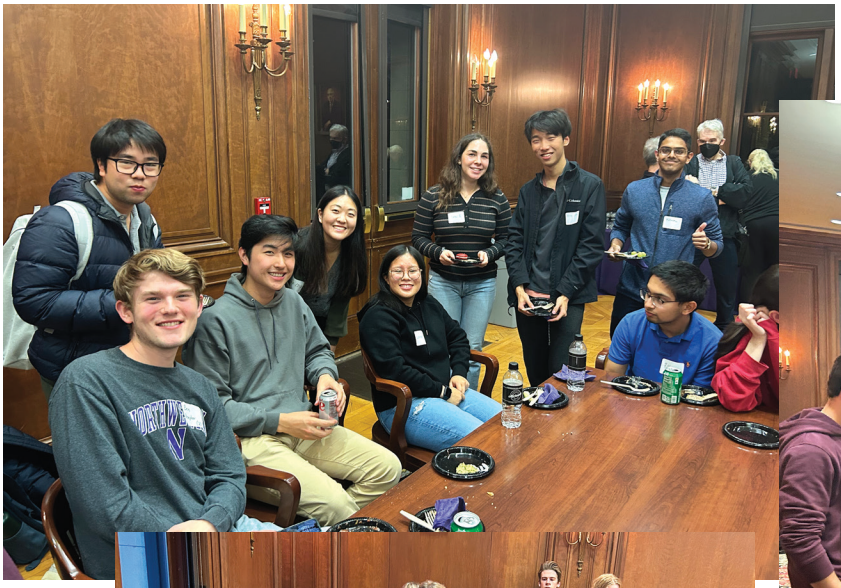
We were also lucky to have all three PAs return from last year so our first years had very seasoned mentors guiding them. Special shout outs to **Ethan Jie**, **Savir Maskara**, and **Dylan Yan—thank you!**

year in review

Year in Review **Fall 2023**

October—Fall Welcome Party

Our fall event is always held in early-to-mid October where the weather is still very pleasant. We had a great turn out as students, TAs and faculty convene for some social time. There is always a mix of excitement and stress as the students balance their academics and extracurricular activities, realizing that mid-terms are just around the corner, especially with the quarter system in full swing. First years and our incoming Sophomore Entry students are well represented. It's also fun to see a significant number of seniors attend, as they realize this will be their last fall MMSS gathering, adding a sense of nostalgia and reflection to the event.



year in review

Year in Review **Winter 2024**

January—MMSS Trivia Night 2024

We are happy to report that the **Nathan Popkin's Fund**, established to enhance the MMSS student experience, had an impact on the MMSS Program over the past year. During January of 2024, the program hosted an inaugural **MMSS Trivia Night**—an event idea generated from MMSS students.

The event was a resounding success and provided a welcome escape from the chilly January weather in Evanston. Students were randomly divided into teams, which created an excellent opportunity for them to connect with MMSS peers across different grade levels.

Trivia was culled from categories on different decades, classic TV, geography, Chicago, and even a few on MMSS. Team selection was dictated by the type of candy each student pulled out of a bag. Teams had fun creating their name which was to be inspired by their designated team candy. The York Peppermint Patty **"Minty Fresh aka Yorkalicious"** or KitKats were the **"Wild Kats"** and Milky Way bars were **"Milk-mathical Methods and the Wayful Sciences"** who came out victorious with the final highest score.

This community-building event is already booked for **January of 2025** and is likely to become an annual tradition for many years to come.

year in review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MMSS


OF ARTS & SCIENCES
WILDCATS WELCOME


HERSHEYS


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WAY


nerds
NERDS


Wild Kats

Year in Review **Spring 2024**

April—Young Alumni Career Panel

The Young Alumni Career event featured a group of alumni who shared their post-graduation experiences and career paths. **Alex Schneider, a 1999 MMSS and 2005 Kellogg School of Management graduate**, moderated the discussion, offering his background in investment banking, private equity, and business ownership. This year's panelists included **Alyssa Connor '23**, **Paige Kaliski '16**, **Allison Shaner '17**, **Robbie Winter '21**, and **Ryan Zlotky '23**.

Moderator: Alex Schneider
LinkedIn Profile

Alyssa Connor

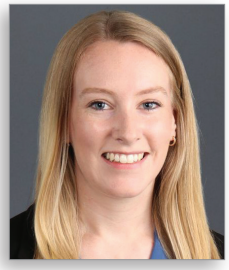
Industry: Consulting
Company: Boston Consulting Group (BCG)
Title: Associate
NU Graduation Year: 2023
Majors: MMSS, Economics, Kellogg Certificate in Managerial Analytics
LinkIn Profile

I graduated from Northwestern in June 2023 with a double major in MMSS and Economics. I started as an Associate at BCG this past October, after having interned before senior year, and primarily work on projects with healthcare insurers and providers.

Paige Kaliski

Industry: Education/Government
Company: Chicago Public Schools
Title: Senior GIS Data Strategist
NU Graduation Year: 2016
Majors: MMSS, Social Policy
LinkedIn Profile

Paige is a GIS Data and mapping professional currently working at Chicago Public Schools. She first learned GIS through the Northwestern Public Interest Program, which placed her at a fellowship in the urban planning agency CMAP. After a year at CMAP she started working for the City of Detroit in various GIS, data and programming capacities related to blight removal and vacant land strategy. She came back to Chicago last summer to continue working with GIS and data in the public sector, using both to understand where CPS students live, go to school, and how that impacts school enrollment and space utilization.



Allison Shaner

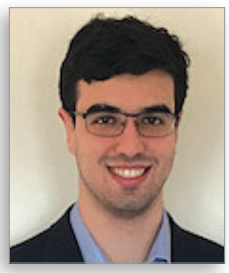
Industry: Tech
Company: Microsoft
Title: Consultant, Industry Solutions Delivery–Engineering and Architecture Group
NU Graduation Year: 2017
Majors: MMSS & Economics, Minor in Spanish
LinkedIn Profile

After graduating from Northwestern and the MMSS program in 2017, I went to work for Navigant Consulting, where I specialized in data analytics related to class action lawsuits and investigations. After a few years of applying my problem-solving skills and learning how to code in multiple languages, I took a job at Microsoft as a Cloud Data and AI Engineer/Consultant. For the last three years, I've been designing and delivering Azure data solutions at some of Microsoft's largest customers. In the fall of 2022, I started at Kellogg in the part-time, Evening and Weekend MBA program. I will graduate from Kellogg this coming summer.

Robby Winter

NU Graduation Year: 2021
Majors: MMSS, Economics, Mathematics, Kellogg Certificate in Managerial Analytics
LinkedIn Profile

Hi all! I graduated from Northwestern in 2021 with majors in MMSS, economics, and mathematics, as well as a Kellogg Certificate in managerial analytics. After graduation, I spent two years as an economic consultant at Epsilon Economics, doing economic analysis for litigation, but also got to dip my toes into the world of life sciences compliance consulting. As of September, I'm a full-time student again—this time at the University of Chicago—pursuing a master's in statistics. I'll be spending the summer interning with the Advanced Analytics team at United Airlines. Outside of work/school, I love to run, and I'm gearing up for my third marathon this fall!



Ryan Zlotky

Industry: Consulting
Company: Bain & Company
Title: Associate Consultant
NU Graduation Year: 2023
Majors: MMSS and Economics with Managerial Analytics certificate
LinkIn Profile

Ryan is an Associate Consultant at Bain with interests in CPG and Retail. He is passionate about using data-driven insights to better understand human behavior.

(Left to Right) Moderator Alex Schneider '99 WCAS and '05 KSM, Alyssa Connor '23, Paige Kaliski '16, Allison Shaner '17, Robbie Winter '21, Ryan Zlotky '23, and Director Jeff Ely

The speakers shared valuable insights on internships, career choices, and work-life balance, offering their firsthand experiences and lessons learned. Alyssa works in healthcare consulting at Boston Consulting Group (BCG), Paige is with Chicago Public Schools (CPS) and has a background in data analysis and urban planning, Allison is a cloud data engineer at Microsoft, Robbie is pursuing a Master's in statistics at UChicago after working in economic litigation consulting, and Ryan is consulting at Bain & Company. **Overall, the conversation emphasized the importance of transferable skills, being open to different internships, and maintaining a strong social and professional network after college.**

Transferable skills: The alumni all had examples on how MMSS helped prepare them in the workforce—from the ability to break down complex terms and scenarios in areas such as seller financing or employment agreements Familiarity with numbers, game theory, decision analysis and econometrics can be vital in real-world scenarios, such as negotiations and data analysis, highlighting the transferable nature of these skills from the MMSS classroom to one's career.

Internships as learning opportunities: The panel was in complete agreement that internships **should be viewed as a chance to explore various fields and gain skills**, rather than just a means to secure a job afterward. Trying various internships can help you learn what you do and don't enjoy, which is as important as gaining industry experience. Alex realized how a sales role, despite seeming unrelated to his later finance career, proved more valuable than his first investment banking internship in developing key interview skills.

Robbie shared how he used his time as a Northwestern tour guide to leverage future internships. For him, the key to success was excelling at any given role, and then learning how to effectively communicate his experience and how this translates to success in future roles. This ability to communicate effectively can help bridge into areas unrelated to your initial internship experience.

Alyssa had a more direct path and shared how her consulting internship after their junior year led to full-time job offers—which was in part due to her attendance at this MMSS event years ago when she connected with a **BCG alumni panelist!**

Year in Review **Spring 2024**

April—Young Alumni Career Panel

Transitioning from college to adult life can make it harder to form friendships. Panelists reflected nostalgically on the close-knit community of college life and how much effort it takes to establish similar relationships once you're out in the workforce. Robbie shared how joining a running group not only helped with fitness but also expanded his social and professional circles, as members were from various age groups and even helped with job referrals. Beyond a running or sports club, there are other activities such as taking art or music classes, to meet people. Work-related friendships also emerge as a natural path to expand one's social circle.

MMSS 2024
Senior Thesis Projects

The senior thesis is the capstone to the MMSS curriculum. It provides students the opportunity to draw upon the skills they have gained in class and apply them to a substantial piece of original research. During their junior year, MMSS students already begin to select a topic and advisor. As seniors, they work to refine their research question, complete any further data collection, and compile their analysis into a cohesive paper. Here are summaries of three research projects from the class of 2024:

"Generating Partially Synthetic Tabular Data with Generative Adversarial Networks Conditioned on Partial Information"

By Evan Olsdal

Evan Olsdal's thesis, supervised by Professor Ursula Porod, introduces a novel approach to generating synthetic tabular data while balancing privacy and utility. By developing a new GAN architecture called PITGAN, Evan focuses on generating partially synthetic data that preserves the utility of datasets like the American Community Survey (ACS) while protecting individual privacy. His model conditions the GAN on partial information from the real dataset, making it useful for privacy-preserving public data release. This work offers important advancements in the field of data privacy, particularly for sensitive datasets, and has real-world applications in public policy and data science.

"Bank Runs, Insolvency, and Competition with Heterogeneous Depositors"

By Alex Brunet

Supervised by Professor Richard Walker in the Department of Economics, Alex Brunet's thesis explores how depositor heterogeneity contributes to bank runs and insolvency, using the 2023 collapse of Silicon Valley Bank as a case study. His theoretical model demonstrates how large depositors and depositor concentration intensify financial instability, especially in competitive environments. Alex proposes that banks could offer tailored deposit contracts to mitigate the risk of insolvency. This timely research makes a valuable contribution to understanding banking crises, depositor behavior, and financial regulation, particularly in light of recent real-world banking challenges.

"DQN with Action Embeddings for Multiplayer Catan"

By Rob Dubinski

Rob Dubinski's thesis, supervised by Professor Zach Wood-Doughty, applies deep reinforcement learning (DRL) to the popular board game Catan, focusing on the complexities of multiplayer environments. By incorporating action embeddings into the Deep Q-Network (DQN), Rob's model improves agents' decision-making and overall performance. His experiments show superior outcomes in both win rates and strategic choices compared to traditional DRL algorithms. Rob's work highlights the practical application of reinforcement learning in complex multiplayer decision-making scenarios, contributing significantly to artificial intelligence and game theory.

MMSS Senior Graduation
Class of 2024

A Celebration of Achievement and Community

The **Mathematical Methods in the Social Sciences (MMSS)** program's seniors were a part of the 166th commencement weekend here at Northwestern University. On Friday, June 7, we hosted a special MMSS reception, alongside friends and family, for these exceptional students who were celebrated for their achievement in completing this rigorous honors program. Aside from the awards and accolades, students appreciated the opportunity to spend the afternoon reconnecting with their classmates. It was a chance to socialize, share experiences, and strengthen friendships, creating a sense of community and camaraderie beyond the formal graduation programming.

senior graduation

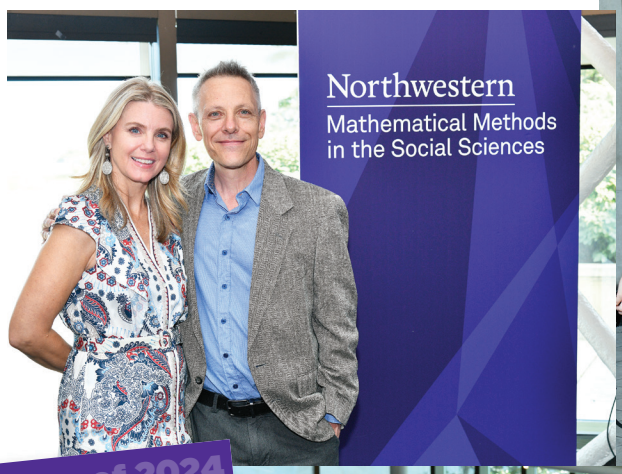
Jeanette M. Dacey and Michael F. Dacey Awards

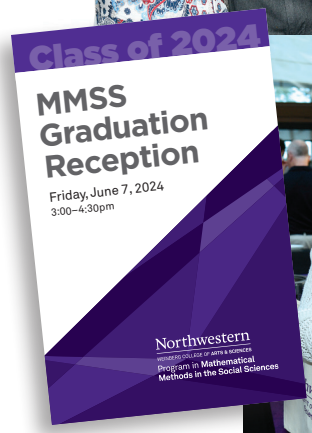
MMSS Professor Michael Dacey was a geography professor and senior associate dean at the Weinberg College of Arts and Sciences. Dacey founded the successful honors MMSS Program in 1978. In the early 2000s, Dacey and his wife, **Jeanette**, generously contributed a monetary gift to the program. This donation established a **research fund** to support MMSS students as they complete their thesis and coursework. In addition, the Daceys' gift funds **prizes for outstanding student accomplishments**, further fostering excellence within the MMSS community.

The Jeanette M. Dacey Prize for the Best Performance in MMSS Required Coursework:
Yuhan Jin

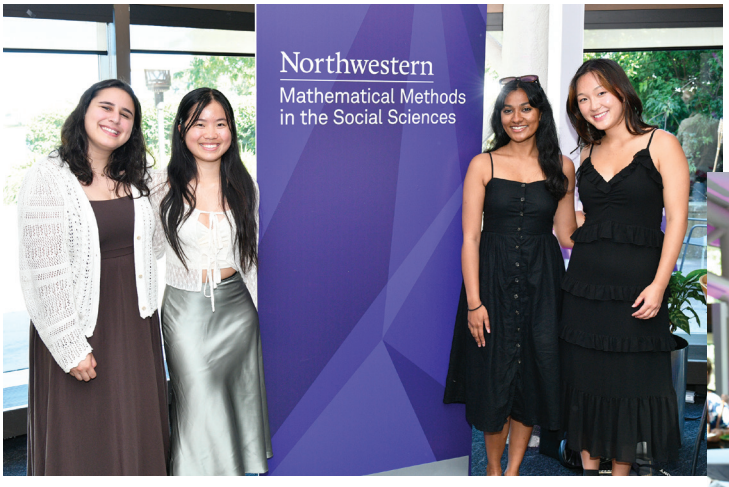
The Michael F. Dacey Prize for the Most Outstanding MMSS Senior Thesis:
Evan Olsdal
Advised by Professor Eric Auerbach

MMSS Senior Graduation
Class of 2024 at the Allen Center





senior graduation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Senior **Profiles**

Austin Segal

Class of 2024, Research & Program Coordinator, Chicago Appleseed Center for Fair Courts

Why did you apply to MMSS?

I applied to MMSS because I wanted to learn how to use my mathematical curiosity to better understand society and advocate for changes I want to see in the world. Mathematical modeling is an incredibly useful skill in the world of research and advocacy, and I knew MMSS would help me connect those dots.

How has MMSS prepared you for graduation?

MMSS challenged me to write a senior thesis, which turned out to be one of the most important experiences of my college career. I graduated from Northwestern with not only skills but direct experience in developing and executing a fully-realized research project. I look forward to moving forward with confidence in my ability to generate knowledge through mathematical techniques.

What have you enjoyed the most about MMSS?

MMSS courses have expanded how I think about mathematical models and their role in the social sciences. I have enjoyed developing a stronger understanding of how data relate with each other to form incredibly useful pictures of social structures and processes. I have worked one-on-one with my professors to figure out how I can apply these ideas to my own work.

Lily Nevo

Class of 2024, Research Assistant, Council of Economic Advisers

Why did you apply to MMSS?

I applied to MMSS because I knew that it vaguely combined my two main academic interests (math and social science), but seemed broad and applicable enough that it would also allow me to explore many areas of study within those fields. I had no idea what I wanted to do or study while applying to college, but I did know that I wanted a strong quantitative foundation. MMSS was a perfect fit because it gave me the flexibility to explore other majors, while also giving me broadly applicable quantitative skills.

How has MMSS prepared you for graduation?

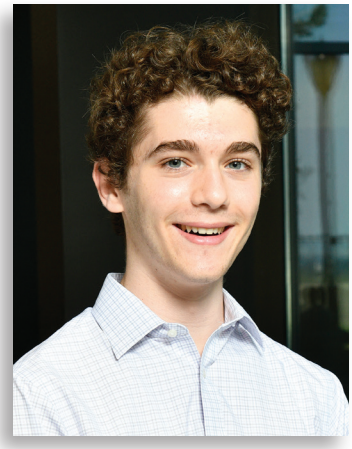
The rigor of the MMSS coursework has prepared me for graduation both in content and in discipline. A standout course for me was the econometrics sequence, which takes a much more mathematical/theoretical approach than a typical undergrad econometrics course. I left those courses with what felt like a pretty deep understanding of the common methods of empirical research, which proved to be particularly useful as I was interviewing for policy research jobs. Beyond course content, MMSS also taught me how to really sit with a problem. I had never been as intellectually challenged before coming to Northwestern (and even in other Northwestern courses) as I was in MMSS, and I think the work ethic that I developed as a result has stayed with me post-grad.

What have you enjoyed the most about MMSS?

I have most enjoyed getting to meet and work with very smart, hardworking, and passionate peers in MMSS. I met some of my best friends through the program, including my roommate of 3 years, and I think this was in large part due to the collaboration encouraged by many professors. In such a small program (full of high-achieving students), it would have been very easy for things to feel competitive, but my experience was the complete opposite. I felt that being a part of such a close-knit cohort was incredibly motivating, and I definitely missed this community in other courses at Northwestern.

Josh Chapman

Class of 2024



Why did you apply to MMSS?

I applied to MMSS almost on name alone. I wrote my Common App essay on how I view my political thinking through math equations, and I remember receiving an email letting me know about this program called Mathematical Methods in the Social Sciences. I have always learned best through making connections between different fields of study, so MMSS sounded like it would be the perfect fit for me. Without really any more research, I decided to apply to the program. In hindsight, I am surprised with how little I knew about MMSS when I applied, but it fortunately worked out well.

How has MMSS prepared you for graduation?

I have obviously learned a lot of econometric and quantitative skills from MMSS, but I think MMSS has best taught me more general learning and metacognitive skills. The program's courses are front-loaded and challenging, and I definitely felt like I was thrown into the deep end during fall of freshman year with my MMSS classes. However, that challenge forced me to improve my learning habits by taking notes, studying more effectively, and seeking help from my professors. MMSS also really helped me build resilience after initially facing a challenge. In the next years after graduation, I hope I will utilize some of the quantitative skills that I have learned from MMSS, but I know I will be relying on my general learning skills and my resilience that I have grown through MMSS.

What have you enjoyed the most about MMSS?

I have enjoyed the classes and the sense of academic community most. I always like to seek out academic challenges, and MMSS certainly fulfilled that role in pushing me to learn and grow. Through taking two classes every quarter for two years with the same 40 or so intelligent and hardworking people, a real community centered around learning and scholarship forms, which is especially helpful starting college during a pandemic where other methods of finding community were more difficult. Whether it was suffering through problem sets together or frantically studying for the next midterm, I have deeply appreciated the friendships that I made because of MMSS.

"I have enjoyed the classes and the sense of academic community most. I always like to seek out academic challenges, and MMSS certainly fulfilled that role in pushing me to learn and grow."

MMSS student Josh Chapman, Class of 2024

young alumni

Alumni **Resources**

Thank You to Our MMSS Alumni Supporters

No other undergraduate program in the nation matches the scope, advanced level or degree of integration of social sciences and mathematics. We are thankful for the support that has allowed us to make sure MMSS students are well prepared for the future—whether going on to the graduate school of their choice, being highly sought by Fortune 500 employers, or bringing analytical rigor to traditionally less data-driven fields.

Donating to MMSS

Donations from our loyal and generous alumni help ensure that the MMSS Program continues to provide vital resources to our students such as statistical software licenses, periodic replacement of computer hardware, support for senior thesis research, community building events and more. Donations to MMSS have a positive impact on the Program's intention of providing a rigorous learning experience within a supportive and resourceful community.

Nathan Carl Popkins MMSS Legacy Fund

In addition to a gift to the MMSS Program, alumni and friends can also direct support to The Nathan Carl Popkins MMSS Legacy Fund. This fund was established in 2018 in honor of late MMSS alum Nathan Carl Popkins '01, who embodied a drive and love for math in all facets of his life. In that spirit, the Popkins Legacy Fund is the first permanently endowed fund exclusively dedicated to enhancing the experience of the MMSS students and building a strong, tight knit community of scholars for years to come.

You can designate gifts directly to MMSS through this secure link:

https://giving.northwestern.edu/MMSSnews

Or if you are mailing in a check, please include MMSS or the Nathan Carl Popkins MMSS Legacy Fund on the memo line.

Stay Connected

Due to the MMSS Program's selectivity, the student body is small by design and the average graduating class is 32 students. Since the first students graduated in 1981, there have been approximately 1,300 MMSS alumni. Here are some key ways this community can all stay connected:

LinkedIn

With over 900 members in our "MMSS Northwestern Alumni" LinkedIn Group, it can be a great resource for connecting. To join, visit our LinkedIn Group **here**, email **mmss@northwestern.edu**, or search for "MMSS Northwestern Alumni" on LinkedIn.

MMSS Mentorships

Sign up to serve as an MMSS mentor through **Northwestern Network Mentorship Program**.

Alumni Profiles

Send an update to **mmss@northwestern.edu** and provide an alumni profile on how MMSS has impacted your life.

Year In Review

Sign up to receive this annual newsletter by sending an email to **mmss@northwestern.edu**.

MMSS Contacts

Ivan Canay

Saltzman Family Director of Mathematical Methods in the Social Sciences Program

Email: mmss-director@northwestern.edu

Phone: 847-491-8208

Nicole Schneider

Program Coordinator of Mathematical Methods in the Social Sciences Program

Email: mmss@northwestern.edu

Phone: 847-491-3574