

Program in  
Mathematical Methods  
in the Social Sciences

# 2017-18 Year in Review

**Northwestern**

WEINBERG COLLEGE OF ARTS & SCIENCES

Program in **Mathematical  
Methods in the Social Sciences**

[mmss.northwestern.edu](http://mmss.northwestern.edu)

# Welcome Letter from **Director**



**Jeff Ely**

Dear MMSS Community—

What an amazing year for MMSS! Alumni engagement with our Program helped to make this year a watershed and brings promising developments for the future. From the activities of our mighty alumni ambassador committee to the recruitment efforts of distinguished alumni at our Sophomore application event to the inspiring speeches at our 40th Anniversary party, our current students have never felt closer to their MMSS extended family.

Speaking of the 40th Anniversary, I would like to share how meaningful it was to have so many students and alumni gathered together to reflect on the MMSS experience past and present. Personally, seeing the faces and hearing the stories from that night brought home how honored I am to be the Director of this world-beating Program. And I know the indelible imprint it has had on our current students in attendance.

Specifically, I would like to recognize the efforts of the following MMSS community members:

- Special thanks to this group for encouraging their fellow MMSS grads to get involved with the 40th Anniversary—Alexandra Hallas Button '09, Blake Heyde '15, Gaurav Kikani '14, Naveen Nallappa '13, Alayna Soehlke '13 and Dharini Subramanian '11.
- Tremendous appreciation goes out to our keynote speaker Paul Lee '97 and fellow guest speakers Paul Blase '93, Jenny Donnelly '97, Drew Rubin '16 and Amanda Wilson '02.
- Gratitude for Adam Ginsburgh '01, who served as an excellent moderator for the panel and partnered with Kevin Yam '01 to kick start the Nathan Carl Popkins MMSS Legacy Fund. These crucial resources will help enrich the experience of MMSS students in honor of a cherished alum, Nathan Popkins, whose passing is a terrible loss for his colleagues, classmates, and our Program.

I am excited about the coming year. Our entering class is among the most diverse in program history and as impressive as ever. And for the first time in many years MMSS has a new course in its curriculum: Foundations of Mathematical Social Science, adding some fundamental concepts long overdue in a program like MMSS.

A handwritten signature in black ink that reads "Jeff Ely". The signature is fluid and cursive.

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

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# Welcoming the Class of 2021

## First-Year Focus

### »»» Jacob Mandel

Class of 2021

#### Why did you apply to MMSS?

I wasn't sure what I wanted to do, but knew that I loved quantitative and analytical problem solving. I hoped to challenge myself by continuing to sharpen these skills, especially through the lens of economics and the social sciences—areas that have peaked my interest throughout life.

#### Favorite MMSS class so far?

My favorite so far would have to be the Math 285 sequence. The sequence successfully integrated computational problems with a more comprehensive and complex understanding of the theoretical math behind them, which I really enjoyed. While the sequence itself was very engaging and intellectually challenging, it was certainly enhanced by the phenomenal instruction from Professor Alongi.

#### How was your first year compared to what you thought it would be?

Overall, my first year offered a great experience and exceeded my expectations. I was definitely nervous coming in and had no idea what to expect, but MMSS offered a collaborative community of friendly faces that helped me acclimate to Northwestern. I also felt like I adapted much quicker to the work-life balance of the university and MMSS program than I thought I would.



### »»» Robby Winter

Class of 2021

“I applied to MMSS because I loved the idea of boiling down the idiosyncrasies, peculiarities, and downright craziness of human beings into precise, succinct, and even beautiful mathematical models. As a first-year MMSS student, I felt I actually got to do that, all while making incredible friends. Getting to know our professors has also inspired me to pursue a career in academia as an economist, but in the meantime, I'm confident that MMSS will do a great job of tying my love of learning over.”



# welcome

# 2017–18 Year in Review

## Thank you to our MMSS PAs for helping to on-board the First-Years!

MMSS Peer Advisors are invaluable resources to the incoming first-years. We're grateful to the 2017-2018 PAs Jonathan Ni, Paul Salamanca and Bobbi Throckmorton. In addition to leading the Wildcat Welcome activities for the new MMSS students, the PAs, along with First-year Advisor and Economics Professor Eric Schulz, hosted a special advising session in advance of registration for winter quarter to provide insights and suggestions based on their experience in MMSS and across Northwestern.



Above: The Peer Advisors (PA) Bobbi Throckmorton and Paul Salamanca. Left: PA Jonathan Ni.

### First-Year Student Data for Class of 2021



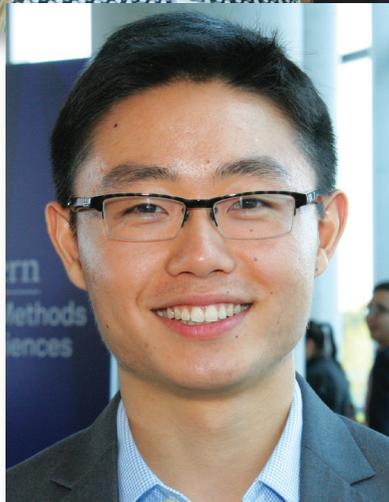
53% female



14% international



35 avg ACT Math  
789 avg. SAT Math



# welcome

## Fall Welcome Party

»»» The annual welcome event is one of the best opportunities for the MMSS students to meet the first-year and sophomore-entry students, and catch up with old friends on the activities of summer. Professor Ely provided updates on courses, special research and internship opportunities and a kick off announcement of the Program's 40th Anniversary events. However, the biggest news coming out of the party this year would have to be the roll out of the new MMSS T-shirts!



Clockwise from top: Students Matthew Nicholson and Mark Scovic along with TA Gabriela Cugat show off the new MMSS t-shirts; Professor Jean Clipperton and Sharadh Sivamani; Students Patricia Tang, Abigail Wolf, and Mikela Gerdes.

# welcome

# 2017–18 Year in Review

## Winter Dinner



Prof. Jeff Ely,  
Jonathan Ni,  
Lindsay Pontello,  
Paul Salamanca,  
Eliott Sassouni,  
and Elizabeth Tyger.

»»» MMSS seniors pass along their wisdom to the underclassmen on how to best navigate the internship and job search. Here are some of the main points from the evening's discussion:

- Some of the first words of advice were to freshmen—being mindful of the fact that they are not really expected to have had a summer internship going into their sophomore year. The consensus was that it is better to focus on doing something that interests you personally that will provide you with stories to share in the future.
- MMSS is fairly well-known amongst most large firms but preparation is key and best done during the summer prior to your junior year to help manage your course-load on top of the recruiting activities.
- And the whole panel agreed that students should start by casting a wide net, keeping an open mind, and be prepared for rejection!

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“For companies that are familiar with MMSS, it’s a huge boost to have on your resume. Employers recognize the hard work and dedication that goes into completing the coursework.”

**Ellie Tyger**

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“Contacting NU alums is very worthwhile—they are your biggest asset.”

**Eliott Sassouni**

**Thanks again to our panel of seniors!**

# winter dinner

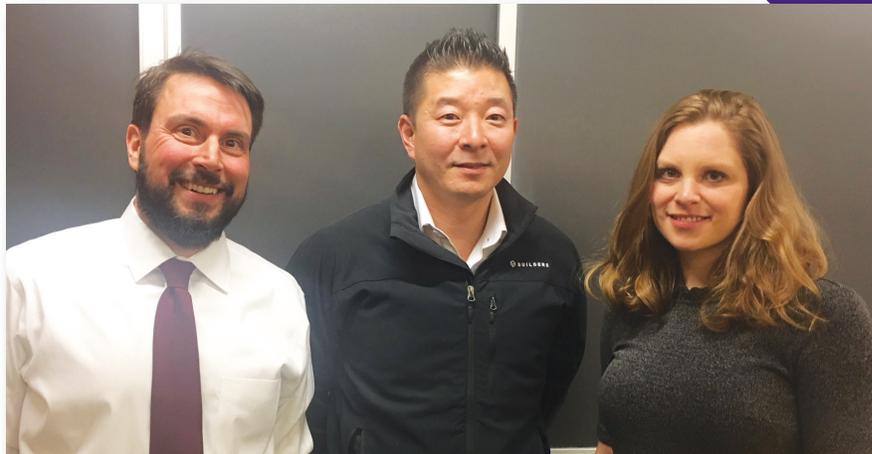
## Sophomore Entry Information Session

Over 35 first-years attended the session which was led by a stellar panel of MMSS alumni! We were fortunate to have three local grads participate. They shared a mix of inspirational and practical stories that had applicants walking away with a clear sense for why an MMSS degree is worthwhile.

Ryan Garino '98 made an early career shift from consulting at BGC to investments at Citadel and felt MMSS allowed him to navigate that change with confidence. **"The skills MMSS provides are made for the real world," Garino says. "They allow you to be numerate and data-oriented in your approach to problem solving in a world where numeracy is increasingly more important yet less prevalent."**

Alexandra Hallas Button '09 is a Director at PWC's Strategy& and recalls a skill she most values from her time in MMSS is the way it teaches you to think and solve problems—and within a team. The ability to bring people from different backgrounds and solve problems has served her well in her consulting role. She is also involved in recruiting for PWC Strategy & and shared that **"any MMSS student is considered a stellar candidate."**

Special thanks to current students Hassan Sayed and Joshua Wasserman, who joined MMSS as sophomore-entry students in 2016, and were on hand to answer questions around the day-to-day experience in the MMSS Program.



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**Information Session on  
Sophomore Entry to MMSS**  
Tuesday, February 27 • 5:00 p.m.  
555 Clark Street, Room B03  
**Please Register**

Join Professor Ely and MMSS Alumni to hear about the Program, and how their MMSS experience positively impacted their career opportunities and professional success.

|  |   |  |
|--|---|--|
| <br><b>Alexandra Hallas Button</b> , '09<br>Director at PwC Strategy& | <br><b>Ryan Garino</b> , '98<br>Former Head of Global Credit at Citadel | <br><b>Paul Lee</b> , '97<br>Founder and EP of Builders Venture Capital |
|--|---|--|

We are looking for first year students with superior academic records and an interest in combining the study of math and the social sciences to enter the program as sophomores in the Fall of 2019. For more information: Go to the **MMSS web site**. Click on "Admission" and then "Sophomore Admission" to get information on the program and access the on-line application.

**Please register no later than Friday, February 23.**

**Contact**  
**Nicole Schneider**  
Program Coordinator  
Mathematical Methods in the Social Sciences  
555 Clark Street, Room 224, Evanston, IL 60208  
847-491-2674  
mmss@northwestern.edu

Top: Panelists Ryan Garino, Alexandras Hallas Button, and Paul Lee.  
Above: Director Ely welcomes prospective students and introduces the alumni panel.

# sophomore entry

# MMSS 40th Anniversary Celebration: One Degree, Many Paths

May 24, 2018

Over 150 alumni, faculty and students came together in May of 2018 in the White Auditorium of the Kellogg Global Hub to celebrate the remarkable legacy of the MMSS Program. With amazing views of the Chicago skyline in the backdrop, Director Ely kicked off the evening with a number of acknowledgements to our enthusiastic MMSS community who helped make the celebration possible.

Ely highlighted how MMSS alumni are thriving in business consulting and academia, finance and retail, insurance and startups. "Word has gotten out that these students appreciate the complexity of data, yet still have the optimism and training to understand what can be modeled and formalized as well the conclusions that can be drawn using rigorous theory and empirical methods," Ely says. The result: a program that remains unique and groundbreaking, decades after its founding.

Taking the stage next was 2016 graduate Drew Rubin who gave a personal testament to the tremendous learning opportunity provided by his senior thesis project. Drew was part of a student team led by Professor Mark Iris in coordination with the New York Police Department. The research question revolved around whether low-level drug crime leads to violent crime. This real-world research question really allowed Drew to synthesize all of the quantitative



Above: Director Jeff Ely shows off the gift.  
Left: Drew Rubin '16.

# 40th anniversary



Left: Adam Ginsburgh introduces special guest panelists (from left to right ) Jenny Donnelly '97, Amanda Wilson '02 and Paul Blase '93.

and qualitative skills he had gained from the MMSS curriculum. In his words, he was able to work on “a wonderfully challenging question that involved complicated logistic regression based on a massive arrest dataset from the NYPD.” Further, this interesting research question also had “serious policy ramifications that dug into the foundations of modern policing strategy.”

Another perspective was provided by the keynote speaker, MMSS alum Paul Lee '97, who delivered an unconventional and inspiring message. Paul shared funny stories and candid memories of his time in the Program. The current students especially appreciated his confession that he often thought of dropping out given the challenging nature of the coursework. Today, Paul is an extremely successful leader in the venture capital field and credits the MMSS Program for giving him a rigorous framework for problem solving and an appreciation for working in teams.



Above: Director Jeff Ely, Drew Rubin '16, Paul Lee '97, Dean Randolph, Amanda Wilson '02, Paul Blase '93, Jenny Donnelly '97 and Adam Ginsburgh '01.

# MMSS 40th Anniversary Celebration: One Degree, Many Paths

May 24, 2018

2001 MMSS grad Adam Ginsburgh has continued to be active on campus with various initiatives to engage students with external companies, primarily through the Chicago Field Studies Program, as well as recruiting MMSS interns for his firm, Align Income Share Funding. Naturally, he played a perfect role in serving as a moderator of the evening's alumni panel. He shared several anecdotes from his days as a student—both insightful and amusing. Adam's biggest feat as an MMSS student may have been that he managed to safely retrieve his stolen backpack which happened to have the entire data set for his police project research paper—all unbeknownst to Professor Iris!

The panel included three MMSS alumni: Jenny Donnelly '97, Paul Blase '93 and Amanda Wilson '02. Each one highlighted different perspectives on how the MMSS Program had a profound impact on their careers—and provided great context for the current students who are working to just get through each quarter. Common themes included how getting through the rigors of the program then gave them confidence to pursue new areas of interest, and recognizing the powerful friendships and resources that fellow MMSS students can provide during undergraduate school and well beyond graduation.

Adam wrapped up the evening with a special call to action asking the audience to consider giving donations to the newly created Nathan Carl Popkins MMSS Legacy Fund, as well as finding additional ways to engage with MMSS and Northwestern University.

**“To me, the sense of community and camaraderie built among classmates has always been one of the defining features and key strengths of the Program.”**

**Former MMSS Director Bill Rogerson**



From the top: MMSS alumni from the Class of 2013 Naveen Nallappa and Bhargav Rajamannar.

Class of 1989 convenes: Amar Das, Brian Elliott, Lili Engelhardt and Richard Chalker.

Professor Mark Witte along with alumnae Lindsay Cohen and Emily Engel.



Grace Zhao '08,  
Lindsay Cohen '01,  
Amanda Wilson '02,  
Emily Barker Moore '04,  
and Emily Engel '04



“Applying data-based approaches to real-world problems has stuck with me as I’ve progressed from professional consulting to leading technology products and teams.”

**Brian Elliott '89**  
General Manager, Slack

# 40th anniversary

# The MMSS Senior Graduation Reception

June 22, 2018

»»» An obvious favorite event of the year is our MMSS graduation reception. Students are able to come together as a class one last time, along with their friends and families, to celebrate this major milestone. Much has been accomplished by this year's class and we are all excited to wish them well as they embark on their next chapter.

Some special acknowledgements were made for those seniors who earned departmental honors by maintaining a 3.5 GPA within the MMSS curriculum and completing an exceptional thesis. Two prizes are also awarded to the student who maintained the highest MMSS GPA, and to the student who has written the most outstanding senior thesis.



2018 Seniors pose for a final photo with their classmates.



The Jeanette M. Dacey Award for the Best Performance in MMSS Required Coursework went to Zachary Herron. The Michael F. Dacey Award for the Most Outstanding MMSS Senior Thesis was awarded to Elizabeth Tyger on "Interplay of Policy Instruments in Climate Economics." Elizabeth was advised by Economics Professor Mark Witte.

# graduation

# MMSS 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 2018 class:

## “The Development of Career-Helping Behaviors”

by Yue Hu

How does altruistic behavior sustain itself in social networks? Yue Hu built a theoretical model of evolutionary dynamics to show how a strategy of *reciprocity* can kick-start a contagious wave of altruism that propagates across generations. Then, simulations of the model reveal the synergy between direct reciprocity and *upstream reciprocity*: a pay-it-forward altruism that transmits benefits to later generations. These findings were validated in a survey of Northwestern alumni which revealed that feelings of gratitude were associated with increased opportunities to both give and receive career assistance to others.

## “Using the Blotto Game to Model the 2016 US Presidential Election”

by Hankyul Lee

In the 2016 United States Presidential Election Hillary Clinton vastly outspent Donald Trump at a nationwide level, won the nationwide popular vote, but lost the Electoral College and the Presidency. Hankyul Lee solved the mystery of this apparent paradox by applying the Game Theoretic model of Electoral College competition to state-wide spending data provided by the Federal Election Committee. The game theoretic model reveals the optimal spending strategy state-by-state. The analysis shows how the Clinton campaign’s spending strategy cost her the election and how re-allocating spending toward battleground states would have secured a Clinton Presidency.



## “Interplay of Policy Instruments in Climate Economics”

by Elizabeth Tyger

Public policy toward limiting carbon emissions faces several tradeoffs that demand an array of economic incentives. A carbon tax reduces emissions and the revenues raised can be used to stock fuel reserves, research efficient alternatives, or simply finance consumption. The goal of policy is to efficiently combine these instruments. Elizabeth Tyger’s thesis won the 2018 Dacey best thesis prize for using advanced economic theory to explore various policy constellations and highlight the advantages of a carbon tax to fund green energy research.

**You can access full copies of these research projects and other past thesis papers via the Thesis Library on the MMSS website**

# senior thesis

# MMSS Senior Thesis Projects

## Dacey Grant Recipients

Former MMSS Professor Michael Dacey and his wife Jeanette provided a monetary gift to both build a research fund in support of MMSS students as they completed their thesis and coursework, and award prizes for outstanding student accomplishments. This year, two Dacey Grants were awarded to Paul Salamanca for his thesis titled “*Yellow Fever and Sticky Rice: A Mixed Method Investigation of Queer Asian Heterophily in Chicago*,” and Parth Rajwade for his thesis titled “*The Effects of Having High Status Goals on Subjective Well-Being*.” The funds significantly supported their data collection efforts: Paul was able to conduct in-depth one-two hour qualitative interviews, and Parth was able to capture a much larger number sample size of students across two different universities.

## MMSS Police Projects

Since 1997, MMSS Lecturer Mark Iris has set up meaningful research projects in an unusual context: acquiring real world consulting experience while providing a public service. Mark’s prior experience as the Executive Director of the Chicago Police Board, has helped him connect teams of student researchers with police departments from major cities across the US, using those agencies’ data to address significant policy and operational questions for the participating organizations.

Police departments typically have massive amounts of data, but are short handed in staff with statistical skills to analyze those data and help agencies work more efficiently and better serve the public. For 2017-2018, two student teams worked with California-based forces—the Los Angeles Sheriff’s Department and the Long Beach Police Department.



Photo of students (Caili Chen, Jonathan Ni, Peter Peng) Mark Iris, Chief of Police Robert Luna and members of his Long Beach command staff.

**Thesis Title: “Police Force Size Optimization for the Long Beach Police Department.”**



Photo of students (Jonathan Kim, Julia Kuhn) Mark Iris and Los Angeles Sherriff’s Dept. including Lieutenant Ryan Vienna and Sergeant J. Jansen, along with their staff.

**Thesis Title: “Evaluation of the Los Angeles County Jail Population.”**

# Alumni: Resources and Spotlight

## MMSS Mentorships

»»» Did you know that Northwestern now has a university-wide mentor program called the Northwestern Network Mentorship Program? And students and alumni can ask for MMSS pairings?

Currently there are over 65 MMSS alumni and 40 MMSS students participating in the program. To learn more, check out the [Northwestern Network Mentorship Program](#) website. The program is facilitated by an easy-to-use online platform that cultivates meaningful opportunities within the Northwestern community. The program is open to students and alumni from all class years, programs, and schools. Alumni have the option of participating as a mentor, mentee, or both at the same time. You can [register here](#) and begin your profile. Be sure to mark Mathematical Methods in the Social Sciences as your major. If you have questions, please contact Caitlin Wyler at [caitlin.wyler@northwestern.edu](mailto:caitlin.wyler@northwestern.edu) | +1 847.467.3571.

## Alumni Thank You

»»» **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.

## Nathan Carl Popkins MMSS Legacy Fund

»»» As it was launched at the 40th Anniversary event, the Nathan Carl Popkins MMSS Legacy Fund was created by a core group of alumni who went to Northwestern with Nathan. He was known for his drive and creativity and love for math so in that spirit, the fund is the first permanently endowed gift that is exclusively dedicated to enhancing the experience of MMSS students. One of the goals of the fund is to support an active alumni engagement program that will continue to strengthen the MMSS network. While the fund is still being procured, once it is set there are a range of potential uses such as procuring data sets for senior research projects, assisting students in attending conferences related to their research, purchasing specific software programs, and connecting students with subject matter experts in their field of study.

## 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 the latest statistical software, periodic replacement of computer hardware, guest speakers, networking and career planning events and more. Donors can designate gifts to MMSS by indicating their preference on the memo line of the check, or if giving online, you can select MMSS under the “Search additional gift designations” section. Visit [Giving to Northwestern University](#) for more information.

# alumni

# Alumni Resources and Spotlight

## Class of 2018 Graduate Profiles

### Vanessa Bursztyn

Class of 2018

Financial Analyst – Iconiqcapital.com



#### Why did you apply to MMSS?

I applied because of the breadth and applicability of the curriculum. I didn't know what I wanted to do after graduation, but felt like MMSS would give me the necessary skills to

succeed anywhere. The courses tend to focus on quantitative problem solving in the real world, which was what I was looking for. I wanted something challenging, interesting, and practical—all things I found within the program.

#### How has MMSS prepared you for graduation?

I think the challenging nature of the program really pushed me, but was also very rewarding at the same time. MMSS definitely gave me the tools needed to address all sorts of real world problems, and I think this is best shown by the senior theses we all write in our final year at school.

#### What have you enjoyed most about MMSS?

I really enjoyed the small size of the program because it gave me a sense of community within the larger Northwestern campus. Taking classes with the same group of people allowed me to get to know everyone by name and even form close friendships with a few along the way. It was nice to always be surrounded by familiar faces!

### Jessica Heller

Class of 2018

Commercial Emerging Leaders Associate – Nielsen



#### Why did you apply to MMSS?

I applied to MMSS because I honestly had no idea what exactly I wanted to study. I loved math and subjects that pushed me to think more analytically in high school but I was also really passionate about different social science subjects such as History and Art History. I wanted to

find something that would let me combine these two completely different courses of study. MMSS allowed me to do just that in a supportive environment.

#### How has MMSS prepared you for graduation?

The MMSS course work is challenging and forces you to think in different ways and make use of your peers as resources. I feel that this has prepared me well for any job that I could take. I am confident in my ability to approach problems in different ways and furthermore am not afraid to rely on my colleagues if I need support.

#### What have you enjoyed most about MMSS?

The small size of the program created a great environment. I loved being able to know everyone in my class and how the professors knew who you were. Furthermore, I have loved how supportive the program is. My course of study was not traditional (MMSS and Art History) and never once was any professor dismissive or unsure that my thesis would be feasible. Every professor I worked with was always willing to meet with me outside of class and provide support for either classwork or other points of study.

## Paul Salamanca

Class of 2018

Project Specialist – Evanston/Skokie District 65 Schools



### Why did you apply to MMSS?

I knew early on in my college career that math was something that interested me. As these interests developed, I realized I was also passionate about research and data analysis. I applied to MMSS because I wanted to synthesize some of these interests; in the process, I also gained rigorous quantitative training that would allow me to do high-level research as an undergraduate.

### How has MMSS prepared you for graduation?

As a Sociology major, I would not have been able to learn the high level of data

and statistical training through the Sociology curriculum alone. MMSS prepared me to conduct Sociology research in quantitative social network analysis, resulting in a successful mixed methods senior thesis. Additionally, the knowledge of statistical programming languages that I learned in the course of this research was influential in securing me a job after graduating. I currently work as a data analyst for a public school district, conducting and disseminating research on racial inequality in their student achievement and outcomes.

### What have you enjoyed most about MMSS?

As a Peer Adviser for the MMSS program, the community has always been a big draw for me. I've really enjoyed engaging with students both in my class and in subsequent classes. There's something quite nice about having the same set of people to do problem sets with—and the lounge in 555 Clark is not a bad place to do work. I've also enjoyed being able to discuss with younger students how I plan to use my MMSS training, to show them the ways that data skills can be useful in a variety of different jobs (even outside of finance!) and the opportunities for interdisciplinary work with many social science disciplines.

## 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 1,200 MMSS alumni. Here are some key ways this community can all stay connected:

### LinkedIn

With over 700 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](mailto: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](mailto: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](mailto:mmss@northwestern.edu).

# alumni

# General Updates

## MMSS 300, Foundations of Mathematical Social Science

MMSS 300, Foundations of Mathematical Social Science is a new course in the MMSS curriculum which will take the place of Math 300, starting in the Fall of 2018. Math 300's historical role in MMSS was to expose students to the kind of abstract mathematical thinking they will use in the second-year courses. But the actual topics covered in Math 300 were lacking any applied content. Instead MMSS 300 will teach the students to think abstractly through the vehicle of formal Social Science topics that are at the foundation of MMSS. From the course catalog:

Formal methods in Social Science are diverse but all are built on a common foundational set of tools ranging from models of individual decision-making to theories of collective action. This course will expose MMSS students to these tools in a mathematically rigorous way in order to prepare them for the advanced Social Science applications of second-year MMSS coursework.

## Northwestern

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### Program in Mathematical Methods in the Social Sciences

#### MMSS Contacts

##### Jeff Ely

Director of Mathematical Methods in the Social Sciences Program

Email: [mmss-director@northwestern.edu](mailto:mmss-director@northwestern.edu)

Phone: 847-491-8208

##### Nicole Schneider

Program Coordinator of Mathematical Methods in the Social Sciences Program

Email: [mmss@northwestern.edu](mailto:mmss@northwestern.edu)

Phone: 847-491-3574

[mmss.northwestern.edu](http://mmss.northwestern.edu)