

2021-2022 Newsletter

Department of Statistics and Data Science

Chair's Note



Dear friends,

I hope you are all well!

This fall, I am starting the third year of my tenure as the Department Chair, and can you believe that the pandemic has lasted for more than two and a half years? This has not been an easy time for anyone, particularly our students. My wholehearted congratulations to all our recent graduates on your perseverance in completing your studies during this difficult pandemic, and I wish all of you luck as you embark upon the new adventures in your life!

Despite the tremendous difficulties we have encountered, I have much good news to share with you in this newsletter about the Department and our programs, faculty, students, staff and alumni. I hope you find it inspiring.

The past ten years have seen a rapid growth in the Department's undergraduate programs. As of Fall 2022, there will be 122 Statistics majors and 17 Statistics minors, which marks a threefold increase of the total enrollment in those programs over ten years. In 2019, the Department launched the Data Science minor. This program has been extremely successful, with 441 declared minors as of this Fall. In 2021, the Department further proposed a Data Science major program, and we are expecting over 190 students to declare the Data Science major when it is officially launched in Fall 2022.

As for our graduate programs, the Department recently began a new terminal MS in Statistics program and a combined BA/MS in Statistics program in addition to the existing PhD program in Statistics and Ad Hoc MS program in Applied Statistics. We are excited to welcome the first cohort of 16 terminal MS students, 1 BA/MS student and 8 new PhD students this Fall. I wish them a successful start to their graduate studies at NU.

Did you know that the Department has changed its name? In Spring 2022, after 36 years as the Department of Statistics, we renamed ourselves the Department of Statistics and Data Science. This is a milestone in the history of the Department, intended to underscore recent major efforts to embrace data science in both our educational programs and the scope of our research (for more information see: tinyurl.com/49sve92t). To accompany this change, the Department has been hiring new tenure line and teaching line faculty. We were delighted to have two teaching track faculty members, Arvind Krishna and Danielle Sass, join us in 2021; and in 2022, we are excited to be joined by three new tenure track faculty members (Miklos Racz, Feng Ruan, and Bradly Stadie) and two new teaching track faculty members (Emre Besler and Lizhen Shi). Welcome aboard, new colleagues! I invite you to read the profiles of the new faculty in this newsletter as well as the other exciting news shared by the rest of our faculty. *(continued on following page)*

Chair's Note (continued)

After over forty years of service at NU, one of the founders of the Department, Bruce Spencer, will be retiring after Winter quarter 2023. Congratulations on your retirement, Bruce! Thank you for the great work you did in leading the Department for so many years and for being an exemplary colleague and friend to all of us. We wish you good health, delight and success as you move into this new phase of your life. Please join us to celebrate Bruce's distinguished career and his contributions to both the profession and the Department from 10:00AM-5PM on October 28, 2022, at the Guild Hall lounge. For details please contact Valerie Lyne (v-lyne@northwestern.edu).

Alums, we are extremely grateful for your continued support and generous gifts to the Department. Thanks for continuing to share your news with us. We would love to stay informed about any exciting or important updates in your careers and your lives. Please stay in touch and come back to visit us anytime.

Will the pandemic end soon? Probably not. Nevertheless, if Darwin's natural selection theory is right, the COVID virus may continue to evolve in such a way that it will eventually have to cooperate with its hosts, our fellow human beings, in order to survive. Let's hope so. Stay safe, and have another prosperous academic year.

Best wishes,

Ji-Ping Wang

Professor and Chair, Department of Statistics and Data Science
Sept 8, 2022

Faculty News

Larry Hedges



The National Academies of Science was asked last year to convene a committee to provide a vision and roadmap for the future of the US National Center for Education Statistics (NCES), the third largest and second oldest federal statistics agency. Hedges chaired the multidisciplinary consensus panel through 18 meetings and edited the final report, A Vision and Roadmap for Education Statistics, which was published in 2022 by the National Academies Press. Hedges also served on another National Academies panel on reproducibility and replicability. He was a commissioner on the Global Evidence Commission, which made its report to the United Nations and Organization for Economic Cooperation and Development in 2022.

In 2022, Hedges also directed his summer Institute for the Design and Analysis of Randomized Field Trials for Established Researchers, now in its 15th year (supported by grants from the US Institute of Education Sciences), directed a summer Institute on Improving the Design of STEM Education Research (supported by the National Science Foundation), and presented a Workshop on the Designs of Randomized Field Trials in Berlin (supported by the German Science Foundation).

Faculty News

Hongmei Jiang



Hongmei Jiang has been appointed as Program Director of the M.S. in Statistics program. Hongmei was promoted to full professor in the Department of Statistics and Data Science effective September 1, 2022. She served as the General Co-Chair for the 13th ACM Conference on Bioinformatics, Computational Biology, and Health Informatics (ACM-BCB) held in Chicago, IL, August 7-10, 2022.

Arend Kuyper



Arend Kuyper was honored to be awarded one of the 2021-2022 WCAS Arts and Sciences Alumni Teaching Awards. Having his efforts recognized by colleagues and students with an award such as this is humbling and inspiring. He has been lucky to have the support of so many people, and they deserve equal praise for his successes. Arend would like to give special thanks to all of the graduate and undergraduate TAs for his courses and to the Department's amazing administrative staff. Without their efforts, his courses would not be what they are.

Finally, Arend would like to recognize the students in his courses. Their enthusiasm for learning makes everything so much easier and is the reason he loves teaching. Thank you!

Faculty News

Beth Tipton



Beth Tipton was recently invited to join the Advisory Board of Blueprints for Healthy Youth Development. Blueprints provides a registry of evidence-based interventions that are effective in reducing antisocial behavior and promoting a healthy course of youth development and adult maturity. Information on Blueprints can be found here: <https://www.blueprintsprograms.org/our-advisory-board/>.

With Peter Buhlmann (ETH Zurich), John Duchi (Stanford), and Bin Yu (UC Berkeley), Beth co-organized a Hot Topics meeting at the Mathematical Sciences Research Institute (MSRI) in March 2022. The 4 day online workshop, called “Foundations of Stable, Generalizable, and Transferable Statistical Learning”, focused on foundational aspects of this goal, linking areas at the interface between statistics, optimization, machine learning and computer science, such as distributional robustness and stability, adversarial and transfer learning, generalizability and meta analysis, and causality. The workshop was recorded and may be of

interest to alumni: <https://www.msri.org/workshops/1020>.

Postdoctoral News

Keren Li

Keren Li, former Postdoctoral Fellow in the Department of Statistics and Data Science, has joined the University of Alabama at Birmingham's College of Arts and Sciences as an Assistant Professor of Mathematics. During his stay at Northwestern University, Dr. Li was supported through the NSF-Simons Center for Quantitative Biology (CQuB) and worked closely with Prof. Ji-Ping Wang and Prof. Xiaozhong Wang on various problems, including ribosome footprint pattern differentiation, DNA bendability prediction and nucleosome positioning.

New Faculty Spotlight

Emre Besler



Emre Besler is joining the Department of Statistics and Data Science as an Assistant Professor in Instruction. He completed his Bachelor of Science degree in Electrical Engineering at Bosphorus University in 2014 and started his PhD in the Department of Electrical and Computer Engineering at Northwestern in the same year. He received his Master of Science degree in 2016 and his PhD in 2020, both in Electrical Engineering with a focus on Biomedical Engineering and Machine Learning. Starting January 2021, he worked as a Lecturing Postdoctoral Fellow in the Department of Biomedical Engineering at Northwestern, doing research on the application of Machine Learning to make cardiac diagnosis more accessible.

Emre's passion for teaching has been a major driving force for him throughout his graduate life and beyond. In every department he has worked in, he has been involved in course/curriculum development in addition to teaching the classes he (co)created. As a PhD student, he redesigned McCormick's Engineering Analysis 1 course and worked as a course coordinator for five years. On top of teaching/designing various courses in Statistics, Data Science and Wearable Devices as a postdoc, he also created and taught a course on Machine Learning.

Emre's research interests lie at the intersection of Machine Learning and biomedical signal processing. His ongoing projects, in collaboration with the Feinberg School of Medicine and the Department of Biomedical Engineering, aim to increase the accuracy of medical specialists' diagnosis and prognosis while decreasing the physical and equipment cost of the entire process.

Arvind Krishna



Krish (Arvind Krishna) joined the Department of Statistics and Data Science in Fall 2021 as an Assistant Professor of Instruction. Krish completed his PhD in Industrial Engineering with a specialization in Statistics at the Georgia Institute of Technology in the summer of 2021. Krish's thesis was on calibration and optimization of computer models.

During his first academic year at Northwestern, Krish designed and taught a new three-course series on data science with Python (STAT 303-1,2,3), which is in parallel with the three-course sequence on data science with R (STAT 301-1,2,3). During the summer of 2022, Krish had a research paper entitled '[Inverse design of acoustic metasurfaces using space-filling points](#)' published in *The Journal of Applied Physics Letters*. The paper is about developing an optimal design in the output space (instead of the usual input space). Krish has been writing a book, in collaboration with the teaching faculty of the department, to be published as an open educational resource (OER) material in Spring 2023. The book will be used by STAT 303-1 students. The unique feature of the book is that it will teach concepts

based on real datasets. Krish has also been creating material for a new course, Introduction to Programming for Data Science (STAT 201), to be introduced in Fall 2022.

New Faculty Spotlight

Miklos Racz



Miklos Z. Racz is joining Northwestern as an Assistant Professor in the Department of Statistics and Data Science with a joint appointment in the Computer Science Department. He is currently an Assistant Professor at Princeton University in the ORFE (Operations Research & Financial Engineering) department, as well as an associated faculty member at the Center for Statistics and Machine Learning (CSML). Before coming to Princeton, he received his PhD in Statistics from UC Berkeley and was then a postdoc in the Theory Group at Microsoft Research, Redmond.

Miki's research interests lie broadly at the interface of probability, statistics, computer science, and information theory. In recognition of his research and teaching, he has received Princeton's Howard B. Wentz, Jr. Junior Faculty Award, a Princeton SEAS Innovation Award, and an Excellence in Teaching Award.

Feng Ruan



Feng Ruan will join the Department of Statistics and Data Science as an Assistant Professor this coming fall. His research spans statistical learning, optimization, information theory and applied harmonic analysis, with three driving goals: 1) to build rigorous statistical inferential procedures accounting for crucial resource constraints such as computation, privacy, etc., 2) to develop modeling and analytic tools that give a calculus for understanding generally solvable non-convex problems such as composite minimization where the objective takes the form of $f = h(c(x))$, and 3) to design new objectives beyond convexities so that local algorithms can attain guaranteed numerical performances in statistical settings. In general, his research agenda blends theoretical with practical considerations, and statistical with computational thinking.

In his leisure time, Feng enjoys hiking, table tennis, piano, and trying to read books.

New Faculty Spotlight

Danielle Sass



Danielle Sass' teaching and research interests include introductory data science and spatial statistics. She is particularly interested in curriculum development and producing engaging, freely available teaching materials that can be adapted to both small- and large-scale classes. This past year she was awarded the Alumnae Grant from the Alumnae of Northwestern University and the Open Educational Resources (OER) Grant to develop a tutorial R package to pair with the STAT 202 textbook that allows for guided coding practice problems. The package is still in development but is publicly available to install from GitHub. The package also provides various functions for instructors looking to improve their own 'learnr' tutorials (<https://nustat.github.io/ISDStutorials/>).

Outside of the classroom, Danielle is a disc golf enthusiast and program director for Disc Golf Chicago, a non-profit currently aiming to grow the sport in the North Shore. This past summer she directed a tournament series featuring temporary courses in the Forest Preserves of Cook County to bring awareness to the sport and educate the public about the endangered species in the local forest preserves. Upcoming goals are to facilitate youth programming by providing disc golf equipment to local schools to use in their gym curriculums and hopefully establish a club at Northwestern to compete in the College Disc Golf National Championships.

Lizhen Shi



Dr. Lizhen Shi is joining Northwestern as an Assistant Professor in Instruction in the Department of Statistics and Data Science. Dr. Shi earned her PhD in Computer Science from Florida State University and has previously served as an Assistant Professor in the Department of Data Science and Business Analytics at Florida Polytechnic University. Her research in Computational Biology bridges Computer Science, Bioinformatics, and Biology with a focus on leveraging state-of-the-art Big Data and Machine Learning technologies for accurate and scalable sequence analysis in Genomics and Metagenomics. To date, she has published several papers in journals such as Nature Methods and Bioinformatics and at conferences such as the ACM Conference on Bioinformatics, Computational Biology, and Health Informatics.

Dr. Shi has participated in a number of predictive modeling competitions on Kaggle, where she gained rich hands-on experience in Data Science and Machine Learning. In her new role, she is excited for the opportunity to pass on her programming/data science experience to students in the Department. Dr. Shi finds teaching to be a source of satisfaction and growth, and she continuously utilizes and reinforces all potential channels to maximize the educational process.

New Faculty Spotlight

Bradly Stadie



Bradly Stadie is excited to join the Northwestern Department of Statistics and Data Science as an Assistant Professor. Bradly received his PhD in Statistics at UC Berkeley, where he studied connections between statistics and reinforcement learning. Bradly has spent time at OpenAI, where he was a founding member of the reinforcement learning team. He was also a research scientist at the Vector Institute in Toronto, where he studied multi-goal reinforcement learning.

Currently, Bradly's research is focused on the intersection of large unsupervised models and planning. In particular, GPT-3 recently showed us that it is possible to train large language models that take enormous amounts of unlabeled text and predict the next character in a string. This unsupervised model — so called because the learning signal comes entirely from predicting the structure of the input — can then be transferred downstream to a variety of NLP tasks including translation, QA, and sentiment analysis. It is quite natural to ask if an extension of these ideas exists for the field of reinforcement learning. While one can try to predict the next state of the world and transfer the learned model to any user-prompted task, in practice this

doesn't work. Bradly's current research is investigating the theory that self-supervised goal-reaching is the correct analogy for GPT-3 in RL. If successful, it will allow reinforcement learning agents to logically reason through complex tasks, explaining how they can be broken down into a series of simpler steps.

In addition to various academic roles, Bradly also enjoys working with startups. He was previously the AI advisor to Y-Combinator, a Bay Area startup school and accelerator, where he advised over 50 companies in their data science and AI operations. Bradly continues to actively advise startups, with an emphasis on interpretable modeling.

Student News

PhD student **Tim Tsz-Kit Lau** received a Hannan Graduate Student Travel Award from the Institute of Mathematical Statistics (IMS). Tim used this award to travel to the 2022 IMS Annual Meeting in London in June 2022, where he presented his talk, Wasserstein Distributionally Robust Estimation with Wasserstein Barycenters. More information is available at <https://imstat.org/2022/05/05/recipients-of-the-2022-ims-hannan-graduate-student-travel-awards-announced/>

In July 2022, PhD student **Zhipeng Hou** presented his talk, Challenges in assisting research synthesis with screening prioritization: a systematic review, at the 2022 Society for Research Synthesis Methodology (SRSM) Annual Meeting in Portland, OR.

Program News

Data Science

Over the past year, we have seen an explosion in the number of students interested in our Data Science program. The Data Science minor, now 3 years old, currently has nearly 500 declared students, with nearly half of those having declared just this past spring. A great deal of time and effort has gone into preparing for the Fall 2022 launch of the new Data Science major. We have now prepared nearly 180 students to declare the Data Science major once it becomes officially available this fall. Taken together, the two Data Science programs consist of approximately 680 undergraduate students who are pursuing either a Data Science major or minor.

Last year, we launched the new STAT 303 Data Science Sequence in Python as an alternative to the STAT 301 Data Science Sequence in R. The new offering has been well-received, and we look forward to taking what we have learned in the past year and improving the second iteration of the sequence. One thing we have discovered is the need for an introductory course that would better integrate basic data science knowledge with practical tools. As such, we are piloting a new course in Fall 2022, STAT 201 Introduction to Programming for Data Science, which will provide important programming concepts within the context of solving data science problems. The course will also serve as an introduction to both Python and R for many students.

Over the next year, we will be closely monitoring the roll out of the Data Science major and working to improve our courses and curriculum to best serve our students and the Northwestern research community.

Masters in Statistics

In Fall 2022, we welcome our first class of 16 masters students and one BA/MS student to the Masters in Statistics Program. The mission of the program is to provide students with comprehensive training in advanced statistical theory and methodology, exposure to cutting-edge research or collaborative experience to practical applications of statistics, and preparation for careers as professional statisticians in industry, government, and the non-profit sector. This program also prepares students for doctoral study in statistics or related fields.

The MS program offers two tracks: 1) coursework of 12 units plus an MS qualifying exam, and 2) coursework of 12 units plus an MS qualifying exam and an optional MS thesis. Both tracks require a minimum of 4 quarters of residency (not including summer), while students on the thesis track may need 5-6 quarters or longer to complete their degree. The degree for both tracks must be completed within two years.

Program News

Statistics PhD

The faculty recently revised our Statistics PhD curriculum. In addition to Statistical Theory and Methodology (STAT 420) and elective courses, students in the first year of the PhD program will take an applied statistics course sequence consisting of Regression, Advanced Regression, and Introduction to Machine Learning. PhD students are now also asked to take courses on Statistical Computing and Bayesian Inference, as these are important areas of study for all students in the field of statistics. And beginning in the next academic year, the Department will offer a new three-quarter course sequence on probability and stochastic processes, which will also be a requirement for our PhD students. This new course sequence will emphasize connections between probability theory and problems in statistics.

PhD Hooding Ceremony Spring 2022

Pictured left to right:
Professor Elizabeth Tipton,
Kaitlyn Fitzgerald, Sarah
Peko-Spicer, Mena Whalen,
Yajun Liu, Professor Beth
Andrews



Photo Credit: Bonnie Robinson

Big congratulations to our PhD graduates from the past year! Listed after each name is their graduating quarter and their current place of employment.

- Kaitlyn Fitzgerald (Summer 2021, Azusa Pacific University)
- Wei Ju (Fall 2021, Facebook)
- Yajun Liu (Spring 2022, Amazon)
- Sarah Peko-Spicer (Fall 2021, American Institutes for Research)
- Sebastian Rodriguez (Summer 2022, ZS Consulting)
- Mena Whalen (Fall 2021, Loyola University Chicago)
- Rita Zejnullahi (Summer 2021, University of Washington)

The Department is also very excited to welcome eight new first-year PhD students in September 2022.

Program News

The Muntz Lassonde Teaching Assistants Program

The Muntz Lassonde Teaching Assistants program has just been established, thanks to the generous gift of alumna Janelle Muntz Lassonde, class of 1988. The program is intended to help the department ensure high quality instruction for undergraduates. Undergraduates who participate in the program as Muntz Lassonde Teaching Assistants will gain experience assisting professors with instruction, provide peer learning support to fellow students, and offer invaluable support to instructors and students. The participants will be undergraduates in their junior and/or senior year who are majors or minors in Statistics or a Data Science. More information about the program can be found on the Department's Canvas page for majors and minors as well as on the Department's website:

https://statistics.northwestern.edu/undergraduate/muntz_lassonde_ta_program.html.

Staff News

This year we were able to add a second staff position to support the faculty and students of our rapidly growing department. **Deric Holloway** joined the department as a Program Assistant for the Undergraduate programs in January 2022. Since his arrival, one of his major projects has been assisting with the preparation of students for the start of the new Major in Data Science which begins in Fall 2022. He is excited to be part of the launch of the new major and to provide enhanced service to our undergraduate majors and minors.

With the addition of the second staff member, **Kisa Kowal** was promoted to Business Coordinator for the department. She is grateful to have Deric as a colleague in supporting the department during this time of growth.

Alumni News

Alumnus **James Pustejovsky** won the 2021 Early Career Award from the Society for Research Synthesis Methods (SRSB). SRSB is an international academic society of statisticians and other professionals interested in methodology for meta-analysis and evidence-based policy and practice. James is the second graduate of our department to win the SRSB Early Career Award (Beth Tipton also won in 2017).

In August, alumnus **Yajun Liu** gave a speech, Sequential Change-Point Detection for Compositional Time Series with Exogenous Variables, at the 2022 Joint Statistical Meetings (JSM) conference in Washington, DC.

Giving at Northwestern

As a Department, we accomplish a great deal in partnership with campus friends. Additionally, we are grateful to alumni and other friends who make individual contributions to support our programming, from lectures and symposia to undergraduate and graduate research travel. If you would like to make a gift to the Department, the easiest way to do so is to give online at www.giving.northwestern.edu/nu/wcas. You may designate the Department of Statistics and Data Science as the direct recipient of your gift. Thank you for your continued support of the Department of Statistics and Data Science.

Visit Our Website

<https://statistics.northwestern.edu/>

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