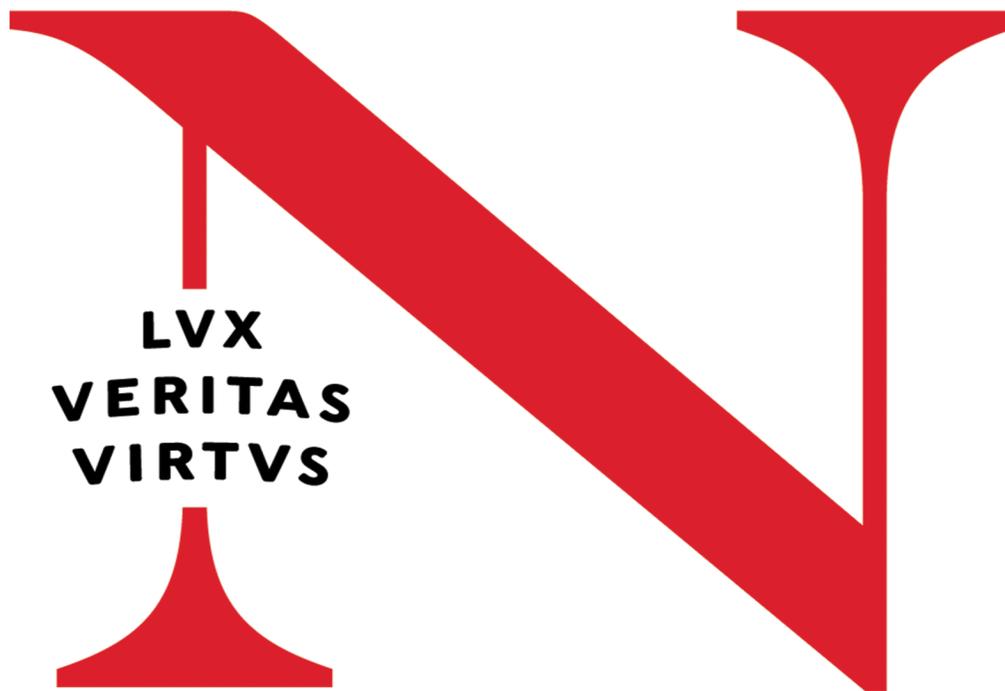


# Northeastern University Department of Mathematics



**Welcome Packet**  
**Academic Year 2019-2020**

## Letter from the Chair

I am delighted to welcome you at the start of this new academic year. I am honored to serve as your Department Chair, and I look forward to working with you to achieve our common goals. I will be assisted in this task by Professors Chris Beasley, Bob McOwen, and Sol Jekel, Prasanth George, and Nate Bade.

This year we hired two new tenure-track faculty: Matthew Hogancamp and Ben Knudsen. We also made a senior hire, Harm Derksen, who we expect to join us next year. Moreover, we made three new Teaching Faculty hires this year: Evan Dummit, Valerie Hower, and He Wang. Furthermore, I am pleased to announce that the University has approved our request for two new tenured/tenure-track searches.

Department research is flourishing, and our goal is to continue this trend and raise our profile by promoting the organization of seminars, conferences and workshops. Last week we hosted the “Quantum Structures in Algebra and Geometry conference”. The Department currently has some 17 faculty members with support from the National Science Foundation, the Simons Foundation, and other funding sources. In particular, the Research Training Group (RTG) grant awarded by the NSF two years ago offers increased opportunities for research, course developments, and mentoring experiences at various levels, including a summer REU program.

We continue to expand our Zelevinsky Research Instructor (ZRI) Program. In addition to hiring three new ZRI postdocs: Hsiang Robert Chang, Iva Halacheva, and Florian Naef, we were able to hire two combined ZRI/RTG postdocs: Vance Blankers and Matej Penciak. The Department also has two other postdocs, Peter Crooks and Robin Walters. Our goal is to further increase the quality of our postdoc program to keep it competitive with the top-named instructorships in the country.

Northeastern’s continuing rise in national rankings has attracted stronger students than ever before. We are endeavoring to meet the needs of the students in the best possible way. We welcome eight new Teaching Assistants in the Ph.D. program. We will continue to encourage Ph.D. students to attend summer schools, workshops, conferences, and to take advantage of all the research opportunities offered by our Department. The effective operation and development of the Department significantly relies on the service contributions of all our faculty. I will strive to motivate more faculty involvement in the affairs of the Department, College, and University.

As you are aware, space, or the lack thereof, continues to be a concern. Following a thorough review of this issue, we endeavored to optimize the use of available space. This summer we renovated several offices and teaching spaces; more improvements and renovations are in the planning stages. I would like to encourage everyone to contribute to creating and maintaining a clean, welcoming environment.

Once again, I welcome all of you, and I look forward to a productive year.

Alexandru Suciu



## Important Dates

Date	Workshop	Time	Location	For	Contact
Tuesday, September 3rd	New Instructors Orientation	9-10 am	Lake 509	New Lecturers	Prasanth George p.george@northeastern.edu 617.373.4275
Tuesday, September 3rd	Department Meeting	11:30-1 pm	Shillman 305	Entire Department	Andrew McGuinness a.mcguinness@northeastern.edu 617.373.2450
Tuesday, September 3rd	Math Major Welcome	2:30-3:30 pm	Lake 533	New Math Majors	Solomon Jekel s.jekel@northeastern.edu 617.373.5639

## Department Administrators and Advisors



Alexandru Suciu  
Professor and Department Chair



Nathaniel Bade  
Teaching Professor and  
MSAM/MSOR Director



Prasanth George  
Teaching Professor and  
Undergraduate Director



Solomon Jekel  
Professor and Head Advisor



Robert McOwen  
Professor and Teaching Director



Christopher Beasley  
Professor and Director of Graduate  
Studies



# New Members of the Department

## Tenure-Track Assistant Professors

### **Professor Ben Knudsen**



Before joining us, Dr. Knudsen was an NSF Postdoctoral Fellow at Harvard University under the supervision of Michael Hopkins. He did his undergraduate studies at Princeton University advised by Zoltán Szabó, and obtained his PhD from Northwestern University in 2016 under the direction of John Francis.

Dr. Knudsen is a leading young researcher interested in Algebraic and Geometric Topology. The main focus of his research has been on elucidating the structure of spaces of configurations of non-colliding particles. Using sophisticated tools coming from factorization homology, higher category theory, and geometric group theory he has done significant work on the homology of configuration spaces of manifolds and graphs, obtaining explicit formulas for the Betti numbers of such spaces, as well as homological stability results.

### **Professor Matthew Hogancamp**



Before coming to Northeastern, Dr. Hogancamp was a Zorn postdoctoral fellow at Indiana University from 2013 to 2016 and then an Assistant Professor (NTT) at the University of Southern California. He did his undergraduate studies at the University of Notre Dame and obtained his PhD from the University of Virginia in 2013 under the direction of Slava Krushkal.

Dr. Hogancamp is a leading young researcher interested in low-dimensional topology and categorification. His research interfaces many other areas of mathematics, including representation theory, algebraic geometry, combinatorics and mathematical physics. His main contributions to date center around an emerging relationship between homology theories for knots and links (such as Khovanov–Rozansky homology) and Hilbert schemes of points in the plane. Dr. Hogancamp is currently working on an exciting project, joint with Ben Elias, which introduces the notion of diagonalization of functors and uses it to construct categorifications of Hecke algebra idempotents.



## Teaching Professors

### **Professor Evan Dummit**



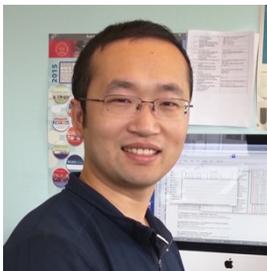
Dr. Evan Dummit is a number theorist by training and is excited to join Northeastern and contribute to our teaching mission. He was most recently a postdoc at Arizona State University, and was previously a postdoc at the University of Rochester, where he worked on problems in algebraic number theory and algebraic combinatorics in addition to teaching a wide array of courses. In addition to his research and teaching, Evan also enjoys writing problems for mathematics competitions: he is a member of the National Question Writing Committee for MATHCOUNTS and regularly submits problems for competitions in his home state of Vermont, including the Vermont Mathematics Talent Search and the University of Vermont High School Prize Examination in Mathematics.

### **Professor Valerie Hower**



Dr. Valerie Hower completed a Ph.D. in mathematics from the University of Georgia. Her dissertation “Hodge Spaces of Real Toric Varieties” involved geometric combinatorics and algebraic topology. She then focused on biology and computational biology through her postdoctoral work, including two years as an NSF Mathematical Sciences Research Postdoctoral Fellow at the University of California, Berkeley. As Dr. Hower transitioned into the role of faculty member, she quickly discovered her passion for teaching and undergraduate education! In her free time, Valerie enjoys running, playing video games with her son, and attending art and music events.

### **Professor He Wang**



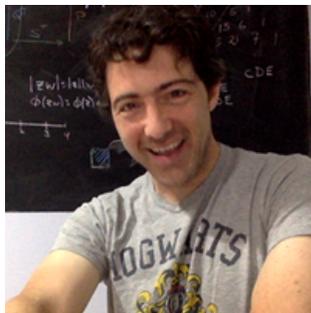
Dr. He Wang received his PhD from Northeastern University in 2016. His advisor was Alexandru Suciu and his thesis was titled, “Resonance varieties, Chen ranks and formality properties of finitely generated groups.” Before joining us, Dr. Wang was a Postdoctoral Researcher at the University of Nevada, Reno.



## Part-Time Instructors



Dan Ehrmann is due to receive his degree from the University of Pittsburgh later this month. His main focus for research involves Khovanskii bases and using them to expand Gröbner theory. He is a big sports fan and enjoys going out to watch games, especially football, however he is originally from Philadelphia so he may not be cheering for the same team.



Dr. Aaron Hoffman has been teaching Mathematics at the college level for fifteen years. He is excited to join the team at Northeastern. Dr. Hoffman is very interested in the balance between providing structure for learning and giving students room to explore and discover. He is sustained by the energy and enthusiasm of young learners.



Dimitre Tzigantchev has earned a Ph.D. degree in Mathematics from Florida State University and a M.A. in Mathematics from Sofia University.

Dr. Tzigantchev interests and achievements are in the areas of Algebra and Biomathematics. He has been a researcher and an educator for more than twenty years and has taught more than twenty courses at several institutions, one being Massachusetts Maritime Academy.

Dr. Tzigantchev feels extra enthusiastic about continuing to pursue his academic endeavors. His teaching goal is to master (to both his students' and his own satisfaction) as many courses as possible. The prospects of completing the undergraduate part of this task in his lifetime are looking rather good as he is currently a Part-Time Instructor at Northeastern and a Visiting Assistant Professor at Wentworth.



## Zelevinsky Research Instructors



### **Hsiang (Robert) Chang**

Dr. Chang received his PhD in Mathematics from Northwestern University, under the supervision of Steve Zelditch, in May 2019. His research interests lie at the intersection of microlocal analysis of spectral problems arising from quantum mechanics, probability, and complex analysis. Specific research areas include quantum chaos; nodal sets and  $L^p$  norms of eigenstates; and spectral asymptotics.



### **Matej Penciak**

Dr. Penciak received his PhD in Mathematics from the University of Illinois at Urbana-Champaign, under the supervision of Tom Nevins, in Spring 2019. His research is at the intersection of algebraic geometry, integrable systems, and mathematical physics. His goal is to tackle problems in integrable systems by interpreting the problems algebro-geometrically and using tools available in geometry to come to a solution. During his time at Northeastern he hopes to broaden his research into quantum integrable systems and representation theory.



### **Iva Halacheva**

Dr. Halacheva received her PhD from the University of Toronto, under the supervision of Dror Bar-Natan and Joel Kamnitzer, in 2016. Her research is in representation theory, quantum algebra, and low-dimensional topology. She studies links and interactions between the geometric, combinatorial and categorical aspects of these fields. Dr. Halacheva works with crystals, cacti, and maximal commutative subalgebras in the setting of combinatorial and geometric representation theory, diagram algebras and Lie superalgebras in categorical representation theory, and tangle and link invariants in knot theory.





### **Vance Blankers**

Dr. Blankers received his PhD in Mathematics from Colorado State University, under the supervision of Dr. Renzo Cavalieri, in May 2019. His research interests include moduli spaces of curves, combinatorial algebraic geometry, enumerative geometry, and Gromov–Witten theory. Dr. Blankers has investigated hyperelliptic loci in  $M_{g,n}$  and has worked on the intersection theory of Hassett spaces.



### **Florian Naef**

Dr. Naef received his PhD in Mathematical Physics from the University of Geneva, under the supervision of Anton Alekseev, in 2017. His general interests lie at the intersection of algebra, geometry, low-dimensional topology and quantization. His research starts from the study of moduli spaces of flat connections on a surface and additional structures induced by the geometry of the surface. These additional structures are essentially encoded by the Goldman–Turaev Lie bialgebra, which has its higher-dimensional generalizations that usually go under the name of String Topology.



## Degrees Awarded in 2018–2019

### **Doctors of Philosophy**

- Brian Hepler
- Ryan Mickler
- Monika Pichler
- Rahul Singh

### **Masters of Science**

- Matthew Burchfield
- Runpeng Li
- Aneesh Nambiar
- Franklin Rea

### **Masters of Science in Applied Mathematics**

- Jialu Cai
- Emily Correa
- Jacqueline Garrahan
- Zhenyu Hong
- Bokai Li
- Wenting Luo
- Arthur McDeed
- Zekiye Ozisik
- Sihong Peng
- Brian Phillips
- Xin Shen
- Sheng Su
- Samuel Takazawa
- Yongyi Tan
- Jiaqi Wang
- Yuanyi Wu
- Liwei Xu
- Yifan Xu
- Xing Yang
- Summer Zacca
- Dilong Zhou
- Chiara Mazzei
- Yexin Hu

### **Masters of Science in Operations Research**

- Hong Tu
- Junjie Wang
- Yitao Wu
- Qifan Zhai
- Xiao Zhang



# Incoming 2019–2020 Graduate Class

## **Doctor of Philosophy**

- Xin Shen
- Yujia Shi
- Torger Olson
- Shengnan Huang
- Dezhou Li
- Muhammad Anadil Saeed Rao
- Matthew Burchfield
- Vsevolod Zadorozhnyy

## **Master of Science in Applied Mathematics**

Ankit Aggarwal

Edith Aromando

Ruobing Bai

Yakun Chen

Chun-Li Chuang

Joshua Galloway

Wanchen Geng

Mu He

Ruiwen Jin

Zechen Jin

Yichen Jing

Yiwen Liu

Qiang Liu

Qining Liu

Hui Ma

Erik McMillan

Ruoyu Meng

Weidi Pan

Nehar Poddar

Ziyun Qiu

Haoang Sun

Hongzhi Wan

Biyang Wang

Zheyang Yu

Zexian Zhao

Dandan Zhou

Heqing Zhu

## **Master of Science in Operations Research**

Nurbanur Demir

Xuan Liu

Haoxuan Qiu

Rohit Thakur

Kaiqi Wang

Yahan Yang

Ruotong Zhang

## **Master of Science**

Xiaochen Xiao



## Events from 2019

### Alumni Conference

On February 15, 2019 the Department was the host of an all-day event that brought together members of its graduate community. The event was held at the Fenway Center and Lake Hall the Alumni Conference was attended by notable alumni, faculty, as well as current and prospective graduate students. For alumni, it was a chance to be connected and share their experience and research. It was also a wonderful opportunity for aspiring researchers to learn about the paths of fellow Northeastern alumni in various fields.

### Maurice Auslander Distinguished Lectures and International Conference

Every year in late April/early May, the Auslander conference is held at Woods Hole Oceanographic Institute in Woods Hole, MA to honor the memory of Maurice Auslander. The event is organized by Gordana Todorov, Alexander Martsinkovsky, and Kiyoshi Igusa. This conference is sponsored by the National Science Foundation and the Department of Mathematics.

### Quantum Structures in Algebra and Geometry Conference

The Quantum Structures in Algebra and Geometry conference was organized in a joint effort between Northeastern and MIT, with support from the National Science Foundation, the Clay Foundation, MIT, the College of Science, and the Department of Mathematics. The five-day conference, held at Northeastern August 26–30, featured twenty one speakers from nineteen different universities, and attracted some one hundred participants.

### Bridge to Calculus and Calculus Field Day

Bridge to Calculus is a six-week math enrichment program on campus that prepares rising juniors from Boston Public schools to take calculus in their senior year.

Calculus Field Day is a challenging math competition for Boston Public High School students. It encourages high school students to enroll in and succeed in calculus, especially AP Calculus.



# Department Policy

## Evaluations

In addition to the TRACE evaluations given directly to students by Northeastern University, the Math Department also requires instructors to hand out an evaluation towards the end of the semester which is kept on record. This greatly assists the Teaching Director and the Teaching Committee in knowing how the students feel about our courses, regarding the effectiveness of your teaching in the classroom, the textbook, your number of office hours, and many other factors. These evaluations are also very important when it comes to assessing faculty for merits and loads, promotions, tenure, and future re-hiring. Instructors are required to pick a trusted student to pass out the evaluations, collect them, and deliver them to the Main Office at 567 Lake Hall. The instructor must not be present in the room while the students are completing this evaluation. They will be available to view by the instructor when they have submitted their final grades after the semester ends.

## Scheduling Conference Rooms

The Department has two conference rooms - 509/511 Lake Hall and 544 Nightingale Hall. These are available to the Department to be used for conferences, seminars, meetings, luncheons, certain tests (e.g. qualifying exams and the Putnam Competition), and for instructors to grade their finals at the end of the semester. If you wish to schedule any of the above events, please contact the administrative assistant, Andrew McGuinness, and provide him with the time, date, title, and any other relevant information pertaining to the event. The Joint Colloquium and most seminars have permanent time slots and will always be on the calendar. However, any shorter-term seminar, or anything with a "floating" time or date should be reserved at the beginning of each semester.

**Please note:** This year we will be conducting two searches for Tenured/Tenure-Track positions. All Faculty, Postdocs, and Graduate Students are strongly encouraged to attend the Special Talks. Competing seminars and events during the period of mid-November to mid-January will only be scheduled after discussion with the Chair. Thank you for your cooperation and consideration in this important departmental function.

## Proctoring

Historically, the Department has assisted instructors who wish to give makeup/retake quizzes/tests/exams to their students. However, due to the growth in the number of students taking our courses, this has become an unwieldy task for the administrative assistant alone. This year, the Main Office will be reducing the number of hours available for proctoring tests - they will be posted on the whiteboard in the Main Office at the beginning of the semester.

We encourage instructors to ask their students to sign up for these time slots at the following link: [calendly.com/math567](https://calendly.com/math567) (no sign-in is required, it's a very small form).



We also call upon instructors to supervise their students' retakes/makeups during their office hours. You may use one of the conference rooms to do this, however, please consult the room calendar above to make sure there are no other events scheduled at the same time.

## Office Hours & Tidiness

Office hours are an important resource for our students to be able to stay in contact with their instructors. Please provide the Main Office (a.mcguinness@ northeastern.edu) with your office hours for this semester - if you are teaching, your office hours must add up to three hours per week.

Because we are always receiving visitors and students, we expect you to maintain a reasonable level of tidiness in your offices. Trash and food items should be cleaned promptly to prevent the spread of pests, stains, and bad smells. Papers and books should be neatly stowed and should not be spread across the office. Cooking devices (microwaves, toaster ovens, portable stoves) are forbidden. If there is any damage to the infrastructure of the room (leaks, broken windows or doors, etc), please notify the department assistant so that he can contact Facilities to repair it.

