

Advising/Mentoring, Service and Professional Activities Statement - Yekaterina Epshteyn
<http://www.math.utah.edu/~epshteyn/>
Summer 2021

1 Advising/Mentoring, Service and Professional Activities Statement

I am an Applied Mathematician with research interests in Numerical Analysis, Scientific Computing and Mathematical Modeling/Analysis with applications to problems from Biology, Materials Science and Fluid Dynamics. I strongly believe that the path to new scientific discoveries is through fostering interdisciplinary interaction and collaboration.

In addition, it is essential to recruit, engage and train a younger generation of scientists and to work on increasing the participation of women and underrepresented groups in the STEM fields. As a part of my advising/mentoring, service and professional activities, I work hard to further advance these important goals.

1.1 Advising and Mentoring Activities

I served as a postdoctoral mentor to one postdoc and I am currently mentoring a new postdoctoral fellow at the Department of Mathematics at the University of Utah, I supervised several individual REU students and taught Math 4800: “Undergraduate Research in Mathematics” course to 10 REU students, I graduated 4 mathematics Ph.D students and I am currently advising 3 more mathematics Ph.D students (two Ph.D students are expected to graduate in Spring 2022). Since 2013, I have been the organizer of the Department’s Applied Mathematics research seminar. The seminar offers a very lively exchange of ideas in modern research areas in Applied Mathematics and has been successful in the past several years. The seminar has also provided crucial exposure to graduate students of various active areas of research at the University of Utah and outside of the University of Utah, as well as it offered an opportunity for students to meet scientists working in different areas of Applied Mathematics. Several graduate students and postdocs also had a chance to showcase their research at the seminar. In addition, during the 2020-2021 academic year, I co-organized a seminar with my colleague Akil Narayan in virtual format due to COVID19. On one hand, it was somewhat challenging to hold this seminar in virtual settings (e.g., there were less opportunities for discussion/scientific exchange of ideas with speakers), on the other hand, it gave us an opportunity to organize a seminar together with Claremont Schools in California and broaden participation in the seminar.

I am also involved in several outreach activities, including the ACCESS program in the College of Science at the University of Utah. The goal of ACCESS is to encourage young women (usually high school students) to consider careers in STEM fields.

Supervision of Students/Postdoc Research Projects:

- **Undergraduate Students:**

- **Supervision of 10 REU students:**

Nathan Briggs, Annie Cherkaev, Stephen Durtschi, Kyle Hiroyasu, Erika Loertscher, Sean O’Connor, Troy Raen, Justin Talbot, Hitesh Tolani and Ericson Weah, as a part of REU course Math 4800 “*Selected Numerical Algorithms and Their Analysis*”, Spring 2014.

- **REU Undergraduate Students (individual REU study):**

James Eckstein, (January 2020 - Current), project “*Numerical Algorithms for Automated Dynamic Grain Boundary Network Identification*”.

Liam Hayes, (January 2020 - March 2021, Columbia University, Co-advisor. Advisor: K. Barmak), project “*Numerical Algorithms for Automatically Processing Data with Application to Grain Growth*”.

Camille Humphries, (January 2019 - December 2019, co-advised jointly with Qing Xia), project “*Fast Numerical Algorithms for Models with Nonlinear Diffusion*”

Charlotte Blake, (August 2018 - May 2019), project “*Numerical Algorithms with Application to Data Processing in Materials Science*”.

Charlotte started Ph.D in Mathematics at the University of Illinois at Urbana-Champaign in Fall 2019.

Gabrielle Legaspi, (January 2019 - May 2019), project “Coarsening Models”

Gabrielle Legaspi, (May 2017 - September 2017, co-advised jointly with Kyle Steffen and Qing Xia), project “*Fast Numerical Algorithms Based on Difference Potentials Method.*” Recipient of Keith Reed Memorial Scholarship, April 2018.

Gabrielle started MSTAT program at the Mathematics Department at the University of Utah in Fall 2019.

Alex Henabray, (May 2014 - September 2014, co-advised jointly with Jason Albright), project “*Numerical Solution of 1D Stefan Problem*”.

Camille Humphries (May 2013 - May 2014, co-advised jointly with Jason Albright in Fall 2013 - Spring 2014), project “*Central-Upwind Schemes for Shallow Water Models*”.

Spencer Phippen (May 2013 - January 2014), project “*Difference Potentials Method for Interface Problems*”. Recipient of Susan C. Christiansen Memorial Scholarship for our REU project, April 2014.

Software Engineer at Google.

- **Ph.D Students:**

Kaitlin O’Dell (Fall 2021 - present), advisor. Research project “*Energetic Variational Particle Based Methods for Fokker-Planck Equations.*”

Dihan Dai (Fall 2016 - Spring 2022 (expected graduation), Ph.D advisor. Ph.D co-advisor: Akil Narayan), thesis area “*Numerical Methods for Shallow Water Models with Uncertainty*”. Recipient of the Department Summer Research Fellowship 2021.

Thuong Nguyen (Fall 2016 - Spring 2022 (expected graduation), Ph.D advisor), thesis area “*Numerical Methods for Shallow Water Models.*” Additional research project in the Fall 2021: “*Computational Models of Grain Growth in Polycrystalline Materials.*”

Thuong is supported during August 2021 - current via research assistantship on the NSF-DMS Grant 1905463.

Recipient of the Vietnamese Government Fellowship for the Graduate Study, 2016-2018.

Qing Xia (Fall 2014 - Spring 2019, Ph.D advisor), Ph.D. thesis “*Robust Numerical Algo-*

rithms with Applications to Interface Problems and Chemotaxis Models in Biology".
Recipient of the Outstanding Graduate Student Award, April 2016 and the Department Summer Research Fellowship 2017.

First Job after Ph.D: Postdoctoral Fellow at the Department of Mathematical Sciences at Rensselaer Polytechnic Institute (RPI), July 2019 - June 2021.

Starting Fall 2021: *Dahlquist Research Fellow* at KTH Royal Institute of Technology, Stockholm, Sweden.

Kyle Steffen, (2013 - 2018, Ph.D advisor. Ph.D co-advisor: Kenneth Golden), Ph.D. thesis "*The Difference Potentials Method for Problems with Evolving Geometry and Modeling Fluid Flow in Sea Ice*"

First Job after Ph.D: Peter O'Donnell Postdoctoral Fellow at Oden Institute for Computational Engineering & Sciences at the University of Texas at Austin, Fall 2018 - Current.

Jason Albright (2012 - 2016, Ph.D advisor), Ph.D. thesis "*Numerical Methods based on Difference Potentials for Models with Material Interfaces*".

Recipient of the Outstanding Graduate Student Award, April 2014.

Recipient of the University of Utah Graduate Research Fellowship, 2015-2016.

Jason was also supported during January 2015 - May 2015 via research assistantship on the NSF-DMS Grant 1112984.

First Job after Ph.D: Postdoctoral fellow at the Theoretical Division at Los Alamos National Laboratory (LANL).

Currently: R&D Staff Scientist 2 at the Theoretical Division at Los Alamos National Lab (LANL).

Patrick Bardsley (2012 - 2016, Ph.D advisor. Ph.D co-mentor: Fernando Guevara Vasquez), Ph.D. thesis "*Intensity-only imaging with waves, restarted inverse Born series, and the analysis of coarsening in polycrystalline materials*".

Recipient of Rushing Research Fellowship, April 2015. Recipient of Best MSTAT student of the year award, April 2016.

First Job after Ph.D: Peter O'Donnell Postdoctoral Fellow at the Department of Mathematics and Oden Institute for Computational Engineering & Sciences at the University of Texas Austin.

Currently: Machine Learning Engineer at Cirrus Logic.

- **Graduate student research project supervision:**

Elias Clark (Fall 2018 - Spring 2021, Advisor on the research project. Co-advisor: Lajos Horvath), research project "*Data-Driven Numerical Simulation and Modeling of Grain Growth in Polycrystalline Materials*".

Elias was supported during August 2019 - May 2020 via research assistantship on the NSF-DMS Grant 1905463.

- **Visiting Ph.D. Students:**

Gustav Ludvigsson and Simon Sticko, Spring 2017 (visiting from Uppsala University, Sweden)

- **Reading Course on Difference Potentials Method to Ph.D students:**

Qing Xia and Vera Babenko, Spring 2014

- **Postdoctoral Mentees:**

Chang (Kamala) Liu (Fall 2021 - present) “*Stochastic Models of Grain Growth and Structure-Preserving Numerical Algorithms.*”

Michael Medvinsky (Fall 2013 - Spring 2015), “*Difference Potentials Methods for the Elliptic Interface Problems in 2D.*”

Currently: Research Assistant Professor at the Department of Mathematics, North Carolina State University.

Ph.D Committee Member:

- Curtis Miller, Ph.D student, Mathematics, Graduated 2020
- Hanlei Zhu, Ph.D student, Mathematics. Graduated 2019
- Erin Linebarger, Ph.D. student, Mathematics. Graduated 2019
- Tyler Johnson, Ph.D. student, Mathematics, 2017-2018
- Jing Ma, Ph.D. student, Physics, Graduated 2017
- Cheryl Zapata-Allegro, Ph.D. student, Mathematics, Graduated 2016
- Brent Kerby, Ph.D student, Mathematics, Graduated 2016
- Yeonjong Shin, Ph.D student, Mathematics, 2015-2016 (moved to Ohio State University)
- Joe Eason, Ph.D student, Mathematics, Graduated 2017
- Victor Camacho, Ph.D student, Mathematics, since 2014
- Predrag Krtolica, Ph.D student, Mathematics, Graduated 2015
- Mingfeng Qiu, Ph.D. student, Mechanical Engineering, May 2013 - May 2015 (moved to the University of British Columbia, Canada, Graduated 2020)
- Michal Kordy, Ph.D student, Mathematics, Graduated 2014
- Brittany Bannish, Ph.D student, Mathematics, Graduated 2012

1.2 Service to the University of Utah and Selected Outreach Activities

Since I joined the University of Utah in 2010, I have served diligently on various Departmental and University committees. For example, since 2015, I have served as,

1. Elected member of the Executive Committee at the Department of Mathematics (2015-2017)
As a member of the *Executive Committee*, I was responsible for advising the Chair of the department on the matters of departmental policy, hiring /staffing decisions, committee assignments, and teaching assignments
2. Member of the Hiring Committee at the Department of Mathematics (2019-2020)
As a member of the *Hiring Committee* for regular (tenure-line) faculty positions, I was responsible for discussing hiring with faculty, for carefully evaluating/reviewing applications, and taking part in making timely recommendations regarding invitations for the interviews and regarding hiring decisions to the Executive Committee

3. Member of the Department Library Committee (2018-2019)
As a member of the *Library Committee*, I was responsible for monitoring and facilitating book and journals orders
4. Member of the Department Graduate Committee (2015-2017, 2020-2021)
As a member of the *Graduate Committee*, I took part in advising the department on the matters of the graduate program, including on the graduate program policy, in evaluating/monitoring graduate students' progress, and in making decisions regarding graduate program and graduate students
5. Member of the Department Graduate Recruitment Committee (2017-2018) and I was a Chair of the Graduate Recruitment Committee (2014-2015) - that year we were very successful in recruiting a high percentage of female graduate students in different areas of Mathematics to our Ph.D program
6. Member of the Department Undergraduate Curriculum Committee (2021-Present)
As a member of the *Department Undergraduate Curriculum Committee*, I take part in coordinating various aspects of our department undergraduate program to ensure that the program meets the needs of the students and department's expectations
7. Member of the Department Development Committee (2018-2021)
As a member of the *Development Committee*, I took part in developing strategic plans for resource development and fund raising for the department
8. Member of the Department Faculty Undergraduate Teaching Award Committee (2021-Present)
As a member of the *Faculty Undergraduate Teaching Award Committee*, I take part in soliciting faculty nominations and deciding the Department Undergraduate Teaching Awards
9. Chair of the Department Faculty Awards Committee (2020-Present)
As the Chair of the *Faculty Awards Committee*, I am responsible for soliciting faculty nominations for the University Awards, for carefully reviewing the department applications/nominations, for preparing and submitting the nominations to the University. I am also responsible for informing faculty about various external awards (outside of the University of Utah) and for helping to prepare nominations for such awards
10. Organizer of the Department Applied Mathematics Seminar (2013-Present)
See Section 1.1 for details
11. Member of Warnock Chair Committee (2019-Present)
As a member of *Warnock Chair Committee*, I take part in decisions about Warnock fund award to recruit outstanding junior faculty to the department
12. Elected member of the College of Science Council (2014-2016 and 2019-2021)
As a member of the *College of Science Council*, I took part in discussing and advising the Dean on various College of Science matters
13. Elected member of the Academic Senate at the University of Utah (2015-2018)
As the University Senator, I took part in discussing, advising and making decisions on various University of Utah matters, such as academic operations of the university including budget decisions and administrative appointments

14. Member of the Senate Advisory Committee on Diversity at the University of Utah (2016-2020)
As a member of the *Senate Advisory Committee on Diversity*, I was responsible for advising Academic Senate on diversity matters
15. Judge, Semi-Finals of Sterling Scholar Competition for High-School Students in Utah, <http://www.sterlingscholar.org/>, February 2019
16. Participation in ACCESS Program (2016, 2018, 2019) at the College of Science at the University of Utah. The goal of ACCESS is to encourage young women (usually high school students) to consider careers in STEM fields.

1.3 Professional Activities and Service

I also diligently serve and participate in various professional activities. For example, since 2015, I have served as,

1. Organizer/Co-organizer of 7 mini-symposia at various national and international scientific conferences and events: for example, at different Society for Industrial and Applied Mathematics (SIAM) meetings, at the American Mathematical Society (AMS) conferences and at the 14th World Congress in Computational Mechanics and ECCOMAS Congress (WCCM-ECCOMAS), (2015-Present)
The organized *mini-symposia* covered a variety of topics, from numerical methods for interface problems to modeling, simulation, analysis and experiments in polycrystalline materials, and featured presentations from renowned researchers, as well as from more junior investigators, including graduate students and postdocs
2. Co-organizer of “CMDS Investigators Workshop: At the Frontiers of Computation and Materials”, Snowbird, Utah, USA, May 16, 2015
The *workshop* was a great success. The goals of CMDS Investigators Workshop were to bring together researchers from around Utah state who worked on the mathematical aspects of complex materials, to give the floor to young investigators in the area, and to discuss recent and current trends in the field. The informal atmosphere of the meeting led to fruitful exchange of ideas, methods and results
3. Co-organizer of the International Conference “Topics in Applied Nonlinear Analysis: Recent Advances and New Trends”, Conference in honor of David Kinderlehrer’s 75th birthday, Carnegie Mellon University, July 18-20 2016, <https://www.math.cmu.edu/CNA/kinderlehrer75/>
The *conference* was a great success and focused on the contemporary trends in Nonlinear Analysis. The conference featured 24 invited talks from renowned and from more junior researchers in a broad variety of areas in Applied Mathematics, as well as in Materials Science. In addition, the conference featured a special poster session and it gave an opportunity for junior researchers to take a more active part in the event and showcase their work to a highly diverse audience, including distinguished researchers, as well as junior peers
4. Co-organizer of the conference, American Mathematical Society (AMS) Fall Western Sectional Meeting, Salt Lake City, UT, October 2022 (postponed to Fall 2022 due to COVID19)
5. Project Leader, Women in Mathematics of Materials (WIMM) Workshop, University of Michigan, Ann Arbor, MI, May 14-May 18 2018

Mentored together with Pania Newell (co-mentor) three female junior researchers, Lei Cao, Amanda Howard and Hala AH Shehadeh on the research project and on career matters in Applied Mathematics, Engineering and Materials Science

6. Reviewer and panelist, American Association of University Women (AAUW) Fellowships and Grants (appointed for the two terms 2018-2022)
I am responsible for carefully reviewing applications and for identifying promising scholars for AAUW International Fellowship awards
7. NSF reviewer and panelist
8. Reviewer for many top scientific journals
9. Member, Society for Industrial and Applied Mathematics (SIAM) Committee on Programs and Conferences, SIAM, 01/2016-12/2021 (Appointed by the SIAM President to serve starting in January 2016 and re-appointed by the SIAM President for the second term to serve starting in January 2019. Each term is a three year appointment.)
The members of “SIAM Committee on Programs and Conferences” are responsible for advising the SIAM Vice President for Programs on matters related to SIAM meetings and conferences
10. Member of the Nominating Committee for the SIAM Activity Group on Analysis of Partial Differential Equations (SIAG/APDE), 2020
The committee is responsible for soliciting and nominating candidates for the election of SIAG/APDE Leadership positions
11. SIAM Activity Group (SIAG) Officer, Leadership of SIAM Mathematical Aspects of Materials Science Activity Group (SIAG/MS), 01/2019-12/2020, (Elected by SIAG/MS Members)
The committee is responsible for developing and overseeing conference strategies and program development for SIAG/MS activity group, as well as advising SIAM on various matters of the activity group