

# Emily T. Winn-Nuñez

🌐 [www.etwinn.github.io](http://www.etwinn.github.io)

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🌐 etwinn

## RESEARCH INTERESTS

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Developing computationally efficient, interpretable methods in machine learning. Specialties include nonparametric, nonlinear models and methods for shape data.

## EDUCATION

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### Brown University

*PhD. in Applied Mathematics*

Advisor: Dr. Lorin Crawford

Providence, RI

*Expected May 2024*

### Brown University

*M.S. in Applied Mathematics*

Providence, RI

*May 2019*

### College of the Holy Cross

*A.B. in Mathematics with High Honors, Magna Cum Laude*

Advisor: Dr. David Damiano

Thesis: Topological Modeling of Force Networks in Granular Materials

Worcester, MA

*May 2017*

### St. Edmund Hall, University of Oxford

*Visiting Students Programme*

Oxford, England, UK

*2015-2016*

## PREPRINTS

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- # E.T. Winn-Nuñez, M. Griffin, # L. Crawford. A Simple Approach for Local and Global Variance Importance in Nonlinear Regression Models. *Under Revision at Computational Data Science and Statistics*. March 2023. doi: <https://doi.org/10.48550/arXiv.2302.02024>

## PUBLICATIONS

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### ( # corresponding author)

- # E.T. Winn, M. Vazquez, P. Loliencar, K. Taipale, X. Wang, # G. Heo (2021). A survey of statistical learning techniques as applied to inexpensive pediatric Obstructive Sleep Apnea data. In: Demir, I., Lou, Y., Wang, X., Welker, K. (eds) *Advances in Data Science*. Association for Women in Mathematics Series, vol 26. Springer, Cham. [https://doi.org/10.1007/978-3-030-79891-8\\_12](https://doi.org/10.1007/978-3-030-79891-8_12)
- K. Lin, J. Rutter, A. Xie, E.T. Winn, B. Pardieu, R. Del Bello, R. Itzykson, Y-R Ahn, Z. Dai, R. Sobhan, G. Anderson, K. Singleton, A. Decker, P. Winter, J. Locasale, L. Crawford, # A. Puissant, # K. Wood. Using antagonistic pleiotropy to design a chemotherapy induced evolutionary trap. *Nature Genetics*, v. 52, 408-417, Apr. 2020. doi: <https://doi.org/10.1038/s41588-020-0590-9>.
- M. Berry, V. Diaz, B. Doleshal, T. Martin, # E.T. Winn, and M. Zhou. The component number of a twisted torus link. *Minnesota Journal of Undergraduate Mathematics*, [S.l.], v. 2, n. 1, Apr. 2017. ISSN 2378-5810.

## WORK EXPERIENCE

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Applied Math Ph.D. Candidate, NSF Graduate Research Fellow

*Division of Applied Mathematics*

Brown University

*June 2019 - Present*

- Upgraded algorithm for ranking variable importance to account for additive effects in addition to marginal effects; applied to genetic data
- Developed and implemented method for sampling shapes from a distribution and generating new shapes to fit in with given shape data set. Built corresponding R package.

### PhD Data Science Intern

**Meta**

*Facebook Ecosystems Team*

*Summer 2022*

Created, defined, and implemented new data metric in collaboration with multi-disciplinary team. Published three internal reports on metric performance, conclusions from analysis, and recommendations for future strategy, including general statistics practices.

### Research Assistant

**Brown University**

*Division of Applied Mathematics*

*May 2018 - May 2019*

- Built algorithm for comparing network differences at the local, neighborhood, and global levels under Dr. Lorin Crawford and applied to cancer tissue data
- Examined limit cycles in chip firing models under Dr. Caroline Klivans
- Studied graph motifs and  $k$ -winner-take-all networks in neural networks under Dr. Elie Bienenstock

### Research Assistant

**College of the Holy Cross**

*Department of Mathematics and Computer Science*

*June 2016 - May 2017*

Honors thesis in topological models of force networks in granular materials under Dr. David Damiano

### Research Assistant

**Sam Houston State University**

*NSF REU Program in Mathematics*

*Summer 2016*

Collaborated with seven undergraduate and graduate students to study properties of twisted torus links under Dr. Brandy Doleshal and Dr. Taylor Martin

## RESEARCH PRESENTATIONS

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*\*Denotes event cancelled due to COVID-19 pandemic*

Invited Talks .....

- Session for Bayesian Computing, Computation for Streaming, Shapes, and Selection, Joint Statistical Meetings, Toronto, ON, August 2023
- Conference on Education, American Mathematical Society, Washington, D.C., September 2022
- AWM Graduate Student Seminar, University of Pittsburgh, Online, April 2022
- Special Session on the Mathematics of Data Science, AMS Spring Eastern Sectional Meetings, Online, March 2022
- Graduate Student Applied Mathematics Seminar, Brown University, Providence, RI, March 2022
- Measuring Graduate Student Success, Virtual Graduate Students Achieving Inclusion Now (GAIN) Conference, Online, October 2021
- Minisymposium on Women in Data Science, Virtual SIAM Conference on Mathematics of Data Science, Online, June 2020
- \*Special Session on Mathematics of Data Science, AMS Spring Eastern Sectional Meetings, Medford, MA, 2020
- Models, Inference, and Algorithms Seminar Series, Broad Institute, Cambridge, MA, 2019

Contributed Talks .....

- Graduate Student Applied Mathematics Seminar, Brown University, Providence, RI, 2019
- AMS Contributed Paper Session on Undergrad. Research, Joint Mathematics Meetings, Atlanta, GA, 2017
- Special Session on Undergrad. Research, AMS Sectional Meetings, Bowdoin College, Brunswick, ME, 2016
- Women in Mathematics in New England (WiMiN), Smith College, Northampton, MA, 2015

Posters .....

- \*Poster Session, SIAM Conference on the Mathematics of Data Science, Cincinnati, OH, 2020
- AWM Graduate Student Poster Session, Joint Mathematics Meetings, Denver, CO, 2020
- MAA Undergraduate Student Poster Session, Joint Mathematics Meetings, Atlanta, GA, 2017
- College of the Holy Cross Summer Research Symposium, Worcester, MA, 2016
- College of the Holy Cross Summer Research Symposium, Worcester, MA, 2015

## FELLOWSHIPS AND GRANTS

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### NSF Graduate Research Fellowship

*Fellowship award for outstanding graduate students in science*

**National Science Foundation**

*2019 - Present*

### Patrick L. McCarthy '63 Alumni Scholarship

*Scholarship award for legacy students with high grade point average*

**Holy Cross Alumni Association**

*2016 - 2017*

## AWARDS AND HONORS

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### AWM Workshop Graduate Poster Award

*Awarded to recognize best posters in Graduate Women Poster Session*

**Joint Mathematics Meetings**

*January 2020*

### Gertrude McBrien Prize in Mathematics

*Awarded to an outstanding mathematics major*

**College of the Holy Cross**

*May 2017*

### Alpha Sigma Nu

*National Jesuit Honor Society, recognizes scholarship and service*

**College of the Holy Cross**

*Inducted 2016*

### Pi Mu Epsilon

*Mathematical Honors Society*

**College of the Holy Cross**

*Inducted 2016*

## TRAVEL GRANTS

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### JSM Student Travel Award

*Awarded to travel to 2023 Joint Statistics Meetings in Toronto, ON*

**ASA**

*August 2023*

### SIAM Student Travel Award

*Awarded to travel to 2020 SIAM Conference on the Math of Data Science in Cincinnati, OH*

**SIAM**

*May 2020*

### AWM Travel Grant (from AWM NSF Workshop Grant)

*Awarded to travel to 2020 Joint Mathematics Meetings in Denver, CO*

**Assoc. for Women in Mathematics**

*January 2020*

### MAA Student Travel Grant

*Awarded to travel to 2017 Joint Mathematics Meetings in Atlanta, GA*

**Mathematical Association of America**

*January 2017*

## CURATED DATABASES

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### Database for Math Graduate Program GRE Requirements

*2020-2022*

- Gathered data about GRE requirements for admission to more than 200 mathematics PhD programs in the US and Canada into one publicly available resource, funded by Transforming Post-Secondary Education (TPSE) Math

### Database for Math Graduate Program Qualifying Exam Practices

*April 2021*

- Collected data for public database about qualifying exam practices in mathematics PhD programs via an online survey, which has had more than 100 response so far

## TEACHING AND MENTORING EXPERIENCE

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Teaching Experience .....

<b>Co-instructor</b> <i>Statistical Inference I (APMA 1650)</i>	<b>Brown University</b> <i>Summer 2020</i>
<b>Teaching Assistant</b> <i>Operations Research Methods (APMA 1200) with Dr. Anasatios Matzavinos</i>	<b>Brown University</b> <i>Spring 2019</i>
<b>Teaching Assistant</b> <i>Information Theory (APMA 1710) with Dr. Matthew Harrison</i>	<b>Brown University</b> <i>Fall 2018</i>
<b>Teaching Assistant</b> <i>Linear Algebra (MATH 244) with Dr. Daniel Franz</i>	<b>College of the Holy Cross</b> <i>Spring 2017</i>
<b>Teaching Assistant</b> <i>Principles of Analysis (MATH 242) with Dr. Stephen Levandoski</i>	<b>College of the Holy Cross</b> <i>Fall 2016</i>
Pedagogy Training .....	
<b>Sheridan Teaching Seminar - Reflective Teaching (Certificate I)</b> <i>The Harriet W. Sheridan Center for Teaching and Learning</i> Course to "develop and refine fundamental teaching and assessment strategies and communication skills based on how students learn."	<b>Brown University</b> <i>Fall 2019</i>
Mentoring Experience .....	
<b>Brown Undergrad-Grad Mentoring Program</b> <i>Division of Applied Mathematics</i> Mentored three students, providing advice on courses, research, and summer opportunities	<b>Brown University</b> <i>2017 - 2020</i>

## SERVICE AND ACTIVITIES

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<b>Paper Submission Reviewer</b> <i>Workshop on Geometric and Topological Representation Learning</i> Reviewed three papers submitted to the workshop	<b>ICLR</b> <i>2022</i>
<b>Member of Review Committee</b> <i>Workshop for Topological Data Analysis and Beyond</i> Reviewed three papers submitted to the workshop	<b>NeurIPS 2020</b> <i>Fall 2020</i>
<b>Treasurer of AWM Student Chapter</b> <i>Division of Applied Mathematics</i> Submitting semester budgets and ensured correct documentation and reimbursement of event expenses.	<b>Brown University</b> <i>Fall 2020</i>
<b>Graduate President of AWM Student Chapter</b> <i>Division of Applied Mathematics</i> Directed and organized weekly meetings and monthly events, including speakers, panels, and support for undergraduate and graduate women in applied math and math	<b>Brown University</b> <i>2019 - 2020</i>
<b>Faculty Graduate Liaison</b> <i>Division of Applied Mathematics</i> <ul style="list-style-type: none"> <li>Organized all proposed budgets for department graduate student organizations and activities each semester</li> <li>Served as contact between faculty and graduate students and advocate for student well-being</li> </ul>	<b>Brown University</b> <i>2018 - 2019</i>
<b>Lead Retreat Coordinator</b> <i>Division of Applied Mathematics</i> Planned logistics and activities for graduate student fall retreat, including accommodation, food, budgeting, transportation, and research activities	<b>Brown University</b> <i>2018</i>

## **CODING LANGUAGES**

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SQL,  $\text{\LaTeX}$ , MATLAB, Python, Pytorch, R, some C++

## **PROFESSIONAL AFFILIATIONS**

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- American Statistical Association (ASA)
- American Mathematical Society (AMS)
- Association for Women in Mathematics (AWM)
- Society for Industrial and Applied Mathematics (SIAM)
- The Rose Whelan Society