

# Emily T. Winn-Nuñez

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

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## RESEARCH INTERESTS

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Statistics of shapes, topological data; nonparametric, nonlinear models for big data; applications to data science, machine learning

## EDUCATION

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### Brown University

*PhD in Applied Mathematics*

*MS in Applied Mathematics*

**Providence, RI**

*Expected May 2024*

*May 2019*

### College of the Holy Cross

*AB in Mathematics with High Honors, Magna Cum Laude*

**Worcester, MA**

*May 2017*

### St. Edmund Hall, University of Oxford

*Visiting Students Programme*

**Oxford, England, UK**

*2015-2016*

## WORK EXPERIENCE

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### PhD Data Science Intern

*Worked on Facebook Home Ecosystems Team*

**Meta**

*Summer 2022*

## RESEARCH AND TEACHING EXPERIENCE

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### NSF Graduate Research Fellow

*Division of Applied Mathematics*

**Brown University**

*June 2019 - Present*

- Upgrade algorithm for ranking variable importance to account for additive effects in addition to marginal effects; apply to genetic data
- Develop method for sampling shapes and manifolds from a distribution
- Program methods in Python and R
- Work to become thesis under Dr. Lorin Crawford

## PUBLICATIONS

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( # denotes corresponding author)

- **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>. Preprint on arXiv.
- **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.
- 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.I.], v. 2, n. 1, Apr. 2017. ISSN 2378-5810.

## PROJECTS

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Database for Math Graduate Program GRE Requirements, Qualifying Exam Practices

*July 2020 - Present*

- o Gather data about GRE requirements for admission to more than 200 mathematics PhD programs in the US and Canada into one publicly available spreadsheet ((available at <https://etwinn.github.io/gre-database/>))
- o Secure funding from Transforming Post-Secondary Education (TPSE) Math to continue work
- o Curate public database about qualifying exam practices in more than 100 mathematics PhD programs via an online survey (available at <https://etwinn.github.io/gre-database/>)

## RESEARCH AND TEACHING EXPERIENCE

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### Doctoral Research, NSF Graduate Research Fellow

*Division of Applied Mathematics*

**Brown University**

*June 2019 - Present*

- o Upgrade algorithm for ranking variable importance to account for additive effects in addition to marginal effects in global and local data; apply to genetic data; program in R and C++
- o Develop method for sampling shapes and manifolds from a distribution over Euclidean space; program in Python

### Course Co-Instructor

*Division of Applied Mathematics*

**Brown University**

*Summer 2020*

- o Curated first online iteration of Statistical Inference I with colleague Patrick Liscio
- o Designed homework assignments, reading quizzes, lecture videos, extra practice problems, and exams
- o Managed two undergraduate teaching assistants

### Teaching Assistant

*Division of Applied Mathematics*

**Brown University**

*Sept. 2018 - May 2019*

- o Created answer keys, graded homework assignments, and conducted office hours for undergraduate students
- o Supervised undergraduate teaching assistants and helped with their grading and preparation for office hours
- o Worked under Dr. Matt Harrison (Information Theory) and Dr. Anastasios Matzavinos (Operations Research Methods)

### Research Assistant

*Division of Applied Mathematics*

**Brown University**

*May 2018 - May 2019*

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

### Research Assistant

*Department of Mathematics and Computer Science*

**College of the Holy Cross**

*June 2016 - May 2017*

- o Built topological models of force networks in granular materials under Dr. David Damiano
- o Simulated data for analysis in MATLAB and C++

### Teaching Assistant

*Department of Mathematics and Computer Science*

**College of the Holy Cross**

*Sept. 2016 - May 2017*

- o Created answer keys, graded homework assignments, and conducted office hours for undergraduate students
- o Worked under Dr. Steven Levandoski (Principles of Analysis) and Dr. Daniel Franz (Linear Algebra)

### Research Assistant

*NSF REU Program in Mathematics*

**Sam Houston State University**

*Summer 2016*

- o Collaborated in group of seven undergraduate and graduate students on studying properties of twisted torus links under Dr. Brandy Doleshal and Dr. Taylor Martin
- o Generated data in Python program to create a new theorem, which was proved with help of teammates

## LEADERSHIP AND SERVICE

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### Paper Submission Reviewer

*Workshop on Geometric and Topological Representation Learning*

**ICLR**

*2022*

### Paper Submission Reviewer

*Topological Data Analysis and Beyond*

**NeurIPS**

*2020*

### Brown Undergrad-Grad Mentoring Program

*Division of Applied Mathematics*

**Brown University**

*2017 - 2020*

Mentored three undergraduate students, providing advice on courses, research, and summer opportunities

### Graduate President; Treasurer of AWM Student Chapter

*Division of Applied Mathematics*

**Brown University**

*2019 - 2020*

Facilitated weekly meetings, monthly events, and support for undergraduate and graduate women in math

**Faculty Graduate Liaison***Division of Applied Mathematics***Brown University***2018 - 2019*

Collected all proposed budgets for department graduate student organizations and activities to be presented to the faculty each semester; advocated on behalf of graduate students and suggest departmental reforms to department leaders

**Lead Retreat Coordinator***Division of Applied Mathematics***Brown University***2018*

Planned logistics and activities for graduate student fall retreat, including travel, accommodation, food, and research

## **CODING LANGUAGES**

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SQL,  $\text{\LaTeX}$ , MATLAB, Python, R, some C++, familiarity with TensorFlow