

# Emily T. Winn

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## RESEARCH INTERESTS

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

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## EDUCATION

### Brown University

*PhD in Applied Mathematics*

*MS in Applied Mathematics*

### College of the Holy Cross

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

### St. Edmund Hall, University of Oxford

*Visiting Students Programme*

**Providence, RI**

*Expected May 2023*

*May 2019*

**Worcester, MA**

*May 2017*

**Oxford, England, UK**

*2015-2016*

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## PUBLICATIONS

(# denotes corresponding author)

- E. Winn, M. Vazquez, P. Loliencar, K. Taipale, X. Wang, # G. Heo. A survey of statistical learning techniques as applied to inexpensive pediatric Obstructive Sleep Apnea data. To appear, *WiSDM Worskshop Proceedings*.
- 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.l.], v. 2, n. 1, Apr. 2017. ISSN 2378-5810.

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## PROJECTS

### Database for Math Graduate Program GRE Requirements, Qualifying Exam Practices *July 2020 - Present*

- 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 <http://www.emilytwinn.com/gre-database>)
- Secure funding from Transforming Post-Secondary Education (TPSE) Math to continue work
- Curate public database about qualifying exam practices in more than 100 mathematics PhD programs via an online survey (available at <http://www.emilytwinn.com/gre-database>)

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## RESEARCH AND TEACHING EXPERIENCE

### 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

### Course Co-Instructor

*Division of Applied Mathematics*

**Brown University**

*Summer 2020*

- Curated first online iteration of Statistical Inference I with colleague Patrick Liscio
- Designed homework assignments, reading quizzes, lecture videos, extra practice problems, and exams
- 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 thesis, which was proved with help of teammates

## LEADERSHIP AND SERVICE

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**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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L<sup>A</sup>T<sub>E</sub>X, MATLAB, Python, R, some C++, familiarity with TensorFlow