

# WILLIAM UNDERWOOD

ORFE Department, Princeton University, NJ 08544  
wgu2@princeton.edu

## EDUCATION

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**PhD, Operations Research & Financial Engineering**  
**Princeton University**

**Sep 2019 – May 2023**

- Awarded the prestigious Francis Robbins Upton Fellowship in Engineering.
- Served as a representative on the ORFE Graduate School Student Committee.

**MMath, Mathematics & Statistics**  
**University of Oxford**

**Oct 2015 – Jun 2019**

- Dissertation: Motif-Based Spectral Clustering of Weighted Directed Networks.
- Supervisor: Mihai Cucuringu, Department of Statistics.
- Graduated with first-class honours.

Computational and statistical projects:

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| • Application of hidden Markov models to array CGH data                                | 2018 |
| • Non-parametric tests and smoothing methods for the weights of beetle larvae          | 2018 |
| • Modelling prison deaths in Australia with logistic regression and GLMs               | 2017 |
| • Modelling performance during a hand-eye coordination exercise with linear regression | 2017 |
| • Applications of PCA and $k$ -means clustering  | 2016 |
| • Numerical analysis of damped pendula   | 2016 |
| • Recursion and Legendre polynomials   | 2015 |

Other activities:

- Senior Choral Scholar and Librarian, St John's College Chapel Choir.
- St John's College Mathematics Social Secretary.

## RESEARCH INTERESTS

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Stochastic analysis, probability and mathematical statistics.

## PUBLICATIONS

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### Articles

- W. G. Underwood, A. Elliott, and M. Cucuringu. Motif-based spectral clustering of weighted directed networks. Submitted March 2020
- L. Smallman, W. G. Underwood, and A. Artemiou. Simple Poisson PCA: an algorithm for (sparse) feature extraction with simultaneous dimension determination. *Computational Statistics*, June 2019. doi: <https://doi.org/10.1007/s00180-019-00903-0>

### Presentations

- W. G. Underwood and M. Cucuringu. Motif-based spectral clustering of weighted directed networks, December 2019. Complex Networks 2019. Presented by MC. Extended abstract available
- W. G. Underwood. The Borel-Kolmogorov paradox, March 2017. St John's College Mathematics Seminar, University of Oxford

## AWARDS & FUNDING

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- Francis Robbins Upton Fellowship in Engineering, Princeton University 2019
- Royal Statistical Society Prize, University of Oxford 2019
- Gibbs Statistics Prize for outstanding academic achievement, University of Oxford 2019
- Research grant, James Fund for Mathematics, St John's College, University of Oxford 2017
- Casberd Scholarship for performance in exams, St John's College, University of Oxford 2016
- Jeston University Scholarship, Haberdashers' Company 2015

## EMPLOYMENT

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**Machine Learning Consultant, Mercury Digital Assets** **Oct 2018 – Nov 2018**

- Developed a recurrent neural network to predict cryptocurrency prices.
- Modelled short/long positions for Bitcoin prices on the Bitfinex exchange.

**Statistics Researcher, Cardiff University** **Aug 2017 – Oct 2017**

- Developed a dimension reduction technique to improve classification of healthcare documents.
- Investigated Markov blanket estimation algorithms for biostatistics.

**Data Science Intern, Rolls-Royce** **Jun 2017 – Aug 2017**

- Solved problems in jet engine health management using machine learning tools.
- Delivered a new diagnostic, reducing the need for costly regular maintenance.

## TEACHING EXPERIENCE

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**Educational Consultant, Polaris & Dawn** **Feb 2018 – Sep 2018**

- University entrance consultant and high school mathematics tutor.

**Premium Tutor, MyTutor** **Jan 2016 – Oct 2018**

- High school mathematics tutor.
- Gave over 150 tutorials and consistently rated 5\* by students and parents.

## TECHNOLOGIES

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R (igraph, ggplot2), Python (numpy, scikit-learn, keras, matplotlib, seaborn), LaTeX, Git, MATLAB.

## REFERENCES

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*References are available upon request.*