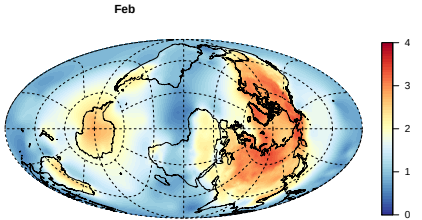
PhD programmes in Statistics in Edinburgh

Prof. Finn Lindgren, finn.lindgren@ed.ac.uk

22nd November 2022

What can a Statistics PhD be?

- Statisticians work on a wide variety of topics which span the natural sciences, social sciences, and machine learning; there any many different ‘types’ of statistics PhD projects available, often closely linked to ecology, biology, genetics, geosciences, epidemiology, medicine, or finance.
- Some statisticians work largely on theory, focusing on ‘pen and paper mathematics’, theorem proving, etc., to develop the foundations of statistical methodology
- Others work largely on data, applying statistical modelling, estimation, and prediction methods to the analysis of data and scientific problems.
- Many are somewhere in the middle, combining elements of theory, algorithm design, computational software, and data applications.



Research Areas at UoE: Application areas

Research Areas in the Statistics group at UoE include (but are not limited to):

- Geosciences
- Financial markets and financial risk
- Genomics
- Ecology
- Neuroscience
- Medical statistics and biostatistics, including links to BioSS (Biomathematics and Statistics Scotland)

Research Areas at UoE: Statistical and stochastic modelling

Research Areas in the Statistics group at UoE include (but are not limited to):

- Extreme values
- Spatial statistics and stochastic space-time models
- Random fields, Gaussian processes, stochastic PDEs
- Hidden Markov Models
- Point processes
- Time Series
- Non-parameteric Bayes
- Bayesian and frequentist inference theory

Research Areas at UoE: Computational methods

Research Areas in the Statistics group at UoE include (but are not limited to):

- Numerical Bayesian methods
- Markov Chain Monte Carlo
- Sequential Monte Carlo
- MCMC-free Bayesian estimation
- Splines and GAMs
- Statistical Machine Learning
- Specialised and general purpose statistical software

Statistics group, activitis, training, and PhD projects

- A rapidly expanding group in the past 6 years: https://www.maths.ed.ac.uk/school-of-mathematics/research/data-decisions/statistics/stats-people
- ~ 25 academic staff and ~ 40 PhD Students
- The Centre for Statistics: a multidisciplinary centre in the university lead by the School of Mathematics, connecting statisticians and statistical activities across the university
- Regular seminars and informal reading and discussion groups, formal training via SMSTC and APTS (https://warwick.ac.uk/fac/sci/statistics/apts/)

PhD project applications

- For the School scolarships, no pre-defined project is required
- In your application, write about what type(s) of problem(s) you are interested in
- Mention if you have discussed potential projects with specific supervisors
- Next slides: some sample projects (past, present, and future)

Sample Projects (past, present, and future)

- Natalia Bochkina, n.bochkina@ed.ac.uk
  Theory of Nonparametric Bayesian Inference
- Vanda de Carvalho, vanda.inacio@ed.ac.uk
  Bayesian flexible models for the statistical evaluation of medical diagnostic tests
- Chris Dent, Gabi Hegerl (Geosciences) and Amy Wilson, chris.dent@ed.ac.uk
  Electricity capacity risk assessment and procurement against a background of uncertain climate (E4)
- Victor Elvira, victor.elvira@ed.ac.uk
  Sequential Bayesian inference in complex and realistic dynamical systems
- Ruth King, ruth.king@ed.ac.uk
  State-space models and efficient Monte Carlo techniques
- Amanda Lenzi, amanda.lenzi@ed.ac.uk
  Spatial and patio-temporal modelling, neural networks
- Finn Lindgren, finn.lindgren@ed.ac.uk
  Estimating changes in the intensity of extreme precipitation events (E4/Geosciences)
  Development and exploitation of a high-resolution sea level product in the coastal ocean (likely SENSE)

Sample Projects

- Yiannis Papastathopoulos, ipapasta@ed.ac.uk
  Graphical modelling of multivariate extremes
  Statistical modelling of grid cell firing using log Gaussian Cox processes through the SPDE approach
- Daniel Paulin, dpaulin@ed.ac.uk
  Scalable optimization methods for sparse statistical models
- Gail Robertson, gail.robertson@ed.ac.uk
  Developing statistical methods to estimate the number of domestic properties with internal lead piping in Scotland (E4)
- Sara Wade, sara.wade@ed.ac.uk
  Bayesian nonparametrics
- Simon Wood, simon.wood@ed.ac.uk
  Computational statistics, smoothing and statistical ecology

General scholarships and CDT/DTP programmes in Statistics (& deadlines)

- General Statistics scholarships (23 January 2023):
  https://www.maths.ed.ac.uk/school-of-mathematics/research/data-decisions/statistics/phd-opportunities
  Projects in Statistics, Data Science, Machine Learning, both theoretical and applied
- Special scholarship opportunities (usually 31 January 2023):
  https://www.maths.ed.ac.uk/school-of-mathematics/studying-here/pgr/funding-opportunities
- MAC-MIGS CDT (23 November 2022 and a later second round):
  https://www.mac-migs.org.uk/
  Applied and Computational Mathematics, including statistical Data Science and modelling
- NERC E4 DTP (5 January 2023, noon):
  https://www.ed.ac.uk/e4-dtp
  A variety of projects related to geoscience, many of which have heavy statistical/OR elements.
- NERC SENSE CDT (Likely early January 2023):
  https://eo-cdt.org/
  A variety of projects related to satellite data in environmental science, many of which have heavy statistical/OR elements.