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Introduction to Statistics MSc programmes

Dr Ioannis Papastathopoulos | 13 November 2024

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Welcome to Edinburgh

- Historic and cultured city of breath-taking beauty and world-class attractions

- Population of 500,000, around one tenth are students

- Year-round destination and festival city

- UNESCO World Heritage Site

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School of Mathematics

- We are located in the James Clerk Maxwell Building at the King's Buildings campus in south Edinburgh.
- This is about 2.5km from main campus.
- About 35 min walk, 20 min bus, 10 min cycle.

- Around 100 academic research and teaching staff and over 145 PhD students.
- Around 2000 undergraduate students.
- Around 200 MSc students each year, of which around 80 study a Statistics MSc.

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Statistics MScs: Student cohort

- Super cosmopolitan cohort

- This year our students are from:

Azerbaijan	Ireland	Romania
China	Italy	Saudi Arabia
Germany	Jamaica	Singapore
Hong Kong	Malaysia	United Kingdom
India	Mexico	USA
Indonesia	Peru	

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Why study a Statistics MSc?

Key features:

- **Theoretical Statistics:** you will develop a deeper understanding of the fundamental principles underpinning modern statistics

- **Applied Statistics:** you will enhance your skills of data analysis and modelling

- Career prospects

How is an MSc different to UG study?

- More intense-one year degree

- Full 12 months of study

- More focused

- Specialising in one area of mathematics

- 180 credits in a year instead of 120

- Substantial dissertation component

MSc structure

- <u>Taught courses</u> (Semesters 1 & 2)

  - Core courses covering both theory and application
  - Optional courses allow you to specialize in areas of particular interest

- <u>Dissertation</u> (Summer)

  - In the summer you will work on open-ended *research projects*
  - Usually projects are consultancy in nature, and provide valuable experience

MSc structure

- **Taught component:** assessed on 120 credits of courses

- **No more** than 120 credits of courses

- **No fewer** than 120 credits of courses

- **You may attend** more than 120 credits of courses

- **All courses** are 10 to 20 credits

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Core Courses

MSc Statistics with Data Science

- Semester 1
  - Bayesian theory
  - Generalised regression models
  - Extended statistical programming

- Semester 2
  - Bayesian data analysis
  - Statistical research skills
  - Design and sampling for data science

Core total = 70 credits

Core Courses

MSc Statistics and Operational Research

- Semester 1
  - Bayesian theory
  - Generalised regression models
  - Statistical programming
  - Fundamentals of operational research
  - Fundamentals of optimization
  - Methodology, modelling and consulting skills

- Semester 2
  - Simulation
  - Statistical research skills

Core total = 80 credits

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Sample optional courses

- Python programming
- Machine learning in Python
- Statistical methodology
- Methods for causal inference
- Biostatistics
- Credit scoring
- Methodology, modelling and consulting skills

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Sample optional courses

- Probabilistic modelling and reasoning
- Fundamentals of optimization
- Stochastic modelling
- Time series
- Large scale optimization for data science
- Nonlinear optimization
- Theory of statistical inference

A typical week

- Normally a semester consists of six 10 credit courses

- Each course has 2 hourly lectures followed by an hour of tutorials every second week

- Computationally intensive courses contain computer practicals (number of hours vary from 5 to 15)

- Average has circa 18-20 contact hours

Sample timetable (Semester 1)

	09:00-10:00	10:00-11:00	11:00-12:00	12:00-13:00	13:00-14:00	14:00-15:00	15:00-16:00	16:00-17:00	17:00-18:00
Monday					Python Programming lecture				Extended Statistical Programming lecture
Tuesday	Stochastic Modelling lecture	Bayesian Theory lecture			Bayesian Theory workshop (every 2nd week)	Extended Statistical Programming workshop		Generalised Regression Models workshop (every 2nd week)	
Wednesday				Stochastic Modelling lecture	Generalised Regression Models lecture				
Thursday						Extended Statistical Programming lecture		Extended Statistical Programming workshop	
Friday	Stochastic Modelling workshop (every 2nd week)				Python Programming workshop				

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Dissertation

- After completing the taught part of the MSc, then in June you start working on your dissertation project (60 credits)

- The dissertation takes the form of
  - two consultancy-client projects for **SwDS**
  - a traditional MSc dissertation for **SOR**

- where a challenging problem is presented by the client and the student address a major aspect of the problem, with further guidance available in the form of weekly drop-in sessions.

Examples of previous dissertation projects

- Forecasting UK electricity demand

- How does DNA sequence specify gene expression in a timecourse of fungal growth?

- Charting the Impact of Bilingualism on Language and Cognitive Development in Autistic Children (NHS)

- Cancer Genomics (Cambridge Cancer Genomics)

- Reselling second-hand items: Identifying the likelihood of stuff being sold online (Thrift)

- Neural De-Duplication and Record Linkage (Amazon)

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Careers in Statistics

- Medical and health sector

- Pharmaceutical

- Government statistics

- Finance/Insurance/Marketing

- Software development

- Data Science

- Sports industry

- … and, of course, Academia!

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Support during your studies

- Student support
  - Student Advisers
  - Academic Cohort Leads
  - Advice on study technique
  - Employability/careers guidance
  - General pastoral support

- MSc community
  - MScHub dedicated study space
  - MScBase study support from tutors
  - MathSoc

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Tips for MSc study

- Statistics MSc programmes have a high workload
  - Good time management is important
  - Start assignments when they are issued…not just before they are due!

- If you do not you will be
  - Very busy at the end of first semester
  - Even busier at the end of the second semester
  - This will depend on your choice of your optional courses

- Being proactive is essential. If you have no assignments
  - Revise lectures
  - Work on examples
  - Study textbooks

- But also…remember to make the most of your MSc year in <u>Edinburgh</u>!

Ævar Jóhannesson

MSc in Statistics with Data Science at the
University of Edinburgh, 2022

Background

- BSc Applied Mathematics at the
  University of Iceland

- Three years in banking in credit risk
  modelling

- Passion for Statistics, Data Science and
  Machine Learning

Why did I choose Edinburgh?

- Program structured in a good way

- Interesting modules

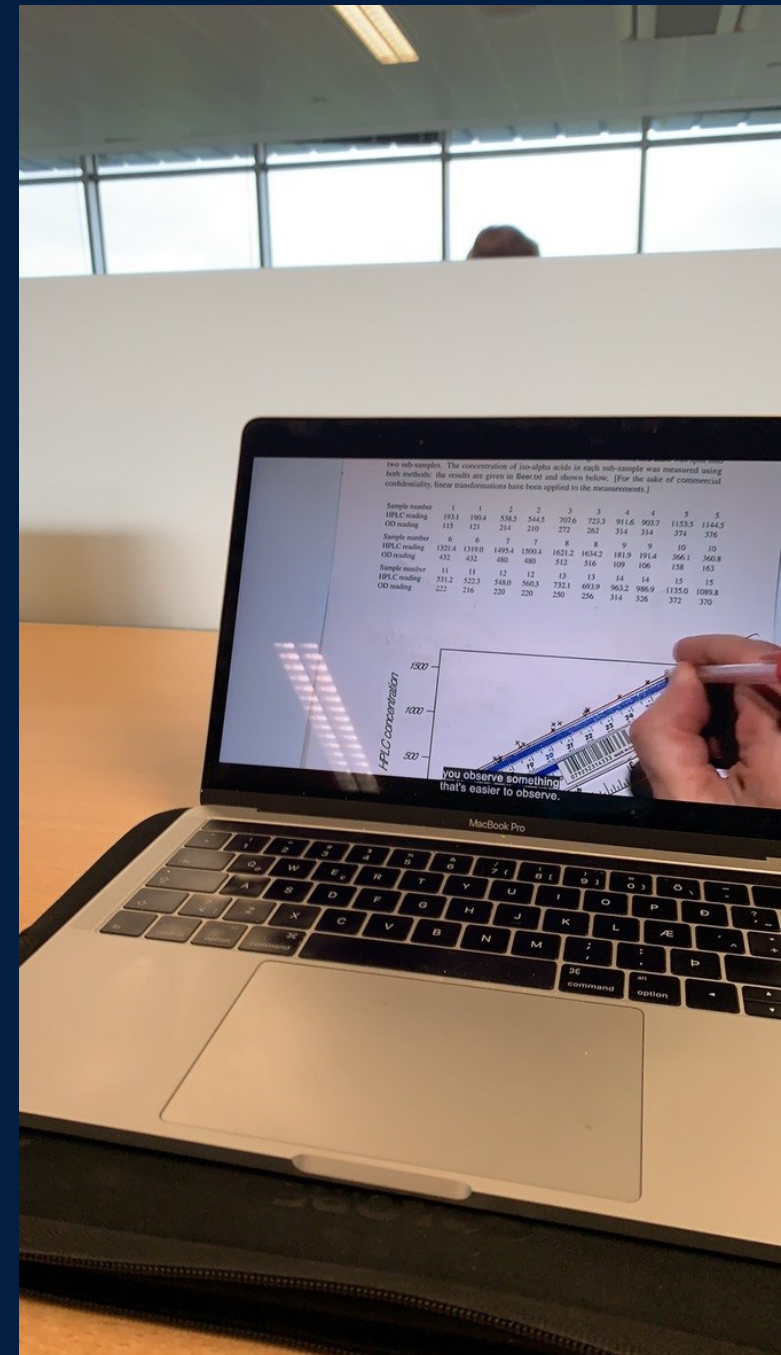- Edinburgh is a great city to live in

MSc Experience

- Challenging and engaging

- Great resources

- Excellent social life

More on my MSc Experience

- Structure of the program was great

- Combination of modules from the School of Mathematics and the School of Informatics

- Industry Projects:

  - Identify risk factors for dementia

  - Predicting age from DNA data

Today

- Lead Data Scientist @ Noona

- Using Data for

    - Business decisions

    - Improving product development

    - Machine Learning use in the product

- Academic collaboration

    - Published research in BMC Urology

My favourite places in Edinburgh

Thank you

# Next steps…

https://virtualvisits.ed.ac.uk/pg

https://edin.ac/student-chat-pg

Contact details for follow-up questions

■ We apologise if we did not get through all of your questions in the time allotted for this session. If you have further questions that have not been answered, please email: futurestudents@ed.ac.uk
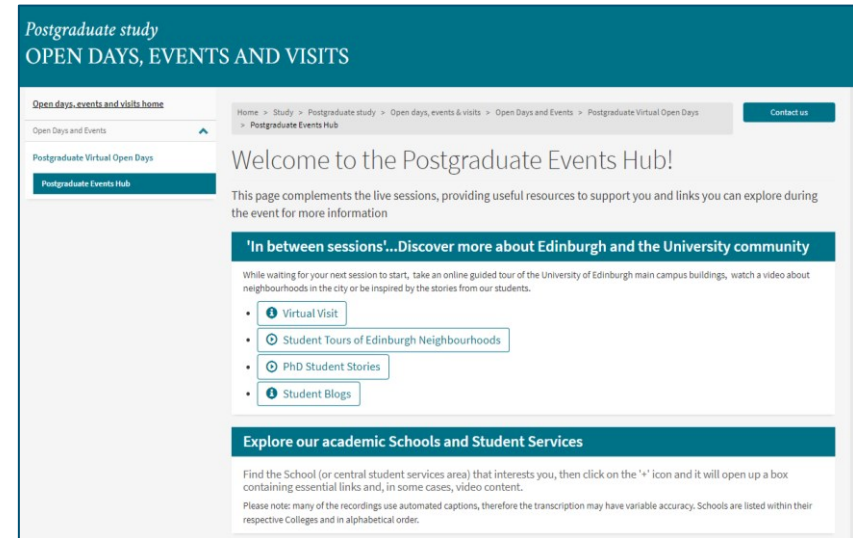
Thank you – click 'Leave' when the session ends

- Return to your 'e-ticket' to find and attend other sessions you've booked – by clicking on the button in the email we sent you…
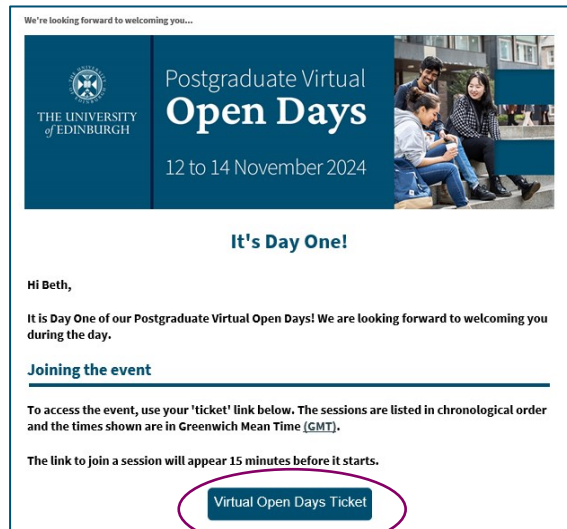
- …and visit the events hub:
- https://edin.ac/4gZuP3G

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Thank you

Further questions?

futurestudents@ed.ac.uk