QUANTITATIVE METHODS: PREPARATION FOR GRADUATE WORK IN ECONOMICS

4TH - 8TH SEPTEMBER

DEPARTMENT OF ECONOMICS
UNIVERSITY OF OXFORD

Are you considering a graduate program in Economics, but feeling uncertain about your foundational maths and quantitative skills?

Our Quantitative Methods summer school will equip you with the fundamental tools you need to succeed. In just one week, our expert Oxford faculty will guide you through key concepts and techniques that form the backbone of many graduate-level courses in Economics.

But that's not all – we'll also supplement our course content with engaging lectures and career insights from economists working across a range of fields, both within academia but also in industry and civil service. You'll have the opportunity to hear from experienced economists and learn about the diverse paths you can take in this exciting field.

Join us in Oxford for a unique and enriching experience.
By the end of the course, you'll have a strong foundation in the essential skills of mathematics and econometrics, and the confidence to take the next step in your career. Don't miss this chance to explore the world of Economics with some of the brightest minds in the field!

TUTORS

JAMES DUFFY

James was a Postdoctoral Fellowship at Nuffield College before taking up an Associate Professorship in Economics and a Tutorial Fellowship at Corpus Christi College. His research is econometric theory, and is principally concerned with non-linear and non-stationary time series models.

BASSEL TARBUSH

Bassel is a Fellow and Tutor in Economics, Merton College, University of Oxford. His research interests are in social and economic networks, games, statistical size distributions, population dynamics, and inequality.

TIMETABLE

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
09:00-11:00	Lecture Maths	Lecture Maths	Lecture Maths	Lecture Econometrics	Lecture Econometrics
11:00-11:30	Break	Break	Break	Break	Break
11:30-12:30	Classes	Classes	Classes	Classes	Classes
12:30-13:30	Lunch				
13:30-15:30	Lecture Maths	Lecture Maths	Lecture Econometrics	Lecture Econometrics	Lecture Econometrics
15:30-16:00	Break	Break	Break	Break	Break
16:00-17:00	Classes	Classes	Classes	Classes	Classes
	Oxford activity or free time	Oxford activity or free time	Oxford activity or free time	Free time	Free time
	Evening Speaker	Evening Speaker	Evening Speaker	Formal Dinner	Departure from Oxford

INTRODUCTION TO MATHEMATICAL METHODS

Objective: This course will introduce students to elements of mathematical analysis and of probability theory with a special emphasis on methods that are important in economics.

Economists use mathematical models to think about social and economic interactions, develop predictions about the outcomes of those interactions, and design policy interventions. This course will introduce some of the standard mathematical tools that are used in economics. The course will focus on the maths rather than on the economics, but examples will be used throughout to illustrate how mathematical tools are useful for tackling economic questions.

The course is divided into two parts: mathematical analysis and probability theory.

The topics that will be covered in mathematical analysis include logic and proofs, sets, relations, functions, sequences and limits, continuity, and differentiability. The focus will not be on proving results in mathematical analysis but rather on understanding key results in mathematical analysis and seeing how they are useful in tackling economic questions. Examples will draw on elements of decision theory and of game theory.

The topics that will be covered in probability theory include the probability axioms, independence, conditional probability and Bayes' rule, discrete and continuous distributions, expectations and moments, correlation, the law of large numbers, and the central limit theorem. Examples will include decisions under risk and mitigation of risk.

The tools that students acquire in this course will be essential for tackling Introduction to Econometrics.

INTRODUCTION TO ECONOMETRICS

Objective: To introduce students to two of the fundamental statistical methods used in applied economic research: regression analysis and instrumental variables.

1. Introduction to statistical inference

How can we learn about economic theories from data? And how much certainty can we reasonably have about what that data tells us? An introduction to hypothesis testing, confidence intervals, and the measurement of uncertainty.

2. Introduction to linear regression

Economists typically want to learn about causal effects: the effects that policy interventions may have on social or economic outcomes. But how can we learn about causal effects from observational data, when many factors may simultaneously affect the outcome of interest? Linear regression provides a powerful tool for disentangling the effects of these factors, so as to obtain estimates of the causal effects of interest.

3. More on regression: inference and nonlinearities

Regression provides us with an estimate of a causal effect, but how precise is that estimate? To answer this question, we combine regression with the approaches to inference developed in Lecture 1. We also discuss how to extend the basic regression model to allow for the more realistic possibility of nonlinear relationships between variables. With an application to effects of university and degree choice on mid-career earnings.

4. Dealing with endogeneity

What are the limits to the use of linear regression to estimate causal effects? When do those estimates cease to be reliable? This lecture discusses the challenges posed by unobserved factors (omitted variables) and reverse causation, both of which create what econometricians term endogeneity. We discuss how endogeneity can sometimes be overcome by the use of regression in conjunction with a carefully designed randomised control trial (RCT). With an application to the effect of class size on test scores.

5. Introduction to instrumental variables

Sometimes the problems discussed in Lecture 4 cannot be solved by running an RCT, and regression fails to reliably estimate the causal effects of interest. We discuss how instrumental variables may provide an alternative avenue for the estimation of causal effects in such cases. With an application to the returns to schooling.

ACCOMMODATION AND CATERING

Rooms will be at Lady Margaret Hall, which is a short walk across University Parks from the Department of Economics. Rooms will be single and en-suite. Breakfast, lunch and dinner will be provided during the course as well as refreshments and all the snacks you could need!

WHAT'S INCLUDED AND COURSE FEE

- 20 hours lectures with Oxford Professors
- 10 hours of Oxford style (5-7 people) tutorials to help implement knowledge learnt in lectures
- Drinks reception at the start of the week
- Dinner and guest speakers every evening. Speakers from industry and academia to help you decide your path with Economics
- A formal dinner on the Thursday evening
- Oxford Activities, including a walking tour and punting
- 4 nights' accommodation at an Oxford College
- All meals included. Breakfast, Lunch, dinner, refreshments, and snacks for the duration of the course (5 days)
- Support with travel arrangements to Oxford
- A personalised course certificate to showcase your newly acquired knowledge and skills

Course Fee: £4500

Please note we can only accept payment for the summer school via MasterCard, Visa credit card, Maestro or Visa debit card

FOR FURTHER INFORMATION PLEASE VISIT:

https://www.economics.ox.ac.uk/september-summer-school

CONTACT:

Emma Lane at summerschools@economics.ox.ac.uk