

# Foundations of Econometric Theory (QM5)

## Syllabus

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<b>Unit code:</b>	ECON21356
<b>Level:</b>	2
<b>Credit point value:</b>	20
<b>Unit director:</b>	Etienne Lalé
<b>Lecturer:</b>	Etienne Lalé
<b>Prerequisites:</b>	Quantitative Methods 1 (ECON11122); Quantitative Methods 2 (ECON12122)
<b>Co-requisite:</b>	QM3 Econometrics (ECON20020)
<b>Teaching:</b>	9 lectures and 9 tutorial sessions in the Autumn term 9 lectures and 9 tutorial sessions in the Spring term
<b>Assessment:</b>	Three-hour closed book examination at the end of the Spring term
<b>Office location:</b>	Social Sciences complex, room 3B7
<b>Office hours:</b>	Wed. 4:30pm - 5:30pm & Thur. 11:30am - 12:30am

## 1 Description of the Course

The course is taught in two parts. The Autumn term covers Statistical theory essential for Econometric theory. It focuses on key properties of sample statistics and on hypothesis testing. It also provides students with new notions to add to their mathematical toolkit, such as moment-generating functions. The Spring term is solely concerned with detailed examination of least squares (ordinary, restricted and generalized). It also deals with maximum-likelihood estimation of the general linear model and instrumental-variable estimation.

## 2 Classes and Course-work

There is one lecture and one tutorial session per week, both of which are one-hour classes. Students are given the opportunity to apply the knowledge acquired during the lectures through problem sets that will be discussed and dealt with during the tutorial sessions. The course material will be distributed through Blackboard.

The **course assessment** consists of a three-hour closed book examination at the end of the Spring term. The examination paper will be in two sections: Section A for Statistics (comprising two questions) and Section B for Econometric theory (comprising four questions). Students will be required to answer one question from Section A and three questions from Section B.

### 3 Course Outline

#### Statistics

1. Refresher: random variables
2. Moment-generating functions
3. Sampling: key concepts
4. Properties of sample statistics
5. Point estimation
6. Hypothesis testing

#### Econometrics

1. Least squares: geometry and algebra
2. Performance of OLS
3. Maximum-likelihood
4. Restrictions and hypothesis testing
5. Heteroskedasticity
6. Instrumental variables

### 4 Relevant Books

The following textbooks cover the essential topics of the course. Students will be referred to parts of these books as we proceed through the lectures:

- Freund, J.E. *Mathematical Statistics*. Pearson Prentice Hall, 6th Edition, 1999. (available in the Arts and Social Sciences Library, ref. QA276 FRE)
- Hogg, R.V., J. McKean and A.T. Craig. *Introduction to Mathematical Statistics*. Pearson Prentice Hall, 6th Edition, 2005. (available in Queen's building Library, ref. QA276 HOG)
- Greene, W.H. *Econometric Analysis*. Pearson Education, 7th Edition, 2012. (available in the Arts and Social Sciences Library, ref. HB139 GRE)
- Stock, J.H. and M.W. Watson. *Introduction to Econometrics*. Pearson Education, 3rd Edition, 2012. (available in the Arts and Social Sciences Library, ref. HB139 STO)

The following textbooks go beyond the course content, but they may also be of interest for students:

- Casella, G. and R. Berger. *Statistical Inference*. Duxbury Press, 2nd Edition, 2002. (available in Queen's building library, ref. QA276 CAS)
- Ruud, P.A. *An Introduction to Classical Econometric Theory*. Oxford University Press, 1st Edition, 2000. (available in the Arts and Social Sciences Library, ref. HB139 RUU)