Mathematics Modules for Visiting Students 2024/5

The mathematics modules available are directly tailored to specific subject areas such as engineering mathematics (mechanical, civil, electronic and robotic) and economics.

Updated April 2024/PJW

Entry requirements:

- GPA of 2.75 or above (out of 4.0) or equivalent.

Pre-requisites:

- **Level 4:** prior study of introductory mathematics at university level is very useful.
- **Level 5:** prior previous study of mathematics (at level 4 or equivalent) is required.
- **Level 6:** substantial prior study of mathematics is required

Taught at:

- Penrhyn Road campus (for economics)
- Roehampton Vale campus (for engineering)

KEY TO MODULE DESCRIPTORS

SUITABILITY OF MODULE FOR STUDENTS VISITING KU ON STUDY OPTION ____

1: Indicates module is suitable for students visiting KU on **Study Option 1** (**Whole Year**)

2: Indicates module is suitable for students visiting KU on **Study Option 2** (**Autumn**)

3: Indicates module is suitable for students visiting KU on **Study Option 3** (**Spring**)

Notes:

1. *All modules are at undergraduate level.*

Study Option 1 = Whole Year
Study Option 2 = Autumn
Study Option 3 = Spring

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2. *Students enrolled on Study Option 1 are required to study the entire module.*

3. *Whilst the University makes every effort to ensure that this information is correct at the time of updating (April 2024), it cannot accept responsibility for omissions or subsequent changes. Module availability and content may be subject to change, as part of the University's policy of continuous improvement and development.*

4. *Details of assessment for students enrolled on either Study Option 2 or 3 where provided are* ***indicative only*** *and may also be subject to change as part of the above policy.*

MODULE CODE	TITLE	SUITABILITY KEY		
LEVEL 4 (INTRODUCTORY)				
EG4017	Engineering Mathematics	1	2	
EC4005	Introductory Mathematics and Statistics for Economics	1	2	3
EC5005	Mathematical Economics and Econometrics	1	2	3
EC6009	Further Mathematical Economics and Econometrics	1	2	3

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LEVEL 4 (INTRODUCTORY)

Module Code	**EG4017**
Module Title	**Engineering Mathematics**
Level	4
Prerequisites	None
Credits	4 (US) 7.5 (ECTS)
Suitability	• This module is taught entirely during the **Autumn semester** • Open to Study Abroad/International Exchange students for Study Options **1** or **2** • Not open to Erasmus students (as Level 4)
Content	The aim of this module is to provide a thorough background in engineering mathematics and equip students with the mathematical skills essential for solving engineering problems. The topics introduced will serve as basic tools for studies in many engineering subjects. This comprises algebra, functions, statistics and probability, trigonometry, calculus, differential equations and vectors. Students will be empowered to understand and be able to use the language and methods of mathematics in the description, analysis and design of engineering systems. The emphasis is on using mathematical tools to solve engineering problems. The computing software used will typically include MATLAB and Excel. ➢ **Topics:** • Matrices, vector analysis, trigonometry functions and complex number • Differentiation and Integration: Revision of basic rules and methods for differentiating and integrating a function of one variable, maximum, minimum, points of inflection, and partial differentiation. • Differential equations: First order equations with separable variables, first order linear equations. • Vectors: Addition of vectors, scalar and vector products, applications to three-dimensional geometry. • Statistics and Probability: Mean and standard deviation, regression and correlation. • Numerical Methods: Numerical integration with trapezium and Simpson's rules, Newton's method for solving algebraic equations.
Teaching	Lectures, tutorials and practical sessions

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Assessment	• 2 x online maths tests (25% each) • 1 x online maths and computing tests (50%)
Last updated	07/04/24 PJW

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Module Code	**EC4005**
Module Title	**Introductory Mathematics and Statistics for Economics**
Credits	• Full Year: 8 (US) 15 (ECTS) • Single Semester: 8 (US) 15 (ECTS)
Level	4
Prerequisites	None
Suitability	• Open to Study Abroad/International Exchange students for Study Options 1 or 2 or 3 • Not open to Erasmus students (as Level 4)

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Content	This module provides an introduction to mathematical and statistical techniques; students are prompted to appreciate how mathematical reasoning is used in economics and develop skills in the numerical, graphical and statistical analysis of economic data. The course starts with a review of material that may have been encountered in previous studies, and moves on to developing their knowledge, understanding and ability to apply quantitative concepts, of particular relevance for microeconomics, macroeconomics and econometrics. ➢ **Topics:** • Introductory maths and basic algebra: arithmetic operators, concept of numbers, algebraic manipulations, exponents, logs, sets. • Linear functions: graphs, calculating from co-ordinates, points of intersection, simultaneous equations. • Applications of linear equations in economics: budget constraints, demand and supply analysis, taxes & subsidies, cost and revenue break even. • Non-linear equations: plotting curves, quadratic equations, roots. • Calculus: derivatives as slopes, power rule, turning points for optima, second order conditions, differentiating a range of functions, economic examples. • Sources of data and sampling methodologies. • Introduction to descriptive and inferential statistics. • Calculation and interpretation of measures of location and variation. Raw and grouped data along with various graphical representations. • Introduction to the normal probability distribution. Inferential statistics; hypothesis testing and Confidence Intervals. Student's t distribution. • Probability theory and statistical inference. Expected values. The application and analysis of; joint, marginal and conditional probabilities and the concepts of; statistical independence, covariance and correlation. • The application of elementary smoothing and decomposition methods to time-series data. • Construction and interpretation of index numbers.
Teaching	Weekly 3-hour workshops

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Assessment	➢ Study Option **1**: • In Class test (90 minutes) (50%) • Quantitative Report (1,500 words) (50%) ➢ Study Options **2/3**: • A version of Study Option 1 assessment
Last Updated:	07/04/24 PJW

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Module Code	**EC5005**
Module Title	**Mathematical Economics and Econometrics**
Credits	• Full Year: 8 (US) 15 (ECTS) • Single Semester: 4 (US) 7.5 (ECTS)
Level	5
Prerequisites	• Previous study of mathematical and statistical economics such as EC4005 (or equivalent) • For Study option 3, good prior knowledge of maths and statistics **is essential**.
Suitability	• Study Options **1** or **2** or **3**

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Content:	This module will extend knowledge of mathematical and statistical techniques acquired previously acquired and will introduce multivariate techniques in mathematics and statistics. This module will encourage students to understand the benefits of using a mathematical and statistical vocabulary and reasoning to analyze economic models. ➢ **Topics:** • Multivariate calculus – partial derivatives, total differential, total derivative. • Optimisation – multivariate functions – first and second order conditions. • Constrained Optimisation – applications to consumer and producer theory • Exponential and log functions – mathematics of finance • Introduction to basic rules of matrix algebra. Solving systems of linear equations. • Integration • Statistical Inference and properties of estimators • Basic linear regression model – estimation and testing. • Multiple Regression model • Autocorrelation and dynamic models. • Model specification errors
Teaching:	Three-hour workshop weekly
Assessment:	➢ Study Option **1:** • 2-hour In-class test (50%) • Group Data handling report (3000 words plus summarised results) (50%) ➢ Study Option **2:** • In-class test (100%) ➢ Study Option **3**: • Group Data handling report (100%)
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Module Code:	**EC6009**
Module Title:	**Further Mathematical Economics and Econometrics**
Credits:	• Full Year: 8 (US) 15 (ECTS) • Single Semester: 4 (US) 7.5 (ECTS)
Level:	6
Prerequisites:	Prior study of intermediate-level mathematical economics and econometrics such as EC5005 or equivalent.
Suitability:	Study Options **1** or **2** or **3**
Content:	• Review of elementary calculus • Introduction to linear and non-linear dynamic equations • Heteroscedasticy, multicollinearity, dummy variables, structural stability, and endogeneity. • Use of computer software to produce results for the quantitative methods taught. • Selection, summary, presentation, and discussion of salient quantitative results.
Teaching:	Weekly three-hour workshops
Assessment:	➢ Study Option **1:** • 2-hour test (50%) • Quantitative report (2000 words) (50%) ➢ Study Options **2/3:** • One of the above assessments
Last Updated:	07/04/24 PJW

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Study Option 1 = Whole Year
Study Option 2 = Autumn
Study Option 3 = Spring

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