The following module specifications reflect the most current planning for module delivery in the 2021/22 academic year. In planning for module delivery in 2021/22 the University will continue to respond to the UK government's projected road map, and also to any further relevant national developments and public health requirements relating to the coronavirus pandemic. The University will continue to develop our approach to delivery and assessment in 2021/22 and these specifications may be subject to change in the event of updating national guidance or public health requirements. The specifications will be updated as soon as practically possible to reflect changes as they arise.

Module Specification

MA1014 Calculus and Analysis

Academic Year: 2021/2
Module Level: Year 1
Scheme: UG
Department: Mathematics
Credits: 30

Student Workload (hours)

Synchronous Lectures	44
Synchronous Small Group Teaching	22
Synchronous Practical Classes/ Workshops/Professional Placements	8
Synchronous Other	
Asynchronous Lectures/Presentations	22
Asynchronous Other	
Guided Independent Study	204
Total Module Hours	300

Period: Academic Year
Occurence: E
Coordinator: Katrin Leschke
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Coursework	20				
002	Skills Tests	30				
003	Examination (final)	50		2		
103	Examination	100		2		Y

Intended Learning Outcomes

- Analyse limits and convergence (of functions/sequences/series)
- Apply and reproduce main theorems of Analysis and proofs
- Determine continuity/differentiability of functions of 1 or 2 variables
- Determine integrability of functions of 1 variable
- Integrate/differentiate a range of functions and solve a number of standard types of differential equations
- Reflect on and articulate motivations, strengths and experience of developing one or more transferable skills

Teaching and Learning Methods

Lectures, feedback lectures, weekly feedback classes for guidance with examples sheets, mixed-module surgeries, computer-aided learning. The module will provide explicit guidance on how to identify personal motivations, strengths and development areas, how to develop transferable skills, and how to record skills and experience in a basic CV. This will be delivered through a combination of course materials, appropriately contextualised instruction and experiential learning opportunities.

Assessment Methods

Coursework, tests, examination

Pre-Requisites

Co-Requisites

Excluded Combinations

Guided Independent Study: Indicative Activities

Directed reading, computer practice, review of lecture recordings and lecture notes, project work, solving problem sheets/ workbooks, homework and examination revision

Module Specification

MA1061 Probability

Academic Year: 2021/2
Module Level: Year 1
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures	
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	
Total Module Hours	

Period: Semester 1
Occurence: E
Coordinator: Bo Wang
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Coursework	20				
002	Class Test	20				
003	Examination (Final)	60		2		
103	Examination (Final)	100		2		Y

Intended Learning Outcomes

- Define basic concepts in probability and calculate probabilities, including those involving independence and conditional probabilities
- Explain what is meant by a random variable, discrete and continuous, and define the main functions of a random variable
- Describe and use Binomial, Poisson, Geometric and Normal distributions
- Explain the content and consequences of the DeMoivre-Laplace and Central Limit Theorems and apply to problems

Teaching and Learning Methods

Lectures, feedback lectures, weekly feedback classes for guidance with examples sheets, surgeries.

Assessment Methods

Exam, test, coursework

Pre-Requisites

Co-Requisites

Excluded Combinations

Guided Independent Study: Indicative Activities

Directed reading, review of lecture recordings and lecture notes, practice for the test, solving problem sheets/workbooks, preparing/revising for class test and examination.

Last Published: 19 September 2021

Module Specification

MA1104 Elements of Number Theory

Academic Year: 2021/2
Module Level: Year 1
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures	30
Synchronous Small Group Teaching	11
Synchronous Practical Classes/ Workshops/Professional Placements	
Synchronous Other	
Asynchronous Lectures/Presentations	10
Asynchronous Other	
Guided Independent Study	109
Total Module Hours	160

Period: Semester 1
Occurence: E
Coordinator: Frank Neumann
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Coursework (Final)	50				
002	Class test	50				
003	Project	100				Y

Intended Learning Outcomes

- Construct proofs by induction and well-ordering. Define and compute GCDs. Prove basic results on prime numbers and divisibility. Apply and understand the fundamental theorem of arithmetic.
- Solve problems using modular arithmetic, compute modular inverses. State and prove Fermat's little theorem.
- Encrypt and decrypt using the RSA cryptosystem

Teaching and Learning Methods

Lectures, problem sheets, class tests, feedback sessions, feedback lectures.

Assessment Methods

Coursework (can include group work), class tests.

Pre-Requisites

Co-Requisites

Excluded Combinations

Guided Independent Study: Indicative Activities

Directed reading, review of lecture recordings and lecture notes, project work, solving problem sheets/workbooks, preparing for class tests.

Last Published: 19 September 2021

Module Specification

MA1114 Linear Algebra

Academic Year: 2021/2
Module Level: Year 1
Scheme: UG
Department: Mathematics
Credits: 30

Student Workload (hours)

Synchronous Lectures	44
Synchronous Small Group Teaching	22
Synchronous Practical Classes/ Workshops/Professional Placements	8
Synchronous Other	
Asynchronous Lectures/Presentations	11
Asynchronous Other	
Guided Independent Study	206
Total Module Hours	291

Period: Academic Year
Occurence: E
Coordinator: Julia Goedecke
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Coursework	20				
002	Skills Tests	30				
003	Examination (final)	50		2		
103	Examination	100		2		Y

Intended Learning Outcomes

- Apply and reproduce main theorems of Linear Algebra and proofs.
- Apply the concepts of vectors, linear independence, bases, subspaces and linear transformations in the context of abstract vector spaces as well as concrete problems.
- Calculate and manipulate vectors, matrices and determinants, inner products of vectors, eigenvalues and eigenvectors.

Teaching and Learning Methods

Lectures, feedback lectures, weekly feedback classes for guidance with examples sheets, mixed-module surgeries, computer-aided learning.

Assessment Methods

Coursework, Tests, Exam

Pre-Requisites

Co-Requisites

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Directed reading, computer practice, reviewing lecture recordings and lecture notes, project work, solving problem sheets/ workbooks, homework and examination revision.

Module Specification

MA1202 Introductory Statistics

Academic Year: 2021/2
Module Level: Year 1
Scheme: UG
Department: Mathematics
Credits: 10

Student Workload (hours)

Synchronous Lectures	30
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	11
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	109
Total Module Hours	150

Period: Semester 2
Occurence: E
Coordinator: Aihua Zhang
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	SKILLS TEST	20				
002	COURSEWORK	20				
003	EXAM (Final)	60		2		
103	EXAM (Final)	100		2		Y

Intended Learning Outcomes

- Explain basic statistical concepts and calculate properties of simple estimators
- Explain the concept of a confidence interval and apply in continuous and discrete cases
- Calculate properties of simple estimators, confidence intervals and construct statistical tests using R
- Explain the general procedures for statistical testing, apply tests and assess them

Teaching and Learning Methods

Lectures, feedback lectures, weekly feedback classes for guidance with examples sheets, surgeries.

Assessment Methods

Exam, Coursework

Pre-Requisites

Co-Requisites

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Directed reading, computer practice, review of recorded lectures, homework and examination revision, continuing to develop R skills.

Module Specification

MA1254 Mathematics in Business

Academic Year: 2021/2
Module Level: Year 1
Scheme: UG
Department: Mathematics
Credits: 10

Student Workload (hours)

Synchronous Lectures	2
Synchronous Small Group Teaching	2
Synchronous Practical Classes/ Workshops/Professional Placements	12
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	134
Total Module Hours	150

Period: Semester 2
Occurence: E
Coordinator: Clive Rix
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Reports and presentations (Final)	70				
002	IT problems	30				
101	Written reports and presentations	100				Y

Intended Learning Outcomes

- Undertake basic mathematical modelling in business, commercial and industrial environments
- Apply mathematical techniques to the solution of practical business problems
- Produce reports for non-mathematical audiences. Deliver presentations on their findings
- Demonstrate effective communication in group sessions
- Solve IT problems in business applications

Teaching and Learning Methods

Case studies, observed group sessions, seminars and practical demonstrations.

Assessment Methods

Reports, Presentations, IT problems

Pre-Requisites

Co-Requisites

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Working in groups on typical business problems, working indiviudally on typical business IT problems. Writing reports and preparing presentations.

Last Published: 19 September 2021

Module Specification

MA1272 Plane Geometry

Academic Year: 2021/2
Module Level: Year 1
Scheme: UG
Department: Mathematics
Credits: 10

Student Workload (hours)

Synchronous Lectures	
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	
Total Module Hours	

Period: Semester 2
Occurence: E
Coordinator: Julia Goedecke
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Tests	60				
002	Coursework (final)	40				
003	Examination	100		2		Y

Intended Learning Outcomes

- Construct basic proofs using the classical axioms of Euclidean geometry. Determine and prove congruency and similarity criteria for triangles.
- Prove and apply theorems about angles and chords in circles.
- Solve problems using the methods and results mentioned above, plus further appropriate theorems of Euclidean geometry.
- Use analytical techniques and coordinates to solve geometric problems.

Teaching and Learning Methods

Lectures, seminars, group work.

Assessment Methods

Coursework and test.

Pre-Requisites

Co-Requisites

Excluded Combinations

Guided Independent Study: Indicative Activities

Solving problems individually and in groups, revision of lecture notes and recordings, revision for test.

Last Published: 19 September 2021

Module Specification

MA1402 Business Macroeconomics

Academic Year: 2021/2
Module Level: Year 1
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures	30
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	10
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	110
Total Module Hours	150

Period: Semester 2
Occurence: E
Coordinator: Nick Foster
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Exam (final)	70		2		
002	Mini project	30				
003	Examination	100		2		Y

Intended Learning Outcomes

- Discuss relevance of economics to business
- Assess main strands of economic thinking
- Analyse recent macroeconomic history
- Discuss relationship between government, markets and firms
- Assess how macroeconomic policies impact business

Teaching and Learning Methods

Lectures/workshops weekly, plus one feedback class per week to go through regular (non-assessed) coursework and a project class fortnightly to prepare students for tackling a real-life piece of economic analysis.

Assessment Methods

Exam and project

Pre-Requisites

Co-Requisites

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Literature review, economic modelling, problem sheets, reviewing lecture recordings, writing project report and exam revision.

Module Specification

MA1407 Business Microeconomics

Academic Year: 2021/2
Module Level: Year 1
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures	27
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	10
Synchronous Other	
Asynchronous Lectures/Presentations	3
Asynchronous Other	
Guided Independent Study	110
Total Module Hours	150

Period: Semester 1
Occurence: E
Coordinator: Leena Sodha
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Exam (final)	70		2		
002	Mini project	30				
102	Exam	100				Y

Intended Learning Outcomes

- Discuss relevance of economics to business
- Assess main strands of economic thinking
- Discuss competitive markets
- Discuss consumer demand and behaviour
- Discuss the efficient operation of a firm and demonstrate an awareness of associated policies and strategies

Teaching and Learning Methods

Lectures/workshops will be given each week, plus one feedback class per week to go through regular (non-assessed) coursework and a project class fortnightly to prepare students for tackling a real-life piece of economic analysis.

Assessment Methods

Exam and project

Pre-Requisites

Co-Requisites

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Literature review, economic modelling, problem sheets, writing project report and exam revision.

Last Published: 19 September 2021

Module Specification

MA2021 Differential Equations and Dynamics

Academic Year: 2021/2
Module Level: Year 2
Scheme: UG
Department: Mathematics
Credits: 20

Student Workload (hours)

Synchronous Lectures	
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	
Total Module Hours	

Period: Semester 2
Occurence: E
Coordinator: Ivan Tyukin
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Coursework	30				
003	Examination (Final)	70		2		
103	Examination (Final)	100		2		Y

Intended Learning Outcomes

- Explain the differences between classes of differential equations
- Analyse initial value problems in order to determine whether or not they have unique solutions
- State, explain, and prove basic existence and uniqueness theorems
- Use and apply methods for finding general solutions of ordinary differential equations
- Apply and write programs for finding numerical solutions of ordinary differential equations

Teaching and Learning Methods

Lectures, feedback classes, computer classes, automated computer assignments

Assessment Methods

Final exam, coursework (problem sheets, computer assignments)

Pre-Requisites

-

Co-Requisites

-

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Directed reading, working on problem sheets, reviewing lecture recordings, preparing reports on computer practical assignments, revision for final exam

Last Published: 19 September 2021

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Module Specification

MA2032 Calculus and Analysis 3

Academic Year: 2021/2
Module Level: Year 2
Scheme: UG
Department: Mathematics
Credits: 20

Student Workload (hours)

Synchronous Lectures	30
Synchronous Small Group Teaching	2
Synchronous Practical Classes/ Workshops/Professional Placements	11
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	107
Total Module Hours	150

Period: Semester 1
Occurence: E
Coordinator: Sergei Petrovskiy
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Examination (Final)	70		2		
002	Coursework	30				
101	Examination (Final)	100		2		Y

Intended Learning Outcomes

- Differentiate and integrate vector valued functions, use Cartesian, polar and spherical coordinates with the corresponding Jacobians to calculate the change of variables.
- Compute line, path, surface and volume integrals of scalar and vector functions in two and three dimensions, apply Stokes, Green and Divergence theorems
- Use Taylor series for multivariable functions and perform estimates based on Taylor series, make calculations with basic Fourier series and use Parseval's theorem.

Teaching and Learning Methods

Lectures, feedback classes, computer-aided learning, problem sheets sheets.

Assessment Methods

Examination, coursework

Pre-Requisites

Co-Requisites

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Directed reading, reviewing of lecture recordings, solving coursework problems, exam revision.

Last Published: 19 September 2021

Module Specification

MA2042 Differential Equations and Dynamics

Academic Year: 2021/2
Module Level: Year 2
Scheme: UG
Department: Mathematics
Credits: 20

Student Workload (hours)

Synchronous Lectures	
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	
Total Module Hours	

Period: Semester 2
Occurence: E
Coordinator: Alexander Baranov
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Coursework	30				
002	Examination (Final)	70		2		
003	Examination	100		2		Y

Intended Learning Outcomes

On successful completion of the module, students should be able to:
- Explain basic concepts of Mathematical Logic; be able to read, comprehend, and construct mathematical arguments.
- Demonstrate knowledge, properties and applications of the abstract mathematical structures used to represent descrete objects, such as graphs, trees, languages, and finite-state machines.
- Explain the concept of an algorithm, its complexity, halting problem; reproduce and analyse basic searching and sorting algorithms.

Teaching and Learning Methods

Lectures, problem classes.

Assessment Methods

Coursework and examination.

Pre-Requisites

Co-Requisites

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Working through problems, studying lecture notes, reviewing lecture recordings, exam revision.

Last Published: 19 September 2021

Module Specification

MA2132 Linear Algebra 3

Academic Year: 2021/2
Module Level: Year 2
Scheme: UG
Department: Mathematics
Credits: 10

Student Workload (hours)

Synchronous Lectures	
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	
Total Module Hours	

Period: Semester 1
Occurence: E
Coordinator: Alexander Baranov
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Examination (Final)	70		2		
003	Coursework	30				
101	Examination	100		2		Y

Intended Learning Outcomes

- Apply and reproduce main theorems of Advanced Linear Algebra and proofs.
- Calculate the minimal polynomial and Jordan normal form of a matrix.
- Diagonalise matrices and define when this is possible.
- Diagonalise normal operators and quadratic forms

Teaching and Learning Methods

Lectures, problem classes and feedback lectures

Assessment Methods

Coursework and Exam

Pre-Requisites

Co-Requisites

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Directed reading, reviewing of lecture recordings, solving coursework problems, exam revision.

Last Published: 19 September 2021

Module Specification

MA2133 Algebra

Academic Year: 2021/2
Module Level: Year 2
Scheme: UG
Department: Mathematics
Credits: 20

Student Workload (hours)

Synchronous Lectures	
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	
Total Module Hours	

Period: Semester 2
Occurence: E
Coordinator: Teimuraz Pirashvili
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Coursework	30				
002	Examination (Final)	70		2		
003	Examination (Final)	100		2		Y

Intended Learning Outcomes

- Perform calculations in the context of groups and rings, especially in cyclic, dihedral and symmetric groups
- Define and apply the key concepts, including to investigate cosets, quotient groups and quotient rings
- Use Lagrange's theorem in order to find subgroups
- Apply the theorems in the module to solve problems

Teaching and Learning Methods

Lectures, feedback classes, continuous assessment based on written coursework, written exam.

Assessment Methods

Coursework and exam

Pre-Requisites

Co-Requisites

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Directed reading, reviewing lecture recordings, solving coursework problems, exam revision

Last Published: 19 September 2021

Module Specification

MA2206 Statistical Data Analysis

Academic Year: 2021/2
Module Level: Year 2
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures	
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	10
Synchronous Other	
Asynchronous Lectures/Presentations	20
Asynchronous Other	
Guided Independent Study	110
Total Module Hours	150

Period: Semester 2
Occurence: E
Coordinator: Nigel Sell
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Coursework	30				
002	Examination (Final)	70		2		
003	Examination	100		2		Y

Intended Learning Outcomes

- Summarise data using appropriate statistical analysis, descriptive statistics and graphical presentation
- Describe, apply and interpret the results of the linear regression model and generalised linear models
- Explain the fundamental concepts of Bayesian statistics, use them to compute Bayesian estimators, and apply to credibility theory

Teaching and Learning Methods

Lectures, seminars, tutorials, Computer practical classes

Assessment Methods

Examination and coursework (problem sheets, computer assignments)

Pre-Requisites

MA2403

Co-Requisites

-

Excluded Combinations

Guided Independent Study: Indicative Activities

Directed reading, computer practice, solving coursework problems and examination revision, continuing to develop R skills.

Last Published: 19 September 2021

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Module Specification

MA2252 Introduction to Computing

Academic Year: 2021/2
Module Level: Year 2
Scheme: UG
Department: Mathematics
Credits: 10

Student Workload (hours)

Synchronous Lectures	
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	
Total Module Hours	

Period: Semester 2
Occurence: E
Coordinator: Ruslan Davidchack
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
004	Coursework	100				

Intended Learning Outcomes

- Define the floating point representation of numbers on a computer, apply the rules of floating point arithmetic and analyse the errors they produce
- Program simple numerical algorithms in Matlab
- Draw flowcharts for numerical algorithms and identify where improvements for efficiency could be made
- Analyse simple numerical methods and predict their performance

Teaching and Learning Methods

Lectures, computer workshops and feedback sessions

Assessment Methods

Coursework (problem sheets, test)

Pre-Requisites

-

Co-Requisites

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Directed reading, review of lecture notes, review of lecture recordings, working on solutions to problem sheets, preparing for the test.

Last Published: 19 September 2021

Module Specification

MA2261 Linear Statistical Models

Academic Year: 2021/2
Module Level: Year 2
Scheme: UG
Department: Mathematics
Credits: 20

Student Workload (hours)

Synchronous Lectures	
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	
Total Module Hours	

Period: Semester 1
Occurence: E
Coordinator: Simona Paoli
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Coursework	30				
002	Examination (Final)	70		2		
003	Examination	100		2		Y

Intended Learning Outcomes

- Fit multiple linear regression models to datasets
- Fit one way analysis of variance models to data
- Demonstrate an understanding of the theory of multiple linear regression

Teaching and Learning Methods

Lectures, problem classes and feedback lectures

Assessment Methods

Coursework and examination

Pre-Requisites

MA1061, MA1202

Co-Requisites

-

Excluded Combinations

Guided Independent Study: Indicative Activities

Working through problems, studying lectures notes, reviewing lecture recordings, using statistical software, exam revision

Last Published: 19 September 2021

Module Specification

MA2402 Business Finance

Academic Year: 2021/2
Module Level: Year 2
Scheme: UG
Department: Mathematics
Credits: 20

Student Workload (hours)

Synchronous Lectures	30
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	10
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	110
Total Module Hours	150

Period: Semester 2
Occurence: E
Coordinator: Leena Sodha
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Examination (Final)	70		2		
002	Coursework	30				
003	Exam	100		2		Y

Intended Learning Outcomes

- Discuss the fundamental framework of corporate finance and governance
- Explain appropriate ways to finance a company
- Construct and analyse financial statements of companies and financial institutions
- Prepare and interpret management information

Teaching and Learning Methods

Lectures, feedback class, regular (non assessed coursework) and a project class to prepare students for tackling real-life business problems

Assessment Methods

Examination, coursework

Pre-Requisites

Co-Requisites

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Directed reading, feedback classes, homework annd exam revision

Module Specification

MA2403 Statistical Distributions and Inference

Academic Year: 2021/2
Module Level: Year 2
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures	
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	10
Synchronous Other	
Asynchronous Lectures/Presentations	30
Asynchronous Other	
Guided Independent Study	110
Total Module Hours	150

Period: Semester 1
Occurence: E
Coordinator: Nigel Sell
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
002	Coursework	30				
003	Exam	100		2		Y
004	Examination (Final)	70		2		

Intended Learning Outcomes

- Describe essential features of statistical distributions
- Summarise data, using statistical analysis, descriptive statistics and graphical presentations
- Describe and apply principles of statistical inference

Teaching and Learning Methods

Lectures/workshops, feedback class to go through regular (non-assessed) coursework and a project class to prepare students for tackling a real-life piece of statistical analysis.

Assessment Methods

Examination and coursework

Pre-Requisites

MA1061, MA1202

Co-Requisites

-

Excluded Combinations

Guided Independent Study: Indicative Activities

Working through problem sheets, reviewing lecture material and reference books, developing R skills

Module Specification

MA2404 Markov Processes

Academic Year: 2021/2
Module Level: Year 2
Scheme: UG
Department: Mathematics
Credits: 20

Student Workload (hours)

Synchronous Lectures	10
Synchronous Small Group Teaching	10
Synchronous Practical Classes/ Workshops/Professional Placements	
Synchronous Other	
Asynchronous Lectures/Presentations	20
Asynchronous Other	
Guided Independent Study	110
Total Module Hours	150

Period: Semester 1
Occurence: E
Coordinator: Bogdan Grechuk
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Examination (Final)	70		2		
002	Coursework	30				
003	Exam	100		2		Y

Intended Learning Outcomes

- Describe general principles of risk modelling
- Describe and classify stochastic processes
- Define and apply a Markov chain
- Define and apply a Markov process
- Explain and apply elementary principles of machine learning

Teaching and Learning Methods

Lectures, problem classes, tutorials. Written examination, independent research project/case-study report.
Students will be provided with material written specifically for the module. Three lectures per week will be used to teach the details of the material. Students are further supported with 1 feedback class per week.

Assessment Methods

2 hour written exam. Substantial independent research project/case-study report which is an individual open-ended task which requires the student to demonstrate self-direction and originality in tackling and solving problems, and act autonomously in planning and implementing tasks at a professional level.

Pre-Requisites

Co-Requisites

Excluded Combinations

Guided Independent Study: Indicative Activities

Reading lecture notes, view lecture recording, solve practice questions presented in lecture notes, coursework questions, and past exam questions. Working on project.

Last Published: 19 September 2021

UNIVERSITY OF LEICESTER

Module Specification

MA2405 Actuarial Modelling 2

Academic Year: 2021/2
Module Level: Year 2
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures	
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	
Total Module Hours	

Period: Semester 2
Occurence: E
Coordinator: Bo Wang
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Coursework	30				
002	Examination (Final)	70		2		
003	Examination	100		2		Y

Intended Learning Outcomes

- Define standard actuarial notation and fundamental life contracts
- Describe and model various life contracts, calculating associated quantities
- Value cashflows dependent on death, survival or other uncertain risks

Teaching and Learning Methods

Lectures, feedback classes

Assessment Methods

Examination and coursework

Pre-Requisites

MA2401

Co-Requisites

-

Excluded Combinations

Guided Independent Study: Indicative Activities

Directed reading, computer practice, homework and examination revision.

Last Published: 19 September 2021

Module Specification

MA2414 Mortality Modelling

Academic Year: 2021/2
Module Level: Year 2
Scheme: UG
Department: Mathematics
Credits: 10

Student Workload (hours)

Synchronous Lectures	
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	
Total Module Hours	

Period: Semester 2
Occurence: E
Coordinator: Andrey Morozov
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Examination (Final)	70		2		
002	Coursework	30				
003	Exam	100		2		Y

Intended Learning Outcomes

- Demonstrate the concepts underlying time series models and their applications
- Explain the concept of survival models; Describe estimation procedures for lifetime distributions
- Derive maximum likelihood estimators for transition intensities.
- Estimate transition intensities dependent on age
- Demonstrate graduation and graduation tests; Mortality Projections

Teaching and Learning Methods

Lectures, problem classes, tutorials. Assessment includes exam and mini-project.

Assessment Methods

Examination; coursework

Pre-Requisites

Co-Requisites

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Directed reading, studying lecture notes, reviewing lecture recordings, solving coursework problems, implementing statistical models and writing a mini-project report, exam revision.

Last Published: 19 September 2021

UNIVERSITY OF LEICESTER

Module Specification

MA2510 Investigations in Mathematics

Academic Year: 2021/2
Module Level: Year 2
Scheme: UG
Department: Mathematics
Credits: 10

Student Workload (hours)

Synchronous Lectures	
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	
Total Module Hours	

Period: Semester 1
Occurence: E
Coordinator: Katrin Leschke
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Coursework (Final)	50		0		
002	Reflective Portfolio	10				
003	Written Report	40				
004	Written Report	100				Y

Intended Learning Outcomes

- Explain the key points of the chosen topic and write a clear, logical report on the topic
- Demonstrate effective communication in group meetings
- Give a group presentation on the chosen topic
- Reflect on and articulate motivations, strengths and skills in relation to a future, work-related learning opportunity

Teaching and Learning Methods

Seminars based on the topic of student's choice from a list of topics. Poster presentation, group presentation and a written report on the module. This module will provide explicit guidance on how to relate strengths, transferable skills and motivations you have developed in this module and the rest of your studies, to a professional opportunity, such as a work placement (e.g. tailored CV and cover letter). This will be delivered through a combination of course materials and appropriately contextualised instruction.

Assessment Methods

Coursework (group work, presentation), written report, reflective portfolio.

Pre-Requisites

-

Co-Requisites

-

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Directed reading, literature search, preparing poster presentation and writing a report

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Module Specification

MA2511 Business Applications of Mathematics

Academic Year: 2021/2
Module Level: Year 2
Scheme: UG
Department: Mathematics
Credits: 10

Student Workload (hours)

Synchronous Lectures	
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	
Total Module Hours	

Period: Semester 2
Occurence: E
Coordinator: Alexander Baranov
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Coursework (Final)	100		0		

Intended Learning Outcomes

- Demonstrate knowledge of business terminology and the types of strategic issues that have to be addressed
- Conduct formal meetings, set agendas, chair meetings and take minutes, and formulate strategic plans
- Apply mathematical techniques to real practical problems proposed by local and regional companies
- Compile reports relating to the business case studies for presenting to the client and give a presentation reflecting on experience of topics covered
- Articulate academic skills for graduate employment; produce an effective CV targeted towards a jobs advertisement/person specification

Teaching and Learning Methods

A competitive business management simulation exercise, undertaken in groups; case studies in groups, seminars and practical demonstrations; guidance on production of an effective CV and job interviews

Assessment Methods

Coursework (business management exercise, case studies, group work, employability skills)

Pre-Requisites

Co-Requisites

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Working in groups, holding formal meetings, writing reports and preparing presentations on case studies and for the Business Management Simulation Exercise. Working individually on CVs and individual reflective presentations.

Last Published: 19 September 2021

Module Specification

MA2514 Actuarial Professional Skills and Employability

Academic Year: 2021/2
Module Level: Year 2
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures	
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	40
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	110
Total Module Hours	150

Period: Semester 1
Occurence: E
Coordinator: Nick Foster
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
002	Coursework	100				

Intended Learning Outcomes

- Develop communication skills and teamworking skills
- Develop business awareness and employability skills
- Explain current issues in actuarial/financial sector
- Reflect on and articulate motivations, strengths and skills in relation to a future, work-related learning opportunity (e.g. placement, internship, employer-led project)
- Develop and understanding of the importance of professionalism

Teaching and Learning Methods

Guest speakers. Students are then required to reflect on those issues raised and prepare a short piece of work in response. Some aspects of group work will be incorporated. The module will provide explicit guidance on how to relate strengths, transferable skills and motivations to a professional opportunity, how to evaluate results from a psychometric test, and how to produce a tailored application (e.g. tailored CV and cover letter). This will be delivered through a combination of course materials and appropriately contextualised instruction.

Assessment Methods

Coursework

Pre-Requisites

Co-Requisites

-

Excluded Combinations

Guided Independent Study: Indicative Activities

Company research, writing applications to companies, preparing group and individual presentations. On-line materials to support completion of Leicester Award Gold qualifying activities. Workshops on exploring career options and application and selection processes.

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Module Specification

MA3002 Equations of Mathematical Physics

Academic Year: 2021/2
Module Level: Year 3
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures	
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	
Total Module Hours	

Period: Semester 1
Occurence: E
Coordinator: Nikolai Brilliantov
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Coursework	30				
002	Examination (Final)	70		2		
005	Examination	100		2		Y

Period: Semester 2
Occurence: E
Coordinator: Nikolai Brilliantov
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Coursework	30				
002	Examination (Final)	70		2		
005	Examination	100		2		Y

Intended Learning Outcomes

- Apply the classification of linear partial differential equations
- Apply the concepts of eigenfunctions, eigenvalues, and a Green function in solution of partial differential equation
- Use the Fourier series and some special functions in solving partial differential equation
- Derive some basic equation of mathematical physics and analyse the limits of its applications.
- Solve time-dependent PDE for two and three dimensional systems and different geometry

Teaching and Learning Methods

Lectures, seminars, feedback sessions, exercises

Assessment Methods

Coursework and exam

Pre-Requisites

Co-Requisites

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Directed reading, reviewing lecture recordings, solving coursework problems/exercises, exam revision

Last Published: 19 September 2021

Module Specification

MA3012 Scientific Computing

Academic Year: 2021/2
Module Level: Year 3
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures	
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	
Total Module Hours	

Period: Semester 1
Occurence: E
Coordinator: Ruslan Davidchack
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Coursework	30				
002	Examination (Final)	70		2		
005	Exam	100		2		Y

Intended Learning Outcomes

- Derive and analyse scientific computing algorithms
- Program the algorithms and use the programs to compute solutions
- Demonstrate programming skills
- Demonstrate problem solving skills

Teaching and Learning Methods

Lectures, feedback classes, instructor-assisted computer lab sessions, revision problem sheets.

Assessment Methods

Coursework (computer assignments, problem sheets) and exam

Pre-Requisites

Co-Requisites

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Studying lecture notes, reviewing lecture recoridngs; solving revision problem sheets, programming studied algorithms; writing computer assignment reports; preparing for the exam.

Module Specification

MA3013 Computational Partial Differential Equations with Finite Elements

Academic Year: 2021/2
Module Level: Year 3
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures	
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	
Total Module Hours	

Period: Semester 2
Occurence: E
Coordinator: Emmanuil Georgoulis
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Coursework	30				
002	Examination (Final)	70		2		
005	Examination	100		2		Y

Intended Learning Outcomes

- Classify classical PDE models from mathematical physics
- Apply standard analytical solution techniques to linear first and second order problems
- Demonstrate the basic concepts (consistency, stability and convergence) and methods from numerical analysis of PDEs
- Demonstrate basic knowledge of linear functional analysis and its relevance in PDE theory
- Reproduce and analyse finite element formulations for linear PDE model and implement these numerical methods in MATLAB.

Teaching and Learning Methods

Lectures, computer labs and tutorials.

Assessment Methods

Coursework (problem sets, computer exercises), Exam

Pre-Requisites

Co-Requisites

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Studying lecture notes, reviewing lecture recordings; solving problem sets and computer exercises; exam revision.

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Module Specification

MA3022 Data Mining and Neural Networks

Academic Year: 2021/2
Module Level: Year 3
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures	
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	
Total Module Hours	

Period: Semester 2
Occurence: E
Coordinator: Alexander Gorban
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Coursework	20				
002	Examination (Final)	50		2		
004	Computational Tasks	30				
005	Examination	100		2		Y

Intended Learning Outcomes

- Demonstrate the structure of the data mining process and explain the basic notions and operations
- Calculate a data mining problem, recognise its type and select the adequate approach to solution, from evaluation and cleaning of the dataset to selection of the algorithms for data analysis. Calculate and validate the results.
- Demonstrate the basic methods and algorithms to data analysis, and construct basic neural networks for data analysis

Teaching and Learning Methods

Lectures, feedback seminars, computer practicals, coursework problem sheets, computational tasks.

Assessment Methods

Coursework, Computational Tasks, Exam

Pre-Requisites

Co-Requisites

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Directed reading, reviewing lecture recordings, solving problem sheets, completing computational tasks, exam revision

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Module Specification

MA3063 Topics in Mathematical Biology

Academic Year: 2021/2
Module Level: Year 3
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures	
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	
Total Module Hours	

Period: Semester 1
Occurence: E
Coordinator: Sergei Petrovskiy
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Coursework	30				
002	Examination (Final)	70		2		
005	Exam	100		2		Y

Period: Semester 2
Occurence: E
Coordinator: Sergei Petrovskiy
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Coursework	30				
002	Examination (Final)	70		2		
005	Exam	100		2		Y

Intended Learning Outcomes

- Demonstrate the main principles of mathematical model building and development for various phenomena in ecosystems and population biology.
- Apply a range of mathematical tools and techniques for mathematical modelling of biological and ecological phenomena
- Explain different types of models, such as space/time discrete and/or continuous, and how to build or choose the model appropriately.

Teaching and Learning Methods

Lectures, seminars/feedback sessions, tutorials

Assessment Methods

Coursework, exam

Pre-Requisites

Co-Requisites

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Directed reading, reviewing lecture recordings, solving coursework assignment, exam revision

Module Specification

MA3071 Financial Mathematics

Academic Year: 2021/2
Module Level: Year 3
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures	30
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	10
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	110
Total Module Hours	150

Period: Semester 1
Occurence: E
Coordinator: Sergey Utev
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Examination (Final)	70		2		
002	Coursework	30				
003	Exam	100		2		Y

Intended Learning Outcomes

- Define principles of asset modelling
- Apply Ito calculus to financial modelling
- Show how to use Binomial trees in valuing options
- Derive option prices and Greeks in the Black-Scholes models
- Discuss interest rates models

Teaching and Learning Methods

Lectures, tutorials, feedback lectures and workshops

Assessment Methods

Exam and Coursework

Pre-Requisites

Co-Requisites

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Directed reading, reviewing lecture recordings, solving coursework problems, exam revision

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Module Specification

MA3073 Financial Risk

Academic Year: 2021/2
Module Level: Year 3
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures	30
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	10
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	110
Total Module Hours	150

Period: Semester 2
Occurence: E
Coordinator: Andrey Mudrov
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Examination (Final)	70		2		
002	Coursework	30				
005	Examination	100		2		Y

Intended Learning Outcomes

On successful completion of this module students will be able to:
Demonstrate an understanding of main principles of rational choice
Describe and apply expected utility theory
Describe the main features of prospect theory critique of expected utility theory
Apply Mean-variance portfolio theory
Perform calculations using the CAPM and using both single and multi-factor models

Teaching and Learning Methods

Lecturers, feedback classes.

Assessment Methods

Exam and coursework

Pre-Requisites

Co-Requisites

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Directed reading and exam revision.

Module Specification

MA3077 Operational Research

Academic Year: 2021/2
Module Level: Year 3
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures	
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	
Total Module Hours	

Period: Semester 1
Occurence: E
Coordinator: Andrey Mudrov
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Coursework	50				
002	Examination (Final)	50		2		
005	Examination (Final)	100		2		Y

Intended Learning Outcomes

- Formulate, and classify linear and nonlinear optimisation problems and apply techniques and methods for solving constrained and unconstrained nonlinear optimisation problems
- Apply the theory of the simplex method, and be able to use the method for solving problems with linear cost functions and constraints
- Solve inventory control and queuing theory problems
- Solve shortest path and minimal-tree problems, solve simple games
- Application of programming skills to production of algorithms

Teaching and Learning Methods

Lectures, computer practicals, automated computer assignments

Assessment Methods

Coursework (class test, computer practicals), exam

Pre-Requisites

Co-Requisites

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Preparing reports for computer practical assignments, preparing for class tests, revision for final exam

Last Published: 19 September 2021

Module Specification

MA3080 Mathematical Modelling

Academic Year: 2021/2
Module Level: Year 3
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures	
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	
Total Module Hours	

Period: Semester 1
Occurence: E
Coordinator: Alexander Gorban
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Coursework	60				
002	Presntation and paper	40				
005	Exam	100		2		Y

Intended Learning Outcomes

- Explain the basic concepts and instruments of mathematical modelling and explain existing models for real phenomena when presented.
- Create simple models for real phenomena with special focus on economic, financial and social systems, to demonstrate these models for real phenomena and interpret the results
- Analyse the models with special attention to anticipation of critical transitions and communicate the results

Teaching and Learning Methods

Lectures, online text, computer classes, tutorials, educational software

Assessment Methods

Coursework, presentation and paper

Pre-Requisites

Co-Requisites

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Directed reading, solving coursework problems, preparing presentation, writing presentation

Last Published: 19 September 2021

Module Specification

MA3121 Complex Analysis

Academic Year: 2021/2
Module Level: Year 3
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures
Synchronous Small Group Teaching
Synchronous Practical Classes/ Workshops/Professional Placements
Synchronous Other
Asynchronous Lectures/Presentations
Asynchronous Other
Guided Independent Study
Total Module Hours

Period: Semester 2
Occurence: E
Coordinator: Frank Neumann
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Examination (Final)	70		2		
002	Coursework	30				
005	Examination (Final)	100		2		Y

Intended Learning Outcomes

- Demonstrate knowledge of basic functions, theorems and computations
- Demonstrate knowledge of basic theory
- Apply theory to familiar problems.
- Demonstrate an understanding of proof

Teaching and Learning Methods

Lectures, problem classes, feedback classes and proof reading classes

Assessment Methods

Examination and coursework

Pre-Requisites

Co-Requisites

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Directed reading, coursework, reviewing lecture recordings and exam revision.

Last Published: 19 September 2021

Module Specification

MA3131 Groups and Symmetry

Academic Year: 2021/2
Module Level: Year 3
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures	
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	
Total Module Hours	

Period: Semester 1
Occurence: E
Coordinator: Alexander Baranov
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Coursework	30				
002	Examination (Final)	70		2		
005	Exam	100		2		Y

Intended Learning Outcomes

- Apply and reproduce main theorems and proofs in the module
- Define and apply key concepts in the module (groups, isometries, presentations, Sylow subgroups, group actions, finitely generated abelian groups)

Teaching and Learning Methods

Lectures, problem classes and feedback lectures

Assessment Methods

Coursework and Exam

Pre-Requisites

MA2133

Co-Requisites

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Directed reading, reviewing lecture recordings; solving coursework problems and examination revision.

Last Published: 19 September 2021

Module Specification

MA3144 Topology

Academic Year: 2021/2
Module Level: Year 3
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures	
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	
Total Module Hours	

Period: Semester 1
Occurence: E
Coordinator:
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Coursework	30				
002	Examination (Final)	70		2		

Intended Learning Outcomes

- Define the key concepts (topology, fundamental group)
- Calculate the fundamental group of surfaces and other basic spaces
- Demonstrate understanding of the notions of connectivity, compactness, Hausdorff property, topological equivalence

Teaching and Learning Methods

Lectures, feedback seminars and tutorials

Assessment Methods

Coursework and Exam

Pre-Requisites

Co-Requisites

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Directed reading, studying lecture notes, reviewing lecture recordings, working set problems, exam revision

Last Published: 19 September 2021

Module Specification

MA3152 Curves and Surfaces

Academic Year: 2021/2
Module Level: Year 3
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures	
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	
Total Module Hours	

Period: Semester 1
Occurence: E
Coordinator: Katrin Leschke
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Group Project	30				
002	Skills test	40				
003	Class test	30				
007	Examination	100		2		Y

Intended Learning Outcomes

- Define the key concepts of curvatures of curves and surfaces, and apply methods of the module to investigate new geometric situations.
- Reproduce and apply the main results and proofs given in the module.
- Demonstrate familiarity with the topic and to be able to solve routine problems.
- Connect visual information with geometric properties.
- Produce mathematical exhibits and to communicate mathematical content to non-experts.

Teaching and Learning Methods

Lectures, feedback classes, example sheets, group project

Assessment Methods

Project and tests

Pre-Requisites

Co-Requisites

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Group work, problem sheets, writing project report and preparing presentation

Last Published: 19 September 2021

Module Specification

MA3153 Number Theory

Academic Year: 2021/2
Module Level: Year 3
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures	
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	
Total Module Hours	

Period: Semester 2
Occurence: E
Coordinator: Frank Neumann
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Examination (Final)	70		2		
002	Coursework	30				
005	Examination	100		2		Y

Intended Learning Outcomes

- Define and use key concepts from Number Theory
- Complete an assigned project in Number Theory
- Demonstrate effective team work

Teaching and Learning Methods

Lectures, feedback classes, coursework

Assessment Methods

Exam and coursework (group project)

Pre-Requisites

Co-Requisites

-

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Directed reading, coursework, reviewing lecture recordings and exam revision

Last Published: 19 September 2021

Module Specification

MA3201 Generalized Linear Models

Academic Year: 2021/2
Module Level: Year 3
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures	
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	
Total Module Hours	

Period: Semester 2
Occurence: E
Coordinator: Simona Paoli
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Coursework	30				
002	Examination (Final)	70		2		
005	Examination	100		2		Y

Intended Learning Outcomes

- Fit generalized linear models to data sets
- Assess the fit of log-linear models using nested hierarchies
- Demonstrate an understanding of the theory of generalized linear models
- Use R to analyse data with the generalised linear model

Teaching and Learning Methods

Class sessions with handouts, revision sessions, tutorials

Assessment Methods

coursework (set problems, computational tasks) and examination

Pre-Requisites

MA2261

Co-Requisites

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Working through problems, studying lecture notes, reviewing video recordings, using R software to work on computational tasks, exam revision

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Module Specification

MA3266 Liability Modelling

Academic Year: 2021/2
Module Level: Year 3
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures	
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	
Total Module Hours	

Period: Semester 2
Occurence: E
Coordinator: Paul King
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Coursework	30				
002	Examination (Final)	70		2		
005	Examination	100		2		Y

Intended Learning Outcomes

- Describe how insurance companies help to reduce or remove risk
- Discuss the advantages and disadvantages of different measures of investment risk
- Demonstrate an understanding of simple stochastic models for investment returns
- Describe, construct, interpret and discuss the models underlying liability valuations

Teaching and Learning Methods

Lectures, feedback lectures and problem classes

Assessment Methods

Coursework and examination

Pre-Requisites

Co-Requisites

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Directed reading, feedback classes, homework and examination revision.

Module Specification

MA3402 Business Macroeconomics

Academic Year: 2021/2
Module Level: Year 3
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures	30
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	10
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	110
Total Module Hours	150

Period: Semester 2
Occurence: E
Coordinator: Nick Foster
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Examination (Final)	70		2		
002	Coursework	30				
003	Examination	100		2		Y

Intended Learning Outcomes

On successful completion of this module, students should be able to:
- Summarise the relevance of economics to business
- Assess the main strands of economic thinking
- Analyse recent macroeconomic history in order to develop criteria for assessing current macroeconomic policies
- Evaluate and assess the relationship between government, markets and firms using real life examples
- Demonstrate how macroeconomic policies impact business using real life examples

Teaching and Learning Methods

Two lectures will be given each week. One workshop per week to go through regular (non-assessed) coursework and discuss issues raised by the course, and a project class fortnightly to prepare students for tackling a real-life piece of economic analysis. Coursework is based on solving real world problems in an authentic way.

Assessment Methods

Coursework and Exam

Pre-Requisites

-

Co-Requisites

-

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Literature review, economic modelling, problem sheets, preparation for workshop discussions.

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Module Specification

MA3407 Business Microeconomics

Academic Year: 2021/2
Module Level: Year 3
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures	27
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	10
Synchronous Other	
Asynchronous Lectures/Presentations	3
Asynchronous Other	
Guided Independent Study	110
Total Module Hours	150

Period: Semester 1
Occurence: E
Coordinator: Leena Sodha
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Examination (Final)	70		2		
002	Mini Project	30				
003	Examination	100				Y

Intended Learning Outcomes

On successful completion of this module, students should be able to:
- Summarise the relevance of economics to business
- Assess the main strands of economic thinking
- Evaluate and critique competitive market theory and test the theory using real examples
- Analyse consumer demand and behaviour
- Define the efficient operation of a firm, demonstrate an awareness of the impact of regulation and compare the effectiveness of common policies and strategies
- Explain economic and financial business solutions to less mathematical members of the sector

Teaching and Learning Methods

Lectures/workshops will be given each week, plus one feedback class per week to go through regular (non-assessed) coursework and to prepare students for tackling a real-life piece of economic analysis. Coursework is based on solving real world problems in an authentic way. Transferable skills are developed via group work and presentations in the coursework elements of the assessment pattern.

Assessment Methods

Mini project and Exam

Pre-Requisites

-

Co-Requisites

-

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Literature review, economic modelling, problem sheets, writing project report and exam revision.

Module Specification

MA3419 Fundamentals of Data Science

Academic Year: 2021/2
Module Level: Year 3
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures	
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	
Total Module Hours	

Period: Semester 1
Occurence: E
Coordinator: Paul King
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Presentation (Final)	50				
002	Coursework	50				
003	Coursework	100				Y

Intended Learning Outcomes

On successful completion of the module, students should be able to:
- Define data science and discuss its role in actuarial science and business analytics
- Plan and build simple program scripts in the RStudio environment and read data into R from a local tabular file
- Compose and share literate programs and reports using R Markdown and undertake simple EDA (including summary statistics and informative visualisations) of data in a tabular structure
- Construct a reproducible workflow for simple data science project and describe ethical and regulatory issues to be considered when undertaking a data science project
- Construct simple SQL queries and utilize them to extract data from a database within the R environment. Outline the function and purpose of different types of database and (big data) distributed storage and processing tools

Teaching and Learning Methods

Lectures, self-study and group work problem classes. Presentation of a data project, as well as a substantial independent research project/case-study report as part of coursework. There will be the opportunity to engage in hands-on coding throughout this module, with project work based on solving real world problems in an authentic way. The module meets a need within the actuarial profession and research community more widely to develop comfort with manipulating data in various formats and its status as one of only two core modules on this programme indicates its importance in allowing innovative approaches to tackling real life problems using data techniques throughout the programme. Transferable skills are developed at every stage, via group work in class and presentation and coursework elements of the assessment pattern.

Assessment Methods

Presentation and coursework

Pre-Requisites

Co-Requisites

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Directed reading, feedback classes, computer practice and homework.

Last Published: 19 September 2021

Module Specification

MA3517 Mathematics Research Journal

Academic Year: 2021/2
Module Level: Year 3
Scheme: UG
Department: Mathematics
Credits: 20

Student Workload (hours)

Synchronous Lectures	
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	
Total Module Hours	

Period: Semester 2
Occurence: E
Coordinator: Bogdan Grechuk
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Coursework	100				
002	Paper Submission	100				Y

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Module Specification

MA4011 Computational Partial Differential Equations with Finite Elements

Academic Year: 2021/2
Module Level: Year 4
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures	30
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	10
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	100
Total Module Hours	200

Period: Semester 2
Occurence: E
Coordinator: Emmanuil Georgoulis
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Computer Practicals	20				
002	Examination (Final)	80		2		
003	Exam	100		2		Y

Intended Learning Outcomes

This module provides learners with the mathematical foundation as well as implementation aspects of computational schemes for Partial Differential Equations (PDEs), using both finite difference and finite element methods. At the end of this module, learners should be able to:
- classify a PDE and recognize the significance of the various terms and boundary conditions appearing in classical PDE models from mathematical physics;
- apply standard analytical solution techniques, such as the method of characteristics and separation of variables, to linear first and second order problems.
- demonstrate the basic concepts and methods from numerical analysis of PDEs, such as: construct an appropriate scheme for the discretization of PDEs based on the finite difference method, analyse its consistency, stability and convergence properties;
- demonstrate basic knowledge of linear functional analysis and its relevance in PDE theory, with the ability to deduce the right functional setting for a given PDE problem and to write its variational formulation;
- construct finite element formulations for linear PDE models;
- analyse the stability and convergence properties of basic finite elements;
- implement these numerical methods in MATLAB or using freely available finite element libraries.

Teaching and Learning Methods

Class sessions/lectures, computer labs and feedback classes.

Assessment Methods

The coursework will consist of regularly assigned exercise sheets, including problem sets and computer assignments. A substantial individual work will be required for a student to grasp the theoretical material (problem sets) and to get enough computational practice (computer exercises) to be able to solve PDEs numerically. The examination will have 4 questions based on the thought theory and some exercises. Full mark are obtained by answering all 4 questions correctly.

Pre-Requisites

Co-Requisites

none

Excluded Combinations

Guided Independent Study: Indicative Activities

Last Published: 19 September 2021

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Module Specification

MA4022 Data Mining and Neural Networks

Academic Year: 2021/2
Module Level: Year 4
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures	30
Synchronous Small Group Teaching	11
Synchronous Practical Classes/ Workshops/Professional Placements	11
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	98
Total Module Hours	150

Period: Semester 2
Occurence: E
Coordinator: Alexander Gorban
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Examination (Final)	50		2		
002	Coursework	20				
003	Computational Tasks	30				
004	Exam	100		3		Y

Intended Learning Outcomes

Students will demonstrate the structure of the data mining process and explain the basic notions and operation:data preprocessing, data cleaning. dimensionality reduction, binning, sampling, supervision and unsupervising learning, classification, clustering, regression, probability distribution estimation, entropy, information, information gain, independence and conditional independence, time series, stationary time series (in strong and in weak sense).
Calculate a data mining problem, recognize its type and select the adequate approach to solution, from evaluation and cleaning of the dataset to selection of the algorithms for data analysis. Calculate and validate the results.
Demonstrate the basic methods and algorithms to data analysis, in particular: for classification kNN and Decision tree algorithms, for clustering k-means, hierarchical clustering and density based algorithms, for prediction multivariate regression (linear regression and the kernel trick), for probability distribution estimation Bayes networks, for dimension reduction principal component analysis, for time series use the basic models(white noise, random walk, moving average processes, autoregressive processes, integrated and ARIMA processes), apply mean filter and median filter, analyze trend and perform segmentation. Construct basic neural networks for data analysis (Hopfield, Kohonen, cascade correlation and back-propagation of errors).

Teaching and Learning Methods

Lectures, feedback classes, computer practicals.

Assessment Methods

Marked fortnightly work, computer logs, written examination.

Pre-Requisites

MA2032

Co-Requisites

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Module Specification

MA4061 Topics in Mathematical Biology

Academic Year: 2021/2
Module Level: Year 4
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures	30
Synchronous Small Group Teaching	10
Synchronous Practical Classes/ Workshops/Professional Placements	
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	110
Total Module Hours	200

Period: Semester 2
Occurence: E
Coordinator: Sergei Petrovskiy
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Examination (Final)	90		2		
002	Class test	10				
003	Exam	100		2		Y

Intended Learning Outcomes

The student is required to demonstrate knowledge of the main principles of model building and analysis in population biology and ecology.

Teaching and Learning Methods

Lectures, seminars.

Assessment Methods

Continuous assessment is achieved through regular assessment of the student's work at problem classes. Summative assessment is also based on the results of written examination

Pre-Requisites

MA2032, MA2021

Co-Requisites

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Module Specification

MA4073 Financial Risk

Academic Year: 2021/2
Module Level: Year 4
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures	30
Synchronous Small Group Teaching	
Synchronous Practical Classes/ Workshops/Professional Placements	10
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	110
Total Module Hours	150

Period: Semester 2
Occurence: E
Coordinator: Andrey Mudrov
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Examination (Final)	70		2		
002	Coursework	30				
005	Examination	100		2		Y

Intended Learning Outcomes

On successful completion of this module students will be able to:
Demonstrate an understanding and apply rational expectations theory
Apply rational choice theory
Describe the main features of prospect theory critique of expected utility theory
Apply Mean-variance portfolio theory
Perform calculations using the CAPM and using both single and multi-factor models
Produce a written independently researched project report on a specified topic in this area

Teaching and Learning Methods

Lecturers, feedback classes.

Assessment Methods

Exam and coursework

Pre-Requisites

Co-Requisites

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Directed reading and exam revision.

Last Published: 19 September 2021

Module Specification

MA4080 Mathematical Modelling

Academic Year: 2021/2
Module Level: Year 4
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures	10
Synchronous Small Group Teaching	10
Synchronous Practical Classes/ Workshops/Professional Placements	20
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	110
Total Module Hours	200

Period: Semester 1
Occurence: E
Coordinator: Alexander Gorban
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Mini-projects	60				
002	Conference Presentation and Paper	40				
003	Exam	100		3		Y

Intended Learning Outcomes

The module will give an introduction to methodology of mathematical modelling and to mathematical methods of their analysis including analysis of critical effects.
At the end of the module a student should be able to:
•Explain the basic concepts and instruments of mathematical modelling.
•Create simple models for real phenomena with special focus on economic, financial and social systems.
•Demonstrate these models for real phenomena and interpret the results.
•Analyse these models with special attention to anticipation of critical transitions and communicate the results.
•Explain existing models for real phenomena when presented.

Teaching and Learning Methods

An electronic textbook will be provided for self study and lectures.

Assessment Methods

Mini-projects, assessed by 3,000 word report (60%)
Internal conference presentation (20%) and paper (20%)

Pre-Requisites

-

Co-Requisites

-

Excluded Combinations

-

Guided Independent Study: Indicative Activities

UNIVERSITY OF LEICESTER

Module Specification

MA4161 Galois Theory

Academic Year: 2021/2
Module Level: Year 4
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures	30
Synchronous Small Group Teaching	10
Synchronous Practical Classes/ Workshops/Professional Placements	
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	110
Total Module Hours	200

Period: Semester 1
Occurence: E
Coordinator: Teimuraz Pirashvili
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Examination (Final)	50		3		
002	Test	50				

Intended Learning Outcomes

To enable student to:
Understand and define the Galois Group of a field extension and the Galois group of a polynomial.
Understand and prove the Galois correspondence, including the relationship between normal subject structure of the Galois groupd and normality of the intermediate extensions.
Understand the definition of a solvable group and be able to determine whether or not a group of reasonable size is solvable.
Appreciate the significance of the Galois group of a polynomial as a group of permutations of the roots.
Prove that the alternating group of degree at least 5 is simple.
Understand the definition of a radical extension and prove that such an extension has a solvable Galois group.
Understand that the symmetric group is the Galois group of the general polynomial.
Be able to construct polynomials whose Galois group is not solvable.
Be able to apply Galois Theory for certain transcendence proofs in Number Theory.

Teaching and Learning Methods

Lectures, Problem classes

Assessment Methods

Test and exam

Pre-Requisites

-

Co-Requisites

none

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Intended Learning Outcomes

To enable student to:
Understand and define the Galois Group of a field extension and the Galois group of a polynomial.
Understand and prove the Galois correspondence, including the relationship between normal subject structure of the Galois groupd and normality of the intermediate extensions.
Understand the definition of a solvable group and be able to determine whether or not a group of reasonable size is solvable.
Appreciate the significance of the Galois group of a polynomial as a group of permutations of the roots.
Prove that the alternating group of degree at least 5 is simple.
Understand the definition of a radical extension and prove that such an extension has a solvable Galois group.
Understand that the symmetric group is the Galois group of the general polynomial.
Be able to construct polynomials whose Galois group is not solvable.
Be able to apply Galois Theory for certain transcendence proofs in Number Theory.

Teaching and Learning Methods

Lectures, Problem classes

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Module Specification

MA4161 Galois Theory

Assessment Methods

Test and exam

Pre-Requisites

-

Co-Requisites

none

Excluded Combinations

-

Guided Independent Study: Indicative Activities

Directed reading, reviewing lecture recordings, solving coursework problems/exercises, exam revision

Last Published: 19 September 2021

Module Specification

MA4701 Advanced Readings in Mathematics

Academic Year: 2021/2
Module Level: Year 4
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures	
Synchronous Small Group Teaching	20
Synchronous Practical Classes/ Workshops/Professional Placements	
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	130
Total Module Hours	200

Period: Semester 1
Occurence: E
Coordinator: Alberto Paganini
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Coursework (Final)	100				

Intended Learning Outcomes

At the end of this module, students should be able to demonstrate knowledge and understanding of the chosen topic studied in this reading module, and have communicated this through seminar discussions, written work and oral presentations.

Teaching and Learning Methods

Seminars, guided reading, problems/project.

Assessment Methods

Problem classes, writing exercise, oral presentation

Pre-Requisites

Co-Requisites

Excluded Combinations

- Students may not take both MA4701 and MA4702

Guided Independent Study: Indicative Activities

Last Published: 19 September 2021

Module Specification

MA4702 Advanced Readings in Mathematics

Academic Year: 2021/2
Module Level: Year 4
Scheme: UG
Department: Mathematics
Credits: 15

Student Workload (hours)

Synchronous Lectures	
Synchronous Small Group Teaching	20
Synchronous Practical Classes/ Workshops/Professional Placements	
Synchronous Other	
Asynchronous Lectures/Presentations	
Asynchronous Other	
Guided Independent Study	130
Total Module Hours	200

Period: Semester 2
Occurence: E
Coordinator: Teimuraz Pirashvili
Mark Scheme: UG Module Mark Scheme

No.	Assessment Description	Weight %	Qual Mark	Exam Hours	Ass't Group	Alt Reass't
001	Coursework (Final)	100				

Intended Learning Outcomes

At the end of this module, students should be able to demonstrate knowledge and understanding of the chosen topic studied in this reading module, and have communicated this through seminar discussions, written work and oral presentations.

Teaching and Learning Methods

Seminars, guided reading, problems/project.

Assessment Methods

Problem classes, writing exercise, oral presentation

Pre-Requisites

Co-Requisites

Excluded Combinations

- Students may not take both MA4701 and MA4702

Guided Independent Study: Indicative Activities

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