UNIVERSITY OF LEICESTER

Study Abroad

Modules in Mathematics

2022/23 Academic Year

MODULE NAME: Calculus and Analysis

MODULE CODE: MA1014

MODULE DESCRIPTION: Click to open.

CREDITS: 30

PERIOD: Academic Year

DEPARTMENT: Mathematics

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

COORDINATOR: Andrew Tonks

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.

PRE-REQUISITES:

TOTAL MODULE HOURS: 300

ASSESSMENT METHODS:

Coursework, tests, examination

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

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

MODULE NAME: Linear Algebra

MODULE CODE: MA1114

MODULE DESCRIPTION: Click to open.

CREDITS: 30

PERIOD: Academic Year

DEPARTMENT: Mathematics

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.

COORDINATOR: Jason Semeraro

TEACHING AND LEARNING METHODS:

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

PRE-REQUISITES:

TOTAL MODULE HOURS: 300

ASSESSMENT METHODS:

Coursework, Tests, Exam

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

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

MODULE NAME: Probability

MODULE CODE: MA1061

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 1

DEPARTMENT: Mathematics

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

COORDINATOR: Dawei Hao

TEACHING AND LEARNING METHODS:

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

PRE-REQUISITES:

TOTAL MODULE HOURS: 150

ASSESSMENT METHODS:

Exam, test, coursework

GUIDED INDEPENDENT LEARNING: 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.

MODULE NAME: Elements of Number Theory

MODULE CODE: MA1104

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 1

DEPARTMENT: Mathematics

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

COORDINATOR: Frank Neumann

TEACHING AND LEARNING METHODS:

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

PRE-REQUISITES:

TOTAL MODULE HOURS: 160

ASSESSMENT METHODS:

Coursework (can include group work), class tests.

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

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

MODULE NAME: Business Microeconomics

MODULE CODE: MA1407

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 1

DEPARTMENT: Mathematics

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

COORDINATOR: Leena Sodha

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.

PRE-REQUISITES:

TOTAL MODULE HOURS: 150

ASSESSMENT METHODS:

Exam and project

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

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

MODULE NAME: Calculus and Analysis 3

MODULE CODE: MA2032

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 1

DEPARTMENT: Mathematics

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.

COORDINATOR: Sergei Petrovskiy

TEACHING AND LEARNING METHODS:

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

PRE-REQUISITES:

TOTAL MODULE HOURS: 150

ASSESSMENT METHODS:

Examination, coursework

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

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

MODULE NAME: Advanced Linear Algebra

MODULE CODE: MA2132

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 1

DEPARTMENT: Mathematics

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

COORDINATOR: Alexander Baranov

TEACHING AND LEARNING METHODS:

Lectures, problem classes and feedback lectures

PRE-REQUISITES:

TOTAL MODULE HOURS: 150

ASSESSMENT METHODS:

Coursework and Exam

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

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

MODULE NAME: Linear Statistical Models

MODULE CODE: MA2261

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 1

DEPARTMENT: Mathematics

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

COORDINATOR: Seyedeh Zahra Rezaei Lalami

TEACHING AND LEARNING METHODS:

Lectures, problem classes and feedback lectures

PRE-REQUISITES: MA1061, MA1202

TOTAL MODULE HOURS: 150

ASSESSMENT METHODS:

Coursework and examination

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

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

MODULE NAME: Statistical Distributions and Inference

MODULE CODE: MA2403

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 1

DEPARTMENT: Mathematics

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

COORDINATOR: Nigel Sell

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.

PRE-REQUISITES: MA1061, MA1202

TOTAL MODULE HOURS: 150

ASSESSMENT METHODS:

Examination and coursework

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

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

MODULE NAME: Markov Processes

MODULE CODE: MA2404

MODULE DESCRIPTION: Click to open.

CREDITS: 20

PERIOD: Semester 1

DEPARTMENT: Mathematics

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

COORDINATOR: Bogdan Grechuk

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.

PRE-REQUISITES:

TOTAL MODULE HOURS: 150

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 plann

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

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

MODULE NAME: Investigations in Mathematics

MODULE CODE: MA2510

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 1

DEPARTMENT: Mathematics

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

COORDINATOR: Jason Semeraro

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.

PRE-REQUISITES: -

TOTAL MODULE HOURS: 150

ASSESSMENT METHODS:

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

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

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

MODULE NAME: Actuarial Professional Skills and Employability

MODULE CODE: MA2514

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 1

DEPARTMENT: Mathematics

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

COORDINATOR: Nick Foster

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.

PRE-REQUISITES:

TOTAL MODULE HOURS: 150

ASSESSMENT METHODS:

Coursework

GUIDED INDEPENDENT LEARNING: 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

MODULE NAME: Equations of Mathematical Physics

MODULE CODE: MA3002

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 1

DEPARTMENT: Mathematics

INTENDED LEARNING OUTCOMES:

COORDINATOR: Nikolai Brilliantov

TEACHING AND LEARNING METHODS:

Lectures, seminars, feedback sessions, exercises

PRE-REQUISITES:

TOTAL MODULE HOURS:

ASSESSMENT METHODS:

Coursework and exam

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

MODULE NAME: Scientific Computing

MODULE CODE: MA3012

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 1

DEPARTMENT: Mathematics

INTENDED LEARNING OUTCOMES:

COORDINATOR: Ruslan Davidchack

TEACHING AND LEARNING METHODS:

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

PRE-REQUISITES:

TOTAL MODULE HOURS:

ASSESSMENT METHODS:

Coursework (computer assignments, problem sheets) and exam

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

MODULE NAME: Topics in Mathematical Biology

MODULE CODE: MA3063

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 1

DEPARTMENT: Mathematics

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.

COORDINATOR: Sergei Petrovskiy

TEACHING AND LEARNING METHODS:

Lectures, seminars/feedback sessions, tutorials

PRE-REQUISITES:

TOTAL MODULE HOURS:

ASSESSMENT METHODS:

Coursework, exam

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

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

MODULE NAME: Financial Mathematics

MODULE CODE: MA3071

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 1

DEPARTMENT: Mathematics

INTENDED LEARNING OUTCOMES:

COORDINATOR: Dawei Hao

TEACHING AND LEARNING METHODS:

Lectures, tutorials, feedback lectures and workshops

PRE-REQUISITES:

TOTAL MODULE HOURS: 150

ASSESSMENT METHODS:

Exam and Coursework

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

MODULE NAME: Operational Research

MODULE CODE: MA3077

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 1

DEPARTMENT: Mathematics

INTENDED LEARNING OUTCOMES:

COORDINATOR: Alberto Paganini

TEACHING AND LEARNING METHODS:

Lectures, computer practicals, automated computer assignments

PRE-REQUISITES:

TOTAL MODULE HOURS: 150

ASSESSMENT METHODS:

Coursework (class test, computer practicals), exam

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

MODULE NAME: Mathematical Modelling

MODULE CODE: MA3080

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 1

DEPARTMENT: Mathematics

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

COORDINATOR: Alexander Gorban

TEACHING AND LEARNING METHODS:

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

PRE-REQUISITES:

TOTAL MODULE HOURS:

ASSESSMENT METHODS:

Coursework, presentation and paper

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

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

MODULE NAME: Groups and Symmetry

MODULE CODE: MA3131

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 1

DEPARTMENT: Mathematics

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)

COORDINATOR: Alexander Baranov

TEACHING AND LEARNING METHODS:

Lectures, problem classes and feedback lectures

PRE-REQUISITES: MA2133

TOTAL MODULE HOURS:

ASSESSMENT METHODS:

Coursework and Exam

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

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

MODULE NAME: Topology

MODULE CODE: MA3144

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 1

DEPARTMENT: Mathematics

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

COORDINATOR: Andrew Tonks

TEACHING AND LEARNING METHODS:

Lectures, feedback seminars and tutorials

PRE-REQUISITES:

TOTAL MODULE HOURS: 150

ASSESSMENT METHODS:

Coursework and Exam

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

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

MODULE NAME: Curves and Surfaces

MODULE CODE: MA3152

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 1

DEPARTMENT: Mathematics

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.

COORDINATOR: Katrin Leschke

TEACHING AND LEARNING METHODS:

Lectures, feedback classes, example sheets, group project

PRE-REQUISITES:

TOTAL MODULE HOURS:

ASSESSMENT METHODS:

Project and tests

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

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

MODULE NAME: Business Microeconomics

MODULE CODE: MA3407

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 1

DEPARTMENT: Mathematics

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

COORDINATOR: Leena Sodha

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.

PRE-REQUISITES: -

TOTAL MODULE HOURS: 150

ASSESSMENT METHODS:

Mini project and Exam

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

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

MODULE NAME: Fundamentals of Data Science

MODULE CODE: MA3419

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 1

DEPARTMENT: Mathematics

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

COORDINATOR: Paul King

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.

PRE-REQUISITES:

TOTAL MODULE HOURS:

ASSESSMENT METHODS:

Coursework

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

Directed reading, feedback classes, computer practice and homework.

MODULE NAME: Mathematical Modelling

MODULE CODE: MA4080

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 1

DEPARTMENT: Mathematics

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.

COORDINATOR: Alexander Gorban

TEACHING AND LEARNING METHODS:

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

PRE-REQUISITES: -

TOTAL MODULE HOURS: 200

ASSESSMENT METHODS:

Mini-projects, assessed by 3,000 word report (60%)

Internal conference presentation (20%) and paper (20%)

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

MODULE NAME: Advanced Readings in Mathematics

MODULE CODE: MA4701

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 1

DEPARTMENT: Mathematics

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.

COORDINATOR: Alberto Paganini

TEACHING AND LEARNING METHODS:

Seminars, guided reading, problems/project.

PRE-REQUISITES:

TOTAL MODULE HOURS: 150

ASSESSMENT METHODS:

Problem classes, writing exercise, oral presentation

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

MODULE NAME: Introductory Statistics

MODULE CODE: MA1202

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 2

DEPARTMENT: Mathematics

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

COORDINATOR: Tatiana Tyukina

TEACHING AND LEARNING METHODS:

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

PRE-REQUISITES:

TOTAL MODULE HOURS: 150

ASSESSMENT METHODS:

Exam, Coursework

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

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

MODULE NAME: Mathematics in Business

MODULE CODE: MA1254

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 2

DEPARTMENT: Mathematics

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

COORDINATOR: Katrin Leschke

TEACHING AND LEARNING METHODS:

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

PRE-REQUISITES:

TOTAL MODULE HOURS: 150

ASSESSMENT METHODS:

Reports, Presentations, IT problems

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

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

MODULE NAME: Plane Geometry

MODULE CODE: MA1272

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 2

DEPARTMENT: Mathematics

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.

COORDINATOR: Julia Goedecke

TEACHING AND LEARNING METHODS:

Lectures, seminars, group work.

PRE-REQUISITES:

TOTAL MODULE HOURS: 150

ASSESSMENT METHODS:

Coursework and test.

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

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

MODULE NAME: Business Macroeconomics

MODULE CODE: MA1402

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 2

DEPARTMENT: Mathematics

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

COORDINATOR: Nick Foster

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.

PRE-REQUISITES:

TOTAL MODULE HOURS: 150

ASSESSMENT METHODS:

Exam and project

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

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

MODULE NAME: Differential Equations and Dynamics

MODULE CODE: MA2021

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 2

DEPARTMENT: Mathematics

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

COORDINATOR: Seyedeh Zahra Rezaei Lalami

TEACHING AND LEARNING METHODS:

Lectures, feedback classes, computer classes, automated computer assignments

PRE-REQUISITES: -

TOTAL MODULE HOURS: 142

ASSESSMENT METHODS:

Final exam, coursework (problem sheets, computer assignments)

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

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

MODULE NAME: Advanced Discrete Mathematics

MODULE CODE: MA2042

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 2

DEPARTMENT: Mathematics

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.

COORDINATOR: Alexander Baranov

TEACHING AND LEARNING METHODS:

Lectures, problem classes.

PRE-REQUISITES:

TOTAL MODULE HOURS: 142

ASSESSMENT METHODS:

Coursework and examination.

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

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

MODULE NAME: Algebra

MODULE CODE: MA2133

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 2

DEPARTMENT: Mathematics

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

COORDINATOR: Alexander Baranov

TEACHING AND LEARNING METHODS:

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

PRE-REQUISITES:

TOTAL MODULE HOURS: 150

ASSESSMENT METHODS:

Coursework and exam

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

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

MODULE NAME: Statistical Data Analysis

MODULE CODE: MA2206

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 2

DEPARTMENT: Mathematics

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

COORDINATOR: Nigel Sell

TEACHING AND LEARNING METHODS:

Lectures, seminars, tutorials, Computer practical classes

PRE-REQUISITES: MA2403

TOTAL MODULE HOURS: 150

ASSESSMENT METHODS:

Examination and coursework (problem sheets, computer assignments)

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

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

MODULE NAME: Introduction to Computing

MODULE CODE: MA2252

MODULE DESCRIPTION: Click to open.

CREDITS: 10

PERIOD: Semester 2

DEPARTMENT: Mathematics

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

COORDINATOR: Ruslan Davidchack

TEACHING AND LEARNING METHODS:

Lectures, computer workshops and feedback sessions

PRE-REQUISITES: -

TOTAL MODULE HOURS:

ASSESSMENT METHODS:

Coursework (problem sheets, test)

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

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

MODULE NAME: Business Finance

MODULE CODE: MA2402

MODULE DESCRIPTION: Click to open.

CREDITS: 20

PERIOD: Semester 2

DEPARTMENT: Mathematics

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

COORDINATOR: Leena Sodha

TEACHING AND LEARNING METHODS:

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

PRE-REQUISITES:

TOTAL MODULE HOURS: 150

ASSESSMENT METHODS:

Examination, coursework

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

Directed reading, feedback classes, homework annd exam revision

MODULE NAME: Actuarial Modelling 2

MODULE CODE: MA2405

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 2

DEPARTMENT: Mathematics

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

COORDINATOR: Bo Wang

TEACHING AND LEARNING METHODS:

Lectures, feedback classes

PRE-REQUISITES: MA2401

TOTAL MODULE HOURS:

ASSESSMENT METHODS:

Examination and coursework

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

Directed reading, computer practice, homework and examination revision.

MODULE NAME: Mortality Modelling

MODULE CODE: MA2414

MODULE DESCRIPTION: Click to open.

CREDITS: 10

PERIOD: Semester 2

DEPARTMENT: Mathematics

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

COORDINATOR: Andrey Morozov

TEACHING AND LEARNING METHODS:

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

PRE-REQUISITES:

TOTAL MODULE HOURS:

ASSESSMENT METHODS:

Examination; coursework

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

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

MODULE NAME: Business Applications of Mathematics

MODULE CODE: MA2511

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 2

DEPARTMENT: Mathematics

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

COORDINATOR: Clive Rix

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

PRE-REQUISITES:

TOTAL MODULE HOURS: 150

ASSESSMENT METHODS:

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

GUIDED INDEPENDENT LEARNING: 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.

MODULE NAME: Equations of Mathematical Physics

MODULE CODE: MA3002

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 2

DEPARTMENT: Mathematics

INTENDED LEARNING OUTCOMES:

COORDINATOR: Nikolai Brilliantov

TEACHING AND LEARNING METHODS:

Lectures, seminars, feedback sessions, exercises

PRE-REQUISITES:

TOTAL MODULE HOURS:

ASSESSMENT METHODS:

Coursework and exam

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

MODULE NAME: Computational Partial Differential Equations with Finite Elements

MODULE CODE: MA3013

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 2

DEPARTMENT: Mathematics

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.

COORDINATOR: Emmanuil Georgoulis

TEACHING AND LEARNING METHODS:

Lectures, computer labs and tutorials.

PRE-REQUISITES:

TOTAL MODULE HOURS:

ASSESSMENT METHODS:

Coursework (problem sets, computer exercises), Exam

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

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

MODULE NAME: Data Mining and Neural Networks

MODULE CODE: MA3022

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 2

DEPARTMENT: Mathematics

INTENDED LEARNING OUTCOMES:

COORDINATOR: Alexander Gorban

TEACHING AND LEARNING METHODS:

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

PRE-REQUISITES:

TOTAL MODULE HOURS:

ASSESSMENT METHODS:

Coursework, Computational Tasks, Exam

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

MODULE NAME: Topics in Mathematical Biology

MODULE CODE: MA3063

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 2

DEPARTMENT: Mathematics

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.

COORDINATOR: Sergei Petrovskiy

TEACHING AND LEARNING METHODS:

Lectures, seminars/feedback sessions, tutorials

PRE-REQUISITES:

TOTAL MODULE HOURS:

ASSESSMENT METHODS:

Coursework, exam

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

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

MODULE NAME: Financial Risk

MODULE CODE: MA3073

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 2

DEPARTMENT: Mathematics

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

COORDINATOR: Bogdan Grechuk

TEACHING AND LEARNING METHODS:

Lecturers, feedback classes.

PRE-REQUISITES:

TOTAL MODULE HOURS: 150

ASSESSMENT METHODS:

Exam and coursework

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

Directed reading and exam revision.

MODULE NAME: Complex Analysis

MODULE CODE: MA3121

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 2

DEPARTMENT: Mathematics

INTENDED LEARNING OUTCOMES:

COORDINATOR: Frank Neumann

TEACHING AND LEARNING METHODS:

Lectures, problem classes, feedback classes and proof reading classes

PRE-REQUISITES:

TOTAL MODULE HOURS:

ASSESSMENT METHODS:

Examination and coursework

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

MODULE NAME: Representation Theory

MODULE CODE: MA3142

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 2

DEPARTMENT: Mathematics

INTENDED LEARNING OUTCOMES:

- Apply and reproduce main theorems and proofs in the module

- Define and apply key concepts of algebraic representation theory

COORDINATOR: Jason Semeraro

TEACHING AND LEARNING METHODS:

Lectures, feedback classes, revision sessions

PRE-REQUISITES: MA2133

TOTAL MODULE HOURS: 150

ASSESSMENT METHODS:

Coursework and Exam

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

Directed reading, reviewing lecture recordings, working independently on solving coursework problems and exam revision.

MODULE NAME: Number Theory

MODULE CODE: MA3153

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 2

DEPARTMENT: Mathematics

INTENDED LEARNING OUTCOMES:

- Define and use key concepts from Number Theory

- Complete an assigned project in Number Theory

- Demonstrate effective team work

COORDINATOR: Frank Neumann

TEACHING AND LEARNING METHODS:

Lectures, feedback classes, coursework

PRE-REQUISITES:

TOTAL MODULE HOURS:

ASSESSMENT METHODS:

Exam and coursework (group project)

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

Directed reading, coursework, reviewing lecture recordings and exam revision

MODULE NAME: Generalized Linear Models

MODULE CODE: MA3201

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 2

DEPARTMENT: Mathematics

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

COORDINATOR: Dawei Hao

TEACHING AND LEARNING METHODS:

Class sessions with handouts, revision sessions, tutorials

PRE-REQUISITES: MA2261

TOTAL MODULE HOURS: 150

ASSESSMENT METHODS:

coursework (set problems, computational tasks) and examination

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

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

MODULE NAME: Liability Modelling

MODULE CODE: MA3266

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 2

DEPARTMENT: Mathematics

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

COORDINATOR: Paul King

TEACHING AND LEARNING METHODS:

Lectures, feedback lectures and problem classes

PRE-REQUISITES:

TOTAL MODULE HOURS: 150

ASSESSMENT METHODS:

Coursework and examination

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

Directed reading, feedback classes, homework and examination revision.

MODULE NAME: Business Macroeconomics

MODULE CODE: MA3402

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 2

DEPARTMENT: Mathematics

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

COORDINATOR: Nick Foster

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.

PRE-REQUISITES: -

TOTAL MODULE HOURS: 150

ASSESSMENT METHODS:

Coursework and Exam

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

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

MODULE NAME: Computational Partial Differential Equations with Finite Elements

MODULE CODE: MA4011

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 2

DEPARTMENT: Mathematics

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.

COORDINATOR: Emmanuil Georgoulis

TEACHING AND LEARNING METHODS:

Class sessions/lectures, computer labs and feedback classes.

PRE-REQUISITES:

TOTAL MODULE HOURS: 150

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 computatio

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

MODULE NAME: Data Mining and Neural Networks

MODULE CODE: MA4022

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 2

DEPARTMENT: Mathematics

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).

COORDINATOR: Alexander Gorban

TEACHING AND LEARNING METHODS:

Lectures, feedback classes, computer practicals.

PRE-REQUISITES: MA2032

TOTAL MODULE HOURS: 150

ASSESSMENT METHODS:

Marked fortnightly work, computer logs, written examination.

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

MODULE NAME: Topics in Mathematical Biology

MODULE CODE: MA4061

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 2

DEPARTMENT: Mathematics

INTENDED LEARNING OUTCOMES:

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

COORDINATOR: Sergei Petrovskiy

TEACHING AND LEARNING METHODS:

Lectures, seminars.

PRE-REQUISITES: MA2032, MA2021

TOTAL MODULE HOURS: 200

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

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

MODULE NAME: Financial Risk

MODULE CODE: MA4073

MODULE DESCRIPTION: Click to open.

CREDITS: 15

PERIOD: Semester 2

DEPARTMENT: Mathematics

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

COORDINATOR: Bogdan Grechuk

TEACHING AND LEARNING METHODS:

Lecturers, feedback classes.

PRE-REQUISITES:

TOTAL MODULE HOURS: 150

ASSESSMENT METHODS:

Exam and coursework

GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:

Directed reading and exam revision.