Programme Specification (Undergraduate) FOR ENTRY YEAR: 2022/23

Date created: 21/04/2021 **Last amended:** 02/03/2022 **Version no.** 1

1. Programme title(s) and code(s):

BSc Mathematics and Actuarial Science (GN1H) PGDip*/PGCert*

BSc Mathematics and Actuarial Science with year in industry

Notes

* An award marked with an asterisk is only available as an exit award and is not available for students to register onto.

a) HECOS Code

HECOS Code	%

b) UCAS Code

GN1H

2. Awarding body or institution:

University of Leicester

3. a) Mode of study

Full-time

b) Type of study

Campus-based

4. Registration periods:

BSc Mathematics and Actuarial Science

The normal period of registration is 3 years

The maximum period of registration 5 years

BSc Mathematics and Actuarial Science with industry

The normal period of registration is 4 years

The maximum period of registration 6 years

5. Typical entry requirements

136 points normally including AAB at A level with A in Mathematics. Entry interviews may be introduced at a later date. Appropriate English language skills.

6. Accreditation of Prior Learning

APL will not be accepted for exemptions from individual modules, however may be considered for direct entry to year 2, on a case by case and subject to the general provisions of the University APL policy.

7. Programme aims

The programme aims to:

- foster confidence, convey knowledge and develop expertise in mathematics, including an appreciation of the usefulness of mathematics, particularly in a business/financial context;
- provide an education and training in mathematics which includes fundamental concepts and gives an indication of the breadth of mathematics, and in particular to gain a solid grounding in the key applications of mathematics within finance/actuarial science;
- provide an education and training in actuarial science consistent with the Faculty and Institute of Actuaries' Core Technical competencies;
- develop an appreciation of the necessity for rigorous justification of assertions and the need for logical arguments;
- develop the ability to model the world using mathematics, and to be able to produce relevant and robust solutions to real-world problems;
- enable students to develop self-confidence gained through the provision of careful guidance in the first level, with increasing independence later;
- improve students' team-working skills;
- stimulate intellectual development and develop powers of critical analysis, problem solving, written communication skills and improve presentational skills;
- develop the ability to communicate solutions to problems and mathematical concepts in general using language appropriate to the target audience;
- develop project-management skills;
- develop competence in IT, in particular the use of mathematical software;
- enhance practical computing skills by learning software relevant to the business community;
- develop skills which will have direct applicability to employment in the financial sector, notably the actuarial profession;
- raise students' expertise and understanding to a point where they could embark upon postgraduate mathematical study;
- develop the ability to complete independent project work and foster the skill of application of mathematical tools in a financial context.

In addition to the aims above, the "with Industry" variant of the programme aims to:

- place students on challenging and relevant industrial placements;
- enable students to use and develop the knowledge and skills gained during the taught part of the programme; and
- develop students' career management and development skills.

8. Reference points used to inform the programme specification

- QAA Benchmarking Statement
- Framework for Higher Education Qualifications (FHEQ)
- UK Quality Code for Higher Education
- University Learning Strategy
- University Assessment Strategy
- University of Leicester Periodic Developmental Review Report
- External Examiners' reports (annual)
- United Nations Education for Sustainable Development Goals
- Student Destinations Data
- Professional organisations (Institute and Faculty of Actuaries)

9. Programme Outcomes

Unless otherwise stated, programme outcomes apply to all awards specified in 1. Programme title(s).

a) Discipline specific knowledge and competencies

i) Mastery of an appropriate body of knowledge

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Knowledge of basic theory, basic techniques of analysis, algebra, applied mathematics, and statistics.	Lectures, specified reading, problem classes. In addition, elements of eLearning are incorporated.	Written examinations, assessed problems. Assessed practical classes. Assessed case studies and short projects.Final year project. Specific projects undertaken on placement (*with industry*)
Knowledge of key techniques and algorithms in actuarial science and finance.	Lectures, specified reading, problem classes. In addition, elements of eLearning are incorporated.	Written examinations, assessed problems. Assessed practical classes. Assessed case studies and short projects.Final year project. Specific projects undertaken on placement (*with industry*)
Knowledge of basic techniques, and model problems.	Lectures, specified reading, problem classes. In addition, elements of eLearning are incorporated.	Written examinations, assessed problems. Assessed practical classes. Assessed case studies and short projects. Final year project. Specific projects undertaken on placement (*with industry*)
Knowledge of a computing languages and software.	Computer practical classes. Use of software packages on placement (*with industry)*	Assessed practical classes. Placement reports (*with industry*)

ii) Understanding and application of key concepts and techniques

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Novel applications of basic knowledge. Exposition of logical structure. Ability to generalise and specialise.	Lectures, tutorials, problem classes, marked assignments. Specific projects undertaken on placement where applicable Lectures, tutorials, problem classes, marked assignments. Computer practical classes.	Written examination, assessed problems, project report. Formal report on placement. Written examinations, assessed problems.
Ability to apply an algorithm for the solution of a standard problem.	Lectures, tutorials, problem classes, marked assignments. Specific projects undertaken on placement where applicable Lectures, tutorials, problem classes, marked assignments. Computer practical classes.	Written examination, assessed problems, project report. Formal report on placement. Written examinations, assessed problems.
Ability to apply standard theorems to solve particular problems. Mathematical modeling. Application of computer algorithms for solving finance problems.	Lectures, tutorials, problem classes, marked assignments. Specific projects undertaken on placement where applicable Lectures, tutorials, problem classes, marked assignments. Computer practical classes.	Assessed practical classes.
Applications of mathematical theory in an industrial setting (*with industry*)	Working through exercises in industrial placement record book. Specific projects undertaken on placement where applicable	Industrial placement record tasks on Blackboard, including formal report on placement.

iii) Critical analysis of key issues

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Analysis of problem and selection of appropriate proof or solution strategy. Critical appraisal of solutions. Analyse and solve `messily defined' finance management problems. Analysis of IT problems.	Lectures, problem classes, feedback on assessed problems, project supervision.	Written examinations, assessed problems, Project report.
Analysis of how projects are set up and managed within an industrial setting (*with industry*)	Working through exercises in industrial placement record on Blackboard. Specific projects undertaken on placement where applicable	Industrial placement record tasks on Blackboard, including formal report on placement.

iv) Clear and concise presentation of material

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Presentation of results (both informal and to a variety of audiences), participation in scientific discussion.	Tutorials, Group workshops, Presentation workshops, project supervision. Feedback on assessed written pieces.	Group presentations. Project presentations. Specific projects undertaken on placement where applicable
Ability to write coherent reports. Software presentation.	Guidance from project supervisor.	Assessed essays. Project presentation.
Presentation of mathematical ideas to a mixed audience (i.e. not all mathematically-trained) within an industrial setting (*with industry*)	Working through exercises in industrial placement record tasks on Blackboard. Specific projects undertaken on placement where applicable	Industrial placement record tasks on Blackboard, including formal report on placement.

v) Critical appraisal of evidence with appropriate insight

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Project design.	Project supervision.	Project reports.

vi) Other discipline specific competencies

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Knowledge of mathematical software such as R, MATLAB and MAPLE.	Lab classes, and purpose designed handbooks.	Log books of practical sessions. Reflective blogs.
Mathematical modeling skills. Language of finance.	Group projects. Project and lectures, eLearning. Use of software packages on placement	Project reports. Written examinations and presentations. Industrial placement record tasks on Blackboard, including formal report on placement.

b) Transferable skills

i) Oral communication

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Response to questioning	Tutorials, workshops.	
Scientific communication.	Tutorials, workshops.	
Project presentation.	Project supervision, presentation workshops. Presentation opportunities on placement where applicable	Presentation assessment. Industrial placement record tasks

ii) Written communication

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Report writing.	Project supervisions.	Assessed reports.
Mathematical communication.	Tutorials.	Assessed questions.
Presenting technical information to peers and tutors in an appropriate form and communicating technical information and mathematical arguments in an appropriate form for a given audience (*with industry*)	Opportunities for written reports while on placement. Formal placement report.	Industrial placement record tasks on Blackboard, including formal report on placement.

iii) Information technology

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Use of Windows. Use of specialist packages. Office software including mathematical software.	Induction. Laboratories. Use of specialist packages on placement	Marked project work. Project reports. Industrial placement record tasks on Blackboard, including formal report on placement

iv) Numeracy

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Use of analytical and graphical methods.	Throughout programme Use of specialist packages on placement	Written examinations, project reports. Use of analytical and graphical methods on placement

v) Team working

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Scientific discussion. Organization, time management	Group problem solving. Group projects.	Group assessment.

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Team working in an industrial setting (*with industry*) • Work with other team members to identify, distribute and undertake tasks necessary to complete a project • Communicate effectively with other team members to ensure effective operation of the team • Demonstrate ability to choose a format and communication appropriate to your work environment • Critically review your own written or oral communication skills • Select self-development activities	Experience of working within a commercial organization. Working through exercises in industrial placement record book. Specific projects undertaken on placement where applicable	Industrial placement record tasks on Blackboard, including formal report on placement.

vi) Problem solving

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Analysis, breakdown, synthesis, critical examination. Mathematical modeling skills.	Lectures, problem workshops, group work, projects.	Marked problems, group work assessment, project assessment.
Problem analysis and solution for `messily defined' problems in an industrial setting (*with industry*)	Experience of working within a commercial organization. Working through exercises in industrial placement record on Blackboard. Specific projects undertaken on placement where applicable	Industrial placement record tasks on Blackboard, including formal report on placement

vii) Information handling

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Conduct background research and literature surveys. Summarise content from information sources.	Project supervision.	Individual project reports.
Ability to learn in DL mode, including elearning.	Experience of working within a commercial organization at a distance eLearning-mode module.	Industrial placement record tasks on Blackboard, including formal report on placement Module assessment.

viii) Skills for lifelong learning

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Study skills.	Resource based learning. Study skills booklet.	Examinations, assessed problems, project assessments.
Independence and time management.	Structured support decreasing through years. Experience of working within a commercial organization (*with industry*)	Meeting deadlines. Industrial placement record tasks on Blackboard, including formal report on placement.
Careers and business awareness.	Careers workshops. Business based project. Guest speakers. Placements	Project reports. Destinations data.
Information retrieval.	Induction library session. Study skills handbook. Project supervision.	Successful feedback from placements.

10. Progression points

This programme follows the standard Scheme of Progression set out in Senate Regulations – see the version of Senate Regulation 5 governing undergraduate programmes relevant to the year of entry.

Students will revert to the degree without industry version of their course if:

- they fail to acquire a placement; or
- they fail any modules requiring re-sits in the placement year unless subject to mitigation; or
- their credit-weighted average for year 2 is less than 50%; or
- they fail to pass the assessment related to the placement; or
- the placement is terminated through no fault of the student after less than 9 months and no suitable alternative placement can be found.

In the event that a module requires a re-sit with mitigation (i.e. is uncapped), and the student has met all the other criteria, arrangements will be made for the student to re-sit the module and continue with the placement secured.

In cases where a student has failed to meet a requirement to progress he or she will be required to withdraw from the course

11. Criteria for award and classification

This programme follows the standard scheme of undergraduate award and classification set out in Senate Regulations – see the version of *Senate Regulation 5 governing undergraduate programmes* relevant to the year of entry.

12. Special features

Options for this degree include: Year in Industry between second and third years.

Despite both being accredited by the Institute and Faculty of Actuaries, the BSc differs significantly from the MSc Actuarial Sciences. In the BSc, the understanding of the mathematics is at a lower level (commensurate with what one would expect in an undergraduate mathematics degree in a good university such as Leicester). There is also an appreciation of how the mathematics is applied in a variety of real-life situations, but these are significantly more limited in scope and complexity than those studied in the MSc. Throughout the BSc, emphasis will be placed on developing broad practical and algorithmic skills relevant to

the financial/actuarial sector, while teaching the general mathematical principles common to UK mathematics undergraduate programmes.

The BSc programme will be taught using computer classes, problem classes and skills sessions in addition to appropriately-paced traditional lectures. Some elements of supported eLearning will be used to develop independent-learning skills necessary for later professional studies. Assessment will be via course work, computational exercises, projects and written exams. In contrast to the MSc's mini-projects present in each module, the BSc follows the model used by other undergraduate programmes by having a single supervisor led final-year project (although some limited use of mini projects will be made in particular BSc modules).

13. Indications of programme quality

QAA subject review [www/qaa.org/], external examiners reports ("the performance of the students is comparable with similar high-quality UK institutions"), subject benchmarks [www.qaa.ac.uk/crntwork/benchmark/phase2/mathematics.pdf], dispensation from professional qualifications.

14. External Examiner(s) reports

The details of the External Examiner(s) for this programme and the most recent External Examiners' reports for this programme can be found at exampapers@Leicester [log-in required]

UNIVERSITY OF LEICESTER

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Appendix 1: Programme structure (programme regulations)

The University regularly reviews its programmes and modules to ensure that they reflect the current status of the discipline and offer the best learning experience to students. On occasion, it may be necessary to alter particular aspects of a course or module.

BSc Mathematics and Actuarial Science All Variants

Level 4/Year 1 2022/23

Credit breakdown

Status	Year long	Semester 1	Semester 2
Core	60 credits	30 credits	30 credits
Optional	n/a	n/a	n/a

120 credits in total

Core modules

Delivery period	Code	Title	Credits
Year long	MA1014	Calculus & Analysis	30 credits
Year long	MA1114	Linear Algebra	30 credits
Sem 1	MA1061	Probability	15 credits
Sem 1	MA1407	Business Microeconomics	15 credits
Sem 2	MA1202	Introductory Statistics	15 credits
Sem 2	MA1402	Business Macroeconomics	15 credits

Notes
n/a

Level 5/Year 2 2023/24

Credit breakdown

Status	Year long	Semester 1	Semester 2
Core	n/a	60 credits	60 credits
Optional	n/a	n/a	n/a

120 credits in total

Core modules

Delivery period	Code	Title	Credits
Sem 1	MA2401	Actuarial Modelling 1	15 credits
Sem 1	MA2404	Markov Processes	15 credits
Sem 1	MA2403	Statistical Distributions and Inference	15 credits
Sem 1	MA2514	Actuarial Professional Skills and Employability	15 credits
Sem 2	MA2405	Actuarial Modelling 2	15 credits
Sem 2	MA2414	Survival Models	15 credits
Sem 2	MA2206	Statistical Data Analysis	15 credits
Sem 2	MA2402	Business Finance	15 credits

Notes
n/a

Level 6/Year 3 2024/25

Credit breakdown

Status	Year long	Semester 1	Semester 2
Core	n/a	30 credits	30 credits
Optional	n/a	30 credits	30 credits

120 credits in total

Core modules

Delivery period	Code	Title	Credits
Year long	MA3515	Actuarial Project	30 credits
Sem 1	MA3471	Financial Engineering for Actuaries	15 credits
Sem 2	MA3266	Liability Modelling	15 credits

Notes

Option modules

Delivery period	Code	Title	Credits
Semester 1	MA3077	Operational Research	15 credits
Semester 1	MN3133	The Management and Shaping of Innovation	15 credits
Semester 1	MA3407	Business Microeconomics*	15 credits
Semester 1	MA3419	Fundamentals of Data Science	15 credits
Semester 2	MA3201	Generalised Linear Models	15 credits
Semester 2	MA3022	Data Mining and Neural Networks	15 credits
Semester 2	MA3511	Communicating Mathematics	15 credits
Semester 2	MA3402	Business Macroeconomics**	15 credits

Delivery period	Code	Title	Credits
Semester 2	MN3138	Behavioural Finance and Investment Strategies	15 credits

Notes

This is an indicative list of option modules and not definitive of what will be available. Option module choice is also subject to availability, timetabling, student number restrictions and, where appropriate, students having taken appropriate pre-requisite modules. ***MA3407 cannot be taken if MA1407 already taken**

****** MA3402 cannot be taken if MA1402 already taken**

BSc Mathematics and Actuarial Science with industry

The 'year in industry' variant of this programme is offered in accordance with the University's standard specification for year in industry programme variants

Finding a placement

Students are regarded as self-managing career professionals responsible for securing their own placements HOWEVER the University supports students to find placements via:

1. The employability programme, which enables students to position themselves for applications for work placements, internships and employment; and
2. A range of programmes designed to improve links with potential employers of mathematics undergraduates, including:
    - Festival of Careers, including opportunities to meet employers from management and finance, and from science, technology and engineering sectors
    - Interview and assessment centre sessions for students to practice interview skills
    - Business projects embedded across programmes
    - Support in articulating skills in applications and CVs within the Professional Skills and Employability module
    - Opportunities to meet actuarial employers via actuarial society meetings across the year.

Risk assessment of placements

1. The Employability Resource Officer will inform the students about the procedure for confirming a placement with the Mathematics Department. This form will also be available from the departmental administrator.
2. **Stage 1**. This is completed by the student once a placement has been offered to them.
3. **Stage 2**. The departmental administrator inputs the basic data from the form on to the 'Placement information spreadsheet' and emails the placement provider the 'Placement Provider form' via email.
4. **Stage 3.** When the 'Placement provider form' is received back from the client – the course tutor is responsible for using the information the forms contain to fill out the risk assessment form.
5. **Stage 4.** When the placement is deemed suitable, the course tutor informs the departmental administrator that the placement can be authorised. The authorised form is sent back to the students and placement provider.

6. If the risk assessments form (stage 2) brings any concerns of higher risks into the equation, then this should be discussed with the Relationship Manager (STEM). Either the Relationship Manager or the Course Tutor should contact the client to discuss resolving these risks.
7. In the case of an ethical risk, the departmental ethical officer should be involved.
8. The University runs compulsory Work Placement Briefing sessions for students before they go out on placement.
9. All placement providers are required to sign up to a Placement Provider Charter before any students may be placed with them.

Support for students while on placement

1. The scope of the placement project is agreed between the placement provider, College and the student in advance.
2. Intended learning outcomes are made clear to the student, as well as how they are to be achieved.
3. The placement provider undertakes to provide additional training to students if necessary to meet the learning outcomes.
4. In most cases, we would expect the placement provider to provide a mentor for the student.
5. The provider undertakes to provide a suitable induction programme for the student, including health and safety requirements, confidentiality requirements and any other key requirements of the placement.
6. Each student will be allocated a placement tutor from the College. The placement tutor will be in close contact with both the mentor (or other placement provider representative) and the student throughout the placement and will undertake to visit the student at least twice at the placement site during the placement.
7. The provider undertakes to ensure that suitable financial arrangements are in place with students, to ensure the student will be paid correctly and in a timely manner.
8. Students will work within a sponsoring company for a minimum required number of days during the period between 1 September of the second year of their course and the start of their final academic year.
9. During their placement students will undertake a programme of training and practical experience which will be agreed by the sponsoring company and the University.
10. Students will be assessed on their performance during the year through a variety of activities including maintaining a log and a formal placement report, as set out in the student's industrial placement Blackboard site.
11. Students who do not satisfactorily complete their industrial placement year (see progression details above) will be transferred to the three year Mathematics and Actuarial Science degree.

Appendix 3: Module specifications

See undergraduate module specification database (Note - modules are organized by year of delivery).