1. Programme Title(s) and UCAS code(s):

BSc Mathematics and Actuarial Science (GN1H)
BSc Mathematics and Actuarial Science with year in industry

2. Awarding body or institution:

University of Leicester

3. a) Mode of study:

Full-time

b) Type of study:

On campus

4. Registration periods:

The normal period of registration for the BSc Mathematics and Actuarial Science programme is three years. The maximum period of registration for the BSc Mathematics and Actuarial Science programme is five years.

The normal period of registration for the BSc Mathematics and Actuarial Science with industry programme is four years. The maximum period of registration for the BSc Mathematics and Actuarial Science with industry programme is six 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 Framework for Higher Education Qualifications in England, Wales and Northern Ireland
- QAA Benchmarking Statement Mathematics, Statistics and Operational Research (MMath)
- QAA Annex to subject benchmark statement: Mathematics, statistics and operational research (2015)
- PDR report (April 2011)
- University Learning Strategy
- University Employability Strategy
- NSS Survey
- First Destination Survey
- External Examiner's Reports
- Professional organisations (Institute and Faculty of Actuaries)

.9. Programme Outcomes:

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
(a) Discipline specific knowledge and competencies		
(i) Mastery of an appropriate body of knowledge		
Knowledge of basic theory, basic techniques of analysis, algebra, applied mathematics, and statistics. Knowledge of key techniques and algorithms in actuarial science and finance. Knowledge of basic techniques, and model problems. Knowledge of a computing languages and software.	Lectures, specified reading, problem classes. In addition, elements of eLearning are incorporated. Computer practical classes. Use of software packages on placement (*with industry*)	Written examinations, assessed problems. Assessed practical classes. Assessed case studies and short projects. Final year project. Specific projects undertaken on placement (*with industry*) Assessed practical classes. Placement reports (*with industry*)
(ii) Understanding and application of key concepts and techniques		
Novel applications of basic knowledge. Exposition of logical structure. Ability to generalise and specialise. Ability to apply an algorithm for the solution of a standard problem. Ability to apply standard theorems to solve particular problems. Mathematical modeling. Application of computer algorithms for solving finance problems. Applications of mathematical theory in an industrial setting (*with industry*)	Lectures, tutorials, problem classes, marked assignments. Specific projects undertaken on placement where applicable Lectures, tutorials, problem classes, marked assignments. Computer practical classes. Working through exercises in industrial placement record book. Specific projects undertaken on placement where applicable	Written examination, assessed problems, project report. Formal report on placement. Written examinations, assessed problems. Assessed practical classes. Industrial placement record tasks on Blackboard, including formal report on placement.
(iii) Critical analysis of key issues		
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. Analysis of how projects are set up and managed within an industrial setting (*with industry*)	Lectures, problem classes, feedback on assessed problems, project supervision. Working through exercises in industrial placement record on Blackboard. Specific projects undertaken on placement where applicable	Written examinations, assessed problems, Project report. Industrial placement record tasks on Blackboard, including formal report on placement.

(iv) Clear and concise presentation of material		
Presentation of results (both informal and to a variety of audiences), participation in scientific discussion. Ability to write coherent reports. Software presentation. Presentation of mathematical ideas to a mixed audience (i.e. not all mathematically-trained) within an industrial setting (*with industry*)	Tutorials, Group workshops, Presentation workshops, project supervision. Feedback on assessed written pieces. Guidance from project supervisor. Working through exercises in industrial placement record tasks on Blackboard. Specific projects undertaken on placement where applicable	Group presentations. Project presentations. Specific projects undertaken on placement where applicable Assessed essays. Project presentation. Industrial placement record tasks on Blackboard, including formal report on placement.
(v) Critical appraisal of evidence with appropriate insight		
Project design.	Project supervision.	Project reports.
(vi) Other discipline specific competencies		
Knowledge of mathematical software such as R, MATLAB and MAPLE. Mathematical modeling skills. Language of finance.	Lab classes, and purpose designed handbooks. Group projects. Project and lectures, eLearning. Use of software packages on placement	Log books of practical sessions. Reflective blogs. Project reports. Written examinations and presentations. Industrial placement record tasks on Blackboard, including formal report on placement.

Intended Learning Outcomes	Teaching and Learning Methods *(b) Transferable skills*	How Demonstrated?
(i) Oral communication		
Response to questioning. Scientific communication. Project presentation.	Tutorials, workshops. Tutorials, workshops. Project supervision, presentation workshops. Presentation opportunities on placement where applicable	Presentation assessment. Industrial placement record tasks
(ii) Written communication		
Report writing. Mathematical communication. 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*)	Project supervisions. Tutorials. Opportunities for written reports while on placement. Formal placement report.	Assessed reports. Assessed questions. Industrial placement record tasks on Blackboard, including formal report on placement.
(iii) Information technology		
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		
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		
Scientific discussion. Organization, time management 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	Group problem solving. Group projects. Experience of working within a commercial organization. Working through exercises in industrial placement record book. Specific projects undertaken on placement where applicable	Group assessment. Industrial placement record tasks on Blackboard, including formal report on placement.
(vi) Problem solving		
Analysis, breakdown, synthesis, critical examination. Mathematical modeling skills. Problem analysis and solution for `messily defined' problems in an industrial setting (*with industry*)	Lectures, problem workshops, group work, projects. Experience of working within a commercial organization. Working through exercises in industrial placement record on Blackboard. Specific projects undertaken on placement where applicable	Marked problems, group work assessment, project assessment. Industrial placement record tasks on Blackboard, including formal report on placement
(vii) Information handling		
Conduct background research and literature surveys. Summarise content from information sources. Ability to learn in DL mode, including elearning.	Project supervision. Experience of working within a commercial organization at a distance eLearning-mode module.	Individual project reports. Industrial placement record tasks on Blackboard, including formal report on placement Module assessment.
(viii) Skills for lifelong learning		
Study skills. Independence and time management. Careers and business awareness. Information retrieval.	Resource based learning. Study skills booklet. Structured support decreasing through years. Experience of working within a commercial organization (*with industry*) Careers workshops. Business based project. Guest speakers. Placements. Induction library session. Study skills handbook. Project supervision.	Examinations, assessed problems, project assessments. Meeting deadlines. Industrial placement record tasks on Blackboard, including formal report on placement. Project reports. Destinations data. Successful feedback from placements.

10. Progression points:

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

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.

11. Scheme of Assessment
The programme follows the standard scheme of award and classification set out in Senate Regulation 5.

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 Examiners
The details of the External Examiner(s) for this programme and the most recent External Examiners' reports can be found here.

Appendix 1: Programme structure see attached regulations

All programmes to formally include range of non-credit bearing attendance only activities for careers, student support etc.:

MA1903 – House hours

MA1902- Peer support

MA2901 Employability: Core Skills (with industry only)

MA2902 Employability (with industry only)

MA3902 – VBA

MA3901- SAS

BSc MATHEMATICS AND ACTUARIAL SCIENCE ALL VARIANTS

Year 1 (2020-21)

SEMESTER ONE	SEMESTER TWO
CORE (60cr year long, sem 1 30cr, sem 2 30cr)	
MA1014 Calculus & Analysis (30cr)	
MA1114 Linear Algebra (30cr)	
MA1061 Probability (15cr)	MA1202 Introductory Statistics (15cr)
MA1407 Business Microeconomics (15cr)	MA1402 Business Macroeconomics (15cr)

Year 2 (2021-22)

SEMESTER ONE	SEMESTER TWO
CORE (60cr)	**CORE (60cr)**
MA2401 Actuarial Modelling 1 (15cr)	MA2405 Actuarial Modelling 2 (15cr)
MA2404 Markov Processes (15cr)	MA2414 Survival Models (15cr)
MA2403 Statistical Distributions and Inference (15cr)	MA2206 Statistical Data Analysis (15cr)
MA2514 Actuarial Professional Skills and Employability (15cr)	MA2402 Business Finance (15cr)

Year 3 (2022-23)

SEMESTER ONE	SEMESTER TWO
CORE (30cr year long, sem 1 30cr, sem 2 45cr)	
MA3515 Actuarial Project (30cr)	
MA3071 Financial Mathematics (15cr)	MA3072 Mathematical Portfolio Theory (15cr)
	MA3266 Liability Modelling (15cr)
OPTIONS (30cr)	**OPTIONS (15cr)**
MA3077 Operational Research (15cr)	MA3201 Generalised Linear Models (15cr)
MA3703 Readings in Actuarial Science (15cr)	MA3022 Data Mining and Neural Networks (15cr)
MN3133 The Management and Shaping of Innovation (15cr)	MA3511 Communicating Mathematics (15cr)
MA3419 Data Science for Actuaries (15cr)	MN3138 Behavioural Finance and Investment Strategies (15cr)
	MD3002 Medical Statistics (15cr)

Appendix 2: Student support for BSc Mathematics and Actuarial Science with industry

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 module specification database: http://www.le.ac.uk/sas/courses/documentation

Appendix 4: Skills matrix