UNIVERSITY OF LEICESTER

Programme Specification (Undergraduate)

For students entering in 2017/18
Date amended: June 2018

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

BSc Mathematics with a year abroad (USA) with year in industry
MMath Mathematics with a year abroad (USA) with a 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 (USA) with industry programme is four years. The maximum period of registration for the BSc programme is six years. The normal period of registration for the MMath (USA) with industry programme is five years. The maximum period of registration for the MMath with industry programme is seven years.

5. Typical entry requirements:
340 points normally including AAB at A level with A in Mathematics.

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;
- provide an education and training in mathematics which includes fundamental concepts and gives an indication of the breadth of mathematics;
- 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 competence in IT, in particular the use of mathematical software and programming;

- enhance practical computing skills by learning software in common use;
- raise students' expertise and understanding to a point where they could embark upon postgraduate mathematical study;
- develop the ability to complete independent project;
- enable students to develop and broaden their learning experience in Mathematics by studying at a non-UK University (for the year abroad options)
- enable students to develop their linguistic abilities, by attending lectures and classes and completing assessments in the native language of a non-UK, European University (for the in Europe degree)

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.

For Foundation Year variant, see Foundation Year Programme Specification

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 (2009)
- PDR report (April 2011)
- University Learning Strategy
- University Employability Strategy
- NSS Survey (2014)
- First Destination Survey
- External Examiner's Reports

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. Ability to recognise sound argumentation and valid proofs. 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	Written examinations, assessed problems. Assessed practical classes. Assessed case studies and short projects. Final year project. Specific projects undertaken on placement where applicable Assessed practical classes. Placement reports
(ii) Understanding and application of key concepts and techniques		
Novel applications of basic knowledge. Exposition of logical structure. Ability to generalise and specialise. Proof techniques. Ability to apply an algorithm for the solution of a standard problem. Ability to apply theorems to solve particular problems. Mathematical modelling. 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	Written examination, assessed problems, project report. Placement reports Written examinations, assessed problems. Assessed practical classes. Industrial placement record book 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 more `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 book. Specific projects undertaken on placement where applicable	Written examinations, assessed problems, Project report. Industrial placement record book including formal report on placement.

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
(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 book. 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 book 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 MATLAB and MAPLE. Mathematical modelling 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 book including formal report on placement
(b) Transferable skills		
(i) Oral communication		
Response to questioning Scientific communication Project and poster presentation	Tutorials, workshops. Tutorials, workshops. Project supervision, presentation workshops. Presentation opportunities on placement where applicable	Presentation assessment. Industrial placement record book including formal report on placement
(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 book including formal report on placement

(iii) Information technology		
Use of Windows. Use of specialist packages. Office software including mathematical software (*with industry*)	Induction. Laboratories. Use of specialist packages on placement	Marked project work. Project reports. Industrial placement record book including formal report on placement
(iv) Numeracy		
Use of analytical and graphical methods.	Induction. Laboratories. 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 book including formal report on placement.
(vi) Problem solving		
Analysis, breakdown, synthesis, critical examination. Mathematical modelling 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 book. Specific projects undertaken on placement where applicable	Marked problems, group work assessment, project assessment. Industrial placement record book including formal report on placement

(vii) Information handling		
Conduct background research and literature surveys. Summarise content from information sources. Ability to learn from e-learning resources.	Covered in project supervision. Experience of working within a commercial organization at a distance eLearning-mode module.	Individual project reports. Industrial placement record book 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 organisation 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 book 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% (this does not apply for MMath students who already require a CWA not less than 52%); 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 3 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.

Throughout the BSc and MMath, emphasis will be placed on developing broad practical and algorithmic skills, while teaching the general mathematical principles common to UK mathematics undergraduate programmes.

The BSc and MMath programmes 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

Good results in National Student Survey and positive comments from external examiner.

14. External Examiners

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

Student support on Mathematics with industry BSc and MMath courses

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
    - Talent Academy, with sponsored group exercises embedded within the Mathematics for Business module
    - 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 Business Applications of Mathematics 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 student 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 the 4th 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 weekly log and a formal placement report, as set out in the student's industrial placement record book.
11. Students who do not satisfactorily complete their industrial placement year (see progression details above) will be transferred to the three year BSc or BA degree or the four year MMath degree as appropriate.

Appendix 1: Programme structure (programme regulations)

BSc Mathematics with a year abroad (USA) with year in Industry

Year one as per BSc Maths, Year two spent in a USA institution, Year three spent in industry, Year four as below

During the second year spent in the USA, students will also complete MA2901 Employability: Core Skills and MA2902 Employability: Placement preparation, by distance learning, and the following additional support is available:

- Use of lecture capture to forward workshops/presentations
- Resources and vacancies accessed through email/Blackboard
- Minimum of three Skype calls to review progress and offer one to one support
- Application and selection support via E Guidance

THIRD YEAR

1. Students will work within a sponsoring company for a minimum required number of days during the period between 1 July of the second year of their course and the start of the following academic year.
2. During their placement students will undertake a programme of training and practical experience which will be agreed by the sponsoring company and the University.
3. Students will be assessed on their performance during the year through a variety of activities including maintaining a weekly log.
4. Students who do not satisfactorily complete their industrial placement year will be transferred to the three year BSc Mathematics degree.

FOURTH YEAR MODULES

SEMESTER 1

Optional Modules: Three selected from:

		Credits
MA3012	SCIENTIFIC COMPUTING	20
MA3071	FINANCIAL MATHEMATICS 1	20
MA3074	INTRODUCTION TO ACTUARIAL MATHEMATICS	20
MA3002	EQUATIONS OF MATHEMATICAL PHYSICS	20
MA3077	OPERATIONAL RESEARCH	20
MA3152	CURVES AND SURFACES	20
MA4142	REPRESENTATION THEORY OF FINITE GROUPS	20

Up to 20 credits may be substituted from Level 2 and Level 3 Computer Science options by negotiation with the Head of Department.+

SEMESTER 2

Optional Modules: Three selected from:

		Credits
MA3101	SQUARING THE CIRCLE AND IRREDUCIBLE POLYNOMIALS	20
MA3121	COMPLEX ANALYSIS	20
MA3201	GENERALIZED LINEAR MODELS	20
MA3517	MATHEMATICS RESEARCH JOURNAL	20
MA3511	COMMUNICATING MATHEMATICS^	20
MA3513	MATHEMATICS BUSINESS PROJECT^	20
MA3153	NUMBER THEORY	20
MD3002	MEDICAL STATISTICS	20
MA4011	COMPUTATIONAL PARTIAL DIFFERENTIAL EQUATIONS WITH FINITE ELEMENTS*	20
MA4022	DATA MINING AND NEURAL NETWORKS*	20

MA4061	TOPICS IN MATHEMATICAL BIOLOGY*	20
	Semester total	60

Up to 20 credits may be substituted from Level 2 and Level 3 Computer Science options by consultation with the Head of Department.

*Students may not take more than two out of the final year options from Level 4.

+Not more than 20 credits of Computer Science options can be selected across the year.

^One of these modules must be selected;

Students may also undertake non-credit bearing modules MA3901 SAS and MA3902 VBA in year 4

MMath Mathematics (USA) with Year in Industry

First year modules: As for BSc Mathematics. Second year spent in the USA. Third year spent in industry. Fourth and fifth years as per MMath USA third and fourth years

During the second year spent in the USA, students will also complete MA2901 Employability: Core Skills and MA2902 Employability: Placement preparation, by distance learning, and the following additional support is available:

- Use of lecture capture to forward workshops/presentations
- Resources and vacancies accessed through email/Blackboard
- Minimum of three Skype calls to review progress and offer one to one support
- Application and selection support via E Guidance

THIRD YEAR MODULES

1. Students will work within a sponsoring company for a minimum required number of days during the period between 1 July of the second year of their course and the start of the following academic year.
2. During their placement students will undertake a programme of training and practical experience which will be agreed by the sponsoring company and the University.
3. Students will be assessed on their performance during the year through a variety of activities including maintaining a weekly log.
4. Students who do not satisfactorily complete their industrial placement year will be transferred to the four year MMath Mathematics degree.

FOURTH YEAR MODULES

SEMESTER 1

Optional Modules

		Credits
MA3012	SCIENTIFIC COMPUTING	20
MA3071	FINANCIAL MATHEMATICS 1	20
MA3074	INTRODUCTION TO ACTUARIAL MATHEMATICS	20
MA3002	EQUATIONS OF MATHEMATICAL PHYSICS	20
MA3077	OPERATIONAL RESEARCH	20
MA3152	CURVES AND SURFACES	20
MA4080	MATHEMATICAL MODELLING	20
MA4701	READING IN MATHEMATICS^^	20
MA4142	REPRESENTATION THEORY OF FINITE GROUPS	20

Semester Total 60

60 credits of options chosen from Level 3 and Level 4** modules as follows: MA3001-3199^ and MA4001-4200.
Up to 20 credits may be substituted from Level 2 and Level 3 Computer Science options by negotiation with the Head of Department.+

SEMESTER 2

Optional Modules

60 credits of options chosen from Level 3 and Level 4** modules as follows:
MA3001-3511^ and MA4001-4200.
Up to 20 credits may be substituted from Level 2 and Level 3 Computer Science options by negotiation with the Head of Department.+

MA3121	COMPLEX ANALYSIS	20
MA3101	SQUARING THE CIRCLE AND IRREDUCIBLE POLYNOMIALS	20
MA3517	MATHEMATICS RESEARCH JOURNAL	20
MA3511	COMMUNICATING MATHEMATICS^	20
MA3201	GENERALIZED LINEAR MODELS	20
MA3513	MATHEMATICS BUSINESS PROJECT^	20
MA3153	NUMBER THEORY	20
MD3002	MEDICAL STATISTICS	20
MA4011	COMPUTATIONAL PARTIAL DIFFERENTIAL EQUATIONS WITH FINITE ELEMENTS *	20
MA4022	DATA MINING AND NEURAL NETWORKS*	20
MA4061	TOPICS IN MATHEMATICAL BIOLOGY*	20
MA4702	READING IN MATHEMATICS^^	20
	Semester Total	**60**

**At least 120 credits of the modules taken in years 3 and 4 must be at Level 4.

^MA3513 may not be taken in conjunction with MA3511.

^^ MA4701 and MA4702 may not both be taken.

+Not more than 20 credits of Computer Science options can be selected across the year.
Students may also undertake non-credit bearing modules MA3901 SAS and MA3902 VBA in year 4

FIFTH YEAR MODULES

SEMESTER 1

Core Modules

		Credits
MA4504	MATHEMATICS PROJECT (TAKEN OVER BOTH SEMESTERS)	20

Optional Modules: Two selected from:

MA3012	SCIENTIFIC COMPUTING	20
MA3071	FINANCIAL MATHEMATICS 1	20
MA3074	INTRODUCTION TO ACTUARIAL MATHEMATICS	20
MA3002	EQUATIONS OF MATHEMATICAL PHYSICS	20
MA3077	OPERATIONAL RESEARCH	20
MA3152	CURVES AND SURFACES	20
MA4080	MATHEMATICAL MODELLING	20
MA4142	REPRESENTATION THEORY OF FINITE GROUPS	20
MA4701	ADVANCED READINGS IN MATHEMATICS*	20
	Semester Total	**60**

Up to 20 credits may be substituted from Level 2 and Level 3 Computer Science options by negotiation

with the Head of Department+

SEMESTER 2

Core Modules

		Credits
MA4504	MATHEMATICS PROJECT (TAKEN OVER BOTH SEMESTERS)	20

Optional Modules: Two selected from:

MA3121	COMPLEX ANALYSIS	20
MA3101	SQUARING THE CIRCLE AND IRREDUCIBLE POLYNOMIALS	20
MA3201	GENERALIZED LINEAR MODELS	20
MA3511	COMMUNICATING MATHEMATICS	20
MA3153	NUMBER THEORY	20
MD3002	MEDICAL STATISTICS	
MA4011	COMPUTATIONAL PARTIAL DIFFERENTIAL EQUATIONS WITH FINITE ELEMENTS *	20
MA4022	DATA MINING AND NEURAL NETWORKS*	20
MA4702	ADVANCED READINGS IN MATHEMATICS	20
MA4072	FINANCIAL MATHS 2	20
MA4061	TOPICS IN MATHEMATICAL BIOLOGY*	20

Up to 20 credits may be substituted from Level 2 and Level 3 Computer Science options by negotiation with the Head of Department+

Semester Total 60

*At least 120 credits of the modules taken in years 3 and 4 must be at Level 4.

+Not more than 20 credits of Computer Science options can be selected across the year. MA4701 and MA4702 cannot be taken in conjunction with each other.

Appendix 2: Module specifications

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

Appendix 3: Skills matrix

Appendix 4: Foundation Year Programme Specification (as for courses with not with industry option)