

Royal Holloway, University of London
Programme specification for an undergraduate award
BSc Mathematics (Four Year Programme with Foundation Year) (G10F)

Section 1 – Introduction to your programme

This programme specification is a formal document, which provides a summary of the main features of your programme and the learning outcomes that you might reasonably be expected to achieve and demonstrate if you take full advantage of the learning opportunities that are provided. Further information is contained in the College prospectus, and in various handbooks, all of which you will be able to access online. Alternatively, further information on the College's academic regulations and polices can be found [here](#). Further information on the College's Admissions Policy can be found [here](#).

Your degree programme in BSc Mathematics with an integrated Foundation Year is delivered in four stages each of which comprises one year of full-time study during which you must follow courses to the value of 120 credits.

The Foundation Year prepares you for university study by offering a rigorous introduction to university level study methods and skills transitioning from FHEQ level 3 to FHEQ level 4. It provides progressive structures in which you are able to gain ever-wider knowledge and understanding of approaches to scientific study and your chosen degree subject, together with embedded practice and study skills, leading towards increasingly discipline specific activities in the practical laboratories or individual project modules which facilitate greater levels of specialisation and individual choice. All modules are mandatory for the foundation year, but subject to good academic performance will allow transfer to other Engineering, Physical and Mathematical Science foundation years. The modules are to provide a strong foundation in mathematics, computing and practical skills to succeed in later years of the degree programme. The mathematics and physics taught modules are primarily assessed by examinations which will allow to practice key skills and exam techniques. The laboratory and project modules are assessed by lab-reports and project reports respectively.

Upon progressing to the first year of your degree programme, in stage one you must take eight courses. In the eight mandatory courses it seeks to provide a broadly based introduction to mathematics, which will develop manipulative skills, understanding of the key concepts and the ability to construct logical arguments. In stage two, you must take eight courses, which continue their study of abstract pure mathematics and its applications. In stage three, you choose eight courses. You are advised on appropriate combinations and pathways depending on your interests, stage one and two options, and possible future career paths. You may choose to undertake an extended project. During your degree programme you will broaden your knowledge and understanding, and be able to develop appropriate skills in Mathematics enabling you to graduate ready for employment in industry

While Royal Holloway keeps all the information made available under review, programmes and the availability of individual course units, especially optional course units are necessarily subject to change at any time, and you are therefore advised to seek confirmation of any factors which might affect your decision to follow a specific programme. In turn, Royal Holloway will inform you as soon as is practicable of any significant changes which might affect your studies.

The following is brief description for some of the most important terminology for understanding the content of this document:

Degree programme – Also referred to as 'degree course' or simply 'course', these terms refer to the qualification you will be awarded upon successful completion of your studies.

Course unit – Also referred to as ‘module’, this refers to the individual units you will study each year to complete your degree programme. Undergraduate degrees at Royal Holloway comprise course units to the value of 120 credits per year. On some degree programmes a certain number of optional course units must be passed for a particular degree title.

Section 2 – Programme details			
Date of specification update	August 2020	Location of study	Egham Campus
Programme award and title	BSc Mathematics	Level of study	Undergraduate
Programme code	3453	UCAS code	G10F
Year of entry	2021/22		
Awarding body	Royal Holloway, University of London		
Department or school	Department of Mathematics and Information Security (School of Engineering, Physical and Mathematical Sciences)	Other departments or schools involved in teaching the programme	N/A
Mode(s) of attendance	Full-time	Duration of the programme	Four years
Accrediting Professional, Statutory or Regulatory Body requirement(s)	<p>Accredited by the Institute of Mathematics and its Applications (IMA) for the purpose of meeting in part the educational requirement for chartered status.</p> <p>Successful completion of this programme enables students to meet the requirements of the Chartered Mathematician designation when followed by subsequent training and experience in employment to obtain equivalent competences to those specified by the Quality Assurance Agency (QAA) for taught masters degrees.</p>		
Link to Coursefinder for further information:	https://www.royalholloway.ac.uk/studying-here/	For queries on admissions:	study@royalholloway.ac.uk

Section 3 – Degree programme structure										
3.1 Mandatory course unit information										
The following table summarises the mandatory modules which students must take in each year of study										
Year	Course code	Course title	Contact hours*	Self-study hours	Written exams**	Practical assessment**	Coursework**	Credits	FHEQ level	Course status (see below)
0	FY1001	Global Perspectives and Academic Practice I	50	100	0	0	100%	15	3	MC
0	FY1002	Global Perspectives and Academic Practice II	50	100	0	0	100%	15	3	MC
0	FY1005	Foundation Maths 1	55	95	70%	0	30%	15	3	MNC
0	FY1006	Foundation Maths 2	55	95	70%	0	30%	15	3	MNC
0	FY1009	Foundation Programming	44	106	0	60%	40%	15	3	MC
0	FY1010	Foundation Physical Sciences	44	106	60%	0	40%	15	3	MC
0	MT1998	Foundation Practical Skills	20	130	0	0	100%	15	3	MNC
0	MT1999	Foundation Individual Scientific Project	20	130	0	0	100%	15	3	MC
1	MT1100	Introduction to Geometry	30	120	85%	0	15%	15	4	MC
1	MT1210	Introduction to Applied Maths	38	112	70%	0	30%	15	4	MC
1	MT1300	Statistical Methods I	40	110	65%	0	35%	15	4	MC
1	MT1710	Calculus I	42	108	85%	0	15%	15	4	MC
1	MT1720	Calculus II	39	111	85%	0	15%	15	4	MC

1	MT1810	Introduction to Pure Mathematics	48	102	85%	0	15%	15	4	MC
1	MT1820	Linear Algebra I	39	111	85%	0	15%	15	4	MC
1	MT1940	Real Analysis I	39	111	85%	0	15%	15	4	MC
2	MT2500	Scientific Programming	57	93	0	0	100%	15	5	MC
2	MT2800	Linear Algebra II	30	120	85%	0	15%	15	5	MC

This table sets out the most important information for the mandatory courses on your degree programme. These courses are central to achieving your learning outcomes, so they are compulsory, and all students on your degree programme will be required to take them. You will be automatically registered for these courses each year. Mandatory courses fall into two categories; 'condonable' or 'non-condonable'.

In the case of mandatory 'non-condonable' (MNC) courses, you must pass the course before you can proceed to the next year of your programme, or to successfully graduate with a particular degree title. In the case of mandatory 'condonable' (MC) courses, these must be taken but you can still progress or graduate even if you do not pass them. Please note that although Royal Holloway will keep changes to a minimum, changes to your degree programme may be made where reasonable and necessary due to unexpected events. For example; where requirements of relevant Professional, Statutory or Regulatory Bodies have changed and programme requirements must change accordingly, or where changes are deemed necessary on the basis of student feedback and/or the advice of external advisors, to enhance academic provision.

*Contact hours come in various different forms, and may take the form of time spent with a member of staff in a lecture or seminar with other students. Contact hours may also be laboratory or, studio-based sessions, project supervision with a member of staff, or discussion through a virtual learning environment (VLE). These contact hours may be with a lecturer or teaching assistant, but they may also be with a technician, or specialist support staff. On your Foundation Year you will also have regulatory meetings with your personal tutor and specialised skills classes taught by staff in the Library.

**The way in which each course on your degree programme is assessed will also vary, however, the assessments listed above are all 'summative', which means you will receive a mark for it which will count towards your overall mark for the course, and potentially your degree classification, depending on your year of study. On successful completion of the course you will gain the credits listed. 'Coursework' might typically include a written assignment, like an essay. Coursework might also include a report, dissertation or portfolio. 'Practical assessments' might include an oral assessment or presentation, or a demonstration of practical skills required for the particular course.

3.2 Optional course units

In addition to mandatory course units, there will be a number of optional course units available during the course of your degree. The following table lists a selection of optional course units that are likely to be available. However, not all may be available every year. Although Royal Holloway will keep changes to a minimum, new options may be offered or existing ones may be withdrawn. For example; where reasonable and necessary due to unexpected events, where requirements of relevant Professional, Statutory or Regulatory Bodies (PSRBs) have changed and programme requirements must change accordingly, or where changes are deemed necessary on the basis of student feedback and/or the advice of External Advisors, to enhance academic provision. There may be additional requirements around option selection, so it is important that this specification is read alongside your department's Student Handbook, which you can access via their [webpage](#).

Year 0	Year 1	Year 2	Year 3
None	None	MT2220 Vector Calculus	MT3000 Mathematics Project
		MT2320 Probability Theory	MT3090 Mathematics in the Classroom
		MT2630 Graphs and Optimisation	MT3110 Number Theory I
		MT2720 Differential Equations and Fourier Analysis	MT3120 Number Theory II
		MT2860 Groups and Group Actions	MT3210 Quantum Information and Coding
			MT3470 Financial Mathematics I

3.3 Optional course unit requirements

At Stage two, you must take options to the value of 90 credits from a list of Stage two courses offered by the department.
 At Stage three, you must take options to the value of 120 credits from a list of Stage three courses offered by the Department. At Stage three you may also choose options from the Stage four list if you wish. You are advised on appropriate combinations and pathways depending on your interests, stage one and two options, and possible future career paths. You may choose to undertake an extended project as MT3000.

Section 4 - Progressing through each year of your degree programme

For further information on the progression and award requirements for your degree, please refer to Royal Holloway's [Academic Regulations](#). As part of your degree programme you may also be required to complete a course to develop your academic writing skills. This course does not carry credit but passing it is a requirement to progress to the next year of study. In order to progress from the Foundation Year to Year One you must pass all 120 credits. Opportunities for resits are detailed in Royal Holloway's [Academic Regulations](#). There is flexibility within the Foundation Year for you to take your Individual Project in one of the other departments in the School of Engineering, Physical and Mathematical Sciences offering a Foundation Year, although please note that if you wish to take your Individual Project in Mathematics or pursue an undergraduate degree with the Department of Mathematics you must take MT1998. The degree programme you choose to take after progression is likely to depend on the individual project you select during the foundation year.

Section 5 – Educational aims of the programme

The aims of this programme are:

For the Foundation Year:

- to develop the required skills in mathematical concepts and techniques to serve as a foundation for learning higher mathematical concepts
- to equip you with the basic computing techniques and programming required for a mathematics degree;
- to start the process of independent project work in mathematics with support of expert academics;
- to put in context scientific knowledge and developments into a wider context of history, society and globalisation.

Following on to aims for the BSc:

- to provide students with technical manipulative skills, the ability to read and write in the compressed language of mathematics, and the ability to distil a problem into a mathematical description of its essential detail;
- to ensure that students gain an appreciation of, and interest in, the logical structure of mathematics, and its use as an analytical and predictive tool in applications;
- to offer a wide range of optional course units to suit students' interests and strengths;
- to provide access to personal, academic and pastoral support;
- to enable students, on graduation, to compete effectively in employment or postgraduate study.

Section 6 - Programme learning outcomes

In general terms, the programmes provide opportunities for students to develop and demonstrate the following learning outcomes. (*Categories – Knowledge and understanding (K), Skills and other attributes (S), and Transferable skills (*)*)

- Foundation Year**
1. Ability to comfortably manipulate and apply level 3 mathematics (K)
 2. Appreciation of how to formulate problems in the appropriate level 3 mathematical language and notation
 3. working knowledge of a least one high level programming language (K);
 4. understanding of applying fundamental physics concepts to simple problems (S).
 5. start to take responsibility and developing the individual learning, communication and research skills (S).
- BSc Mathematics**
6. Knowledge and understanding of mathematical methods (K);
 7. Knowledge and understanding of mathematical concepts such as number and function (K);
 8. Knowledge and understanding of abstract structures such as groups, matrices, and fields (K);
 9. Knowledge and understanding of some results from a range of major areas of mathematics, statistics or operational research (K);
 10. Knowledge and understanding of at least one major area of applications in which the mathematics is used in a serious manner and is essential for proper understanding (K);
 11. A high level of numeracy (S);
 12. Ability to manipulate and analyse complex mathematical expressions accurately (S);
 13. Ability to understand the role of logical mathematical argument and deductive reasoning, including formal proof (S);
 14. Familiarity with computer methods in mathematics and statistics (S);
 15. Ability to formulate problems in mathematical or statistical form using appropriate notation (S);
 16. The ability to solve equations or inequalities arising from a problem analytically or numerically, and to interpret the results (S);

17. Accurate analysis of a situation, the factors involved and possible approaches to solution. This is embedded in a general ethos of numeracy and of analytical approaches to problem solving (S);
18. Ability to take theoretical knowledge gained in one area and apply it elsewhere (S);
19. Ability to make a sequence of logical steps, and reflect on the result (S);
20. Ability to communicate mathematical results clearly, to both mathematicians and lay persons (S);
21. Spatial awareness in two and three dimensions (S);
22. Good general skills of time-management and organization (S*);
23. To learn independently, using a variety of media including books, learned journals, the internet etc (S*);
24. To work independently with persistence and patience, pursuing the solution of problems to their conclusion (S*);
25. Develop IT skills, including word-processing and use of the internet (S*);
26. Personal motivation and the planning of a career path (S*);
27. Good written and oral communication skills, which enable them to write coherently and turn a rough draft into a convincing argument and contribute to discussions (S*);
28. Ability to work together with others as a team (S*).

Section 7 - Teaching, learning and assessment

Teaching and learning is mostly by means of lectures, small group tutorials, problem-solving workshop sessions, written and oral feedback on coursework, practical sessions in statistics and computational mathematics, guided independent study and oral presentations. You are in addition encouraged to read around the subject, and at the end of the first and second stages you write essays or projects on topics of your own choice. Assessment is typically by formal examinations and in certain courses in-term tests, projects, coursework essays and oral presentations. Full details of the assessment methods for individual courses may be obtained from the [Department](#).

Section 8 – Additional costs

None.

These estimated costs relate to studying this particular degree programme at Royal Holloway. General costs such as accommodation, food, books and other learning materials and printing etc., have not been included, but further information is available on our website.

Section 9 – Indicators of quality and standards

QAA Framework for Higher Education Qualifications (FHEQ) Level	3-6
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Your programme is designed in accordance with the FHEQ to ensure your qualification is awarded on the basis of nationally established standards of achievement, for both outcomes and attainment. The qualification descriptors within the FHEQ set out the generic outcomes and attributes expected for the award of individual qualifications. The qualification descriptors contained in the FHEQ exemplify the outcomes and attributes expected of learning that results in the award of higher education qualifications. These outcomes represent the integration of various learning experiences resulting from designated and coherent programmes of study.

QAA Subject benchmark statement(s)	http://www.qaa.ac.uk/quality-code/subject-benchmark-statements
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Subject benchmark statements provide a means for the academic community to describe the nature and characteristics of programmes in a specific subject or subject area. They also represent general expectations about standards for the award of qualifications at a given level in terms of the attributes and capabilities that those possessing qualifications should have demonstrated.

Section 10 – Further information

This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate when taking full advantage of the learning opportunities that are available. More detailed information on course units, including teaching and learning methods, and methods of assessment, can be found via the online [Course Catalogue](#). The accuracy of the information contained in this document is reviewed regularly by the university, and may also be checked routinely by external agencies, such as the Quality Assurance Agency (QAA).

Your programme will be reviewed regularly, both by the university as part of its cyclical quality enhancement processes, and/or by your department or school, who may wish to make improvements to the curriculum, or in response to resource planning. As such, your programme may be revised during the course of your study at Royal Holloway. However, your department or school will take reasonable steps to consult with students via appropriate channels when considering changes. All continuing students will be routinely informed of any significant changes. In line with the College’s [Admissions Policy](#), if your department make any significant changes to any year of your programme of study between the time at which an offer is made to you on the Foundation Year and the point at which you complete your registration we will write to you advising you of the changes and the rationale.

Section 11 – Intermediate exit awards (where available)

You may be eligible for an intermediate exit award if you complete part of the programme as detailed in this document. Any additional criteria (e.g. mandatory course units, credit requirements) for intermediate awards is outlined in the sections below.

Award	Criteria	Awarding body
Diploma in Higher Education (DipHE)	Pass in 210 credits of which at least 90 must be at or above FHEQ Level 4 and at least 120 of which must be at or above FHEQ Level 5	Royal Holloway and Bedford New College
Certificate in Higher Education (CertHE)	Pass in 120 credits of which at least 90 must be at or above FHEQ Level 4	Royal Holloway and Bedford New College

Section 12 - Associated award(s)

BSc Mathematics (G100)