

Faculty: Science, Technology and Creative Arts

Title of Programme: BSc Honours Mathematics

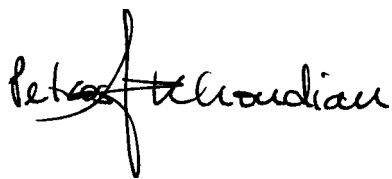
Programme Code: EIMM

# Programme Specification

Start Date: September 2011

Date of Approval: 25<sup>th</sup> August 2011

Associate Dean (Academic Quality): PETROS KHOUDIAN

A handwritten signature in black ink, appearing to read 'Petros Khoudian', written in a cursive style.

Signature

# Programme Specification BSc Honours Mathematics

This programme specification (PS) is designed for prospective students, enrolled students, academic staff and potential employers. It provides a concise summary of the main features of the programme and the intended learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. More detailed information on the teaching, learning and assessment methods, learning outcomes and content for each module can be found in Definitive Module Documents (DMDs) and Module Guides.

## Section 1

<b>Awarding Institution/Body</b>	University of Hertfordshire
<b>Teaching Institution</b>	University of Hertfordshire
<b>University/partner campuses</b>	College Lane Campus
<b>Programme accredited by</b>	IMA
<b>Final Award</b>	BSc Hons
<b>All Final Award titles</b>	1. Mathematics 2. Financial Mathematics 3. Computing Mathematics (Last intake September 2009)
<b>FHEQ level of award</b>	Honours (level 6)
<b>UCAS code(s)</b>	1. G100 BSc/MM 2. GN13 BSc /FMat

### A. Programme Rationale

The programme operates in full-time, sandwich and part-time modes to allow for differing financial and time-constraint requirements of students, both school-leavers and mature. It offers a mathematics degree to allow students to study a range of mathematical topics and specialist degrees centred on areas with excellent career prospects.

Entry onto the programme benefits people with a variety of backgrounds: from school or college with A or AS levels, from the Foundation Year programme, with access qualifications or from overseas with suitable qualifications from their home country. It also attracts mature students, with numbers fluctuating in line with the job market.

Students who have successfully completed an honours degree will have a firm foundation for postgraduate study. This is especially true for those who have chosen a specialist degree, which will naturally lead to further study in the chosen area.

Successful students are eligible for professional status through membership of the Institute of Mathematics and its Applications.

Problem-solving is at the heart of this applicable programme, with computers and software packages being used in many of the modules to help illustrate and solve more complex problems. All students are introduced to computers and a selection of relevant software packages for communicating and solving numerical problems at level 4. The level 5 has a project component on both routes and provides a further opportunity for students to practice their communication skills and develop their knowledge of the area. Students access teaching materials and carry out other administrative functions through the University's Managed Learning Environment, StudyNet.

Applications form an integral part of many of the modules and illustrate how mathematics relates to the real world.

The application of mathematical thought processes, creativity and a critical approach are required in the understanding of concepts and relationships, as well as in problem-solving activities. These feature in the understanding and construction of proofs within pure mathematics and mathematical

logic; in the applications of mathematics; in financial modelling; within statistics; in the selection and use of algorithms and in the designing and building of software. Indeed, opportunities arise for creative solutions to problems in all the constituent modules of the programme.

In some of the modules a wider perspective is taken, placing the studies in context. Factors influencing model-building, interpretations and decision-taking are also referred to in relevant modules. Some examples and models used within modules are taken from spheres outside mathematics.

Communication skills are addressed directly within the programme through compulsory modules at levels 4 and 5 and are continually supported by requirements for written coursework, individual and team project work and a project component at level 5. In particular, electronic communication is introduced at the outset and is used thereafter, both in the taught modules and administratively. At level 5 students have to choose one of two modules that address professional issues relevant to a professional career. One module is aimed at career mathematicians whilst the other is tailored specifically to the teaching of mathematics in schools.

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## B. Educational Aims of the Programme

The programme has been devised in accordance with the University's general educational aims of programmes of study as set out in UPR TL01.

### **Additionally this programme aims to:**

- offer an education suited to the abilities and career aspirations of students which, by offering choices of study path, will help them realise their own potential to reach professional mathematician status;
- offer potential postgraduate students a platform which will enable them to embark upon further study in areas such as pure mathematics, numerical analysis, statistics, financial modelling or other related disciplines;
- offer students opportunities to specialise in areas of applicable mathematics and related subjects based on a broad foundation;
- develop competence in communicating mathematical results clearly to other experts and to non-specialists, including the use of computers and software packages for information retrieval and presentation;
- develop the ability to approach problem-solving activities using mathematical approaches aided, where appropriate, by computer-based techniques.

In addition, for those opting to take professional training (leading to a sandwich award):

- provide a one year training placement in a suitable environment working alongside other professionals. This enhances the achievement of most of the above aims, dependent upon the character of the placement.

Additional aim for the Financial Mathematics named route:

- provide a coherent programme of study focused on financial modelling.

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## C. Intended Learning Outcomes

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, skills and other attributes in the following areas. The programme outcomes are referenced to the QAA benchmark statements for Mathematics, Statistics and Operational Research and the Framework for Higher Education Qualifications in England, Wales and Northern Ireland (2008) and relate to the typical student. Additionally, the SEEC Credit Level Descriptors for Further and Higher Education 2003 have been used as a guiding framework for curriculum design.

Knowledge and Understanding of:	Teaching/learning methods & strategies	Assessment
<p>A1-areas of fundamental importance to mathematics and its applications;</p> <p>A2-further areas of mathematics and its applications selected by themselves, at a level appropriate to a professional mathematician;</p> <p>A3-appropriate ways of using computers to solve problems and to communicate;</p> <p>A4-effective ways of communicating results to mathematicians and non-specialists;</p> <p>A5-time and resource management in order to meet deadlines;</p> <p>A6-the significance of science, technology and economic factors in modern society;</p> <p>A7-appropriate ways of developing computer algorithms for solving a variety of mathematical problems and methods of estimating the accuracy of results.</p> <p>All, or nearly all, of the above learning outcomes will be met by those undertaking a non-honours Degree, but some to a lesser extent than for an Honours Degree.</p>	<p>Acquisition of knowledge and understanding (A1-8) is through a combination of lectures, tutorials, practicals, coursework and project work. Additional support is provided by StudyNet, the Mathematics Drop-in Centre, the student proctor and in the case of level 4, personal tutors.</p> <p>Throughout, the learner is encouraged to undertake independent study both to supplement and consolidate what is being taught/learnt and to broaden their individual knowledge and understanding of the subject.</p>	<p>Knowledge and understanding are assessed through a combination of unseen examinations (A1-3, 7-8), assessed individual in-course assignments (A1-8), assessed group in-course assignments (A1-6), workbooks (A1), class tests (A1-2), presentations (A2, 4-6) and a final year project report (A2-5, 7-8).</p>

<p>Additional LO for the Financial Mathematics named route:</p> <p>A8-appropriate ways of building and solving stochastic and deterministic models of financial instruments and interpreting the results.</p>		
Intellectual skills - able to:	Teaching/learning methods & strategies	Assessment
<p>B1-apply their knowledge and understanding of areas of mathematics and its applications to the solution of problems in a manner appropriate to a professional mathematician;</p> <p>B2-use computers to solve problems in an appropriate manner;</p> <p>B3-be able to think logically and critically within areas appropriate to a professional mathematician; be able to use creativity and mathematical approaches in practical problem-solving activities;</p> <p>B4-learn independently and to continue learning;</p> <p>B5-have the capacity to work successfully, both as an individual and as a member of a team, by managing time and resources in order to meet deadlines.</p> <p>And in the case of sandwich students:</p> <p>B6-will have obtained significant practical experience of working in a suitable environment, alongside professionals or others engaged in scientific or commercial work.</p>	<p>Intellectual skills are developed throughout the programme by methods and strategies outlined in section A, above.</p> <p>Learning outcome B1 is developed through tutorial exercises, practical classes, coursework, teamwork and project work. The modelling process permeates the programme and requires the use of analytical skills and creative thought processes, enhancing B3. Many of the models are solved using computer techniques which are developed and used throughout the programme, thereby developing B2. Specifically, B2 is attained through practical classes, tutorials, lectures, coursework and project work and B3 is achieved through lectures, tutorials coursework and project work.</p> <p>Throughout, the learner is encouraged to develop intellectual skills further by independent study, thereby developing B4. The modelling process and problem solving also develop intellectual curiosity, enhancing B4.</p> <p>B5 is developed through individual and team project work/assignments, presentations, pacing oneself for examination periods and the final year project.</p>	<p>Intellectual skills are assessed through a combination of unseen examinations (B1-3), assessed individual and group in-course assignments (B1-5), workbooks (B1-3), class tests (B1, 3-5), presentations (B1-5) and a final year project report (B1-5).</p> <p>B6 is assessed by written report from the student, written report from the placement organisation and the placement tutor's report.</p>

Practical skills - able to:	Teaching/learning methods & strategies	Assessment
C1-use computers to effectively solve relevant models.	<p>Practical skills (C1) are developed throughout the programme by computer practical classes, associated exercises and coursework assignments.</p> <p>Throughout learners are expected to consolidate their development of practical computing skills by use of personal computers available in the learning resources centre.</p>	Practical skills are assessed through coursework assignments, presentations and the project report.
Transferable skills - able to:	Teaching/learning methods & strategies	Assessment
D1-present results to mathematicians and non-specialists using technology, verbally and in writing.	<p>Transferable skills are developed throughout the programme by practical classes, presentations, group work, project work, coursework and in the modelling process.</p> <p>Throughout, the learner is encouraged to develop transferable skills by maintaining a record of evidence and completing a personal development plan.</p>	Transferable skills are assessed through coursework, presentations, project work and unseen examinations.

## D. Programme Structures, Features, Levels, Modules and Credits

The programme is offered in full-time (3 years), sandwich (4 years) and part-time (5 or 6 years) modes and leads to the award of one of the following, depending upon the study path followed.

1. BSc Hons Degree in Mathematics
2. BSc Hons Degree in Financial Mathematics

Entry is normally at level 4 (with suitable A-level or equivalent qualifications) but is possible at level 5 or 6 with suitable qualifications (e.g. successful completion of relevant studies at the correct level at another institution).

### Work-Based Learning, including Sandwich Programmes

An award in the sandwich mode is made if at least 48 weeks of approved, supervised work experience is undertaken in addition to the period required for the full-time award.

### Programme Structure

The programme structure and progression information below (Table 1a, 1b and 1c) is provided for the Honours award. Any interim awards are identified in Table 1d. The Programme Learning Outcomes detailed above are developed and assessed through the constituent modules. Table 2 (in section 2) identifies where each learning outcome is assessed.

Table 1a Outline Programme Structure for Mathematics

The following programme will be offered from September 2010

### Level 4 BSc (Hons) Mathematics

Compulsory Modules Module Title	Module Code	Credit Points	% examination	% coursework	Semester
Mathematical Techniques 1	4PAM0007	30	50	50	AB
Linear Algebra and Analysis	4PAM1003	30	70	30	AB
Financial and Actuarial Mathematics	4PAM1017	15	0	100	A
Basic Statistics	4BUS0075	15	60	40	A
Applications of Mathematics	4PAM1002	15	80	20	B
Applications of Computing	4PAM0023	15	0	100	B

### Level 5 BSc (Hons) Mathematics

Compulsory Modules Module Title	Module Code	Credit Points	Pre-req	% examination	% coursework	Semester
Mathematical Techniques 2	5PAM0012	15	4PAM0007	80	20	A
Professional Skills*	5PAM0024	15		0	100	A
Professional Teaching Skills*	5PAM0028	15		0	100	A
Real Analysis	5PAM1002	15	4PAM1003	80	20	B
Differential Equations	5PAM1001	15	4PAM0007	80	20	B

\*Exactly one of these two

Optional Modules Module Title	Module Code	Credit Points	Pre-req	% examination	% coursework	Semester
Numerical Methods	5PAM1004	30	4PAM0007	80	20	AB
Portfolio Risk Management	5PAM0021	30	4PAM1017	70	30	AB
Number Theory	5PAM0030	15	4PAM1003	80	20	A
Algebra	5PAM1006	15	4PAM1003	80	20	A
Mechanics	5PAM1003	15	4PAM0007	80	20	B
Statistical Modelling	5BUS0256	15	4BUS0075	60	40	B

### Optional sandwich year

Available to both Mathematics and Financial Mathematics awards

Optional Modules Module Titles	Module Code	Credit Points	Pre-req	% examination	% coursework	Semester
Professional Placement (Placement Year)	6PAM0011	0	-	0	100	AB
Year Abroad	6PAM0030	0	-	0	100	ABC

## Level 6 BSc (Hons) Mathematics

<b>Compulsory Modules</b> Module Title	Module Code	Credit Points	Pre-req	% examination	% coursework	Semester
Complex Analysis	6PAM1002	15	5PAM1002	80	20	A
Investigation in Mathematics	6PAM1005	15	-	0	100	B

<b>Optional Modules</b> Module Titles	Module Code	Credit Points	Pre-req	% examination	% coursework	Semester
Nonlinear Systems	6PAM0007	30	4PAM0007	80	20	AB
Boundary Value Problems	6PAM0022	30	5PAM0012	80	20	AB
Linear Optimisation	6PAM0020	30	4PAM0007	80	20	AB
Waves and Fluids	6PAM0014	30	5PAM1003	60	40	AB
Financial Optimisation	6PAM0023	30	5PAM1004	80	20	AB
Quantum Computing A	6COM0247	15	4PAM0007	0	100	A
Linear Modelling	6BUS1031	15	5BUS0256	0	100	A
Quantum Computing B	6COM0260	15	6COM0247	100	0	B
Space Dynamics	6PAM0027	15	4PAM0023	0	100	B
Multivariate Statistics	6BUS1033	15	5BUS0256	0	100	B

Table 1b Outline Programme Structure for Financial Mathematics

The following programme will be offered from September 2010

## Level 4 BSc (Hons) Financial Mathematics

<b>Compulsory Modules</b> Module Title	Module Code	Credit Points	% examination	% coursework	Semester
Mathematical Techniques 1	4PAM0007	30	50	50	AB
Linear Algebra and Analysis	4PAM1003	30	70	30	AB
Financial and Actuarial Mathematics	4PAM1017	15	0	100	A
Basic Statistics	4BUS0075	15	60	40	A
Applications of Mathematics	4PAM1002	15	80	20	B
Applications of Computing	4PAM0023	15	0	100	B

## Level 5 BSc (Hons) Financial Mathematics

<b>Compulsory Modules</b> Module Title	Module Code	Credit Points	Pre-req	% examination	% coursework	Semester
Mathematical Techniques 2	5PAM0012	15	4PAM0007	80	20	A
Professional Skills*	5PAM0024	15		0	100	A
Professional Teaching Skills*	5PAM0028	15		0	100	A
Portfolio Risk Management	5PAM0021	30	4PAM0007 4PAM1017	70	30	AB
Numerical Methods	5PAM1004	30	4PAM0007	80	20	AB

\*Exactly one of these two

<b>Optional Modules</b> Module Title	Module Code	Credit Points	Pre-req	% examination	% coursework	Semester
Number Theory	5PAM0030	15	4PAM1003	80	20	A
Algebra	5PAM1006	15	4PAM1003	80	20	A
Real Analysis	5PAM1002	15	4PAM1003	80	20	B
Differential Equations	5PAM1001	15	4PAM0007	80	20	B
Mechanics	5PAM1003	15	4PAM0007	80	20	B
Statistical Modelling	5BUS0256	15	4BUS0075	60	40	B

### Optional sandwich year

Available to both Mathematics and Financial Mathematics awards

<b>Optional Modules</b> Module Titles	Module Code	Credit Points	Pre-req	% examination	% coursework	Semester
Professional Placement (Placement Year)	6PAM0011	0	-	0	100	AB
Year Abroad	6PAM0030	0	-	0	100	ABC

## Level 6 BSc (Hons) Financial Mathematics

<b>Compulsory Modules</b> Module Title	Module Code	Credit Points	Pre-req	% examination	% coursework	Semester
Project – (Mathematics)	6PAM0025	30	-	0	100	AB
Financial Optimisation	6PAM0023	30	5PAM1004	80	20	AB
Mathematics of Derivatives and Option Pricing	6PAM0009	30	5PAM0021 5PAM1004	80	20	AB

<b>Optional Modules</b> Module Titles	Module Code	Credit Points	Pre-req	% examination	% coursework	Semester
Nonlinear Systems	6PAM0007	30	4PAM0007	80	20	AB
Boundary Value Problems	6PAM0022	30	5PAM0012	80	20	AB
Linear Optimisation	6PAM0020	30	4PAM0007	80	20	AB
Waves and Fluids	6PAM0014	30	5PAM1003	60	40	AB
Complex Analysis	6PAM1002	15	5PAM1002	80	20	A
Quantum Computing A	6COM0247	15	4PAM0007	0	100	A
Linear Modelling	6BUS1031	15	5BUS0256	0	100	A
Quantum Computing B	6COM0260	15	6COM0247	100	0	B
Space Dynamics	6PAM0027	15	4PAM0023	0	100	B
Multivariate Statistics	6BUS1033	15	5BUS0256	0	100	B

Table 1c Outline Programme Structure for Computational Mathematics

The following programme will not recruit for September 2010 and will be withdrawn by 2013.

#### Level 4 BSc (Hons) Computing Mathematics

<b>Compulsory Modules</b> Module Title	Module Code	Credit Points	% examination	% coursework	Semester
Mathematical Techniques 1	4PAM0007	30	50	50	AB
Linear Algebra and Analysis	4PAM1003	30	70	30	AB
Financial and Actuarial Mathematics	4PAM1017	15	0	100	A
Basic Statistics	4BUS0075	15	60	40	A
Applications of Mathematics	4PAM1002	15	80	20	B
Applications of Computing	4PAM0023	15	0	100	B

#### Level 5 BSc (Hons) Computing Mathematics

<b>Compulsory Modules</b> Module Title	Module Code	Credit Points	Pre-req	% examination	% coursework	Semester
Mathematical Techniques 2	5PAM0012	15	4PAM0007	80	20	A
Professional Skills*	5PAM0024	15		0	100	A
Professional Teaching Skills*	5PAM0028	15		0	100	A
Numerical Methods	5PAM1004	30	4PAM0007	80	20	AB

\*Exactly one of these two

<b>Optional Modules</b> Module Title	Module Code	Credit Points	Pre-req	% examination	% coursework	Semester
Number Theory	5PAM0030	15	4PAM1003	80	20	A
Real Analysis	5PAM1002	15	4PAM1003	80	20	B
Portfolio Risk Management	5PAM0021	30	4PAM0007 4PAM1017	70	30	AB
Differential Equations	5PAM1001	15	4PAM0007	80	20	B
Mechanics	5PAM1003	15	4PAM0007	80	20	B
Statistical Modelling	5BUS0256	15	4BUS0075	60	40	B

### Level 6 BSc (Hons) Computing Mathematics

<b>Compulsory Modules</b> Module Title	Module Code	Credit Points	Pre-req	% examination	% coursework	Semester
Project – (Mathematics)	6PAM0025	30	-	0	100	AB
Financial Optimisation	6PAM0023	30	5PAM1004	80	20	AB
Quantum Computing A	6COM0247	15	4PAM0007	0	100	A
Quantum Computing B	6COM0260	15	6COM0247	100	0	B

<b>Optional Modules</b> Module Titles	Module Code	Credit Points	Pre-req	% examination	% coursework	Semester
Nonlinear Systems	6PAM0007	30	4PAM0007	80	20	AB
Boundary Value Problems	6PAM0022	30	5PAM0012	80	20	AB
Linear Optimisation	6PAM0020	30	4PAM0007	80	20	AB
Waves and Fluids	6PAM0014	30	5PAM1003	60	40	AB
Linear Modelling	6BUS1031	15	5BUS0256	0	100	A
Space Dynamics	6PAM0027	15	4PAM0023	0	100	B
Multivariate Statistics	6BUS1033	15	5BUS0256	0	100	B

Progression to level 5 requires:

A minimum of 105 credits to remain on honours award. The maximum study rate in such an instance would be 135 credits and students would be expected to remedy any failed modules from level 4 in the first instance.

Progression to non-honours level 5 with 75 credits may be permissible. The maximum study rate in such an instance would normally be 120 credits and students would be expected to remedy any failed modules from level 4 in the first instance.

Progression to level 6 requires:

225 credit points and above to Honours award. The maximum study rate in such an instance would be 135 credits and students would be expected to remedy any failed modules from level 5 in the first instance.

Progression to non-honours level 6 with 180 credits may be permissible. The maximum study rate in such an instance would normally be 120 credits and students would be expected to remedy any failed modules from level 5 in the first instance.

### Honours classification

The University has approved structure and assessment regulations common to all programmes. Full details are provided in UPR AS14.

#### Table 1d Interim awards available

The programme provides the following interim awards:

Award	Minimum requirements	Available at end of Level
University Certificate	45 credit points at level 4	4
Certificate of Higher Education	120 credit points at level 4	4, 5
University Diploma	180 credit points including at least 60 at level 5	5, 6
Diploma of Higher Education	240 credit points including at least 120 at level 5	5, 6
Students with an enrolment date before September 2008 will be eligible for a BSc	270 credit points including 180 at level 6/5 of which 90 must be at level 6	6
BSc	300 credit points including 240 credits at levels 4 & 5 and 60 credits at level 6, or 210 credits at levels 4 & 5 and 90 credits at level 6	6
BSc (Hons)	360 credit points including 240 at level 6/5 of which 120 must be at level 6	6

## E. Support for students and their learning

Students are supported by:

- An induction programme.
- An extensive UH Learning Resources Centre, incorporating a library and computer centre.
- Guided student-centred learning through the use of StudyNet.
- A Faculty Learning Resources Centre.
- A Programme Tutor to help students understand the course/programme structure.
- Placement Tutors to oversee students on sandwich placement.
- Personal Tutors to provide academic and pastoral support.
- Project Tutors to guide students through their final year Project.
- A substantial Student Centre that provides advice on issues such as finance, University regulations, legal matters etc.
- An Accommodation Office.
- An International Students Centre.
- Overseas Orientation.

- Medical Centre.
- A Mathematics Drop-in Centre.
- A Faculty-based Disabled Student Co-ordinator.
- English language support.
- An Equal Opportunities Officer.
- The Students' Union.
- Undergraduate bursaries.
- Student representatives on programme committees.
- A Careers Service for all current students and graduates.

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## F. Entry requirements

The normal entry requirements for the programme are:

- 240 points from minimum of two GCE/VCE A-levels (normally including GCE A-level Mathematics), or one VCE Double Award plus GCE A level Mathematics. All key skills and other tariff points counted.

**or**

- BTEC ND/NC with 2 distinctions and a merit profile across other units, subject to interview;

**plus**

- GCSE English and Mathematics at grade C or above.

The programme is subject to the University's Principles, Policies, Regulations and Procedures for the Admission of Students to Undergraduate and Taught Postgraduate Programmes and will take account of University policy and guidelines for assessing accredited prior certificated learning (APCL) and accredited prior experiential learning (APEL).

## Section 2

### Programme management

<b>JACS code(s)</b>	G100
<b>Modes of study</b>	Full-time, Part-time, Sandwich
<b>Intakes</b>	A
<b>Relevant QAA subject benchmarking group</b>	Mathematics, Statistics and Operational Research
<b>Date of validation/last periodic review</b>	2003/04, March 2010
<b>Date of production/ last revision of PS</b>	March 2010, August 2011
<b>Relevant cohorts</b>	All
<b>Faculty</b>	Science, Technology and Creative Arts
<b>Administrative School(s)/Departments</b>	Physics, Astronomy and Mathematics

#### Course (i.e. pathway) details

Course (i.e. Pathway Point) Titles	Course (i.e. Pathway Point) Codes
BSc Mathematics (non-honours)	MAT1, MU2, MU3, MU4
BSc Honours Mathematics	MAT1, MAT2, MAT3, MAT4
BSc Honours Financial Mathematics	MAT1, FM2, FM3, FM4
BSc Honours Computing Mathematics	MAT1, CM2, CM3, CM4

The programme is managed by:

- Associate Head of School who has overall responsibility in Physics, Astronomy and Mathematics;
- a Programme Tutor who is responsible for the day-to-day management of the programme;
- an Admissions Tutor, with specific responsibility for open days and selection;
- a Placements Tutor to assist with the procurement of placements and to advise on placements;
- a designated Administrator to deal with day-to-day administration associated with the programme;
- a programme committee, the membership of which includes student representatives, academic staff teaching the modules, Head and Associate Head of School and chaired by the Programme Tutor.

### Programme-specific assessment regulations

The programme is compliant with the University's generic assessment regulations (Structure and Assessment Regulations for Academic Programmes, UPR AS14) with the exception of those listed below, which have been specifically approved by the University:

- For purpose of degree classification the modules 6PAM1005 Investigation in Mathematics and 6PAM1002 Complex Analysis, may not be substituted for 30 credits of level 5 modules on the BSc (Hons) Mathematics programme.
- For the purpose of degree classification the module 6PAM0025 Project may not be substituted for 30 credits of level 5 modules on the BSc (Hons) Financial Mathematics programme.
- For the purpose of degree classification the module 6PAM0025 Project may not be substituted for 30 credits of level 5 modules on the BSc (Hons) Computing Mathematics programme.

Further points of clarification and interpretation relevant to this specific programme are given below:

- The Programme operates a Faculty-wide policy for treatment of extenuating circumstances (see Student Handbook).
- Progression from one level to the next depends on meeting the pre-requisite requirements of specific chosen modules as detailed in Table 1a above.
- To be eligible for any of the above awards a student must attain pass grades in all compulsory courses as listed in Tables 1a, 1b and 1c.
- In the case of a sandwich award, students must also perform satisfactorily in the Professional Training Year, as assessed by the professional Training Certification Panel.

- To qualify for a specialised degree the Project must have been deemed appropriate to the named route by the Project Viva Panel.
- Students have the right to refuse a specialised award title and instead to be awarded a BSc Degree with Honours in Mathematics.
- The programme includes a significant amount of group working, as a consequence specific regulations governing cheating and plagiarism are provided in the student handbook.
- The maximum length of time that a student can remain registered on the programme is: 5 years for Full-time, 6 years for Sandwich and 7 years for Part-Time.

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## Other sources of information

- Definitive Module Documents
- Module Guides
- Student Handbook
- Programme Specification website:  
(StudyNet → Staff → Department Lists → Academic Quality Office → Programme Management → Programme Specifications)
- University of Hertfordshire Course website:  
<http://www.herts.ac.uk/courses/>
- QAA Benchmark Statement website:  
<http://www.qaa.ac.uk/academicinfrastructure/benchmark/default.asp>
- The Framework for Higher Education Qualifications in England, Wales and Northern Ireland, 2008:  
<http://www.qaa.ac.uk/academicinfrastructure/FHEQ/EWNI08/default.asp>
- SEEC Credit Level Descriptors for Further and Higher Education 2003: <http://www.seec-office.org.uk/creditlevel descriptors2003.pdf>
- External Quality Review report website:  
[http://www.qaa.ac.uk/revreps/inst\\_reports.asp?instID=H-0060](http://www.qaa.ac.uk/revreps/inst_reports.asp?instID=H-0060)
- UNISTATS website:  
<http://www.unistats.com/>
- University of Hertfordshire Academic Quality Office website:  
(StudyNet → Staff → Department Lists → Academic Quality Office)
- Structure & Assessment Regulations - Undergraduate & Taught Postgraduate Programmes, UPR AS14:  
<http://herts.ac.uk/secreg/upr/AS14.htm>
- Learning and Teaching Policy and General Educational Aims, UPR TL01:  
<http://herts.ac.uk/secreg/upr/TL01.htm>
- Admissions - Undergraduate & Taught Postgraduate Students, UPR SA03:  
<http://herts.ac.uk/secreg/upr/SA03.htm>
- Academic Quality, UPR AS17:  
<http://herts.ac.uk/secreg/upr/AS17.htm>
- Index of UPRs for students:  
[http://www.herts.ac.uk/secreg/upr/upr\\_azlist\\_student\\_info.htm](http://www.herts.ac.uk/secreg/upr/upr_azlist_student_info.htm)
- Institute of Mathematics & Its Applications website:  
<http://www.ima.org.uk/>

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## Other information relevant to the programme

Successful Honours students will be eligible for Graduate Status (GIMA) of the Institute of Mathematics and its Applications, the professional body for Mathematics in the UK.

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## University policies relevant to the Programme

The University undertakes to use all reasonable endeavours to deliver, assess and administer this programme in accordance with this Programme Specification. At the same time it is recognised that it is in the nature of academic developments that changes, for example to the structure, curriculum and assessment of a programme may be necessary in order to ensure that the programme remains up to

date, in response to issues raised as a result of on-going monitoring and evaluation and/or in order to conform to new regulatory requirements imposed by this institution, by professional or statutory bodies, or by national or governmental bodies.

The programme operates within the guidelines and policies relating to equal opportunities and environmental issues which may be agreed from time to time by the Board of Governors and/or the Academic Board of the University.

Where the programme is offered in collaboration with another institution these policies and guidelines will normally be those of the partner institution.

The programme operates in accordance with the University's Regulations Governing Studies Involving the Use of Human Subjects (UPR RE01) agreed from time to time by the Academic Board of the University. However, where the programme is offered in collaboration with another institution (for example through a franchise arrangement for all or part of the programme) then specific approval must be obtained from the University for the operation of the programme within ethical guidelines prepared by the partner institution. The partner institution will be responsible for all insurance liability in connection with the observance of ethical guidelines



Signed  
Chair of Faculty Academic Quality Enhancement Committee

Date 25<sup>th</sup> August 2011

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If you would like this information in an alternative format please contact:

Mrs Anne Passmore, Senior Administrator (Academic Quality), Faculty of Science, Technology and Creative Arts

Telephone: 01707 284102

Email: [a.j.passmore@herts.ac.uk](mailto:a.j.passmore@herts.ac.uk)

## BSc (Hons) Mathematics

**Table 2: Development of Programme Learning Outcomes in the Constituent Modules**

This map identifies where the programme learning outcomes are assessed in the constituent modules. It provides (i) an aid to academic staff in understanding how individual modules contribute to the programme aims (ii) a checklist for quality control purposes and (iii) a means to help students monitor their own learning, personal and professional development as the programme progresses.

		Programme Learning Outcomes (as identified in section 1 and the following page)																	
		Knowledge & Understanding								Intellectual Skills						Practical Skills		Transferable Skills	
Module Title		Module Code	A1	A2	A3	A4	A5	A6	A7	A8	B1	B2	B3	B4	B5	B6	C1	D1	
Level 4	Mathematical Techniques 1	4PAM0007	X												X				
	Linear Algebra and Analysis	4PAM1003	X										X		X				
	Applications of Computing	4PAM0023			X						X	X		X	X		X	X	
	Basic Statistics	4BUS0075	X								X		X						
	Applications of Mathematics	4PAM1002	X								X		X						
	Financial and Actuarial Mathematics	4PAM1017				X		X		X		X						X	
Level 5	Real Analysis	5PAM1002	X										X		X				
	Algebra (From 2011)	5PAM1006	X										X		X				
	Numerical Methods	5PAM1004	X		X				X		X								
	Portfolio Risk Management	5PAM0021				X		X		X	X						X		
	Statistical Modelling	5BUS0256									X								
	Number Theory	5PAM0030	X		X						X		X						
	Mechanics	5PAM1003	X								X		X						
	Differential Equations	5PAM1001	X										X						
	Mathematical Techniques 2	5PAM0012	X																
	Professional Skills	5PAM0024				X									X			X	
	Professional Teaching Skills	5PAM0028				X									X			X	
	Professional Placement (Placement Year)	6PAM0011				X	X				X				X	X		X	
	Year Abroad	6PAM0030					X							X				X	
Level 6	Investigations in Mathematics	6PAM1005		X		X	X				X	X	X	X					
	Complex Analysis	6PAM1002		X									X		X				
	Quantum Computing A	6COM0247		X					X				X						
	Quantum Computing B	6COM0260		X					X				X						
	Financial Optimisation	6PAM0023		X						X	X	X					X		
	Linear Optimisation	6PAM0020		X							X	X							
	Boundary Value Problems	6PAM0022		X					X			X							
	Nonlinear Systems	6PAM0007		X								X							
	Linear Modelling	6BUS1031			X			X			X	X		X					
	Multivariate Statistics	6BUS1033		X	X			X			X	X							
	Space Dynamics	6PAM0027		X	X	X					X	X						X	
Waves and Fluids	6PAM0014		X							X	X								

## BSc (Hons) Financial Mathematics

**Table 2: Development of Programme Learning Outcomes in the Constituent Modules**

This map identifies where the programme learning outcomes are assessed in the constituent modules. It provides (i) an aid to academic staff in understanding how individual modules contribute to the programme aims (ii) a checklist for quality control purposes and (iii) a means to help students monitor their own learning, personal and professional development as the programme progresses.

		Programme Learning Outcomes (as identified in section 1 and the following page)																	
		Knowledge & Understanding								Intellectual Skills						Practical Skills		Transferable Skills	
Module Title		Module Code	A1	A2	A3	A4	A5	A6	A7	A8	B1	B2	B3	B4	B5	B6	C1	D1	
Level 4	Mathematical Techniques 1	4PAM0007	X												X				
	Linear Algebra and Analysis	4PAM1003	X										X		X				
	Applications of Computing	4PAM0023			X						X	X		X	X		X	X	
	Basic Statistics	4BUS0075	X								X		X						
	Applications of Mathematics	4PAM1002	X								X		X						
	Financial and Actuarial Mathematics	4PAM1017				X		X		X		X						X	
Level 5	Real Analysis	5PAM1002	X										X		X				
	Algebra (From 2011)	5PAM1006	X										X		X				
	Numerical Methods	5PAM1004	X		X				X		X								
	Portfolio Risk Management	5PAM0021				X		X		X							X		
	Statistical Modelling	5BUS0256									X								
	Number Theory	5PAM0030	X		X						X		X						
	Mechanics	5PAM1003	X								X		X						
	Differential Equations	5PAM1001	X										X						
	Mathematical Techniques 2	5PAM0012	X																
	Professional Skills	5PAM0024				X										X		X	
	Professional Teaching Skills	5PAM0028				X										X		X	
	Professional Placement (Placement Year)	6PAM0011				X	X				X				X	X		X	
	Year Abroad	6PAM0030					X							X				X	
Level 6	Complex Analysis	6PAM1002		X									X		X				
	Quantum Computing A	6COM0247		X					X				X						
	Quantum Computing B	6COM0260		X					X				X						
	Financial Optimisation	6PAM0023		X						X	X		X				X		
	Mathematics of Derivatives and Option Pricing	6PAM0009		X						X	X		X				X		
	Linear Optimisation	6PAM0020		X							X		X						
	Nonlinear Systems	6PAM0007		X									X						
	Linear Modelling	6BUS1031			X			X			X		X		X				
	Multivariate Statistics	6BUS1033		X	X			X			X		X						
	Space Dynamics	6PAM0027		X	X	X					X		X					X	
	Boundary Value Problems	6PAM0022		X					X				X						
	Waves and Fluids	6PAM0014		X							X		X						
	Project - (Mathematics)	6PAM0025		X		X	X				X		X	X	X			X	

**BSc (Hons) Computing Mathematics** (Programme will not recruit for September 2010 and will be withdrawn by 2013)

**Table 2: Development of Programme Learning Outcomes in the Constituent Modules**

This map identifies where the programme learning outcomes are assessed in the constituent modules. It provides (i) an aid to academic staff in understanding how individual modules contribute to the programme aims (ii) a checklist for quality control purposes and (iii) a means to help students monitor their own learning, personal and professional development as the programme progresses.

		Programme Learning Outcomes (as identified in section 1 and the following page)																
		Knowledge & Understanding								Intellectual Skills						Practical Skills	Transferable Skills	
Module Title		Module Code	A1	A2	A3	A4	A5	A6	A7	A8	B1	B2	B3	B4	B5	B6	C1	D1
Level 4	Mathematical Techniques 1	4PAM0007	X												X			
	Linear Algebra and Analysis	4PAM1003	X										X		X			
	Applications of Computing	4PAM0023			X						X	X		X	X		X	X
	Basic Statistics	4BUS0075	X								X		X					
	Applications of Mathematics	4PAM1002	X								X		X					
	Financial and Actuarial Mathematics	4PAM1017				X		X		X		X						X
Level 5	Real Analysis	5PAM1002	X										X		X			
	Numerical Methods	5PAM1004	X		X				X		X							
	Portfolio Risk Management	5PAM0021				X		X		X	X						X	
	Statistical Modelling	5BUS0256									X							
	Number Theory	5PAM0030	X		X						X		X					
	Mechanics	5PAM1003	X								X		X					
	Differential Equations	5PAM1001	X											X				
	Mathematical Techniques 2	5PAM0012	X															
	Professional Skills	5PAM0024				X										X		X
	Professional Teaching Skills	5PAM0028				X										X		X
Level 6	Quantum Computing A	6COM0247		X					X				X					
	Quantum Computing B	6COM0260		X					X				X					
	Financial Optimisation	6PAM0023		X						X	X		X				X	
	Linear Optimisation	6PAM0020		X							X		X					
	Nonlinear Systems	6PAM0007		X									X					
	Linear Modelling	6BUS1031			X			X			X		X		X			
	Multivariate Statistics	6BUS1033		X	X			X			X		X					
	Space Dynamics	6PAM0027		X	X	X					X		X					X
	Boundary Value Problems	6PAM0022		X						X				X				
	Waves and Fluids	6PAM0014		X							X		X					
	Project - (Mathematics)	6PAM0025		X		X	X				X		X	X	X			X

**Key:** Learning Outcome which is assessed as part of the module

## Key to Programme Learning Outcomes

### Knowledge and Understanding

- A1. areas of fundamental importance to mathematics and its applications;
- A2. further areas of mathematics and its applications selected by themselves, at a level appropriate to a professional mathematician;
- A3. appropriate ways of using computers to solve problems and to communicate;
- A4. effective ways of communicating results to mathematicians and non-specialists;
- A5. time and resource management in order to meet deadlines;
- A6. the significance of science, technology and economic factors in modern society;
- A7. appropriate ways of developing computer algorithms for solving a variety of mathematical problems and methods of estimating the accuracy of results;
- A8. appropriate ways of building and solving stochastic and deterministic models of financial instruments and interpreting the results.

### Intellectual Skills

- B1. apply their knowledge and understanding of areas of mathematics and its applications to the solution of problems in a manner appropriate to a professional mathematician;
- B2. use computers to solve problems in an appropriate manner;
- B3. be able to think logically and critically within areas appropriate to a professional mathematician; be able to use creativity and mathematical approaches in practical problem-solving activities;
- B4. learn independently and to continue learning;
- B5. have the capacity to work successfully, both as an individual and as a member of a team, by managing time and resources in order to meet deadlines;
- B6. will have obtained significant practical experience of working in a suitable environment, alongside professionals or others engaged in scientific or commercial work.

### Practical Skills

- C1. use computers to effectively solve relevant models.

### Transferable Skills

- D1. present results to mathematicians and non-specialists using technology, verbally and in writing.