University of the West of England
BRISTOL

PROGRAMME SPECIFICATION

BSc (Hons) Mathematical Sciences

Programme Specification

Section 1: Basic Data

Awarding institution/body	UWE
Teaching institution	UWE
Faculty responsible for programme	CEMS
Programme accredited by	
Highest award title	BSc (Hons) Mathematical Sciences
Default award title	
Interim award title	BSc Mathematical Sciences Dip HE Mathematical Sciences Cert HE Mathematical Sciences
Modular Scheme title (if different)	MAR
UCAS code (or other coding system if relevant)	
Relevant QAA subject benchmarking group(s)	
On-going/valid until* (*delete as appropriate/insert end date)	
Valid from (insert date if appropriate)	September 2003

Authorised by… **Date:…**

Version Code

For coding purposes, a numerical sequence (1, 2, 3 etc.) should be used for successive programme specifications where 2 replaces 1, and where there are no concurrent specifications. A sequential decimal numbering (1.1; 1.2, 2.1; 2.2 etc) should be used where there are different and concurrent programme specifications

Section 2: Educational aims of the programme

The BSc (Hons) Mathematical Sciences has the following general aims:

1. To produce graduates who are familiar with concepts and skills of Mathematics, Statistical and Operational Research techniques that will enable them to gain employment in a number of sectors including science, technology, government and business.

2. To prepare students for progression to study for higher degrees in Statistics, Mathematics and Operational Research.

3. To develop in students analytical, problem-solving and other transferable skills that will be valuable to them in any career

4. To continue the development of those general study skills that will enable students to become independent, lifelong learners.

5. To encourage the discerning use of reference material from a variety of sources.

The BSc (Hons) Mathematical Sciences has the following specific aims:

1. To develop an understanding of mathematical, statistical and operational research concepts which underline many techniques and applications

2. To develop the ability to apply mathematical, statistical and operational research techniques and concepts in a range of contexts

3. To develop the ability to use a range of specialized computer software to solve problems in the mathematical sciences.

4. To develop an understanding of the modelling process as a solution of a range of problems in different contexts.

Section 3: Learning Outcomes of the Programme

The award route provides opportunities for students to develop and demonstrate knowledge and understanding, intellectual skills, subject-specific skills and transferable skills., as shown below.

A. Knowledge and Understanding

Knowledge and Understanding of:	*Teaching/Learning Methods and Strategies*	*Assessment*
1. mathematical analysis of discrete and continuous linear systems 2. mathematical analysis of discrete and continuous nonlinear systems 3. numerical techniques for solving mathematical problems. 4. computer-based applications relevant to the mathematical sciences and quantitative methods. 5. programming concepts of sequence, selection, iteration and decomposition into procedures 6. a wide range of methods for the statistical presentation, analysis and modelling of data and processes. 7. the design and analysis of experiments 8. the theoretical underpinning of statistical	Throughout the award, the learner is encouraged to undertake the practical application of theory knowledge learnt in other modules. Independent learning through reading and use of appropriate software is encouraged both to supplement and consolidate what is being taught / learnt and to broaden the individual knowledge and understanding of the subject. This is further emphasized in the project module, either, (UFQEFX-20-3) or, (UFQEGX-20-3) Acquisition of 1 is through core modules (UFQEFS-20-1), , (UFQEFV-20-1), (UFQEFT-20-2), (UFQEFP-20-2), and, (UFQEFQ-20-3). Additional support is provided through option modules, (UFQEFW-20-2), (UFQEFU-20-3), (UFQEG4-20-3) and (UFQEG5-20-3). Acquisition of 2 is through core module (UFQEFQ-20-3). Acquisition of 3 is through core module, (UFQEFP-20-2), and supported by option module (UFQEG4-20-3). Acquisition of 4 is through core module (UFQEGJ-20-1) and is further supported by modules at higher levels such as (UFQEFT-20-2), (UFQEFP-20-2), and (UFQEFQ-20-3).	The outcomes are assessed in core modules through a variety of methods, including exams under controlled conditions and coursework assignments, some of which are based on computational laboratory investigations.

techniques 9. operational research modelling techniques 10. the practical application of statistical and operational techniques	Acquisition of 5 is through core module, (UFCE4V-20-1). Acquisition of 6 is gained through the core statistical and OR modules (UFQEGE-20-1), (UFQEGP-20-2), (UFQEGT-20-2), (UFQEGD-20-3) and can be further developed in the option modules (UFQEGF-20-3), (UFQEGH-20-3), (UFQEGL-20-3) and (UFQEGN-20-3) Acquisition of 7 is through (UFQGP-20-2) and (UFQEGD-20-3) and is extended in the optional module (UFQEGH-20-3) Acquisition of 8 is gained from modules (UFQEGE-20-2), (UFQEGP-20-2), (UGQEGD-20-3) and in particular (UFQEGV-20-2) Acquisition of 9 is through module (UFQEGT-20-2) and from the optional module (UFQEGG-20-1). Acquisition of 10 is through all core modules with prominence in module (UFQEGX-20-3)	

B. Intellectual Skills

Intellectual Skills	***Teaching/Learning Methods and Strategies***	***Assessment***
1. ability to think logically and use symbolic language to describe the relationships between real or abstract quantities in the context of mathematical, statistical and operational research problems. 2. ability to critically interpret solutions obtained using mathematical, statistical and operational research techniques and report conclusions in a clear and appropriate manner. 3. ability to design , implement and test simple algorithms.	Intellectual skills are developed through tutorials that stimulate the student's analytical and problem-solving abilities and through computer practical sessions that stimulate the student's ability to design and test algorithms to undertake a required function. Specific use is made of appropriate mathematical software such as Maple and Matlab and statistical software, such as Minitab, SPSS, SAS and S-plus, to analyse and interpret results. The final year core modules consolidate the development of these skills. Furthermore the project module promotes intellectual independence and self-confidence	Intellectual skills 1 and 2 are assessed mainly through coursework and examination throughout the programme. Intellectual skill 3 is assessed by practical laboratory based assignments and examination. The project module, either (UFQEGX-20-3), or (UFQEFX-20-3) with its assessment based on a substantial report further enhances intellectual skills.

C. Subject, Professional and Practical Skills

Subject/Professional/Practical Skills	***Teaching/Learning Methods and Strategies***	***Assessment***
1. mathematical, statistical and operational research techniques appropriate to the solution of problems that arise in a variety of contexts. 2. use of mathematical language, notation and methods in the description and analysis of problems in appropriate areas of application. 3. applications of mathematical theory in a variety of contexts such as financial derivatives or fluid dynamics. 4. applications of statistical methods in a variety of contexts including economics and industrial and biomedical applications	The understanding and application of mathematical, statistical and operational research techniques to a variety of problems in the business and scientific community is a key outcome of the award. The mathematical theory which forms the basis is introduced through lectures at a general level in level one and developed further at level two. At level three, specialized applications are covered which make use of the mathematics and statistics learnt at previous levels. Tutorials consolidate material introduced in the lecture environment, which together with computer simulation using appropriate software and laboratory practice, facilitate interpretation of theory to practical problems.	Skills 1 and 2 are assessed in core modules (UFQEFS-20-1), (UFQEFV-20-1), (UFQEFT-20-2), (UFQEFP-20-2), (UFQEFQ-20-3), (UFQEGE-20-1), (UFQEGP-20-2), (UFQEGT-20-2), (UFQEGD-20-3) by examination and coursework. These skills are then applied to real world applications, skill 3, in option modules (UFQEFU-20-3), (UFQEG4-20-3) and (UFQEG5-20-3). Skill 4 is assessed in (UFQEGF-20-3), (UFQEGH-20-3), (UFQEGL-20-3) and (UFQEGN-20-3)

D. Key (Transferable) Skills

Key (Transferable) Skills	Teaching/Learning Methods and Strategies	Assessment
1. Communication skills**:** to communicate orally or in writing.	1. Skill one is developed through a variety of methods and strategies including the following: ♦ Students participate in workshops, and group work sessions. ♦ Students participate in discussion tutorials ♦ Students present practical assignments in tutorials ♦ Students participate in individual tutorials ♦ Students submit written reports for coursework	All of the skills are demonstrated in varying degrees in all of the employed assessments with the exception of teamwork, which is covered in some of the coursework.
2. Self-management skills: to manage one's own time; to meet deadlines; to work with others having gained insights into the problems of team-based software development.	2. Skill two is developed through a variety of methods and strategies including the following: ♦ Students conduct self-managed practical work ♦ Students participate in practically-oriented tutorial laboratory sessions ♦ Students work through practical work-sheets in teams ♦ Students practice design and programming ♦ Students participate in laboratory-based group work.	
3. IT skills in context: to use software tools in the context of application development.	3. Skill three is developed through a variety of methods and strategies including the following: ♦ Students conduct self-managed practical work ♦ Students participate in experimental investigation tutorials ♦ Students work through practical work-sheets in teams ♦ Students make use of online teaching materials ♦ Students are encouraged to practice programming to extend their skills	

Key (Transferable) Skills	Teaching/Learning Methods	Assessment
4. Problem Formulation and Decision-Making: To undertake analysis and interpretation of information and express problems in appropriate notations.	4. Skill four is developed through a variety of methods and strategies including the following: ♦ Students develop modelling approaches to problem-solving. ♦ Students practice different problem-solving methods ♦ Students develop problem solving programs	
5. Progression to independent learning: To gain experience of, and to develop skills in, learning independently of structured class work. For example, to develop the ability to use on-line facilities to further self-study.	5. Skill five is developed through a variety of methods and strategies including the following: ♦ Students are encouraged to practice with appropriate software to extend their skills ♦ Students are encouraged to research relevant topics ♦ Students are encouraged to use online facilities to discover information	
6. Awareness of professional literature: to read and to use literature sources appropriate to the discipline to support learning activities	6. Skill six is developed through a variety of methods and strategies including the following: ♦ Students are encouraged to access online material ♦ Students review the literature for discussion in tutorial classes.	
7. Teamwork: to be able to work as a member of a team; to be aware of the benefits and problems which teamwork can bring	7. Skill seven is developed through a variety of methods and strategies including the following: ♦ Students develop experimental design and investigation in small groups	

Section 4: Programme structure

Note: This structure is indicative and subject to change

Award Structure for BSc(Hons) Mathematical Sciences – 2003/4 [Updated 06/01/04]]

Nonlinear Mathematics (UFQEFQ-20-3)	Advanced Statistics UFQEGD-20-3)	60 Credits Option 3	20 Credits Option 4

Year 2P (Industrial Placement Year)

Mathematical Methods 2 (UFQEFT-20-2)	Numerical Analysis 1 (UFQEFP-20-2)	Statistical Modelling (UFQEGP-00-2)	Operational Research (UFQEGT-20-2)	Mathematical Statistics (UFQEGV-20-2)	20 Credits Option 2
Mathematical Methods 1 (UFQEFS-20-1)	Linear Algebra (UFQEFV-20-1)	Professional Skills (UFQEGJ-20-1)	Programming for Mathematics (UFCE4V-20-1)	Statistics 1 (UFQEGE-20-1)	20 Credits Option 1

Core modules Option modules

Options

Option 1 taken from	
(UMAC33-20-1)	Understanding Financial Information
(UFQEGG-20-1)	Decision Analysis & Modelling
ILP	Modern Language

Option 2 taken from	
(UFQEFW-20-2)	Discrete Mathematics
(UFCE4E-20-2)	Sub-Symbolic Processing
Option 1	Not already chosen
ILP	Modern Language

Options 3 taken from	
Option 1 or 2	Not already chosen
(UFQEGS-20-3)	Mathematical Programming
(UFQEFU-20-3)	Fluid Dynamics
(UFQEG4-20-3)	Numerical Analysis 2
(UFQEG5-20-3)	Mathematical Modelling of Financial Derivatives
(UFQEGF-20-3)	Business Research Methods
(UFQEGH-20-3)	Industrial Statistics
(UFQEGL-20-3)	Econometric Analysis
(UFQEGN-20-3)	Biomedical Statistics

Option 4 taken from	
(UFQEFX-20-3)	Mathematics Project
(UFQEGX-20-3)	Quantitative Methods Project

PLEASE NOTE: REFER TO THE FACULTY ON-LINE INFORMATION SYSTEM FOR UP-TO-DATE STRUCTURE INFORMATION
http://www.cems.uwe.ac.uk/exist/index.xql

Section 5: Entry requirements

GCSE Maths English required
Tariff points range 180– 220
Specific subjects Maths grade C or above
Relevant subjects
Baccalaureate EB% 6-68
Baccalaureate IB pts 24-26
Irish Highers BBC -BBBC

Section 6: Assessment Regulations

a) **MAR** yes

b) **Approved MAR variant (insert variant)**

c) **Non MAR**

Section 7: Student learning: distinctive features and support

Within the Faculty of Computing Engineering and Mathematical Sciences, student learning will be supported in the following distinctive ways:

Class Activities

The mode of delivery of a module is determined by its Module Leader, and typically involves a combination of one or more lectures, tutorials, practical or laboratory classes, group activities and individual project work. Where modules are common with other programmes, students will typically be taught together which gives students the opportunity to appreciate the material from the viewpoint of different engineering disciplines). However, a specialist flavour may be given to a common module through the provision of discipline specific practical, laboratory or tutorial material supporting a core of common lectures.

Academic Support

Academic advice and support is the responsibility of the staff delivering the module in question. Staff are expected to be available outside normal timetabled hours, either by appointment or during published "surgery" hours, in order to offer advice and guidance on matters relating to the material being taught and on its assessment.

Virtual Learning Environment

The faculty is in the process of developing its presence on UWEOnline, the university's virtual learning environment. In 2003-04, a total of over 40 of the faculty's modules are using UWEOnline to assist in delivery, and this number will increase in future years. The faculty's goal is to have a presence on UWEOnline for all of its modules once technological constraints permit.

Pastoral Care

The faculty offers pastoral care through its Student Advisers, a team of staff who provide comprehensive, full-time student support service on a drop-in basis or by appointment. All students on a given degree route are allocated to the same Adviser, who is trained to provide advice on matters commonly of concern, including regulatory and other matters. The Adviser will, when necessary, advise the student to seek advice to from other professional services including the university's Centre for Student Affairs or from members of academic staff.

Progression to Independent Study

Many modules require students to carry out independent study, such as research for projects and assignments, and a full range of facilities are available to help students with these. The philosophy is accordingly to offer students both guided support and opportunities for independent study. Guided support, mainly in the form of timetabled sessions, takes the form of lectures, tutorials, seminars and practical laboratory sessions. Students are expected to attend all sessions on their timetable, and this is especially important because of the high content of practical work in the programme.

The progression to independent study will also be assisted by the nature of the support offered in individual modules. Typically, module leaders will provide a plan for the module indicating the activities to be carried out and the forms of learning to be undertaken during the delivery of the module, with a view to encouraging students to plan ahead and to take responsibility for managing their time and resources.

Additional Support

IT support is provided for students in the Faculty of Computing, Engineering & Mathematical Scirences in the following ways :

- through provision of a large Open Access Laboratory 3P10) containing 50 machines that provide students with access to a wide range of computer-based applications;
- through provision of a Mathematics Learning Centre that provides a drop-in service for students in need of subject specific advice on a variety of mathematically based techniques.
- through provision of nine other, frequently available, computer laboratories that provide similar access;
- through provision of the CEMS System Support Helpdesk that provides a range of support for learning to students including:

• support for a wide range of applications used by the students;
• help in the form of Assistants who are trained to resolve many common student problems;
• and help in the form of a large set of "Helpsheet Documents", developed over a number of years, that cover a variety of common student requests for information.

The faculty's extensive PC labs provide support for the development of applied IT skills, through access to a range of Industry standard mathematics and statistical analysis modelling software e.g. SPSS, Maple), database software e.g. Oracle 9i and Access) and simulation applications e.g. ARENA).

The teaching and learning strategy for the awards recognises the need to offer students greater learning support at the beginning of their degree programmes in order to aid the transition to studying at university. Hence the school provides a Mathematics and Statistics Learning Resource centre and an extensive support network from academic staff. The Resource Centre provides a learning environment supported by staff, computer aided learning and a range of learning materials to support students.

Section 8 Reference points/benchmarks

• This programme has been prepared with reference to a number of external benchmarks, including the QAA Subject Benchmark Statements for Mathematics, Statistics and Operational Research, the QAA Framework for HE Qualifications, and the university's Learning & Teaching Strategy.

The Subject Benchmark Statement for Mathematics, Statistics and Operational Research draws attention (para 2.2) to the diversity of programmes which are likely to draw upon this benchmark. It notes that some programmes, of which the one being considered here is an example, give a broad coverage of a wide area, while others develop particular subject areas in depth. It also notes that it is common for programmes to include coverage of subject areas outside the mathematical sciences, as is the case for the programme being considered here.

The university's Learning & Teaching Strategy has informed the faculty's policy for the delivery of its programmes, whose main features are described in section 7.

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 if he/she takes full advantage of the learning opportunities that are provided. More detailed information on the learning outcomes, content and teaching, learning and assessment methods of individual modules can be found in module specifications. These are available on the University Intranet.

Programme monitoring and review may lead to changes to approved programmes. There may be a time lag between approval of such changes/modifications and their incorporation into an authorised programme specification. Enquiries about any recent changes to the programme made since this specification was authorised should be made to the relevant Faculty Administrator.