1	**Awarding Institution**	**University of Newcastle upon Tyne**

2	**Teaching Institution**	**University of Newcastle upon Tyne**

3	**Final Award**	**Joint Honours BSc**

4 Programme titles: Mathematics OR Statistics Component of the following:

CG81 Mathematics and Psychology
NG41 Mathematics and Accountancy
FG11 Mathematics and Chemistry
GG41 Mathematics and Computing
GL11 Mathematics and Economics
GF18 Mathematics and Geography
FG31 Mathematics and Physics
GH12 Mathematics and Surveying
CG83 Statistics and Psychology
NG43 Statistics and Accountancy
FG13 Statistics and Chemistry
GG34 Statistics and Computing
GL31 Statistics and Economics
GF38 Statistics and Geography
GG35 Statistics and Information Systems

5 Programme Accredited by: **N/A**

6 UCAS Codes: See 4.

7	**QAA Subject Benchmarking Group(s)**	**Mathematics, Statistics and Operational Research**

8	**Date of production/revision**	**June 2002**

9 Programme Aims:

Each of the fifteen Joint Honours programmes aims to enable the student to study an appropriate mix of mathematics and statistics in equal weighting to the other subject on the programme. The mathematics and statistics half of the structure aims to produce graduates who have a sound, broad knowledge of the fundamental aspects of mathematics or statistics, complemented by a knowledge of specialist areas, and an awareness of applications of these subjects. The structure allows students to develop the ability to reason logically and their capacity for mathematical and statistical thinking, and to equip students with a range of subject-related key skills..

10(a) Programme Intended Learning Outcomes:

A Knowledge and understanding

A1 A broad understanding of fundamental concepts and methods of mathematics and statistics.

B Subject-specific/professional skills

B1 Further knowledge and experience of theoretical concepts and analytical techniques in mathematics and statistics

B2 Further broad knowledge of a number of topics in mathematics and statistics or a more specialist knowledge of particular areas within these subjects, as appropriate to the pathway chosen and as reflected in the degree title awarded

C Cognitive skills (for codes see Commentary: Key Skills Map).

C1 Logical deduction (all mathematics modules)

C2 Problem formulation (all mathematics modules)

C3 Problem solving (s6)

C4 Organisation of data (all statistics modules)

C5 Interpretation of data (all statistics modules)

D Key (transferable) skills (for codes see Commentary: Key Skills Map).

D1 Written communication (s1)

D2 Interpersonal communication (s2)

D3 Oral presentation (s3)

D4 Teamwork (s4)

D5 Planning and organisation (s5)

D6 Initiative (s7)

D7 Adaptability (s8)

D8 Numeracy (s9)

D9 Computer Literacy (s10)

10(b) Programme Intended Learning Outcomes: Teaching and Learning Methods and Strategies

The School of Mathematics & Statistics uses a variety of methods for teaching and learning. These include lectures, class tutorials, practical classes, homework assignments, mini-projects, directed reading and student seminars. See Commentary: Key Skills Map, for details of how the Cognitive and Key Skills listed in Section 10(a) C and D are introduced and practised throughout the degree programme.

- **Lectures** are the principal vehicle for presenting the essential material which defines the module, and provide the key element towards achieving the programme intended learning outcomes in Section 10(a) A and B. Notes taken by students are often supplemented by handouts.
- **Class tutorials** are used to support lectures and to enhance students' learning by providing an opportunity to discuss previous or current homework problems, or to clarify issues arising from lectures. Together with lectures, tutorials are the main vehicle for developing the cognitive skills in Section 10(a) C. The arrangements for class tutorials were reviewed at one of our School Teaching Forums. Class tutorial groups are typically about 20 in Stage 1 and about 35 in subsequent stages. We have deliberately chosen to concentrate support on Stage 1 in order to strengthen the base for later study.
- **Practical classes**, held in a computer teaching laboratory, introduce students to the use of computer packages. At Stage 1, students learn to use Minitab for data analysis and simulation studies and the computer algebra package Maple. In later stages, students may be expected to use the computer network for homework assignments. Practical classes contribute towards a number of key transferable skills listed in Section 10(a) D.
- **Homework assignments** are designed to allow students to test and develop their understanding of the material presented in lectures. The assignments are usually set on a fortnightly rota. Typically, there are questions of varying difficulty; answers to some of the questions are handed in for marking and contribute to both formative and summative assessment. Other problems are provided for further practice or for discussion in the tutorial classes. Model solutions to all homework exercises are made available to students when the marked work is returned. The homework assignments develop cognitive and key skills in Section 10(a) C and D, while reinforcing knowledge and understanding and subject-specific professional skills in Section 10(a) A and B.
- **In-class tests** are used in some courses, to give students practise in problem solving under exam-like conditions. Cognitive and Key Skills listed in Section 10(a) C and D are developed.
- In a few courses, particularly in Applied Statistics, **mini-projects** (including group work) are used to encourage students to investigate and write a report on some topic. Cognitive and key skills in Section 10(a) C and D are developed by mini-projects, while knowledge and understanding, and subject specific professional skills in Section 10(a) A and B, are reinforced.

10(c) Programme Intended Learning Outcomes: Assessment Strategy and Methods

The standard assessment format, used for the majority of lecture courses, is based on a written examination (counting for at least 80% of the assessment), together with an appropriate mixture of course assignments, in-course tests and mini-projects. These methods all enable assessment of the Programme Intended Learning Outcomes in Section 10(a) A and B, while the range of assessment techniques allows assessment of various Cognitive and Key Skills as listed in Section 10(a) C and D (see Commentary: Key Skills Map for details). Assessment by unseen examinations is seen as a valid and reliable method of assessing both ability and knowledge. Details of the specific assessment modes and weightings, for each module, are set out in the module specification in the Degree Programme Handbooks.

We use a standard format for examination papers in which there is a compulsory Section A, consisting of short, straightforward questions which cover the whole module, and a Section B, normally offering a choice of 2 out of 3 questions which are longer and designed to test a greater depth of understanding. Our external examiners have commented favourably on the merits of this structure. Science Faculty Teaching Committee and the University's internal Subject Review panel have also commended this approach as an example of good practice.

11 Programme Curriculum, Structure, and Features:

Curriculum design strategy

A distinctive feature of the School's curriculum is the flexible structure, operating within the University's modular system, in which Joint Honours students can choose pathways which allow them to either:

a) obtain a broad grounding in mathematics or statistics

b) specialise in particular areas of mathematics or statistics of interest

The curriculum was completely revised in preparation for university-wide modularisation and semesterisation in 1995. It is reviewed periodically by Board of Studies and School Teaching & Learning Committee. The School participates in the NEMAS (North of England Mathematics and Statistics) Forum which meets to discuss the changing needs of the curriculum.

Course structure by stage

Students registered for a BSc Joint Honours degree in two subjects normally study modules to the value of 60 credits in each subject in each of the three years. In Mathematics or Statistics, the JH component is a subset of the single Honours programme.

It is in the nature of the subjects of Mathematics and Statistics that there is progression in the material taught. In **Stage 1** of Joint Honours, the School aims first to consolidate and reinforce the students' knowledge on entry, and to provide a sound body of introductory material in mathematical methods, and in two of the three subject areas of Applied Mathematics, Pure Mathematics and Statistics (appropriate to the degree programme). This provides the foundation for subsequent study in these areas.

In **Stage 2**, students undertake further core study; 20 credits in each of two of the three areas of Applied Mathematics, Pure Mathematics and Statistics (appropriate to the degree programme). These modules develop relevant knowledge and experience of more theoretical concepts and further analytical techniques.

Also in Stage 2, students choose 20 credits options from among other Stage 2 modules offered by the school. This allows some specialisation, if desired, although students may choose the 20 credits of core study from the third area of study. It is also possible to catch up with the subject area omitted at Stage 1.

In **Stage 3**, a wide choice of modules is provided, extending over the three subject areas. This allows students either to specialise or to continue to study a broad curriculum. Students may also choose a limited number of Stage 2 modules, including some which are provided on a "rolling" basis in alternate years in order to widen the choice available. The student must choose 60 credits in the school of mathematics and statistics (appropriate to the degree programme), and 60 credits in their other subject. Students may be permitted by the senior tutor to take other than 60 credits in the school.

The Programmes Statistics and Accountancy (NG43), Statistics and Economics (GL31), Statistics and Geography (GF38) and Statistics and Information Systems (GG35) have a two-stream system. In addition to the Course Structure described above, available to students with A-Level Mathematics, there is another stream for students without A-Level Mathematics. In this programme, students in stage 1 will take foundation mathematics courses together with introductory material in Statistics. Broad introductory study of one of the areas of Pure Mathematics and Applied Mathematics will then take place in Stage 2, along with further study of core material in Statistics. This structure ensures that students without A-Level Mathematics will receive the appropriate grounding in mathematics prior to undertaking broader study of mathematics and statistics in Stage 2 and specialising in statistics in Stage 3.

12 Criteria for Admission:

See the overarching document for Joint Honours degrees.

13 Support for Students and their Learning:

Induction

The School of Mathematics & Statistics contributes to a comprehensive induction programme for new JH students, which introduces the facilities for study available both at University and School level. On acceptance, students are sent a copy of the student handbook and its contents are discussed with them at induction. Students are also offered general advice about the course structure and the choices open to them at Stage 1. The handbook includes information about the School, and on the respective roles and responsibilities of staff and students. In other sessions, guidance is given on study skills and IT skills using the booklets "Winning at Mathematics" and "Introduction to the Oracle cluster", which are issued to all new students. A senior teacher from a local school addresses new students on the transition from School/College to University life. The School's handbooks were identified as examples of "good practice" by both the Faculty Teaching Committee and the Subject Review panel.

At subsequent stages, advice is provided about course structure, and the pathways open to students, at general meetings held in April; this allows students to pre-register their choice of modules in early May, for the following academic year, so that the timetable can be organised to allow the maximum number of student choices. Further detailed advice about modules is available during Induction Week at the start of the next academic year. Students also discuss their choices with their personal tutors and, where necessary, with the Degree Programme Directors (DPDs). Changes of module choices from pre-registration are allowed subject to the constraints of the timetable. Revision sessions on key material taught the previous year are provided to help students to prepare for their new modules.

Academic and Pastoral Support

General help on academic problems is available in class tutorials (see Section 2) and from lecturers individually.

Each student has a personal tutor who is responsible for providing access to pastoral care. The School has a designated member of staff as Joint Honours adviser. Students identified on entry as requiring particular support (e.g. mature students, international students, students with disabilities, or those with an unusual background) are assigned to more experienced tutors. In a change of policy arising from a Teaching Forum on pastoral care, tutors meet their tutees at the start of the year and at the end of terms 1 and 2, rather than at the start of each semester.

Support for students who encounter serious personal difficulties is provided by the University's Student Counselling Service. In addition, more general advice is available from the Student Advice Centre. The Joint Honours Adviser takes responsibility for the pastoral care of Joint Honours Mathematics and Statistics students, in conjunction with the Degree Programme Director for Joint and Combined Honours and the Degree Programme Director for Mathematics & Statistics. They monitor the progress of students as described below.

Monitoring Student Progress

The performance of all students is carefully monitored. Records of work handed in and marks obtained on all modules are held by the Degree Programme Directors. In Stage 1, attendance at tutorials is also checked, and absentees contacted, in order to encourage good work habits. The progress of all students is reviewed regularly by the DPDs in Mathematics & Statistics; students, who give cause for concern (whether by failing to hand in work or by poor performance), are called in by the relevant DPD for that Stage. The problems are discussed, and help and advice are offered. Persistent offenders may be required to demonstrate regular attendance at all classes by obtaining lecturers' signatures. Personal tutors are advised when a tutee's progress is giving cause for concern.

Careers Advice

The University Careers Service provides support and advice for students throughout their course of study. One of the careers advisers gives an introductory talk to Stage 1 students at induction and further talks in subsequent stages. At Stage 2, students are invited to assess their personal skills and are given guidance as to ways in which their skills profile might be improved. Also in Stage 2, students are given advice on how to prepare a draft CV.

Early in their final year, students are given further advice on the career opportunities available and are encouraged to use the Careers Service facilities. Personal tutors, and one or two members of staff with particular experience, are also able to offer guidance.

For those students wishing to proceed to further academic study or research, a presentation is organised by the Director of Postgraduate Teaching.

Learning Resources: Physical

Many lectures take place in Merz Court. The lecture and tutorial rooms within the School are of a good standard and suitable for their purpose.

The computer cluster in Merz Court has 40 fast PCs (running WindowsXP) and 2 laser printers. It is conveniently situated within the School and is used as the primary teaching laboratory for practical classes. Mathematics and Statistics students also use the cluster when carrying out homework assignments and for general IT purposes, such as word-processing.

The cluster provides access to campus-wide facilities such as the central file space servers, electronic mail and the internet. Extensive software is available, ranging from the general, such as standard Microsoft applications (Word, Excel etc.), to the technical, such as the statistical package Minitab and the general symbolic algebra package Maple. The campus-wide windows network ensures that software and data sets used in our modules are accessible from any cluster (including the Halls of Residence), which is of great convenience to all users, both staff and students. A teaching room in the School has been designated as a reading room for private study by students; this facility is well-used. Students have access to a full-range of library services provided by the award-winning Robinson library.

Learning Resources: Staff

The academic staff are the primary teaching and learning resource. Staff have a wide range of experience in Mathematics and Statistics, with particular expertise in the research areas of functional analysis, group theory, fluid dynamics, cosmology, applied statistics, medical statistics and applied probability. Some staff also have extensive consultancy experience. This expertise informs our teaching, especially at the more advanced levels. All experienced staff act as personal tutors to students.

PhD students in the School also contribute to teaching by marking homework and conducting some first-year tutorials.

The academic staff and students are supported by the clerical staff in the General Office. The secretaries deal with many student enquiries on a day-to-day basis and they provide a helpful and friendly service.

The Computer Officer is responsible for maintaining the School's computing facilities and in advising on the purchase of hardware and software.

14 Methods for evaluating and improving the quality and standards of teaching and learning:

Monitoring Quality

Recently, the School has moved to a web-based questionnaire where students are asked to comment on all the modules they are taking in that Semester. If students do not reply fairly quickly they are sent email reminders and this has led to a greatly increased response rate compared to the previous paper-based system. At the end of the questionnaire the students are asked to comment on the overall structure of their degree course. Summaries of the responses are discussed at Staff-Student Committee, School Teaching and Learning Committee and the Board of Studies. New staff, and staff giving a new module, typically give out module questionnaires part way through the module to gain more immediate feedback from the students.

The School participated in the University's biennial "Taught Programme Review", until this was replaced by a scheme of Degree Programme Review, under which the school reviews its degree programmes and reports to the Faculty Teaching Committee. There is also a less frequent process of "subject review" in which a panel, which includes a QAA trained reviewer and external reviewers, assess the nature and quality of provision.

Committees for Monitoring Quality

The School's **Board of Studies** has a membership which includes all teaching staff, together with three students nominated by the Staff/Student committee. It is responsible for the undergraduate programme including the Mathematics and Statistics components of these Joint Honours courses. All proposals for new courses, or for changes to regulations or practices, must be approved by the Board before being sent on (where appropriate) to Faculty Teaching & Learning Committee and University Teaching & Learning Committee.

The **School Teaching and Learning Committee** meets frequently to initiate, discuss or respond to current teaching and learning issues. The agenda and minutes are circulated to all staff, thereby ensuring wide debate before proposals are brought to Board of Studies.

The **Board of Examiners** meets, primarily, to discuss the examination results of each student and to determine or advise on the progress after the current stage. Matters of concern raised by the External Examiners, or by the Board, are discussed by School Teaching & Learning Committee and Board of Studies. Faculty Teaching & Learning Committee reviews External Examiners' reports, and the School responses thereto, annually.

The **Staff/Student Committee**, which includes Joint Honours students from each Stage, normally meets six times a year to discuss matters of mutual concern, both those raised by the students and any items referred to it by the School Teaching& Learning Committee or the Board of Studies. The outcome from these discussions is reported to the Head of School or School & Learning Teaching Committee or Board of Studies, as appropriate. E-mail is used to broadcast messages to targeted groups of students, e.g. to give information relating to a module or year group.

There is a representative from the School of Mathematics and Statistics on the **Joint Honours Board of Examiners**, and on the **Joint Honours Board of Studies**.

15 Regulation of Assessment

All work is marked against the University mark scheme for which the 'pass mark' is 40. Modules use a common set of published marking criteria supplemented, as appropriate, for specific pieces of work, with additional criteria.

Most modules are assessed by a combination of in-course assessment and a written examination taken at the end of the semester in which the module finishes. A variety of assessment methods are used, including: assessment of worked exercises, individual mini-projects, unseen examinations and open book examinations. The methods of assessment, their relative weighting and their timing appear in every module description.

The final honours average is calculated on the basis of a Stage 2 average and a Stage 3 average, weighted in the ratio 40:60. Honours marks are based on the University scale:

Mark	**Degree Class**
≥ 70	First
60-69	Upper Second
50-59	Lower Second
40-49	Third
<40	Fail

Module marks are combined in proportion to their credit value. The module class criteria are detailed in Commentary: Degree Classification Criteria.

Assessment is overseen by a Board of Examiners that interprets marks and makes recommendations regarding progression and, ultimately, the class of degree to be awarded. The Board consists of all staff who examine modules on the programme, plus three External Examiners: one from each of the areas Pure, Applied and Statistics.

The External Examiners are independent of the School. Their role is to:

Comment on honours examination papers
Comment on the marking of examination scripts
Comment on coursework, including mini-projects
Contribute to the discussion at the Board of Examiners
Report to the University regarding standards used

16 Indicators of Quality and Standards:

The School of Mathematics and Statistics was awarded an excellent **23 out of 24** points in the QAA Subject Review in 2000. We were particularly commended for *excellent teaching, student support and guidance, learning resources*, and for having a *well structured curriculum.*

In the 2001 Research Assessment Exercise, the Statistics and Pure Mathematics submissions were each awarded **5**, and the Applied Mathematics submission was awarded **4**.

17 Other Sources of Information

This specification provides a concise summary of the main features of the programme and of the learning outcomes that a typical student might reasonably be expected to achieve if she/he takes full advantage of the learning opportunities provided. The accuracy of the information contained is reviewed by the University and may be checked by the Quality Assurance Agency for Higher Education.

In addition, information relating to the course is provided in:

The University Prospectus

The School Prospectus

The University Degree Programme Regulations

The School Degree Programme Handbook: http://www.ncl.ac.uk/math/internal/

The QAA Subject Review Report

Newcastle Programme Specification

School of Mathematics and Statistics web page: http://www.ncl.ac.uk/math/undergrad/