Programme specification for	**BSc Joint Honours Physics**

1	**Awarding institution**	University of Newcastle upon Tyne
2	**Teaching institution**	University of Newcastle upon Tyne
3	**Final award**	BSc (Hons)
4	**Programme title**	Joint Honours in Science
5	**Programme accredited by**	
6	**UCAS code**	FG31 Joint Honours in Mathematics & Physics FG34 Joint Honours in Computing Science & Physics
7	**QAA subject group**	Physics and Astronomy

8	**Date of revision**	October 2004

9 Programme Aims

The purpose of our provision is to produce graduates who have a sound knowledge and understanding of the fundamental aspects of physics and an appreciation of general and, where appropriate, specialist applications.

Our graduates will have a range of skills including laboratory, computing, mathematical, problem-solving and communications skills.

Our graduates will be capable of taking a wide range of employment and training opportunities and professional careers in physical science and cognate areas.

The programme meets the national benchmark statements for physics.

10(a) Programme Intended Learning Outcomes

At the end of their degree programme students will have developed:

A *Knowledge and understanding*

- A 1 a sound knowledge and understanding of fundamental aspects of physics,
- A 2 an appreciation of general applications of physics,
- A 3 a complementary experience of mathematics or computing in the other part of their Joint Honours Degree Programme

B *Subject-specific / Practical skills*

- B 1 core mathematical skills,
- B 2 scientific computing skills,
- B 3 practical laboratory skills,

C *Cognitive skills*

- C 1 analytical, critical evaluation and problem-solving skills,

D *Key skills*

- D 1 in IT,
- D 2 in numeracy,
- D 3 in problem solving,
- D 4 and the ability to communicate, in writing, in a manner appropriate to the target audience.

10(b) Teaching and Learning Methods and Strategies

A Knowledge and understanding

Teaching Strategy
The primary method for teaching knowledge and understanding of the fundamental aspects of physics (A1) is through lectures supplemented by marked exercises set by the lecturers where students gain a greater insight into the topics. The applications of physics (A2) are integrated, where appropriate, within the lecture courses. The 'technical report', set in Stage 3, provides a broader outlook (A2) and the final year options offer some insight into physics in a wider context.

Learning Strategy
Problem solving classes in Stage 1 provide guidance on learning of the main branches of physics (A1). The learning in Stage 1 is supported by a comprehensive text that includes a facility for self-assessment. The class tutor has an overview of the effectiveness of student learning and guides individual students through the marking of their work. Students ask questions during, and after, the lectures and are encouraged to participate actively in problem-solving classes. In Stages 2 and 3 the effectiveness of student learning is monitored and guided by work set and marked by the lecturer. Students are provided with reading lists and they are expected to read around the taught material to enhance their knowledge and understanding of the taught material. As the programme proceeds the benefits of supplementary reading become a more important and this greater emphasis on independent learning promotes a self-reliance that equips students for life-long learning. An appreciation of the general applications (A2) is achieved in a similar way. Experience of laboratory work offers an immediate awareness of way fundamental laws are applied to practical situations.

Assessment Strategy
Assessment of the fundamental aspects (A1) is mainly by unseen written examination papers. In Stages 1 and 2 there is a policy of assessing the breadth of knowledge with compulsory short questions coupled with a choice of longer questions that probe the depth of understanding. In Stages 1 and 2 a small component of formative assessment of lecture courses is based on the work set by the lecturer during the course. This encourages a continuous effort in learning and promotes a sound understanding.
The student's appreciation of the way that the principles are applied (A2) is assessed in the examination papers and in practical and project reports.

B Subject specific / Practical Skills

Teaching Strategy
In Stage 1 students are taught core mathematical skills (B1) through MAS161/3 in FG34 and MAS101, MAS102 and MAS121 in FG31. In Stage 2 mathematical skills are taught in MAS251/2. Computing skills (B2) are taught to FG31 students through lectures, supervised practical computer sessions and take away exercises. Basic practical laboratory skills (B3) are taught through supervised laboratory sessions in Stage 1 and further experience is offered in Stage 3. Guidance in practical work is given through induction presentations, laboratory practical manuals, laboratory manuscripts and guidance from laboratory demonstrators.

Learning Strategy
Students acquire core mathematical skills (B1) by practising mathematical problems. Problems are set as part of the mathematics modules. Submitted work is annotated and returned to the students. Students on FG31 acquire computing skills (B2) through the experience of using *Maple,* writing computer programs and making them run. Practical laboratory skills (B3), are gained through 'hands on' experience in the Stage 1 physics laboratory.

Assessment Strategy
Mathematical skills (B1) are assessed by unseen written examinations. Assessment of laboratory work (B3) is by written reports and by the assessment of laboratory notebooks. Computing skills (B2) are assessed by the submission of programs.

C Cognitive Skills

Teaching Strategy
Analytical and critical evaluation skills (C1) are inherent in the approach adopted by physicists and they form an intrinsic part of physics teaching. Examples of processes and phenomena encountered in physics modules are analysed in terms of physical laws and fundamental underlying principles. In experimental physics, and in computer exercises, students are encouraged to assess the accuracy of the predicted outcomes and to assess, critically, their validity.. In Stage 3, a compulsory course on problem-solving teaches students to approach problems in a systematic way by adopting a strategy for their solution based on an understanding of the underlying principles.

Learning Strategy
Analytical and critical evaluation skills (C1) are learnt through using a systematic approach to problem solving, laboratory work, computing exercise and through a reflective evaluation their outcomes. Interviewers question the motivation for actions and probe the validity of conclusions to promote a greater understanding and encourage an ethos of defending a reasoned argument.

Assessment Strategy
Assessment of analytical and critical evaluation skills is an integral aspect of marking the work submitted in written examinations, computing reports and laboratory reports.

D Key skills

Teaching Strategy
In Stage 1, basic IT skills (D1) are taught in PHY103. Help is available at the main University clusters. Numeracy (D2) is an integral part of the physics teaching programme and is found at each Stage. Problem-solving (D3) is also an integral part of the programme. It is taught specifically in the Stage 1 problem-solving classes, mostly in the context of solving physics problems, but the techniques are generic. Teaching of problem-solving skills culminates in Stage 3 where there is a course devoted to physics problem-solving in physics that forms part of PHY352. Written communications (D4) are taught mainly as part of the laboratory classes where advice is offered on how to communicate, effectively, in writing.

Learning Strategy
Students learn key skills in IT (D1) through practice at the keyboard. Numeracy (D2) and problem-solving (D3) are an integral aspect of most modules in the programme. Skills in written communication (D3) are learnt through the writing of reports and reflection on their assessment.

Assessment strategy
Key skills in IT (D1) are assessed though course-work. Numeracy (D2) and problem-solving (D3) are an integral aspect of most modules in the programme. Written communication (D3) and effective use of IT (D1) forms part of the assessed work in the Technical Report in PHY352, in laboratory and computer reports, and, where selected, in project reports.

11 Programme Curriculum, Structure, and Features

The BSc Joint Honours programme, Physics is paired with either Mathematics or Computing Science. The degree programme is divided into three Stages. Each Stage requires the study of modules with a total credit value of 120 credits. You must study a total of 360 credits to be eligible for the award of the degree. Each credit requires a total student effort of 10 hours, that may include lectures, course-work, laboratory sessions, computing, private study, and revision.

Students are required to undertake laboratory practical work in Stage 1.

Stage 1 normally contains 60 credits of basic physics in FG31Physics / Mathematics and 40 credits of basic physics in the case of FG34 Physics / Computing Science.

Stage 2 contains lecture courses on four fundamental aspects of physics:
atomic physics, statistical mechanics, electromagnetism, quantum mechanics.
Students on the BSc Physics / Computing Science degree take a further 20 credits of compulsory mathematics to support their understanding of the above topics.
Students on the BSc Physics / Mathematics students take 20 credits of further physics that includes computing skills, thermodynamics and solid state physics.

Stage 3 contains lecture courses on classical mechanics, nuclear physics, solid state physics and relativity together with an option module to broaden the experience of physics. A compulsory component promotes problem-solving skills and written communication skills.

Compensation of marginally failing marks in up to 40 credits is allowed by the regulations. Two resit attempts are permitted.

An honours degree is awarded if the average weighted mark in Stages 2 and 3 is 40 or more.

Particular features of the programme are:
(i) the essential aspects of undergraduate physics are covered,
(ii) there is an opportunity to include experimental physics in your programme,
(iii) there is an opportunity to study two subjects for your degree.

BSc Joint Honours Programme Structure
Physics component

⇓

NORMAL ENTRY POINT

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Stage 1

PHY101	Fundamental Physics IA	(20)	Cp	A1	B3	C1	D2,3
PHY102	Fundamental Physics IB	(20)	Cp	A1	B3	C1	D2,3
PHY103	Physics MA	(20)	Cp	A1,2		C1	D1,2,3
	[Available only to BSc Mathematics / Physics students.]						

PASS 120 credits to proceed

⇓

Stage 2

PHY226	Fundamental Physics IIA	(20)	Cp	A1,2		C1	D3
PHY227	Fundamental Physics IIB						
PHY202	Maths Skills for Physicists	(20)	Cp		B1	C1	D3
	[BSc Computing Science / Physics only.]						
PHY204	Further Physics II	(20)	Cp	A1,2	B2	C1	D1,2
	[BSc Mathematics / Physics only.]						

PASS 120 credits to proceed

⇓

Stage 3

PHY351`	Fundamental Physics IIIA	(20)	Cp	A1,2	C1	D3,
PHY352	Fundamental Physics IIIB	(20)	Cp	A1,2	C1	D3,4
PHY376	Relativity	(10)	Cp	A1	C1	
	plus option of value of 10 credits		Op	A2	C1	

AVERAGE WEIGHTED MARK OF 40
OR MORE IN STAGES 2 AND 3

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AWARD OF HONOURS BSc DEGREE

Cp: compulsory module. Rec: Recommended module. Op: Option module

12 Criteria for Admission

Entrance requirements

GCSEs required
No GCSE subjects are specified.

A-Level Subjects and Grades
3 year BSc: B (Physics), B (Maths), C.

Alternative entry qualifications
Scottish Highers: A (Phys), A (Maths), B, B. (Advanced Highers preferred.)
I.B. A minimum of 30 points is required including Physics(HL) 6 and Mathematics (HL) 6.
Irish Leaving Certificate: ABBBB. A in Mathematics.

Access Qualifications
For candidates offering HEFC the mathematical component should be at distinction level.
Other Access to HE courses are considered on an individual basis.

Admissions policy
To offer a place, without discrimination, to suitably qualified applicants that have an academic interest in the programme.
Places are offered primarily on the basis of predicted grades at A-level.
Students, to whom offers are made, are invited to an open day to meet staff and to see the facilities and the university campus. Attendance is recommended but is not compulsory.
Overseas students are normally admitted on the basis of their qualifications.

Arrangements for non-standard entrants
Normally non-standard entrants are interviewed. Applicants from abroad are not required to attend an open day but they are very welcome to come.
Where English is not their first language applicants must have a proficiency equivalent to IELTS 6.5.

13 Support for Students and their Learning

Induction
An induction programme is provided for new students at the start of the programme.
The aims and the learning outcomes of the programme of study are outlined and the way in which the learning outcomes are achieved and assessed. There is study advice tailored to the needs of physicists. Students are informed of the facilities provided by the University.

Induction sessions are also provided for students returning to their programme of study.
The aims for the year are set out and the sessions contain specific advice relating to choice of optional modules and practical and computing work.

Study skills support
Advice on study skills is offered during Induction Week. Personal tutors can offer advice on how to study effectively. Self-tuition support is provided by the University Library.
Where appropriate, advice on specific study methods is offered within the modules.

Academic support
Induction sessions give general advice at the start of each academic year.
Personal tutors offer further advice appropriate for individual students. There is access to a Personal Tutor and a Subject Co ordinator throughout the year and access to the University Student Office regarding welfare or any problems that might affect a student's progress.

Pastoral support
Each student is assigned a personal tutor who provides pastoral care, advises on module selection and takes an overview of students' performance. The personal tutor is usually chosen from the School offering one of the subjects in the Joint Honours combination. Help is also available from the Subject Co-ordinators in the School teaching the other half of the degree programme. The University also offers students help by trained counsellors. There is access to the University Accommodation Office, the Student Union Society resources,notably the Welfare Officer and access to the University Careers Service.

Support for Special Needs
The University Disability Unit offers help and advice through a Disability Officer.

Learning resources
Registered students have access to the Robinson Library and the facilities of the University Computer Service.

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

The standards and quality of the programmes are monitored continuously by reference to feedback from staff, students, external examiners and by regular reviews.

Module reviews
Modules are reviewed each year by module leaders in the light of the experience gained in teaching the module and feedback from student evaluation questionnaires.

Programme reviews
The Joint Board of Studies in Physics reviews the programme regularly in order to enhance and develop it. Staff and student evaluations are considered. The Board considers progression rates, degree classes achieved and graduate employment statistics.
The Joint and Combined Honours Board of Studies takes an overview of matters related to the running of the Joint and Combined Honours programmes.

External examiner reports
Each year the Joint Board of Studies in Physics reviews the comments made by the External Examiners in Physics and confirms any action points to the SAgE Faculty office. The External Assessor's report is reviewed by the Joint and Combined Honours Board of Studies.

Student evaluations
Student evaluation of the modules is sought annually. The modules are reviewed by module leaders in the light of student comment and comments made in the Physics Staff-Student Committee and the Joint Honours Staff-Student Committee.

Feedback Mechanisms
A summary of the comments made by students about the modules in the previous year is reported to the current students at the start of the module.

Faculty and University Review Mechanisms
The University has a regular system of Degree Programme Review.

15 Regulation of Assessment

Pass Mark
The pass mark in all modules is 40. Modules are marked in accordance with published marking criteria. Details of the assessment are given in the module descriptors.

Course Requirements
Normally, students are required to pass all modules to progress to the following Stage. Compensation is permitted for marginal failures in up to 40 credits at Stages 1and 2 provided no mark is less than 35. There are two resit opportunities. Module marks are combined in proportion to their weighted credit value.

Weighting of Stages
All modules at Stages 2 and 3 count towards the classification of the award.
The modules at Stages 2 and 3 are weighted equally.

The University Common Marking Scheme

70 or more-	First Class
60 - 69	Second Class (Division 1)
50 - 59	Second Class (Division 2)
40 - 49	Third Class
39 or less	Fail at honours level.

Role of the External Examiners
The External Examiners in Physics, who are distinguished members of the academic community, are appointed by SAgE FTLC on the recommendation of the Joint Board of Studies in Physics.

The External Examiners in Physics approves written questions that count towards honours, advises on their standard, vets their assessment and the assessment of projects and other written work.

The External Examiner may interview graduating students to assist the evaluation of their degree classification and/or a means of establishing the comparability of the standards of the programme. The External Examiner attends the meeting of the Board of Examiners normally held at the end of the academic year that advises on degree classifications and contributes to the evaluation process.

The External Examiner reports to the University on the conduct of the examining process and the comparability of the standards of the Physics programme.

The Joint Honours and Combined Honours programme has an External Assessor who oversees and advises on the examining process.

16 Indicators of Quality and Standards

Internal Review Reports
The programmes have passed the internal reviews conducted by the University.

QAA Report
The physics programmes were reviewed by the QAA in November 1999
2I points were awarded out of a maximum possible 24.

17 Disclaimer and sources of further 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. It should be noted that there may be variation in the range of learning opportunities reflecting the availability of staff to teach them.

While every effort will be made to ensure that the module or modules described in the programme specification are available, this cannot be guaranteed.

The accuracy of the information 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 of Newcastle Undergraduate Prospectus

The Physics Prospectus

The Degree Programme Handbook

The University Regulations

The Degree Programme Regulations

The QAA Subject Review Report November 1999 (http://www.qaa.ac.uk)