BSc PHYSICS with COMPUTER SCIENCE UCAS Code: F3G4

Degree programme for students entering Part I in October 2002

Awarding Institution:	The University of Reading
Teaching Institution:	The University of Reading
Relevant QAA subject benchmarking group:	Physics
Faculty of Science	Programme length: 3 years

Date of specification:	20 March 2004
Programme Director:	Dr D Dunn
Programme Advisers:	Dr P A Hatherly and Dr P A Mulheran
Board of Studies:	MMP

Accreditation: This degree programme has been accredited by the ***Institute of Physics***

Aims

The aim of the course is to provide students with an extensive knowledge and practical experience in Physics. In addition it should provide a sufficient knowledge of Computer Science for students to be able to develop scientific and other software.

Transferable skills

The University's Strategy for Teaching and Learning has identified a number of generic transferable skills that all students are expected to have developed by the end of their degree programme. In following this programme, students will have had the opportunity to enhance their skills relating to career management, communication (both written and oral), information handling, numeracy, problem-solving, team working and use of information technology.

By the end of the programme students are expected to have gained experience and show competence in the following transferable skills: IT (word-processing, using standard and mathematics software), scientific writing, oral presentation, team-working, problem-solving, use of library resources, time-management, career and management and planning.

Programme content

The profile that follows states which modules must be taken (the compulsory part), together with one or more lists of modules from which the student must make a selection (the "selected" modules). Students must choose such additional modules as they wish, in consultation with their programme adviser, to make 120 credits in each Part. The number of modules credit for and the level of each module are shown in brackets after its title.

PART 1 (2003-2004)

Compulsory Modules

Module Code	*Module Name*	*Credits*	*Level*
PH1001	Concepts in Physics	20	C
PH1002	Classical Physics	20	C
MA111	Mathematics for Scientists	20	C
PH1004	Experimental Physics I	20	C
CS1C2	Introductory Programming 1	10	C
CS1D2	Introductory Programming 2	10	C
CS1H2	Functional Programming	20	C

PART 2 (2004-2005)

Compulsory Modules

Module Code	*Module Name*	*Credits*	*Level*
PH2001	Thermal Physics	20	I
PH2002	Quantum Physics	20	I
PH2003	Electromagnetism	20	I
PH2005	Introductory Computational Physics	20	I
CS2E2	Software Engineering	10	I
CS2D2	Databases	10	I
CS2G2	Algorithmic Techniques	20	I

Note: PH2001 contains 5 credits of Career Skills

PART 3 (2005 - 2006)

Compulsory Modules

Module	*Module Name*	*Credits*	*Level*
PH3701	Relativity	10	H
PH3702	Condensed Matter	10	H
PH3703	Atomic & Molecular Physics	10	H
PH3801	Nuclear & Particle Physics	10	H
PH3003	Project	40	H
PH3808	Computational Physics II	10	H
PH3709	Statistical Mechanics	10	H

Selected Modules

Select one of the following option groups

Group A

CS3B2	GUI, Web & Multimedia Design	10	H
CS3F2	XML Technologies & Applications	10	H

Group B

CS3B2	GUI, Web & Multimedia Design	10	H
CS3J2	Computer Graphics 1	10	H

Group C

CS3L2	Neural Computation	10	H

Progression

To proceed to Part 2 of this degree it is sufficient to obtain an average of at least 40% overall with no module mark below 30%.
Marks of less than 30% in modules to a total of 20 credits, except for modules PH1001, PH1002, MA111 and PH1004, may be condoned provided that the candidate has pursued the course for the module with reasonable diligence and has not been absent from the examination without reasonable cause.

To proceed to Part 3 of this degree it is sufficient to obtain an average of at least 40% overall, with no module mark below 30%.
Marks of less than 30% in modules to a total of 20 credits, except modules PH2001, PH2002 and PH2003, may be condoned provided that the candidate has pursued the course for the module with reasonable diligence and has not been absent from the examination without reasonable cause.

Summary of teaching and assessment

A wide variety of teaching/learning methods are used; lectures; problem-solving workshops; independent-learning; FLAP; practical laboratories; computational laboratories; projects.
The teaching is organised in modules: In a typical lecture-based module the teaching is supplemented by problem-solving workshops that provide interaction between student and lecturer.
Modules are assessed by a combination of continuous assessment and formal examinations. The aim of the continuous assessment is to provide feedback to each student as the module progresses.
The final-year project (under the guidance of a project supervisor) provides an opportunity for independent learning and investigation.

The contributions of Part 2 and Part 3 to the final assessment are in the proportions of 1:2.

Admission requirements

Entrants to this programme are normally required to have at least:
UCAS Tariff 280 pts, including 180 pts in physics and mathematics.
There is no points distinction between BSc and MPhys entry but MPhys has more stringent progression rules at the end of the second year.

Admissions Tutor: Dr M Hilton.

Support for students and their learning

University support for students and their learning falls into two categories. Learning support includes IT Services, which has several hundred computers and the University Library, which across its three sites holds over a million volumes, subscribes to around 4,000 current periodicals, has a range of electronic sources of information and houses the Student Access to Independent Learning (S@IL) computer-based teaching

and learning facilities. There are language laboratory facilities both for those students studying on a language degree and for those taking modules offered by the Institution-wide Language Programme. Student guidance and welfare support is provided by Personal Tutors, the Careers Advisory Service, the University's Special Needs Advisor, Study Advisors, Hall Wardens and the Students' Union.

Within the contributing departments additional support is given though practical classes in Part 1. The development of problem-solving skills is assisted by extensive provision of model solutions to problems. There is a Course Adviser to offer advice on the choice of modules within the programme.

Career prospects

In recent years the graduates on Reading physics-based degrees have progressed to careers in

- Scientific Research in Government and Industrial Laboratories
- Computing and IT industry
- Electronic engineering
- Production engineering
- Management in industry
- Accountancy and Financial Sector

and also to Further education (PhD, MSc and BEd degrees).

Opportunities for study abroad

There are no formal arrangements for this degree programme but a transfer to the degree *Physics with a Year in Europe* may be possible.

Educational aims of the programme

The aim of the course is to provide students with an extensive knowledge and practical experience in Physics. In addition it should provide a sufficient knowledge of Computer Science for students to be able to develop scientific and other software.

Programme Outcomes

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, skills, qualities and other attributes in the following areas:

Knowledge and Understanding

A. Knowledge and understanding of:

1. The empirical nature of physics: that theories must be testable and must be tested quantitatively.
2. The core topics of physics: classical and quantum mechanics; thermal and statistical physics; wave, optics and electromagnetism; particle physics.
3. The application of physical and mathematical methods to the description, modelling and prediction of physical phenomena.

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Teaching/learning methods and strategies

The knowledge required for the basic topics is delineated in formal lectures supported by problem-solving workshops.

The knowledge required for more specialist topics is enhanced through self-learning based on guided reading, problem solving and project work.

Assessment

Most knowledge is tested through a combination of coursework and unseen formal examinations. Practical work is assessed by means of logbooks, reports and viva examinations. Dissertation and oral presentations also contribute.

Skills and other attributes

B. Intellectual skills – the ability to:

1. Recognise and use subject-specific theories, paradigms, concepts and principles
2. Analyse, synthesise and summarise information critically
3. Apply knowledge and understanding to address familiar and unfamiliar problems
4. Collect and integrate evidence to formulate and test hypotheses

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Teaching/learning methods and strategies

Most modules are designed to develop 1 and 2. 1, 2 and 3 are enhanced through the use of coursework assignments, and project work. 4 is enhanced mainly by project work.

Assessment

1-3 are assessed indirectly in most parts of the programme. 3 is also assessed by a general problem-solving paper in finals. 4 is assessed in the final-year project.

C. Practical skills

1. Planning, conducting, and reporting on experimental investigations
2. Planning, conducting, and reporting on theoretical/computational investigations
3. Referencing work in an appropriate manner

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Teaching/learning methods and strategies

Laboratory work, projects and IT classes are designed to enhance skills 1 and 2.
3 is emphasised through guidelines and advice given to students in connection with projects.

Assessment

1 and 2 are tested in laboratory and project modules.
3 is included within the assessment of laboratory and project reports.

D. Transferable skills

1. Communication: the ability to communicate knowledge effectively through written and oral presentations.
2. Numeracy and C & IT: appreciating issues relating to treatment of laboratory data; preparing, processing, interpreting and presenting data; solving numerical problems using computer and non-computer based techniques; using the Internet critically as a source of information.
3. Interpersonal skills: ability to work with others as a team, share knowledge effectively; recognise and respect the views and opinions of other team members.
4. Self management and professional development: study skills, independent learning, time management, identifying and working towards targets for personal, academic and career development
5. Library skills: the effective use of library and internet resources.

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Teaching/learning methods and strategies

Skill listed under 1 and 2 are developed throughout most of the programme, but especially through practical and project work.
3 is encouraged through team-working within several modules.
4 is enhanced partly through the provision of a Career Development Skills module during part 3, and partly through a PAR tutorial system.
5 is covered by *study skills* incorporated in Part I modules.

Assessment

1 is assessed directly as an outcome of project work, and contributes to the assessment of practical work. 2 is assessed directly in the *Computational Physics* module and indirectly in most laboratory modules. Skills in 3, 4 and 5 are not assessed but their effective use will enhance performance in H level modules.

Please note: This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably expect 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 each module can be found in module and programme handbooks.