LOUGHBOROUGH UNIVERSITY

Programme Specification

Information Technology & Physics

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 be expected to achieve and demonstrate if full advantage is taken 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 Specifications and other programme documentation and online at http://www.lboro.ac.uk/
The accuracy of the information in this document is reviewed by the University and may be checked by the Quality Assurance Agency for Higher Education.

Awarding body/institution; Department;	Loughborough University Physics
Teaching institution (if different);	
Details of accreditation by a professional/statutory body;	Provisional accreditation by the Institute of Physics (full accreditation is expected when the first cohort of students graduate).
Name of the final award;	BSc Honours
Programme title;	Information Technology and Physics
UCAS code;	GF53BSc/INP, GF5HBSc/INP4
Date at which the programme specification was written or revised.	3rd Jan 2008

1. Aims of the programme:

The aim of the programme is to give students the knowledge and skills needed to become effective professionals within the IT industry, in physics based industries or to progress immediately to a masters degree programme in physics or Information Technology. The programme also aims to provide students with the background required to contribute to the probable future developments in computing based around Quantum Computers and to equip students with the transferable skills required for future employment.

Within this context the programme consists of the following major themes:

Programming languages, algorithms, methods and techniques

Computer architectures, networks and operating systems

Information systems technology including data structures and databases

Theoretical underpinning of mathematics

Core studies required to work as a professional physicist

Training in experimental work and the ability to analyse critically the results of an experimental investigation.

An environment that gives students opportunities to develop their own interests, self-reliance and career aspirations.

2. Relevant subject benchmark statements and other external and internal reference points used to inform programme outcomes:

The national benchmark statement for Physics
Institute of Physics degree accreditation guidelines
University Teaching and Learning Strategy
Framework for Higher Education Qualifications
External Examiner's reports

3. Intended Learning Outcomes

Knowledge and Understanding:

On successful completion of this programme, students should be able to demonstrate knowledge and understanding of core concepts of IT including:

Programming languages, algorithms, methods and techniques

Computer architectures, networks and operating systems

Knowledge and understanding of most fundamental physical laws and principles and competence in the application of these principles to diverse areas of physics.

They should also be able to demonstrate

An ability to solve problems in physics using appropriate mathematical tools.

An ability to identify physical principles relevant to a problem and to make the approximations necessary to obtain solutions.

An ability to execute and analyse critically the results of an experimental investigation and to draw valid conclusions with an estimate of the uncertainty in the result. The ability to critically compare experimental results with the predictions of theory.

An ability to communicate scientific information especially in the form of clear and accurate scientific reports.

The optional structure of the final year of the programme offers the student the chance to develop in a wide range of specialised topics.

Teaching, learning and assessment strategies to enable outcomes to be achieved and demonstrated:

Knowledge and understanding is acquired through lectures, tutorials, problem classes and guided independent study. Practically oriented knowledge is acquired in

practical classes, both in experimental physics and computing, team working and in associated lectures.

Assessment is by a mixture of examinations and coursework supplemented by written and viva voce examinations. Coursework takes many different forms including written assignments, computer based assignments, viva voce examinations, formal presentations and presentation of scientific reports.

Most lecture modules are allocated two hours of contact time per week and in addition a further hour either weekly or every two weeks for a problem class/tutorial session. The style of lectures is very varied from the classic "chalk & talk" to complete presentations using data projection. Where staff load permits, tutorial sessions are smaller than the lecture classes and usually discuss "problem sheets" related to recently presented material. Computing practical sessions in the Computer Science department's laboratories are sometimes timetabled but it is more common to expect the students to organise their own visits to the computer laboratories. Several modules in Part B require students to work in groups on well-structured assignments which may involve interviewing the 'customer'. Each group of students is given the opportunity to submit evidence of the relative work of each group member. Physics laboratory sessions consist of a weekly laboratory sessions where students work in pairs on pre-assigned experiments. The pairs are self selecting after the first year.

Students are expected to attend all contact periods for their modules. They have access to all the teaching staff by email which they can also use to arrange personal visits and small group tutorial sessions (typically 5 students) are arranged for all students in Part A. Physics staff are generally available for 'drop in' sessions most weeks. Students are supported by teaching materials on the Computer Science department's intranet and the University Learn Server. Quantitative and qualitative feedback relating to assessment is made available to students as soon as possible.

Skills and other attributes:

a. Subject-specific cognitive skills:

On successful completion of the programme students should be able to

Apply their knowledge to understand complex computer systems. They should be able to build on their knowledge to research and develop new and more advanced systems therefore enabling them to undertake research, development or consultancy roles within IT in business, industry or academia.

Evaluate, interpret and collate information and data.

Apply such knowledge and understanding to the solution of qualitative and quantitative problems of a familiar and unfamiliar nature.

Recognise and analyse novel problems and plan strategies for their solution.

Teaching, learning and assessment strategies to enable outcomes to be achieved and demonstrated:

Cognitive skills are promoted by lectures, practicals, tutorials and supervision of advanced work in the final year and by guided independent study.

Cognitive skills are assessed by examinations and coursework. Examinations show how well a student can understand and apply an area of knowledge by applying their knowledge and understanding to an unseen question in a limited time period. Coursework allows the student to demonstrate wider skills by incorporating experimental skills, literature research, report writing skills and presentation skills in the assessment.

In the final year the student demonstrates all of the above skills in an academic research project that may be theoretically or experimentally based. This will require research and development which students will undertake with guidance mainly from their project supervisor. In most cases the project will build on a foundation of knowledge obtained from other modules taken. The second year team projects also require students to research and apply their knowledge to produce complex systems relevant to a computing environment. Guidance is given during the team project modules by a module team of lecturers and support staff.

b. Subject-specific practical skills:

On successful completion of this programme, students should be able to apply their knowledge to

Analyse, design, build, test, maintain and support complex computer systems that are well structured, reliable and usable.

Explain the logic underlying ideas in physics and computer science.

Observe, accurately record and analyse, including estimates of accuracy, the results of experiments into physical processes.

Design an experiment to test a physical theory.

Communicate ideas effectively by means of written reports and orally.

Plan and execute a research project.

Apply appropriate mathematical or computing tools to a problem.

Teaching, learning and assessment strategies to enable outcomes to be achieved and demonstrated:

Practical skills are promoted through laboratory and project work. In Parts A and B students are taught in practical classes, in Part B they take part in compulsory team projects and in Part C they undertake a research project under the supervision and guidance of a staff member. Assessment is via coursework, mainly in the form of written reports and discussions of experimental work with staff members. In Part C the major research project is assessed by report, viva voce examination and research presentation. Practical and analytical skills are taught in practical classes associated with laboratory modules in parts A and B.

c. Key/transferable skills:

On successful completion of the programme students should be able to

Formulate problems in precise terms and identify key issues, construct logical arguments and use technical language correctly.

Demonstrate study skills for continuing professional development.

Demonstrate retrieval skills for directly taught and independently acquired information and for primary as well as secondary information sources.

Use investigative skills to research novel aspects of their work

Work on their own or as part of a team

Communicate effectively with team members, managers and customers

Appreciate the legal and professional implications of their work

Present their work in the form of reports, oral presentations or an internet web site

Teaching, learning and assessment strategies to enable outcomes to be achieved and demonstrated:

Study skills information is provided to each student on arrival. Students should have gained an understanding of how to clearly report experimental methodology, observations and results including the analysis of qualitative and quantitative data through written reports and their feedback. Tutorials and presentations provide an opportunity to develop skills in the oral and written presentation of information from directly taught and independently acquired information, and for primary as well as secondary information sources. They also aid interpersonal skills by interaction with other people and engagement in team-working to develop scientific arguments and problem solve. Timetabled laboratory classes, practical sessions and published coursework deadlines train students in time management and organisational skills.

4. Programme structures and requirements , levels, modules, credits and awards:

The programme is split equally between Physics and Information Technology.

From the Computer Science Department, students learn the core of IT, including aspects of web based computing, programming, databases, the business process and legal issues.

In Physics the students concentrate on core Physics for the first two years enabling them to choose from a variety of modules in the final year.

More detail can be found at:
http://www.lboro.ac.uk/departments/ph/teaching/programmes/itp.html

Full details are to be found in the Programme Regulations:
http://www.lboro.ac.uk/departments/ph/teaching/regs/current/itphr.pdf

5. Criteria for admission to the programme:

A-Level qualifications: 280 points to include a minimum of grade C in Physics and Maths at A-Level (A2) or equivalent. Mature candidates and candidates with other qualifications are invited to apply. All applications will be considered on their merits.

6. Information about assessment regulations:

Most modules are assessed by a mixture of written examination and coursework and some will include practical assessment.

Part A and Part B assessment is for progression to the second and third year respectively. Second and third year results are weighted 40:60 in calculating final degree classification.

Students follow modules weighted at 120 credits per year. In order to progress to the next year of the programme, or to be awarded a degree at the end of Part C, students must, each year, accumulate at least 100 credits. A pass mark of 40% is applied to each module.

Any student who fails to meet these module requirements has the automatic right of reassessment on one occasion only. Candidates are permitted to undertake reassessment in modules which, if passed, would give them a maximum of 100 credits (unless a candidate has achieved 90 credits with one 10 credit module and one 20 credit module, when they may take the 20 credit module). Students can opt for reassessment in either the September following the end of the academic year or during the course of the following academic year. However, some modules (chiefly those involving practical work) are **not** available in September. Students who are reassessed in the following year may choose to take the reassessment with or without tuition. Students who are reassessed with tuition are required to take both coursework and examination components of the module (and the new mark supersedes the original mark). Students who are reassessed without tuition may be allowed to carry forward the component which has been passed. The overall mark, averaged over coursework and examination, for reassessed modules is capped at 40%.

7. What makes the programme distinctive:

Physics makes up 50% of the material covered, so that graduates from the programme are very much "physicists". However, they will also have a sound understanding of computers and software development, together with a broad spread of other subjects in Information Technology.

The optional sandwich year provides the opportunity either to study abroad for a year (in another European country or in Australia) or to work in an industrial or research environment for a year. The year of study abroad introduces students to a new academic and cultural environment and complements their studies by offering subjects that may not be covered at Loughborough and developing language and other skills. The industrial placement exposes students to a workplace environment and develops skills such as personal management, communication and team working.

8. Particular support for learning:

i) Departmental Support

The department has an integrated structure for the management, appraisal and planning of teaching and learning. This is comprised of a Director of Teaching who manages the teaching committee and has overall responsibility for teaching matters, Programme Tutors who have responsibility for the academic content and the general

organisation of the programmes, and Personal Tutors, who are responsible for matters relating to a students academic welfare.

On the first day of their academic studies, students receive a handbook from the department with important information including the management structure of the department, programme specifications and general points relating to coursework and examination. The students are also assigned a personal tutor who is responsible for their personal welfare who arranges to see them during the first semester. Thereafter the personal tutor arranges to see their tutees at important times, such as after examinations, or when problems have been raised in respect to the tutees by module organisers, Programme Tutors or the Director of Teaching. The personal tutor is available for consultation by a student at all reasonable times.

The Physics Department has a well-equipped computer room/resource centre equipped with self-teaching packages and books, notes and other documents related to the physics modules. In addition to the self help facilities the centre is staffed one day per week in order to assist students with problems they have related to their physics work. Past exam papers are placed on the LEARN server and many members of the department place lecture notes, problems and answers to past exam papers and background reading lists on this facility.

ii) University Support

Please refer to http://www.lboro.ac.uk/admin/ar/templates/notes/lps