LOUGHBOROUGH UNIVERSITY

Programme Specification

MPhys Engineering 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;	MPhys
Programme title;	Engineering Physics
UCAS code;	F312/F313
Date at which the programme specification was written or revised.	3rd Jan 2008

1. Aims of the programme:

To communicate to students the laws and phenomena that comprise the world view of the physicist.

To educate students as physicists in preparation for employment in industry, public service or academic research by providing the knowledge, competence and skills expected of a physicist.

To enable students to apply a broad understanding of the basic principles of physics to the solution of physical problems.

To provide students with a sound grounding in chosen aspects of engineering related to physics.

To provide opportunities for advanced study in key engineering topics through group and individual learning

To provide the student with enhanced skills in mathematics, problem solving, experimental techniques, scientific report writing and the collection and analysis of information.

To provide the student with enhanced skills in presenting information and the use of information technology.

To provide 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

Engineering Council

3. Intended Learning Outcomes

Knowledge and Understanding:

The degree programme in Physics covers the fundamental topics of physics, provides a selection of advanced topics and develops experimental, mathematical, computational and other transferable skills. On successful completion of this programme students should have demonstrated

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

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

3. Knowledge and understanding of general engineering principles and the particular problems of application in the chosen subject area.

4. Comprehensive knowledge and understanding of a number of specialist engineering science disciplines in greater depth than is normally associated with a first degree award.

5. An ability to identify physical principles relevant to a physics or engineering problem and to make approximations necessary to obtain solutions.

6. 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.

7. An ability to use competently IT packages and a knowledge of computer programming.

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

9. An ability to use competently advanced experimental equipment and to interpret results obtained *and/or* use theoretical or computer modeling skills to tackle an advanced theoretical problem.

Teaching, learning and assessment strategies to enable outcomes to be achieved and demonstrated:
The strategy employed by the department to deliver the outcomes is through a carefully balanced combination of delivery of material, guided self study and assessment.

Acquisition of the above knowledge and understanding is through a combination of lectures, tutorials, seminars, projects, practical laboratory work, and coursework assignments. The foundations for all of the above outcomes are laid in compulsory core physics and mathematics modules in parts A and B. Physics and Mathematics are the foundations of all engineering disciplines and mastery of these core elements enables students to follow engineering modules which are delivered in Parts C and D. Communication skills are particularly emphasized in the Part A Information Skills module, the laboratory modules and project work which include written reports, viva voce examinations and oral presentations.

Assessment is through a combination of written examinations and continuously assessed coursework. Coursework forms a particularly important part of the assessment in the first year. The coursework is designed to encourage students to develop independent learning skills Coursework assessment includes the evaluation of laboratory reports, project reports, problem solving exercises, computer-assisted assessment, oral presentations and viva-voce examinations. Examinations are used to test knowledge, understanding and application of the concepts introduced in lectures.

Skills and other attributes:

a. Subject-specific cognitive skills:

On successful completion of the programme students should be able to

1. Demonstrate knowledge and understanding of essential facts, concept, principles and theories relating to the areas listed in 3.

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

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

4. Evaluate, interpret and collate information and data.

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

Cognitive skillls 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.

b. Subject-specific practical skills:

On successful completion of the programme students should be able to

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

2. Design an experiment to test a physical theory.

3. Communicate ideas effectively by means of written reports and orally.

4. Plan and execute a research project on a topic of current scientific and engineering interest.

5. Apply appropriate mathematical or computing tools to a physical or engineering 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, B and C students are taught in practical classes. In Part D 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 D the major research project is assessed by report, viva voce examination and research presentation.

c. Key/transferable skills:

On successful completion of the programme students should be able to

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

2. Use standard IT packages (wordprocessors, spreadsheets) and write computer programs.

3. Listen carefully, read demanding texts and present complex information in a clear and concise manner.

4. Demonstrate study skills and time management for continuing professional development.

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

6. Apply an engineering approach to the solution of problems.

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. Collaborative coursework aids interpersonal skills by interaction with other people and engagement in team-working to develop arguments and solve problems. 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:

In Parts A and B students follow the same programme as Physics students with the exception that they are encouraged to take optional modules from Engineering Departments. This ensures that they cover the physics core. In Part C and in Part D students are required to study a minimum of 40 credits of Engineering modules.

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

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

5. Criteria for admission to the programme:

A-Level qualifications: 300 points normally 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 either an examination or a mixture of written examination and coursework and some will include practical assessment. Detailed information regarding the assessment of individual modules is in the appropriate module specification.

To progress from Part A to Part B, all candidates must achieve a minimum mark of 30% in all modules listed as compulsory modules.

To progress from Part B to Part C, a mark of at least 30% must be achieved in all modules and the overall average mark must be at least 50%.

In order to progress from Part C to Part D, candidates must achieve at least 100 credits from degree level modules taken in Part C. A mark of at least 30% must be achieved in all modules.

Candidates final degree classification will be determined on the basis of their performance in degree level Module Assessments Parts B, C and D. The average percentage marks for each Part will be combined in the ratio specified below:

Part B:Part C:Part D: 20 : 40: 40

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%.

If a candidate fails, after any re-assessment, at the end of Part C or Part D the Programme Board may, at their discretion, award any such candidate who has satisfied the credit requirements for BSc Engineering Physics that degree, the classification being based on the average marks obtained in Parts B and C in exactly the same way as for the BSc degree.

7. What makes the programme distinctive:

The programme exploits the extensive range of modules taught by the Faculty of Engineering and IPTME to allow students to follow one or more engineering specialisations while also gaining a solid grounding in physics.

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.

A major research project forms half of the final year. This may be taken throughout the year or as full-time work in one semester. In the latter case the project may be carried out in an ERASMUS partner institution or elsewhere. The project will develop skills in planning, time management, investigation, analysis and communication and other skills specific to the topic of the project.

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 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