

MSc in Physics Research

For students entering in 2006

Awarding Institution:	The University of Reading
Teaching Institution:	The University of Reading
Faculty of Science Programme length:	12 or 24 months
Date of specification:	July 2006
Programme Director:	Professor G.R.Mitchell
Board of Studies: Physics	

Summary of programme aims

This programme aims to provide a flexible course that enables students to acquire specialist research techniques and expertise in their chosen area of Physics. The ultimate aim of the programme is to fully prepare students for a career in Research and Development, or for taking a higher degree by research. Students will be trained to undertake practical and theoretical research in their specialist area of physics with guidance from an experienced researcher. This necessitates that all students will be able to establish the extent of published knowledge in the chosen field, understand and summarise that knowledge and be able to report formally, both orally and in writing. In addition, all students will be provided with a solid theoretical grounding of important concepts associated with their chosen research area and training in relevant planning and project management skills will be provided as well as those required for scholarly research.

Transferable skills

A number of generic transferable skills will be acquired during this programme and these will be taught via formal courses as well as day-to-day training. In following this programme, students will have the opportunity to develop their skills relating to organisation and time management, communication (both written and oral), information handling, numeracy, problem solving and team working. A major focus of the programme will be on practical methods in both experimental and theoretical physics and the development and perfection of research methods and skills, self-motivation skills and the ability to work independently or as a team member will be expected at the end of the programme.

Programme content

The MSc Physics Research degree combines taught modules with a research project module. All students follow the modules on Advanced Physics, and Research Methodology and Planning and either Experimental Physics Research Techniques or Theoretical Physics Research Techniques as appropriate to the dissertation project. The Techniques Module is jointly selected by the student and supervisor in conjunction with the programme coordinator.

Where appropriate, the Advanced Physics module can be substituted by a validated module or modules drawn from other Masters programmes in the School of Mathematics, Meteorology and Physics or elsewhere for example in the School of Chemistry with the approval of the programme coordinator and the relevant Director of Teaching and Learning. A summary of the structure of the MSc programme is provided below.

Module Code	Module Title	Credits	Level
PHMAPH	Advanced Physics	20	M
PHMERT*	Experimental Physics Research	20	M

	Techniques		
PHMTRT*	Experimental Physics Research Techniques	20	M
PHMRMP	Research Methodology and Planning	20	M
PHMRPJ	Research Project	120	M
* Students select one of PHMERT or PHMTRT			

Part-time/modular arrangements

The programme may be taken over 12 months full-time or 24 months part-time.

Progression requirements

None

Summary of teaching and assessment

Teaching is organised in modules that involve a combination of lectures and tutorials. Most taught modules will be assessed by continual assessment and formal summative reports. Candidates must achieve an overall average mark of 50% or better in the taught modules. In cases of failure there will be a resit examination, within the course schedule. The remainder of the course assessment will come from the written dissertation and *viva voce* exam, which will be based on the research project. Each candidate will be examined by an approved external examiner, selected for both his/her expertise in the subject and experience in examining. As with other (research) higher degrees a suitable internal examiner will also be appointed. A *viva voce* will be arranged which will examine the material of the dissertation. Examination scripts, papers and marking schemes will be available to examiners.

The University's taught postgraduate marks classification is as follows:

Mark	Interpretation
70 – 100%	Distinction
60 – 69%	Merit
50 – 59%	Good standard (Pass)

Failing categories:

40 – 49%	Work below threshold standard
0 – 39%	Unsatisfactory Work

To pass the MSc students must gain an average mark of 50 or more overall including a mark of 50 or more for the dissertation. In addition the total credit value of all modules marked below 40 must not exceed 30 credits and for all modules marked below 50 must be less than 60 credits.*

Students who gain an average mark of 70 or more overall including a mark of 60 or more for the dissertation and have no mark below 40 will be eligible for a Distinction. Those gaining an average mark of 60 or more overall including a mark of 50 or more for the dissertation and have no mark below 40 will be awarded eligible for a Merit.

*The provision to permit a candidate to be passed overall with a profile containing marks below 40 is made subject to the condition that there is evidence that the candidate applied his or herself to the work of those modules with reasonable diligence and has not been absent from the examination without reasonable cause.

Admission requirements

Entrants to this programme are normally required to have obtained a degree at the equivalent of UK 2.2 (Hons) or better in Physics or other Science programme such as Engineering, Chemistry or Biological Sciences. Motivated applicants with other degree backgrounds are also strongly encouraged to apply.

Admissions tutor: Prof. G.R.Mitchell - E-mail : g.r.mitchell@rdg.ac.uk

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, 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 and the training course in generic research methods provided by the Joint Faculties of Science and Life Sciences. 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 Programme Directors, the Careers Advisory Service, the University's Special Needs Advisor, Study Advisors, Hall Wardens and the Students' Union.

School support is provided through the project supervisor and an internal assessor, the course administrator, and the Director of Postgraduate Studies, all of whom are actively involved in the running of the course. Each student will be assigned a supervisor with expertise in the subject area of the student's dissertation project. It is the responsibility of this research supervisor to give guidance to the student through regular meetings. For full-time students these meetings should take place at least once every three weeks. It is the responsibility of the student to raise with the supervisor any difficulties or problems which occur in the course of the work and to submit coursework and progress reports as required by the course handbook. The choice of taught courses to be taken should be made by the student in consultation with the supervisor and must be validated by the Director of Postgraduate Studies. Tutorials and problem classes are held for the taught elements of the course. A progress report on the research project at the end of Term 2 is a requirement. This report is read by the Internal Assessor who provides feedback. A detailed course handbook is also available and students are able to report back comments on the course via the Staff Student Committee.

Career prospects

This programme is attractive to graduates who wish to obtain additional research experience before seeking employment. Graduates from this programme will be well qualified to obtain employment in research and development, as technical assistants and as sales and marketing personnel in the scientific or engineering industries. They are also eligible to continue research at the higher degree (PhD) level. Alternatively, graduates will have the necessary numerical and transferable skills to allow them to move into a range of more general career choices such as accounting or computing. The part time option is also suitable for graduates already working in industry who wish to undertake a research project relevant to their job. Teaching Company Associates will also find the programme of use for combining their Teaching Company project with an academic award.

Opportunities for study abroad or in industry

The nature of the course does not provide scope for spending time abroad or in industry.

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 chosen research area of Physics
2. Scientific advances related to the research area
3. Specialist research techniques

Teaching/learning methods and strategies

1 and 2. Knowledge of the chosen research area and related areas will be acquired by attending formal lectures and problem classes from the agreed modular programme, as well as attending colloquia and conferences related to the subject area.

Researching and reading primary journals during the programme will provide theoretical knowledge of the chosen area.

3. Hands on practical experience will be gained during the research project and training in specialist research techniques will be provided by the supervisor, technicians and senior members of the research group. Feedback on the student's progress will be provided via formal meetings with the supervisor, and discussions on taught work during tutorials as well as by the Internal Assessor from the Term 2 report.

Assessment

The knowledge and understanding that has been acquired will be assessed via MSc Modules the written thesis and the *viva voce* exam on PHMRPJ.

Skills and other attributes

B. Intellectual Skills – be able to:

1. think logically
2. analyse and solve problems
3. organise tasks into a structured form
4. understand the evolving state of knowledge within the chosen research area
5. plan, conduct and write a report on the chosen research topic

Teaching / learning methods and strategies

1. Logic is an essential part of the MSc programmes and will be involved in the problem solving elements of the taught courses and the conduct of the research project in PHMRPJ

2. The analysis of problems will be central to all parts of the course and students will gain experience in this area by solving theoretical problems in lectures, tutorials and problem classes, and overcoming practical problems in experimental or theoretical physics that may occur during the research project in PHMRPJ.

3. The efficient running of the research project in PHMRPJ will require the development of effective organisation and planning skills. Guidance in this area will be provided by the

supervisor and via attendance of lectures covering time and resource management during PHMRMP

4. The student will be required to review the current state of knowledge within their chosen research area part of the planning process in PHMRMP and in the Term 2 report and the thesis as part of PHMRPJ. Guidance in this area will be provided by the research supervisor.

5. The supervisor and senior members of the research group will provide guidance in planning, conducting and writing a report of the chosen research area. Guidance in writing reports will be provided by attending lectures on communication skills during PHMRMP.

Assessment

All points will be assessed through the assessments relating to the taught modules as well as via the dissertation and viva voce exam relating to PHMRPJ.

C. Practical Skills – be able to

1. follow practical instructions safely and accurately
2. formulate safety protocols
3. carry out a variety of experimental procedures
4. measure and interpret various experimental or theoretical physics techniques
5. interpret quantitatively the results of their experiments
6. devise suitable experimental or theoretical methods for tackling a particular problem

Teaching / learning methods and strategies

1, 2 and 3. Practical instruction in conducting experimental or theoretical research and formulating safety protocols will be provided by the supervisor(s), senior research group members and technicians and by attendance of lectures within PHMRMP. These will also cover ethical and legal issues of research.

4 and 5. All research techniques selected in PHMERT/TRT will necessitate the evaluation and interpretation of a range of data. All projects will produce data that must be analysed and interpreted in a qualitative and quantitative fashion before further experimental or theoretical procedures can be designed. In the first instance training in data analysis will be provided by the research supervisor and senior members of the research group.

6. As research progresses within PHMRPJ the student will have the opportunity to devise new procedures involving experimental or theoretical physics for obtaining novel data or new instrumentation. At the onset of PHMRPJ procedures will be designed in collaboration with the research supervisor. Discussions held during the planning of such procedures will serve to train the student to think independently and devise new experiments that will provide meaningful results for the project

Assessment

Assessment will mainly be via the dissertation and viva voce exam relating to PHMRPJ and in the reports prepared as part of PHMERT or PHMTRT.

D. Transferable skills – be able to:

1. perform research with efficient planning and time management
2. use IT (word-processing, spreadsheets and databases)

3. prepare and deliver written and oral reports
4. ability to work in a team or as an individual
5. solve problems
6. make decisions

Teaching/learning methods and strategies

1. Module PHMRMP will provide training in time and resource management and in planning and day-to-day training will be provided by the supervisor during PHMRPJ.
2. Specific training in IT will be provided through training programmes organised by the library as well as lectures outlined in PHMRMP.

Training on searching databases such as the Web of Science will also be provided by the research supervisor and senior members of the research group during PHMRMP and PHMRPJ in the context of their particular chosen area. Training to familiarise students with specific data presentation tools such as Origin packages will also be provided by the supervisor and senior members of the research group during PHMRPJ and PHMERT/TRT

3. Attendance of the lectures on communication skills within PHMRMP as well as guidance from the research supervisor and senior members of the research group will assist with training in this area.

4. The ability to work in a team or as an individual will be covered both during the lectures on interpersonal skills, included in PHMRMP and via day-to-day experiences during PHMRPJ

5. Training in problem solving will be provided through lectures and tutorials, as well as through discussions with the research supervisor of problems encountered in PHMRPJ and in PHMERT/PHMTRT

6. During PHMRPJ the student will gradually be given the opportunity to work independently on the chosen research area. This will allow them to make decisions as to which procedures should be performed, and how experiments/simulations should be conducted.

Assessment

Assessment will mainly be via the dissertation and viva voce exam relating to PHMRPJ.

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.

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a change to be made. In such circumstances, a revised specification will be issued.