College of Science and Engineering

Notification of new / changed courses for approval

New courses, or major changes to existing courses, should be entered by the School via the DPT and Courses facility in EUCLID.

After entering the details in EUCLID and after approval by the Board of Studies, the School should complete this pro-forma and sent it to the college office:  

linda.archibald@ed.ac.uk

This pro-forma is used by the College Office to alert the Committee Secretary that courses are awaiting approval at College level and to provide a background to the discussion at the College Learning and Teaching Committee.

Name of School:  Physics and Astronomy

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<th>Course Code</th>
<th>Course Title</th>
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<th>What other schools have been consulted on this proposal?</th>
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New MSc Course Proposal
(6th November 2012)

Course Name: Problem Solving in Theoretical Physics

Normal Year Taken: MSc

Course Level: PG

Visiting Student Availability: No

SCQF Credits: 10

Credit Level: 11

Home Subject Area: Postgraduate (School of Physics and Astronomy)

Other Subject Area: none

Course Organiser: Dr R Horsley

Course Secretary: Ms Crystal Lei

Percentage not taught by this institution: 0

Collaboration Information (School / Institution): none

Total contact teaching hours: 22 hours (1 2-hour session per week for 11 weeks)

Any costs to be met by students: none

Pre-requisites: none

Co-requisites: none

Prohibited Combinations: none

Visiting Students pre-requisites: n/a

Short Description: This first-semester course is compulsory for all students on the MSc programmes in Mathematical Physics and Theoretical Physics. It aims to consolidate, extend and expand students’ Mathematical abilities, and to use these to develop problem-solving skills in Theoretical Physics. It will be taught via weekly workshops in which students will work in small groups to solve a wide range of problems. There are no formal lectures, but students are encouraged to use Methods of Mathematical Physics, Symmetries of Classical Mechanics, Lagrangian Dynamics and Complex Analysis lectures and/or course material in a supporting role. Problems sheets from MoMP, SoCM, Lagrangian Dynamics, etc, will be supplemented by additional problems which develop further understanding.

Keywords:
Fee if invoiced at course level: Standard 10-credits course fee

Course type: Standard

Default Course Mode of Study: Class and oral examination

Default Delivery Period: Semester 1

Marking Scheme: PG Grade Only

Taught in Gaelic: no

Summary of Intended Learning Outcomes: At the completion of the course students will have acquired the skills to:

1. Apply techniques of vector and tensor analysis and analytical dynamics to problems in theoretical physics
2. apply techniques of complex analysis, such as contour integrals and analytic continuation, to the study of problems in mathematical physics
3. calculate approximations to integrals by saddle point and other asymptotic expansion methods
4. be fluent in the use of Fourier and Laplace transformations to solve differential equations and derive asymptotic properties of solutions
5. solve partial differential equations with Green function techniques, taking examples from electromagnetism and quantum theory
6. apply these key mathematical techniques to a wide range of challenging problems in theoretical physics

Students will work individually and in groups to develop their analytic and problem solving skills, with input and tutorial support from postgrads and RAs.

Components of assessment: 100% continuous assessment (weekly hand-ins)

Reading List:

Syllabus: A course on application of advanced mathematical methods to problem solving in mathematical physics. The course will review and develop the theory of: vector and tensor analysis, calculus of variations, advanced complex analysis; asymptotic expansions; ordinary and partial differential equations, integral transform and Green function techniques; the generality of approaches will be emphasised and illustrative examples from electrodynamics, Lagrangian dynamics, quantum and statistical mechanics will be given.
Course Name: Research Skills for Theoretical Physics

Normal Year Taken: MSc

Course Level: PG

Visiting Student Availability: No

SCQF Credits: 10

Credit Level: 11

Home Subject Area: Postgraduate (School of Physics and Astronomy)

Other Subject Area: none

Course Organiser: Dr B J Pendleton

Course Secretary: Ms Crystal Lei

Percentage not taught by this institution: 0

Collaboration Information (School / Institution): none

Total contact teaching hours: 11 hours (equivalent of 1 1-hour session per week for 11 weeks)

Any costs to be met by students: none

Pre-requisites: none

Co-requisites: none

Prohibited Combinations: none

Visiting Students pre-requisites: n/a

Short Description: This second-semester course is compulsory for all students on the MSc programmes in Theoretical and Mathematical Physics. Students will develop their research skills through a set of exercises which include written and oral analyses of recent research papers. This will impact on their choice of MSc dissertation topic.

Keywords:

Fee if invoiced at course level: Standard 10-credits course fee

Course type: Standard
Default Course Mode of Study: Class and oral examination

Default Delivery Period: Semester 1

Marking Scheme: PG Grade Only

Taught in Gaelic: no

Summary of Intended Learning Outcomes:

After completion of the first part of the course, students will be able to

• Understand and critically review a paper in the research literature via a written report.

After completion of the second part of the course, will have

• understood in detail an extended theoretical derivation in one or more research papers
• understood the underlying physical principles;
• communicated this understanding orally.
• Chosen a topic for their dissertation and completed an initial time-plan for the project

Components of assessment: 100% continuous assessment

Reading List:

Syllabus: This course consists of several exercises, each of which will develop the students’ research skills:

1. Review of recent research papers in theoretical or mathematical physics: reading and comprehending the papers; explanation of the papers’ content to the student’s peers; writing a short report.
2. Detailed analysis of one or more research papers in a specialised area, preferably related to the student’s MSc Dissertation; oral examination.
3. Choice of general area of MSc Dissertation; project planning – topic of dissertation; aims and objectives, with realistic targets, including dates.
New MSc Course Proposal  
(19th November 2012)

Course Name: Dissertation in Theoretical/Mathematical Physics

Normal Year Taken: MSc

Course Level: PG

Visiting Student Availability: No

SCQF Credits: 60

Credit Level: 11

Home Subject Area: Postgraduate (School of Physics and Astronomy)

Other Subject Area: none

Course Organiser: Dr B J Pendleton and Dr R Horsley

Course Secretary: Ms Crystal Lei

Percentage not taught by this institution: 0

Collaboration Information (School / Institution): none

Total contact teaching hours: 12 hours (1 1-hour session per week for 12 weeks)

Any costs to be met by students: none

Pre-requisites: none

Co-requisites: none

Prohibited Combinations: none

Visiting Students pre-requisites: n/a

Short Description: This course is compulsory for all students on the MSc programmes in Mathematical Physics and Theoretical Physics.

The dissertation comprises a report of circa 15000 words/50 pages describing a 12-week project applying the techniques and skills developed from the taught courses. Students are also required to present their work as a seminar to the School.

The dissertation must be based on original work carried out solely by the candidate and conform to the University's regulations. The project work may be undertaken within the School of Physics and Astronomy or in an external organisation. The subject area covered by the project can, with the approval of the Programme Director, be chosen by the candidate to align with their own research interests.
Keywords:

Fee if invoiced at course level: Standard 10-credits course fee

Course type: Standard

Default Course Mode of Study: Class and oral examination

Default Delivery Period: Summer

Marking Scheme: PG Grade Only

Taught in Gaelic: no

Summary of Intended Learning Outcomes: On completion of this course, students will have been exposed to research-level work in an area of contemporary theoretical or mathematical physics. They will have successfully completed a literature search, reviewed of existing work in the area, performed a substantial or original calculation or computation, and presented their results in a written dissertation and in an oral presentation.

Components of assessment: 100% continuous assessment

Reading List:

Syllabus: Research-level work in theoretical and/or Mathematical Physics, to include
1. Literature review
2. Analysis of recent work in the area
3. Substantial calculation or computation
4. Written report, including critical analysis of results
5. Bi-weekly group meetings, with short presentations by students of their progress in the previous fortnight
6. Oral presentation after completion of dissertation