26 School of Physical Sciences

PH700 Physics Research Project

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Whole Year	M	60 (30)	100% Project	

Availability

This is not available as a wild module.

Contact Hours

Total contact hours: 40
Private study hours: 560
Total study hours: 600

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Have:
An ability to identify relevant principles and laws when dealing with problems, and to make approximations necessary to obtain solutions.
An ability to solve problems in physics using appropriate mathematical tools.
An ability to execute and analyse critically the results of an experiment or investigation and draw valid conclusions. To evaluate the level of uncertainty in these results and compare them with expected outcomes, theoretical predictions or with published data; thereby to evaluate the significance of their results in this context.
An ability to interpret mathematical descriptions of physical phenomena.
An ability to plan an experiment or investigation under supervision and to understand the significance of error analysis.
A working knowledge of a variety of experimental, mathematical and/or computational techniques applicable to current research within physics.
An ability to present and interpret information graphically.
An ability to communicate scientific information, in particular to produce clear and accurate scientific reports.
A familiarity with laboratory apparatus (including relevant aspects of Health & Safety), theories and techniques.
The systematic and reliable recording of experimental data or derivation of theoretical results.
An ability to make use of appropriate texts, research-based materials or other learning resources as part of managing their own learning.
C&IT skills which show fluency at the level and range needed for project work such as familiarity with a programming language, simulation software or the use of mathematical packages for manipulation and numerical solution of equations.
An ability to communicate complex scientific ideas, the conclusion of an experiment, investigation or project concisely, accurately and informatively.
Experimental skills showing the competent use of specialised equipment, the ability to identify appropriate pieces of equipment and to master new techniques and equipment.
An ability to make use of research articles and other primary sources.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Have a knowledge and understanding of:
Problem-solving skills, in the context of both problems with well-defined solutions and open-ended problems; an ability to formulate problems in precise terms and to identify key issues, and the confidence to try different approaches in order to make progress on challenging problems. Numeracy is subsumed within this area.
Investigative skills in the context of independent investigation including the use of textbooks and other available literature, databases, and the interaction with colleagues to extract important information.
Communication skills in the area of dealing with surprising ideas and difficult concepts, including listening carefully, reading demanding texts and presenting complex information in a clear and concise manner. C&IT skills are an important element to this.
Analytical skills – associated with the need to pay attention to detail and to develop an ability to manipulate precise and intricate ideas, to construct logical arguments and to use technical language correctly.
Personal skills – the ability to work independently, to use initiative, to organise oneself to meet deadlines and to interact constructively with other people.

Method of Assessment

Project progress (i.e. supervisor assessment of performance) (15%)
Project report (55%), max. 12,000 words
Viva voce (15%)
Presentation (15%), duration 15 minutes

Preliminary Reading

None; appropriate background reading will be suggested by individual project supervisors

Pre-requisites

None.

Restrictions

School of Physical Sciences
Procedures for Projects Involving Human Participation

It is a University requirement that any final year project undergraduate, postgraduate or staff research project involving human participants should be subject to a procedure to determine whether ethics approval is needed. The procedure employed by SPS and the Faculty of Science are described here:
http://www.kent.ac.uk/stms/faculty/adminprocedures/research-ethics/index.html

Undergraduate projects PH600, PH603, PS620, CH620, PS720, PS740 and PH700
Each project proposal collected from academics will include an ethics approval checklist designed to determine if ethical approval is required from the faculty i.e. does the project involve human participants. It is the responsibility of convenors to ask supervisors to fill in these checklists with students. If the answer to any of the questions on the checklist is yes please see below;

The following text will be introduced into the information pack or the handbooks of the module:

“Before you commence any work, it is important that the ethics of that work be considered; for example, taking fingerprints or collecting images of faces of your colleagues etc. Your supervisor will discuss any ethics issues with you and you should keep a copy of the documentation”

For projects involving human participants other than those conducting the project itself, students and their supervisors are required to read, note and act upon the guidelines available at
http://www.kent.ac.uk/stms/faculty/adminprocedures/research-ethics/index.html to obtain approval from the Sciences Research Ethics (Human Participation) Advisory Group.

Further information on Ethics can be obtained from Dr Donna Arnold, SPS representative on the Sciences Research Ethics Advisory Group.

Synopsis *

Aims:
To provide an experience of open-ended research work.
To begin to prepare students for postgraduate work towards degrees by research or for careers in R&D in industrial or government/national laboratories.
To deepen knowledge in a specialised field and be able to communicate that knowledge orally and in writing.

Syllabus

All MPhys students undertake a laboratory, theoretical or computationally-based project related to their degree specialism. These projects may also be undertaken by Diploma students. A list of available project areas is made available during Stage 3, but may be augmented/revised at any time up to and including Week 1 of Stage 4. As far as possible, projects will be assigned on the basis of students' preferences – but this is not always possible: however, the project abstracts are regarded as 'flexible' in the sense that significant modification is possible (subject only to mutual consent between student and supervisor). The projects involve a combination of some or all of: literature search and critique, laboratory work, theoretical work, computational physics and data reduction/analysis. The majority of the projects are directly related to the research conducted in the department and are undertaken within the various SPS research teams.

PH709 Space Astronomy and Solar System Science

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Autumn	M	15 (7.5)	70% Exam, 30% Coursework	

Availability

This is not available as a wild module.

Contact Hours

Total contact hours (Lectures and workshop sessions – does not include office contact hours): 30
Private study hours: 120
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Have:
An ability to identify relevant principles and laws when dealing with problems in Space Astronomy and Solar System Science, and to make approximations necessary to obtain solutions.
An ability to solve problems in astronomy, astrophysics and space science using appropriate mathematical tools.
An ability to use mathematical techniques and analysis to model physical behaviour in Space Astronomy and Solar System Science.
An ability to comment critically on how spacecraft and space telescopes (operating at various wavelengths) are designed, their principles of operation, and their use in solar system exploration and astronomy & astrophysics research.
An ability to solve advanced problems in astronomy, astrophysics and space science using appropriate mathematical tools.
An ability to interpret mathematical descriptions of physical phenomena in Space Astronomy and Solar System Science.
An ability to work within the space sciences area that is well matched to the frontiers of knowledge, the science drivers that underpin government funded research and the commercial activity that provides hardware or software solutions to challenging scientific problems in these fields.
An ability to present and interpret information graphically.
An ability to make use of appropriate texts, research-based materials, other primary sources or other learning resources as part of managing their own learning.

Other more specific learning outcomes:
An ability to discuss coherently the origin and evolution of Solar Systems and be able to evaluate claims for evidence of Solar Systems other than our own.
Ability to identify relevant principles, make relevant approximations and solve problems using a mathematical approach.
Students should become fluent in current trends and methods as regards to space astronomy and Solar System exploration.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Have a knowledge and understanding of:
Problem-solving skills, in the context of both problems with well-defined solutions and open-ended problems; an ability to formulate problems in precise terms and to identify key issues, and the confidence to try different approaches in order to make progress on challenging problems. Numeracy is subsumed within this area.
Investigative skills in the context of independent investigation including the use of textbooks and other available literature and databases, to extract important information.
Communication skills in the area of dealing with surprising ideas and difficult concepts, including listening carefully, reading demanding texts.
Analytical skills – associated with the need to pay attention to detail and to develop an ability to manipulate precise and intricate ideas, to construct logical arguments and to use technical language correctly.

Method of Assessment

Two homework assignments (15% each) (10 hours each)
Examination (2 hours, 70%)

Preliminary Reading

Wertz and Larson, Space Mission Analysis and Design, 3rd Edition, 1992 [TL 790]
Jones, Discovering the Solar System, 2nd Edition, 1999 [q QB501]
Taylor, Solar System Evolution, 2nd Edition, 2001 [q QB501]
Fortescue, Stark and Swinerd, Spacecraft Systems Engineering, 3rd ed, Wiley, 2003 [TL875]

Other reading:
Davies; Astronomy from Space: The Design and Operation of Orbiting Observatories, Wiley,1997 [QB136]
Encrenaz, Bibring and Blanc; The Solar System, Springer, 2010 [QB 501]
Jakosky: The Search for Life on Other Planets, 1998 [QB 54]
Gilmour & Sephton: Introduction to Astrobiology, 2004 [qQB 501]
Carroll and Ostlie, Modern Astrophysics, 2nd Edition, 2007 (copies of the 1st edition are in the library at QB461)

Pre-requisites

None.

Synopsis *

Space Astronomy:
Why use space telescopes; other platforms for non-ground-based astronomical observatories (sounding rockets, balloons, satellites); mission case study; what wavelengths benefit by being in space; measurements astronomers make in space using UV, x-ray and infra-red, and examples of some recent scientific missions.

Exploration of the Solar System:
Mission types from flybys to sample returns: scientific aims and instrumentation: design requirements for a spacecraft-exploration mission; how to study planetary atmospheres and surfaces: properties of and how to explore minor bodies (e.g. asteroids and comets): current and future missions: mission case study; how space agencies liaise with the scientific community; how to perform calculations related to the orbital transfer of spacecraft.

Solar System Formation and Evolution:
The composition of the Sun and planets will be placed in the context of the current understanding of the evolution of the Solar System. Topics include: Solar system formation and evolution; structure of the solar system; physical and orbital evolution of asteroids.

Extra Solar Planets:
The evidence for extra Solar planets will be presented and reviewed. The implications for the development and evolution of Solar Systems will be discussed.

Life in Space:
Introduction to the issue of what life is, where it may exist in the Solar System and how to look for it.

PH711 Rocketry and Human Spaceflight

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Spring	M	15 (7.5)	70% Exam, 30% Coursework	

Availability

This is not available as a wild module.

Contact Hours

Total contact hours (Lectures and workshop sessions – does not include office contact hours): 30
Private study hours: 120
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Have a knowledge and understanding of:
Aspects of the theory and practice of space science, and of those aspects upon which space science depends in relation to rocketry and Human Space Flight (a knowledge of key physics, especially for rocketry).
An understanding of relevant fundamental laws and principles of physics, along with their application to rocketry and human spaceflight.
An ability to identify relevant principles and laws when dealing with problems, and to make approximations necessary to obtain solutions.
An ability to solve problems in rocketry and human spaceflight using appropriate mathematical tools.
An ability to use mathematical techniques and analysis to model physical behaviour.
An ability to solve advanced problems in rocketry and human spaceflight using appropriate mathematical tools, to translate problems into mathematical statements and apply their knowledge to obtain order of magnitude or more precise solutions as appropriate.
An ability to interpret mathematical descriptions of physical phenomena.
An ability to present and interpret information graphically.
An ability to make use of appropriate texts, research-based materials, other primary sources or other learning resources as part of managing their own learning.

Other more specific learning outcomes:
To develop an appreciation of the design, construction and testing of space vehicles and their operation.
To understand the basic physiological changes the human body is subject to in space.
To develop an appreciation of the uses of space for science and by astronauts.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Have a knowledge and understanding of:
Problem-solving skills, in the context of both problems with well-defined solutions and open-ended problems; an ability to formulate problems in precise terms and to identify key issues, and the confidence to try different approaches in order to make progress on challenging problems. Numeracy is subsumed within this area.
Investigative skills in the context of independent investigation including the use of textbooks and other available literature and databases to extract important information.
Communication skills in the area of dealing with surprising ideas and difficult concepts, including listening carefully, reading demanding texts.
Analytical skills – associated with the need to pay attention to detail and to develop an ability to manipulate precise and intricate ideas, to construct logical arguments and to use technical language correctly.

Method of Assessment

Two homework assignments (15% each, 10 hours each)
Examination (2 hours, 70%)

Preliminary Reading

Recommended Text:
Fortescue, Stark and Swinerd, Spacecraft Systems Engineering, 3rd ed, Wiley, 2003 [TL875, 6 copies]
Wertz and Larson, Space Mission Analysis and Design, 3rd Edition, 1999 [TL 790]
Sutton, Rocket Propulsion Elements, 1992 [TL 782]
Sidi, Spacecraft Dynamics and Control, 1997 [TL 1050]

Background reading (In addition, a fuller reading list will be distributed in the lectures):
McNamara: Into the Final frontier, Harcourt, 2000 [qTL873]
Nicogossian, Huntoon and Pool: Space Physiology and Medicine, Lea & Febiger, 1994 [RC1150]
Turner: Rocket and Spacecraft Propulsion, Praxis, 2000 [TL782]

Pre-requisites

Prerequisite:
PHYS5080 Spacecraft Design and Operations

Synopsis *

Flight Operations: Control of spacecraft from the ground, including aspects of telecommunications theory.
Propulsion and attitude control: Physics of combustion in rockets, review of classical mechanics of rotation and its application to spacecraft attitude determination and control.
Impact Damage: The mechanisms by which space vehicles are damaged by high speed impact will be discussed along with protection strategies.
Human spaceflight: A review of human spaceflight programs (past and present). Life-support systems. An introduction to some major topics in space medicine; acceleration, pressurisation, radiation, etc.
International Space Station: Status of this project/mission will be covered.

PH712 Cosmology and Interstellar Medium

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
4	Canterbury	Spring	M	15 (7.5)	70% Exam, 30% Coursework	

Availability

This is not available as a wild module.

Contact Hours

Total contact hours: 30
Private study hours: 120
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Have:
Knowledge and understanding of aspects of the theory and practice of astronomy, astrophysics and space science, and of those aspects upon which astronomy, astrophysics and space science depends.
A systematic understanding of most fundamental laws and principles of physics and of astronomy, astrophysics and space science, along with their application – some of which are at (or are informed by) the forefront of the discipline.
An ability to identify relevant principles and laws when dealing with problems, and to make approximations necessary to obtain solutions.
An ability to solve problems in physics using appropriate mathematical tools.
An ability to use mathematical techniques and analysis to model physical behaviour.
An ability to comment critically on how spacecraft are designed, their principles of operation, and their use to access and explore space, and on how telescopes (operating at various wavelengths) are designed, their principles of operation, and their use in astronomy and astrophysics research.
An ability to solve advanced problems in physics using appropriate mathematical tools, to translate problems into mathematical statements and apply their knowledge to obtain order of magnitude or more precise solutions as appropriate.
An ability to interpret mathematical descriptions of physical phenomena.
A working knowledge of a variety of experimental, mathematical and/or computational techniques applicable to current research within physics.
An enhanced ability to work within in the astronomy, astrophysics and space science areas that is well matched to the frontiers of knowledge, the science drivers that underpin government funded research and the commercial activity that provides hardware or software solutions to challenging scientific problems in these fields.
An ability to present and interpret information graphically.
An ability to make use of appropriate texts, research-based materials or other learning resources as part of managing their own learning.
An ability to make use of research articles and other primary sources.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Have a knowledge and understanding of:
Problem-solving skills, in the context of both problems with well-defined solutions and open-ended problems; an ability to formulate problems in precise terms and to identify key issues, and the confidence to try different approaches in order to make progress on challenging problems. Numeracy is subsumed within this area.
Analytical skills – associated with the need to pay attention to detail and to develop an ability to manipulate precise and intricate ideas, to construct logical arguments and to use technical language correctly.

Method of Assessment

Take-home Test 1 (10 hrs, 15%)
Take-home Test 2 (10 hrs, 15%)
Examination (70%, 2hrs)

Preliminary Reading

The Physics of the Interstellar Medium; Dyson, J.E. & Williams, D.A (1997)
Cosmological Physics; Peacock, J.A (1999)
Cosmology; Rowan-Robinson, M (1997)
Astrophysics vol.2; Bowers, R.L. & Deeming, T (1994)
Annual Reviews of Astronomy and Astrophysics, 30, 499-542; Carroll, Press & Turner (1992)

Pre-requisites

Prerequisites:
PHYS5030 Atomic Physics
PHYS5070 The Multiwavelength Universe and Exoplanets
PHYS6070 Stars, Galaxies and the Universe

Synopsis *

Interstellar Medium:
The major properties of the Interstellar Medium (ISM) are described. The course will discuss the characteristics of the gaseous and dust components of the ISM, including their distributions throughout the Galaxy, physical and chemical properties, and their influence the star formation process. The excitation of this interstellar material will be examined for the various physical processes which occur in the ISM, including radiative, collisional and shock excitation. The way in which the interstellar material can collapse under the effects of self-gravity to form stars, and their subsequent interaction with the remaining material will be examined. Finally the end stages of stellar evolution will be studied to understand how planetary nebulae and supernova remnants interact with the surrounding ISM.

Extragalactic astrophysics:
Review of FRW metric; source counts; cosmological distance ladder; standard candles/rods.
High-z galaxies: fundamental plane; Tully-Fisher; low surface brightness galaxies; luminosity functions and high-z evolution; the Cosmic Star Formation History
Galaxy clusters: the Butcher-Oemler effect; the morphology-density relation; the SZ effect
AGN and black holes: Beaming and superluminal motion; Unified schemes; Black hole demographics; high-z galaxy and quasar absorption and emission lines.

PH722 Particle and Quantum Physics

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Autumn	M	15 (7.5)	70% Exam, 30% Coursework	

Availability

This is not available as a wild module.

Contact Hours

Total contact hours: 30
Private study hours: 120
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Have:
Ability to identify relevant physical principles, make mathematical descriptions or approximations and solve problems using a mathematical approach.
Familiarity with how particle physics experiments work.
Ability to discuss particle physics in the language of particles and fields.
An understanding of the formalism of quantum mechanics and the ability to cast physical problems into it and solve them.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Have the knowledge and understanding of:
Enhancement of problem solving abilities, particularly mathematical approaches to problem solving.
To use appropriate sources as part of directed self-learning.
Enhancement of the ability to interpret theory.
An improved ability to manipulate precise and complex ideas and to construct logical arguments.

Method of Assessment

Assignment 1 (10hour, 15%)
Assignment 2 (10hour, 15%)
Examination (70%)

Preliminary Reading

B. R. Martin, Nuclear and Particle Physics, Wiley (2006)
Bettini, Introduction to Elementary Particle Physics (QC794.6.575)
S. McMurry, Quantum Mechanics, Prentice-Hall (1993)
M. Thomson, Modern Particle Physics (2013)
F. Mandl, Quantum Mechanics, Wiley (1992)

Pre-requisites

Prerequisites:
PHYS5020 Quantum Physics
PHYS5030 Atomic Physics

Synopsis *

• Approximation Methods, perturbation theory, variational methods.
• Classical/Quantum Mechanics, measurement and the correspondence principle.
• Uncertainty Principle and Spin precession.
• Key Experiments in Modern Quantum Mechanics (Aharonov-Bohm, neutron diffraction in a gravitational field, EPR paradox).
• Experimental methods in Particle Physics (Accelerators, targets and colliders, particle interactions with matter, detectors, the LHC).
• Feynman Diagrams, particle exchange, leptons, hadrons and quarks.
• Symmetries and Conservation Laws.
• Hadron flavours, isospin, strangeness and the quark model.
• Weak Interactions, W and Z bosons.

PH751		Research Review				
Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Whole Year	M	15 (7.5)	100% Coursework	

Contact Hours

Total contact hours: 0
Private study hours: 150
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Have:
An appreciation of the "state of the art" in a chosen focussed area of Physics.
An ability to explain complex physical arguments to an audience of experts.
An ability to make a critical analysis of specialist literature.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Have:
An understanding at the frontier of knowledge in a subject.
An ability to make a critical analysis of published scientific literature.
Enhancement of the ability to interpret theory.
An ability to present information graphically and textually at an advanced intellectual level.
An ability to explain complex physical arguments to a scientifically literate, but non-specialist audience.
An ability to produce a substantial piece of independent work.

Method of Assessment

Assignment (80%)
Presentation (20%)

Preliminary Reading

Journal: Reviews of Modern Physics (American Physical Society)
Journal: Reports on Progress in Physics (Institute of Physics)
Journal: Condensed Matter Physics: Eds Seitz, Turnbull and Ehrenreich (Academic Press)
Journal: Astronomy and Astrophysics Review (Springer)

Pre-requisites

None.

Synopsis *

In consultation with a member of staff the student will choose a topic within any branch of physics for which appropriate supervision is available and write an article on that topic that would be suitable for publication in the scientific literature as a review article.

PH752		Magnetism and Superconductivity				
Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Whole Year	M	15 (7.5)	70% Exam, 30% Coursework	

Availability

This is not available as a wild module.

Contact Hours

Total contact hours: 30
Private study hours: 120
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Have:
An understanding of the underlying physics of magnets and superconductors.
An appreciation of the rich variety of physics dependent correlated electrons.
An ability to solve problems in the science of magnetism and superconductivity.
An appreciation of the role of magnets and superconductors in devices and industry.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Have a knowledge and understanding of:
Enhancement of problem solving abilities, particularly mathematical approaches to problem solving.
To use appropriate sources as part of directed self-learning.
Enhancement of the ability to interpret theory.
A deeper appreciation of the connection of the role played by fundamental science in society generally.

Method of Assessment

Assignment (15%)
Assignment (15%)
Examination (70%)

Preliminary Reading

S. Blundell; Magnetism in Condensed Matter (2001).
J. F. Annett; Superconductivity, Superfluids and Condensates (2004).
R. M. White; Quantum theory of magnetism: magnetic properties of materials (2010).
P. G. de Gennes; Superconductivity of Metals and Alloys (1999).

Pre-requisites

Prerequisite: PHYS6060 Solid State Physics.

Synopsis *

Introduction. Magnetism, magnetometry and measuring techniques, Localised magnetic moments, spin and orbital moments, magnetic moments in solids. Paramagnetism. Exchange interactions, direct, indirect and superexchange, Magnetic structures, ferro, ferri, antiferromagnetism. Neutron and X-ray scattering. Spin waves, magnons. Magnetic phase transitions. Superconductivity: Introduction to properties of superconductors, Thermodynamics and electrodynamics of superconductors, Type I and Type II superconductors, the flux lattice Superconducting phase transitions. Microscopic superconductivity, correlations lengths, isotope effect, Cooper pairs, Froehlich Interaction, BCS theory. High Tc superconductors, superfluids, liquid helium.

PH754		Euromasters Project				
Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Whole Year	M	120 (60)	100% Project	

Contact Hours

Five days per week for 24 weeks. Contact with supervisor as appropriate, collaboration with other members of the research group.

Learning Outcomes

Personal skills such as the ability to work independently and as part of a group, to use initiative, time management and the ability to meet deadlines.

The ability to perform research at the forefront of a research topic.

The ability to write a large scale report on research.

Method of Assessment

Coursework 100%.

The dissertation required at the end of the project and the interim report after two months have the objectives of encouraging students to write clearly and express their understanding of their work in appropriate formal ways. The presentations during the final conference and after two months are designed to develop comparable oral and public speaking skills.

The quality of the work undertaken as represented in the project report and the oral presentation will contribute towards the final mark with approximate weightings of 80% and 20%.

At the end of Year 2, students will submit a dissertation of circa 100 pages and make a second presentation to a conference of Euromasters students, including the next cohort, supervisors and others who may be interested in learning about the work.

Preliminary Reading

None; appropriate background reading will be suggested by individual project supervisors

Pre-requisites

Progression from Stage 1 of the Euromasters programme.

Restrictions

School of Physical Sciences Procedures for Projects Involving Human Participation: It is a University requirement that any final year undergraduate, postgraduate or staff research project involving human participation should be subject to a procedure to determine whether ethics approval is needed. The procedures employed within the SPS are described below. Undergraduate Projects, PH600, PH603, PS620, PS720, PS740, CH620 and PH700 Each project proposal collected from academics will include an answer to the question “Does the project involve human participation?”. It is the responsibility of convenors to ask supervisors to check the Yes or No box. If Yes is ticked, please see below: The following text will be introduced into the information pack or the handbooks of the module: “Before you commence any work, it is important that the ethics of that work be considered; for example, taking fingerprints, or collecting images of faces of your colleagues, etc.. Your supervisor will discuss any ethics issues with you and you should keep a copy of the documentation." For projects involving human participants other than those conducting the project itself, students and their supervisors are required to read, note and act upon the guidelines available at http://www.kent.ac.uk/stms/faculty-office/adminprocedures/research-ethics/handbook.html to obtain approval from the Sciences Research Ethics (Human Participation) Advisory Group.” Taken from a document by Adrian Podoleanu, SPS’ representative on the above ethics Group, October, 2012.

Synopsis *

• A student, supervisor and project will be brought together consensually and a one year research project will be performed within one of the SPS research groups. This will be completely equivalent to a current research masters degree.

PH800		Biomedical Optics				
Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Whole Year	M	15 (7.5)	70% Exam, 30% Coursework	

Contact Hours

Total contact hours: 33
Private study hours: 117
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Have:
Knowledge and understanding of concepts of propagation of light into the tissue.
Knowledge of optical imaging methods with emphasis on confocal microscopy and on white light interferometry for optical coherence tomography.
An understanding of the interaction of low power optical waves with the tissue.
A comprehensive understanding of the principles of white light interferometry applied for imaging tissue.
Knowledge and understanding of principles of fluorescence, adaptive optics, confocal microscopy and optical coherence tomography applied in imaging the eye and the skin.
An ability to make use of appropriate texts, research-based materials or other learning resources as part of managing their own learning.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Have:
Capability to develop and conduct independent research on optics applied for non-invasive optical imaging.
Ability to complete successfully a thesis (Master or PhD) or a shorter research project (3-10 months).

Method of Assessment

Assignment (7%)
Assay (8%)
IC Test (15%)
Examination (70%), 2 hours

Preliminary Reading

Confocal microscopy; Wilson, T. (ed.) (1990)
Handbook of biological confocal microscopy; Pawley, J.B. (ed.) (1990)
Handbook of optical coherence tomography; Bouma, B.E. & Tearney, G.J. (eds.) (2002)
Optical coherence tomography, technology and applications; Drexler, W. & Fujimoto, J.G. (eds.) (2008)

Pre-requisites

PHYS5040 Electromagnetism and Optics
PHYS6040 Relativity Optics and Maxwell's Equations
PHYS5130 Medical Physics

Synopsis *

Introduction into tissue optics (absorption, scattering, anisotropy, therapeutic window), reflectance spectrometry, fluorescence, safety), optical properties of the tissue
Photodynamic therapy, contrast media, ICG angiography
Confocal microscopy (CM) principles and resolutions
CM in ophthalmology, dermatology and biology
Advanced microscopy techniques
Endoscopic microscope techniques
Principles of Optical Coherence Tomography (OCT), relation between the linewidth and depth resolution, large bandwidth sources, source correlation function, configurations of flying spot OCT systems
Nanoparticles as contrast agents for CM, OCT, toxicity, measurements of their concentration
Signal processing in Longitudinal and en-face OCT
Coherence radar
Channelled spectrum and spectral OCT
Configurations of optical path difference scanning, Combining OCT with CM
Noise in CM and in OCT
Polarisation and dispersion in CM and OCT
Adaptive optics for enhanced transverse resolution in CM and OCT
The eye (The eye as an optical instrument)
Optical sources for optical modalities, tunable lasers and supercontinuum sources
Specialised lectures on Optical Coherence Tomography for eye imaging, on histology, on specific language programmes used in the optics lab, such as LabView and CUA

PS700 Physical Science Research Investigation

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
3	Canterbury	Whole Year	M	15 (7.5)	100% Project	

Availability

This is not available as a wild module.

Contact Hours

Total contact hours 35
Private study time 115
Total study hours 150

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Demonstrate an ability to identify relevant principles and laws when dealing with problems, and to make approximations necessary to obtain solutions.
Demonstrate an ability to execute and analyse critically the results of an experiment or investigation and draw valid conclusions. To evaluate the level of uncertainty in these results and compare them with expected outcomes, theoretical predictions or with published data; thereby to evaluate the significance of their results in this context.
Demonstrate competent use of appropriate C&IT packages/systems for the analysis of data and the retrieval of appropriate information.
Demonstrate an ability to present and interpret information graphically.
Demonstrate an ability to communicate scientific information, in particular to produce clear and accurate scientific reports.
Demonstrate an ability to make use of appropriate texts, research-based materials or other learning resources as part of managing their own learning.
MPhys/MSci/MSc students:- Demonstrate an ability to communicate complex scientific ideas, the conclusion of an experiment, investigation or project concisely, accurately and informatively.
MPhys/MSci/MSc students:- Demonstrate an ability to make use of research articles and other primary sources.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Demonstrate investigative skills in the context of independent investigation including the use of textbooks and other available literature, databases, and the interaction with colleagues to extract important information.
Demonstrate communication skills in the area of dealing with surprising ideas and difficult concepts, including listening carefully, reading demanding texts and presenting complex information in a clear and concise manner. C&IT skills are an important element to this.
Demonstrate analytical skills – associated with the need to pay attention to detail and to develop an ability to manipulate precise and intricate ideas, to construct logical arguments and to use technical language correctly.
Demonstrate personal skills – the ability to work independently and as part of a group, to use initiative, to organise oneself to meet deadlines and to interact constructively with other people.
Demonstrate self-direction and originality in applying and adapting problem-solving skills to unfamiliar, complex and open-ended situations.
Demonstrate the independent learning ability required for continuing professional development.
Establish advanced research skills needed at a postgraduate level or graduate level in other sectors.
Demonstrate the capacity to undertake advanced scientific investigations, advanced problem solving and data analysis in a research environment.

Method of Assessment

100% coursework. The coursework assesses student's familiarity with and ability to implement current research methods. Preparation of their coursework will require independent, original problem solving while planning carefully for the time available and to present their work in a professional manner.

Colloquium Report 1 (10 hours) 20%
Colloquium Report 2 (10 hours) 20%
Application outline (4 hours) 10%
Group Research Project (30 hours) 40%
Poster Presentation of Project (10 hours) 10%

Preliminary Reading

http://www.epsrc.ac.uk/
http://www.scitech.ac.uk

On writing proposals:
https://www.epsrc.ac.uk/funding/howtoapply/preparing

FOR WRITING A FUNDING PROPOSAL
http://www.learnerassociates.net/proposal/
http://www.learnerassociates.net/proposal/

Pre-requisites

None.

Synopsis *

Students will develop a number of skills related to the investigation and planning of research such as analytical skills, critical thinking and ability to understand and communicate scientific information in graphically. Students will learn how to search and retrieve information from a variety of locations (colloquia, websites, journals, proceedings etc). They will learn how to compile professionally-produced scientific documents such as colloquia reports, posters and applications for funding of future research activities/research job applications. The Group research investigation strengthens these skills, adding experience of working in a team.

PS701 Topics in Functional Materials

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Whole Year	M	15 (7.5)	80% Exam, 20% Coursework	

Availability

This is not available as a wild module.

Contact Hours

Total contact hours: 31
Private study hours: 119
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Have:
A systematic understanding and a critical awareness of some current topics of interest in materials research.
A understanding of techniques applicable for synthesis and purification of materials.
A understanding of techniques applicable for chemical and physical characterisation methods of materials.
A critical awareness of the applications of materials in industry.
A systematic understanding of knowledge relating to materials.
An ability to apply the knowledge to solve problems in materials.
An understanding of the fundamental phenomena of the electronic structure of materials.
An appreciation of the key driving forces in nanoscience and knowledge of selected important nanomaterials

The intended generic learning outcomes.On successfully completing the module students will be able to:
Have:
Problem-solving skills, in the context of both problems with well-defined solutions and open-ended problems, extending to situations where evaluations have to be made on the basis of limited information.

Method of Assessment

Assignment 1 (3-4 pages, 6.67%)
Assignment 2 (3-4 pages, 6.67%)
Assignment 3 (3-4 pages, 6.67%)
Examination, 3 hours (80%)

Preliminary Reading

• Dieter Vollath "Nanomaterials", Wiley, 2013
• Anthony R. West “Solid State Chemistry and Its Applications”, Wiley, 2014
• Richard J. D. Tilley “Defects in Solids”, Wiley, 2008
• Richard M. Martin “Electronic Structure”, Cambridge University Press, 2008

Pre-requisites

None.

Synopsis *

Chemists and physicists are now playing an important role in the growing field of materials research. More recently, there has been a growing interest, driven by technological needs, in materials with specific functions and this requires a combination of physics and chemistry. For example, new materials are needed for the energy industry (batteries and photovoltaics), for the optics and electronics industry (glasses and semiconductors). The aim of this module is to introduce students to this area of modern materials and associated techniques. Examples of the topics that might typically be covered are: Crystal growth and defects; Liquid crystals; Nanomaterials; Glases; Magnetism and Magnetic Materials; Multiferroics; X-ray absorption spectroscopy (XAS).

PS702 Contemporary and Advanced Issues in Forensic Science

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Whole Year	M	15 (7.5)	70% Exam, 30% Coursework	
2	Canterbury	Whole Year	M	15 (7.5)	70% Project, 30% Coursework	

Availability

This is not available as a wild module.

Contact Hours

Total contact hours: 20
Private study hours: 130
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Demonstrate a specialist knowledge of techniques within particular areas of forensic science.
Show engagement and familiarity with recent and current research methods, results and publications.
Demonstrate clear recognition of the constraints and opportunities of the environment in which professional forensic science is carried out.
Discuss the moral and ethical issues involved in the practice of forensic science.
Demonstrate confidence in their ability to interpret complex technical information and to communicate it in a professional situation.
Communicate the need and application of quality standards supporting the delivery of forensic science.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Use self-direction and originality in applying and adapting problem-solving skills to unfamiliar, complex and open-ended situations.
Use independent learning ability required for continuing professional development.

Method of Assessment

Presentation (30 mins, 30%)
Dissertation (5000 words, 70%)

Preliminary Reading

Gill.P Misleading DNA Evidence, Reasons for Miscarriages of Justice, 2014
Gunn. A Essential Forensic Biology, 2009
Ubelaker, D.H. Forensic Science: Current Issues, Future Directions, 2013
Heard, B.J. Forensic Ballistics in Court: Interpretation and Presentation of Firearms Evidence. Oxford: Wiley-Blackwell, 2013
Kintz, P., & Kintz, P. Toxicological Aspects of Drug-Facilitated Crimes, 2014
Stuart, B. Forensic Analytical Techniques, 2013
Lentini, J.J. Scientific Protocols for Fire Investigation. Second edition. Boca Raton, Fla.: CRC Press, 2013
Carlin, M, and Dean J.R. Forensic Applications of Gas Chromatography, 2013
Journal of Forensic Sciences [0022-1198]
Forensic Science International [0379-0738]
Journal of the Forensic Science Society [0015-7368]

Pre-requisites

None.

Synopsis *

This module enables students from a variety of backgrounds (e.g. graduates in Forensic Science, Chemistry, Biochemistry, Forensic Biology etc.) to develop their expertise within selected areas of forensic science. Areas for development (e.g. crime scene analysis, ballistics, drug analysis, face recognition, DNA, etc.) will be identified during an initial meeting of the module convenor with each student.

Students will then be assigned a supervisor in the appropriate area who will guide them towards appropriate learning resources such as lecture and practical materials within the School's portfolio of modules, textbooks and research journals, as well as providing tutorial guidance throughout the module. Guidance will be also given in preparing the dissertation and the presentation. Students will be expected to present verbally, and in writing, the background and advances (focussing on the last ten years) in their selected area of expertise.

PS704 Major Incident Management

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Whole Year	M	15 (7.5)	100% Coursework	
2	Canterbury	Whole Year	M	15 (7.5)	60% Exam, 40% Coursework	

Availability

This is not available as a wild module.

Contact Hours

Total contact hours: 40
Private study hours: 110
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:

Understand the general processes involved with managing various incident types (indicative topics may include – civil infrastructure incidents, disaster victim identification (DVI), acts of terrorism and weapons of mass destruction (WMDs).
Understanding how major incidents are managed at local, national, and international levels.
Manage personnel & logistics in live and simulated major incidents including decision-making in complex and unpredictable situations
Comprehensively understand the science underlying chemical, biological, radiological and nuclear (CBRN) incidents.
Use computer simulations to aid their understanding of major incident investigation and interpretation.
Apply a multidisciplinary scientific knowledge to their incident investigation processes across many different possible scenarios (see 8.1 for indicative topics).

The intended generic learning outcomes. On successfully completing the module students will be able to:

Manage resources and personnel under strict time pressure.
Problem solve in real time incidents and simulated exercises.
Gather information and data from numerous sources and use such information to synthesis a response to highly fluid incident.
Interact with personnel in order to extract accurate information and to take command of a major incident.
Use computer software to model various scenarios.

Method of Assessment

Assignment 1 - Incident Portfolio – 5,000 words (60%)
Assignment 2 - table-top major incident exercise - 2 hours (40%)

Preliminary Reading

Core text:
Introduction to Emergency Management, Haddow. 2008.

Recommended reading:
Aircraft Safety, Kraues. 2003
Maritime Safety: The Human Factors. Trafford. 2009. Book Guild Publishing Homeland Security in the UK: Future Preparedness for Terrorist Attack since 9/11: Wilkinson.2007
Blackstone's Counter-Terrorism Handbook: Stainforth. 2010 OUP: Derail: Why Trains Crash. Faith: 2000. Channel 4 Publishing:
Air Accident Investigation. Owen. 2001.
The Terrorism Reader: 4th Edition. Whittaker. 2012.
Explaining terrorism; causes, processes and consequences. Crenshaw, Techniques of crime scene investigation, CRC Press, Fisher, 2012,

Pre-requisites

None.

Synopsis *

The module will cover incident management from a tactical/regional and national/ strategic perspective using the four stage model: Identification, preparation, mitigation, and recovery.

A range of actual and potential incidents will be covered including air accident, marine accident, rail and road incident, terrorist attacks, and industrial and chemical incidents.

This will be achieved using lectures, critical evaluation of case studies, and real time simulated incident exercises.

Students will be required to examine all aspects of scene and major incident management, disaster planning. This will encompass emergency management, damage limitation, evacuation plans, logistical support, inter-agency operation and cooperation, and personnel management.
In addition to the process-driven content above, students will further study the relevant science behind some of the major incident types and develop the capability to computer model various aspects of these events. This ultimately provides students with the ability to take a modern, holistic and multidisciplinary scientific approach when interpreting what may have happened during such events.

PS713 Substances of Abuse

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Whole Year	M	15 (7.5)	70% Exam, 30% Coursework	

Availability

This is not available as a wild module.

Contact Hours

Total contact hours: 30
Private study hours: 120
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Have a knowledge and understanding of:
The theoretical chemistry of the principles of analysis and identification of several chemicals that are related to substances of abuse.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Display an ability to demonstrate knowledge and understanding of essential facts, concepts, principles and theories relating to the subject areas identified in the syllabus.
Display an ability to apply such knowledge to qualitative and quantitative problem solving in the relevant subject area.
Display an ability to communicate complex scientific topic in the form of an audio-visual presentation.

Method of Assessment

Scientific Presentation (15 mins plus questions, 15%)
Case Study Presentation (5-7 mins, 10%)
Assignment (5%)
Examination (3 hours, 70%)

Preliminary Reading

Clarke's Analytical Forensic Toxicology, Pharmaceutical Press; 1st edition (30 Jun 2008) ISBN-10: 0853697051; ISBN-13: 978-0853697053
Michael D. Cole, The Analysis of Controlled Substances: A Systematic Approach. Cole 2003. ISBN 0-471-49253-1
Coleman, Michael D., Human Drug Metabolism: an introduction, 2010. ISBN: 13-9780470742167
Perrine, Daniel M, The Chemistry of Mind-Altering Drugs: History, Pharmacology and Cultural Context, 1996. ISBN: 13-9780841232532
Stevens, A, Drugs, Crime and Public Health: the political economy of drug policy, 2011. ISBN: 13-9780203844168

Pre-requisites

Prerequisite:
CHEM3140 Introduction to Biochemistry and Drug Chemistry

Synopsis *

Elements of synthetic organic chemistry and medicinal chemistry which are relevant to substances of abuse.
The theoretical chemistry and principles of analysis and identification of several substances that are substances of abuse.
The following are indicative:

Amphetamines and related compounds
LSD and related compounds
Cannabis and Cannabis products
Opiate compounds
Cocaine and related compounds
Certain controlled pharmaceutical drugs

PS717 Modern Approaches to Incident Management

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
3	Canterbury	Whole Year	M	30 (15)	100% Coursework	

Availability

This is not available as a wild module.

Contact Hours

Total contact hours: 55
Private study hours: 245
Total study hours: 300

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Understand the general processes involved with managing various incident types (indicative topics may include – civil infrastructure incidents, disaster victim identification (DVI), acts of terrorism and weapons of mass destruction (WMDs) and smaller scale murder scene investigation).
Understand evidential prioritisation in relation to incident investigation.
Manage evidence recovery, storage and analysis.
Manage personnel & logistics in live and simulated incidents.
Write a critical report based on their own incident scene management.
Understand the science underlying chemical, biological, radiological and nuclear (CBRN) incidents.
Use computer simulations to aid their understanding of incident investigation and interpretation.
Apply a multidisciplinary scientific knowledge to their incident investigation processes across many different possible scenarios (see the first learning outcome above for indicative topics).

The intended generic learning outcomes. On successfully completing the module students will be able to:
Manage time, resources, and personnel.
Solve problems during real-time incidents and simulated exercises.
Communicate clearly with a variety of personnel.
Write reports to a professional level.
Use computer software effectively to model various complex scenarios.

Method of Assessment

Incident Management Practical – 3 hours (25%)
Incident Report – 3000 words (15%)
Table-top incident simulation – 3 hours (25%)
Incident Portfolio – 5,000 words (35%)

Preliminary Reading

Core text:
Introduction to Emergency Management, Haddow. 2008.

Recommended reading:
Aircraft Safety, Kraues. 2003
Maritime Safety: The Human Factors. Trafford. 2009. Book Guild Publishing
Homeland Security in the UK: Future Preparedness for Terrorist Attack since 9/11: Wilkinson.2007
Blackstone's Counter-Terrorism Handbook: Stainforth. 2010 OUP
Derail: Why Trains Crash. Faith: 2000. Channel 4 Publishing
Air Accident Investigation. Owen. 2001.
The Terrorism Reader: 4th Edition. Whittaker. 2012.
Explaining terrorism; causes, processes and consequences. Crenshaw,
Techniques of crime scene investigation, CRC Press, Fisher, 2012,

Pre-requisites

None.

Synopsis *

This module will cover the core principles behind the management and investigation processes that may relate to a range of forensically-relevant incident types. Indicative areas of discussion may include investigation of civil infrastructure incidents, disaster victim identification (DVI), acts of terrorism and weapons of mass destruction (WMDs) as well as managing forensic resources over a range of major and smaller incidents.

In addition to the process-driven content above, students will further study the relevant science behind some of the incident types and develop the capability to computer model various aspects of these events. This ultimately provides students with the ability to take a modern, holistic and multidisciplinary scientific approach when interpreting what may have happened during such events.

PS740 Forensic Science Research Project MSCI

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Whole Year	M	60 (30)	100% Project	

Availability

This is not available as a wild module.

Contact Hours

Total contact hours: 348
Private study hours: 252
Total study hours: 600

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Build on the research independence gained in year 3 as part of PSCI7200 (Advanced Forensic Science Laboratory).
Establish advanced research skills at Level 7.
Have the capacity to undertake advanced scientific investigations, advanced problem solving and data analysis in a research environment.
Have the ability to communicate scientific ideas through presentations and written reports.
In conjunction with PSCI7000 (Physical Science Research Planning) to gain knowledge of how research is structured and funded.
Have time management and forward planning skills.

The intended generic learning outcomes. On successfully completing the module students will be able to:
It is considered that the subject specific learning outcomes and assessment pattern fulfil or contribute to the following learning outcomes;

Ability to demonstrate knowledge and understanding of essential facts, concepts, principles and theories relating to the subject and to apply such knowledge and understanding to the solution of qualitative and quantitative problems.
Ability to recognise and analyse novel problems and plan strategies for their solution by the evaluation, interpretation and synthesis of scientific information and data by a variety of computational methods.
Ability to recognise and implement good measurement science and practice and commonly used Forensic/Chemistry laboratory techniques. Including the ability to select the most appropriate techniques for a given analysis and to use a wide range of advanced apparatus. Ability to exercise Good Laboratory Practice (GLP) including the safe handling of chemical materials, taking into account their physical and chemical properties, including any specific hazards associated with their use and to risk assess such hazards and the skills required to conduct of standard laboratory procedures (including the operation of standard forensic instrumentation such as that used for analytical investigations and separation).
Skills in essay writing and presenting scientific material and arguments clearly and correctly, in writing and orally, to a range of audiences. The ability to communicate complex scientific arguments to a lay audience.
Ability to interpret data derived from laboratory observations and measurements in terms of their underlying significance and the theory underpinning them and to present such data to an examining body for example as an expert witness.
Communication skills, covering both written and oral communication. Self management and organisational skills with the capacity to support life-long learning. Including Information technology skills such as word processing and spreadsheet use, data logging and storage, internet communications etc.
Problem solving skills relating to qualitative and quantitative information extending to situations where evaluations have to be made on the basis of limited information.
Information retrieval skills in relation to primary and secondary information sources including information retrieval through on-line computer searches.
Time management and organisational skills as evidenced by the ability to plan and implement efficient and effective modes of working. Including the study skills necessary for continuing professional development and preparation for employment as a practicing forensic scientist or chemist.

Method of Assessment

Progress report (approx 4 pages, 10%)
Final report (approx 20-50 pages depending on project, diagrams etc. 50%)
Supervisor mark (20%)
Presentation (20 mins, 20%)

Preliminary Reading

Appropriate learned journals and texts as set by project supervisor and sourced by student.

Pre-requisites

Prerequisite:PSCI7200
Co-requisite: PSCI7000

Restrictions

School of Physical Sciences
Procedures for Projects Involving Human Participation

It is a University requirement that any final year project undergraduate, postgraduate or staff research project involving human participants should be subject to a procedure to determine whether ethics approval is needed. The procedure employed by SPS and the Faculty of Science are described here:
http://www.kent.ac.uk/stms/faculty/adminprocedures/research-ethics/index.html

Undergraduate projects PH600, PH603, PS620, CH620, PS720, PS740 and PH700
Each project proposal collected from academics will include an ethics approval checklist designed to determine if ethical approval is required from the faculty i.e. does the project involve human participants. It is the responsibility of convenors to ask supervisors to fill in these checklists with students. If the answer to any of the questions on the checklist is yes please see below;

The following text will be introduced into the information pack or the handbooks of the module:

“Before you commence any work, it is important that the ethics of that work be considered; for example, taking fingerprints or collecting images of faces of your colleagues etc. Your supervisor will discuss any ethics issues with you and you should keep a copy of the documentation”

For projects involving human participants other than those conducting the project itself, students and their supervisors are required to read, note and act upon the guidelines available at
http://www.kent.ac.uk/stms/faculty/adminprocedures/research-ethics/index.html to obtain approval from the Sciences Research Ethics (Human Participation) Advisory Group.

Further information on Ethics can be obtained from Dr Donna Arnold, SPS representative on the Sciences Research Ethics Advisory Group.

Synopsis *

Students will undertake a project from an available project listing and will work under the guidance of a supervisor. The student will be encouraged to develop some level of research independence within the project remit appropriate of an M-level masters' student. The project will be assessed on a number of criteria which will include the project work (the amount, quality etc appropriate for the level), effort put in by the student, the preparation of a written report and an oral presentation session. The student's progress will be assessed at the end of the first term through some form of progress report. This will also involve some degree of forward planning such that the students assess their own project requirements for the following term allowing the student to learn time management and forward planning skills.
Aims:
To conduct individual masters level research.
To develop research independence such that the student can take responsibility for the research direction of the project within the confines of the project remit.
To further deepen the student's knowledge within a specific research area.
To prepare students for independent research careers in industry or at PhD level.
To further enhance student's abilities for scientific communication through oral presentations and report writing.
Time management and forward planning skills.

PS780		MSC Research Project				
Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Spring	M	60 (30)	100% Project	

Contact Hours

Total contact hours: 300
Private study hours: 300
Total study hours: 600

Learning Outcomes

The intended subject specific learning outcomes. On successfully completing the module students will be able to:
Report practice in laboratory analysis, functional materials and/or substances of abuse.
Use advanced laboratory analytical methods and apparatus as applied to general analysis and forensic investigation.
Demonstrate advanced research skills at postgraduate level including the ability to select the most appropriate techniques for a given analysis and to be able to communicate and report these in the most effective manner.
Undertake advanced scientific investigations, advanced problem solving and data analysis in a research environment.
In conjunction with PSCI7000 (Physical Science Research Planning) gain knowledge of how postgraduate research is structured and funded.

The intended generic learning outcomes. On successfully completing the module students will be able to:
Use critical thinking, reasoning and reflection.
Recognise and solve problems at an advance level.
Generate, analyse, interpret and present in a range of environments.
Demonstrate personal and interpersonal skills, working as a member of a team and individual.
Learn effectively for the purpose of continuing personal development.
Demonstrate skills relevant to a career in forensic science, chemical industry or research.
Manage time and resources within an individual project.

Method of Assessment

Progress report (approx. 8 pages 10%)
Presentation (30 mins, 20%)
Supervisor's assessment (20%)
Project report (approx. 40 pages, 50%)

Preliminary Reading

The Templeman Library has extensive holdings of recently published texts and journals relevant to this module.

Examples include:
Journal of Forensic Sciences [0022-1198]
Forensic Science International [0379-0738]
Journal of the Forensic Science Society [0015-7368]

Pre-requisites

Prerequisite:
Successful completion of the Stage 1 of the MSc programme

Synopsis *

Students will undertake a project from an available project listing and will work under the guidance of a supervisor. The student will be encouraged to develop some level of research independence within the project remit appropriate of a postgraduate master's student.
The project will be assessed on a number of criteria which will include the project work (the amount, quality etc. appropriate for the level), effort put in by the student, the preparation of a written report and an oral presentation session. The student’s progress will be assessed mid way through the research project through a progress report. This will also involve some degree of forward planning such that the students assess their own project requirements for the following period allowing the student to learn time management and forward planning skills.