College of Science, Engineering & Food Science

UCC

University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

BSc (Joint Honours)
MATHEMATICS & PHYSICS

Course Code:	CK407 Mathematical Sciences
	CK408 Physics & Astrophysics
Duration:	4 years

Further Information:
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E: maths@ucc.ie or physics@ucc.ie
W: http://www. physics.ucc.ie
or http://www.ucc.ie/en/euclid/

Why study Mathematics and Physics?
Mathematics, both as a language and a body of knowledge and technique, has for centuries provided the fundamental underpinnings of science and technology.

The Physics of general relativity and quantum mechanics would have been impossible without related advances in geometry and operator algebra. Apart from its wide-ranging application, Mathematics is also studied for the elegance and coherence of its ideas and the intellectual challenges it presents. Mathematicians work on abstract problems independent of any immediate practical application – creating new mathematics, building new mathematical structures and unravelling new mathematical patterns; they also work with Physicists on creating the mathematics relevant to problems in Physics.

Physics occupies a central position in science and technology. It is concerned with fundamental questions such as 'what are the basic building blocks of matter?' and 'how did the universe evolve?' and at the same time, is the basis of much present and future technology, tackling problems as pressing and diverse as the development of new energy sources, safer medical diagnostics, high-temperature superconductors and ever smaller and faster devices for electronics and telecommunications.
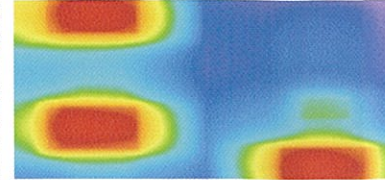
Physics is a dynamic and exciting subject, which combines intellectual fascination with practical relevance to a wide range of human endeavour, from Philosophy and Theology to Medicine and the Biological Sciences to Engineering and the Earth Sciences. The attributes needed by a good Physicist include spatial and conceptual vision, mathematical fluency, curiosity and imagination, and a modicum of hard work.

Programme Overview
This degree programme is offered jointly by the Departments of Physics and School of Mathematical Sciences.   It provides a solid grounding in mathematics and physics with an emphasis on developing students' problem-solving skills and their capacity for analytical and logical thinking in mathematics, as well as their intuitive and analytical understanding of Physics.

Career Opportunities
Graduates from the BSc (Hons) in Mathematics and Physics do well in the employment market because of the skills they offer. As society becomes increasingly more complex and more technologically oriented, the capacity for clear logical thinking and the quality of numeracy are in continuing and growing demand.

Employers recognise that graduates of this degree have already proved their ability to master difficult ideas and solve challenging problems and can consequently be expected to have the capacity and flexibility to learn new techniques and new problem solving skills quickly. A wide range of careers is open to graduates of this degree:

- Careers directly related to a qualification in this subject, such as teaching and lecturing, scientific research and development, software development and computing.
- Careers that require the ability to think logically and quantitatively, such as banking, management, consulting and insurance.
- Careers that are open to graduates of any discipline, such as retailing, sales and marketing, administration, the media and the civil service.
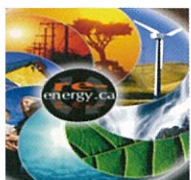
BSc MATHEMATICS & PHYSICS Sept 2013

What will you be studying?

Year 1
CK407
Core Modules:
• Introduction to Mechanics (5 credits) • Introduction to Mathematical Modelling (5 credits) • Mathematical Software (5 credits) • Calculus (5 credits) • Introduction to Analysis (5 credits) • Introduction to Abstract Algebra (5 credits) • Introduction to Linear Algebra (5 credits) • Introduction to Probability and Statistics (5 credits) • Introductory Physics I (10 credits) • Introductory Physics II (10 credits)

CK408
Core Modules:
• Introductory Physics I (10 credits) • Introductory Physics II (10 credits) • Calculus (5 credits) • Introduction to Analysis (5 credits) • Introduction to Linear Algebra (5 credits) • Introduction to Mechanics (5 credits) • Introduction to Mathematical Modelling (5 credits)
Plus elective modules to the value of 15 credits from the following:
• Computer Science • Chemistry • Applied Mathematics • Mathematics • Physics • Statistics

Year 2
Core Modules:
• Fourier Methods • Mathematical Analysis I • Mathematical Experimentation and Chaos • Ordinary Differential Equations • Linear Algebra • Multivariable Calculus
Plus Physics Modules: Classical Mechanics • Introduction to Quantum Physics • Electrostatics and Magnetostatics • Introduction to Thermodynamics and Statistical Physics • Introduction to Astrophysics and Special Relativity • Experimental Physics I

Year 3
Core Modules:
• Mathematical Analysis II • Introduction to Modern Algebra • Introduction to Differential Geometry • Complex Analysis • Metric Spaces and Topology • Topics in Discrete Mathematics
Plus Physics Modules: Optics • Quantum Mechanics • Electromagnetism • Statistical Thermodynamics • Nuclear and Particle Physics • Experimental Physics II • Observational Astrophysics

Year 4
• Topics in Mathematics • Functional Analysis • Project • Measure Theory and Martingales • Topics in Modern Algebra • Topics in Differential Geometry •Stochastic Modelling II
Plus Physics Modules:
Physics: • Minor Research Project and 3 modules from list (A) and two modules from list (B)
Or
Nuclear and Particle Physics • Stars and the Interstellar Medium • Galactic and Extragalactic Astrophysics • Gravitation and Cosmology • Minor Research Project and one 5 credits module from list (A) or list (B)
List (A) Advanced Mechanics • Advanced Quantum Mechanics • Advanced Electromagnetism • Atomic and Molecular Physics • Gravitation and Cosmology • Experimental Physics III
List (B) Introduction to Condensed Matter Physics • Nuclear and Particle Physics • Observational Astrophysics • Advanced Condensed Matter Physics Quantum Field Theory • Introduction to Plasma Physics • Introduction to Lasers and Photonics • Advanced Computational Physics • Stars and the Interstellar Medium • Galactic and Extragalactic Astrophysics • Quantum Optics and Advanced Spectroscopy

Postgraduate Opportunities in UCC
Graduates can undertake a wide range of one year fulltime (or two year part-time) professional diplomas, as well as research MSc and PhD degrees.

Graduate Profile

Entry Requirements
CK407: Minimum HC3 in two subjects & passes in four subjects at H or O level in the Leaving Certificate, from Irish, English, Mathematics, and three other subjects recognised for entry purposes.

Additional entry requirements include HB3 in Mathematics.

Students must also have the requisite points for entry to this course.

CK408: Minimum HC3 in two subjects & passes in four subjects at H or O level in the Leaving Certificate, from Irish, English, Mathematics, one laboratory Science subject (i.e. Chemistry, Physics, Biology, Physics with Chemistry (joint) or Agricultural Science) and two other subjects recognised for entry purposes. One of the HC3 subjects must be in a laboratory science subject or Mathematics or Applied Mathematics. In addition students must have the requisite points for entry to this course.

For further information contact:
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