ROYAL IRISH ACADEMY
MEMBERS

PROF TONY LEWIS
PRINCIPAL INVESTIGATOR
IN MAREI & PROFESSOR
EMERITUS AT UCC
HAS BEEN AWARDED THE
CHEVALIER DES PALMES
ACADÉMIQUES

NABEEL A RIZA
CHAIR PROFESSOR OF
ELECTRICAL & ELECTRONIC
ENGINEERING
HAS BEEN NAMED A
FELLOW OF THE US
NATIONAL ACADEMY OF
INVENTORS (NAI)

SEÁN WHELAN
MEDICAL STUDENT & BSC
NEUROSCIENCE
COLLEGE OF SEFS
GRADUATE OF THE YEAR
2016 AWARD

DR DAVID MCNULTY
A POSTDOCTORAL RESEARCHER AT UCC,
IS ONE OF JUST THREE PEOPLE FROM IRELAND
SELECTED TO PARTICIPATE IN THE LINDAU NOBEL
LAUREATE MEETING IN LINDAU IN JUNE.

UCC’s Limited Lactis team was awarded a gold medal recently at the iGEM (international Genetically Engineered Machine) competition in Boston.

More than 600 teams from top universities across the globe, including MIT, Harvard, Stanford, Cambridge and Oxford took part in the competition, which is held up as the gold standard for ‘research-led education’.

The Cork team, the only Irish entrants in the competition, used the bacterium Lactococcus Lactis, a generally recognised as safe (GRAS) bacterium, commonly used in food production, to develop a potential new vaccine against cancer and also Leishmaniasis, a neglected tropical disease which is increasing in geographical distribution.

Gold Medal for UCC’s Limited Lactis team

Dr Maria McNamara, Paleobiologist, School of Bees, has been featured in the RIA Portrait ‘Women on Wall’ as one of 12 female academic leaders. Dr McNamara has recently been able to reconstruct a fossil in full living colour for the first time.

Women on Wall

Dr Fionn Edwards, Engineering & Bees Student, Google Anita Borg Scholarship in 2017

Kevin Murphy, Medicine Student, 2016 Cunningham Award, for his work on mapping a remote Scottish Island

Fiona Edwards, Engineering & Bees Student, Google Anita Borg Scholarship in 2017

Sean McSharry, UCC Architecture Graduate, Winner of the RIAI Scott Tallon Walker Student Excellence Award in Architecture

Prof Barry O’Sullivan, Dept of Computer Science and Director of Insight Centre for Data Analytics

Admitted to the Royal Irish Academy.

Prof O’Sullivan was Science Foundation Ireland Researcher of the Year in 2016. He also has been named SFI Researcher of the Year, recognising his significant contribution to the Irish research community in his career.

Prof Fergal Shanahan, Director of the APC Microbiome Institute at UCC

Has been awarded the 2016 Royal Irish Academy Gold Medal.

Dr David McNulty, a Postdoctoral Researcher at UCC, is one of just three people from Ireland selected to participate in the Lindau Nobel Laureate Meeting in Lindau in June.

Dr Maria McNamara, Paleobiologist, School of Bees, has been featured in the RIA Portrait “Women on Wall” as one of 12 female academic leaders. Dr McNamara has recently been able to reconstruct a fossil in full living colour for the first time.

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Gold Medal for UCC’s Limited Lactis team

PROF PETER KENNEDY
PROFESSOR OF MICROELECTRONIC ENGINEERING AT UCC

* * *

PROF FERGUS SHANAHAN
DIRECTOR OF THE APC MICROBIOME INSTITUTE AT UCC
HAS BEEN AWARDED THE 2016 ROYAL IRISH ACADEMY GOLD MEDAL.

* * *

PROF BARRY O’SULLIVAN
DEPT OF COMPUTER SCIENCE AND DIRECTOR OF INSIGHT CENTRE FOR DATA ANALYTICS

ADMITTED TO THE ROYAL IRISH ACADEMY.

PROF O’SULLIVAN WAS SCIENCE FOUNDATION IRELAND RESEARCHER OF THE YEAR IN 2016. HE ALSO HAS BEEN NAMED SFI RESEARCHER OF THE YEAR, RECOGNISING HIS SIGNIFICANT CONTRIBUTION TO THE IRISH RESEARCH COMMUNITY IN HIS CAREER.

* * *

DR MARIA MCNAMARA, PALEOBIOLOGIST, SCHOOL OF BEES, HAS BEEN FEATURED IN THE RIA PORTRAIT “WOMEN ON WALLS” AS ONE OF 12 FEMALE ACADEMIC LEADERS. DR MCNAMARA HAS RECENTLY BEEN ABLE TO RECONSTRUCT A FOSSIL IN FULL LIVING COLOUR FOR THE FIRST TIME.

* * *

DEPARTMENT OF PROCESS AND CHEMICAL ENGINEERING

WINNER OF THE INSTITUTE OF CHEMICAL ENGINEERING SUSTAINABILITY TEACHING AWARD

* * *

PROF FERGUS SHANAHAN
DIRECTOR OF THE APC MICROBIOME INSTITUTE AT UCC
HAS BEEN AWARDED THE 2016 ROYAL IRISH ACADEMY GOLD MEDAL.

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DEPARTMENT OF PROCESS AND CHEMICAL ENGINEERING

WINNER OF THE INSTITUTE OF CHEMICAL ENGINEERING SUSTAINABILITY TEACHING AWARD

* * *

FIONA EDWARDS, ENGINEERING & BEES STUDENT, GOOGLE ANITA BORG SCHOLARSHIP IN 2017

KEVIN MURPHY, MEDICINE STUDENT, 2016 CUNNINGHAM AWARD, FOR HIS WORK ON MAPPING A REMOTE SCOTTISH ISLAND

FIONA EDWARDS, ENGINEERING & BEES STUDENT, GOOGLE ANITA BORG SCHOLARSHIP IN 2017

SEAN MCMARON, UCC ARCHITECTURE GRADUATE, WINNER OF THE RIAI SCOTT TALLON WALKER STUDENT EXCELLENCE AWARD IN ARCHITECTURE

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As a Microbiologist, my research career to date has addressed a variety of roles that bacteria play, ranging from food production and fermentation to human health and well-being. The pioneering study of micro-organisms in large microbial communities as they occur in natural environments is transforming our understanding of these simplest of life forms. An example of such ground-breaking research is occurring within UCC’s APC Microbiome Ireland, which is defining how the microbiota in the human intestine is programmed by diet and how this in turn influences human health and well-being in everything from infection to brain functioning. This is truly a transformational and collaborative area of scientific discovery and is changing how we view many disciplines within the life sciences.
Many of our disciplines rank highly according to University QS Rankings. We have more than 3,000 undergraduate students and 1046 postgraduate students, including 583 PhD students, currently studying in the College.

The College offers a wide choice of STEM (Science, Technology, Engineering and Mathematics) programmes at undergraduate and postgraduate levels and is renowned internationally for the quality of its teaching and research. Many of our disciplines rank highly according to University QS Rankings. We have more than 3,000 undergraduate students and 1046 postgraduate students, including 583 PhD students, currently studying in the College. We offer an outstanding research-led curriculum to all our undergraduate and postgraduate students.

Academics and researchers in the College of Science, Engineering and Food Science have a strong track record of attracting prestigious research funding and are involved in international collaborations with colleagues throughout the world. Moreover, the College encompasses a number of world leading institutes including Tyndall, APC (Alimentary Pharmabiotic Centre) and ERI (Environmental Research Centre). These resources contribute to an exciting and advanced environment for research and teaching, and provide a vigorous and challenging academic atmosphere for all of our students.

The College believes strongly in supporting students and operates a very successful student mentoring scheme, where all first year students are assigned an Academic Staff mentor. Mentors provide support and advice to the students to help them with any issues they may have. The College also operates a Peer Assisted Learning Scheme (PAL), where students/peers (usually third or fourth years) support and assist first year students with challenging topics in their disciplines in a friendly, open environment.

Finally, I want to encourage all of you who are considering a programme in the College of SEFS to come in and talk to us in person. We are happy to show you the campus and introduce you to other students who can help with your decisions.
When it came to choose what college I’d attend, I was very torn, as I fancied the idea of going to America. However, when I found out about the quercus scholarship I knew UCC would be the ideal place for me. Obviously it’s so close to where I grew up, only about a 40 minute drive, which is very handy, and the atmosphere on campus is one of the best I’ve ever experienced. There’s nothing quite like sitting in the amphitheatre in the sun on a nice day and watching campus life happen around you!

My scholarship is innovation and entrepreneurship, so obviously I’m heavily involved in those areas. I spend a lot of time travelling Ireland and indeed the world attending conferences, speaking on behalf of young people and giving the youth perspective on a range of issues from women in STEM to activism.

However, I have also gotten involved in more mainstream campus life. Since entering college, I joined the UCC Trampoline Club, and this year I’ll be the captain of the club, having previously been first year rep and PRO. Last year I was also PRO of the Clubs’ Exec, the governing body for all UCC Clubs. This meant I was in charge of all of the marketing for sport at UCC, which was a brilliant way to gain experience in something a little difference from my course while also getting more involved in university life! I’m also a peer support leader, and was an ordinary committee on the Genetics society last year.

The two years I have now spent here have been the best of my life to date. I have had the pleasure of meeting some of my best friends here, many of whom I know will be my friends for life. UCC has offered me so many opportunities to grow as a person on levels much more diverse than just academically. My favourite time of the year at UCC is in April just before the summer exams. Even though it can be a stressful time, campus comes alive as the weather dries up, and the sight of people gathered around the amphitheatre or laying out in the sun in president’s garden always fills me with a feeling of warmth.

To my leaving cert self, I’d say just to stay calm and wait for the exams to come - it’s never too late to start studying! I’ll always remember the advice given to me by my fellow quercus scholar Marie Martin at my interview for the program in May of my leaving cert year: “never underestimate the power of the cram.”

After UCC, my sights are set on America. I have an interest in bioinformatics, so I’d love to do a postgrad in that area in one of the institutions on the east coast, perhaps MIT or Harvard. I actually did a research project this past Summer in UCC based around machine learning and bioinformatics, so maybe that experience will be of use to me!
I really can’t emphasise enough how much I have been helped by the Quercus scholarship program. The field that I am in (innovation and entrepreneurship) means that I have a lot of things drawing on my attention outside the confines of my degree. The Quercus scholarship has helped to keep me focused on my lectures and exams, and has helped to keep some of the stress away when I have to miss large amounts of college by putting support systems in place to allow me to catch up on what I’ve missed. Last year I had an event in Paris on the same day as one of my summer exams, but due to my scholarship I was allowed to sit the exam at the same time as my peers in a separate exam centre which means I didn’t have to do the exam during the repeats in August.
# Degree Outlet Table

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Introduction
Computer Science encompasses all aspects of computer systems, software and hardware, as well as information and communications technology. Topics include software development, database technology, computer networks, operating systems, algorithms, security, web technology and applications. Graduates learn to harness the potential of these technologies to develop useful and sophisticated computer applications.

Why Study
There are two streams in the BSc in Computer Science and all students take the same modules in Year 1. From Year 2 onwards, module selection is based on stream choice.

The BSc in Computer Science, the flagship computer science degree, equips graduates for exciting and rewarding careers in the IT sector and beyond.

A joint degree in BSc in Computer Science (Software Entrepreneurship) is a 50:50 blend of Computer Science and Economics/Business.

Work Placement
Third Year incorporates a six or 12 month paid work placement with an organisation within the ICT industry. The work placement is jointly monitored by a UCC computer science staff member and an employee of the placement organisation. Recent placements have been in companies such as Amazon, Cisco, Deloitte, Dell EMC, Fexco, Glanbia, Google, Intel, Janssen, Liebherr, Newsweaver, PFH, QUMAS, Siemens, Smarttech, Stryker, Tyco, VMware, Zenith, Zeto and others. The placement is facilitated via the UCC Careers Service.

Students have the opportunity to undertake their work placement abroad if a suitable company is identified.

Careers
The technology sector in Ireland is thriving, employing over 105,000 people with 75% employed in multinational companies and the remainder in the indigenous digital technology sector.

Ireland is home to:
- 9 of the top 10 global software companies
- The top 10 'born on the internet' companies.
- 9 of the top 10 US ICT companies
- Top 3 global enterprise software companies
- 4 of the top 5 IT services companies

(Source: IDA Ireland)
Further Study
Students can progress to a taught Masters, a research Masters or a PhD. Details of MSc and PhD opportunities are available on www.ucc.ie/en/compsci/postgraduatecourses and www.ucc.ie/en/compsci/research.

Year 1 Modules

CORE: CS1106 Introduction to Relational Databases (5 credits); CS1110 & CS1111 Systems Organisation I & II (5 credits each); CS1112 & CS1113 Foundations of Computer Science I & II (5 credits each); CS1115 & CS116 Web Development I & II (5 credits each); CS1117 Introduction to Programming (10 credits)

ELECTIVES: EC1202 & EC1203 Business Economics 1 & 2 (5 credits each); FR1105 Threshold French (5 credits); French for Reading Purposes I (5 credits); GE0003 & GE0004 German Language 1 & 2 (5 credits each); GE0005 & GE0008 German Language (Intermediate Level ) 1 & 2 (5 credits each); CH1001 Chinese Language (Mandarin) I (Beginner Level) (5 credits); MA1001 & MA1002 Calculus for Science I & 2 (5 credits each); MA1059 Calculus (5 credits); MA1060: Introduction to Analysis (5 credits); HS0028 Spanish Language (10 credits); IT1101 Non-Beginners’ Written and Spoken Italian (10 credits); IT1109 Introduction to Written and Spoken Italian (10 credits)

Year 2 Modules

BSc SINGLE HONOURS COMPUTER SCIENCE
CORE: Intermediate Programming; Introduction to Java; Algorithms and Data Structures; Database Design and Administration; Logic Design; Operating Systems; Network Computing; Computer Architecture

ELECTIVES: Computer Science; Language options; Mathematics

BSc SINGLE HONOURS COMPUTER SCIENCE (SOFTWARE ENTREPRENEURSHIP)
Intermediate Programming; Introduction to Java; Algorithms and Data Structures; Database Design and Administration; XML and the Extended Enterprise; Quantitative Methods: Skills for Data Collection; Interpreting Economic Data; Introduction to Mathematical Economic Analysis; Introduction to Statistical Economic Analysis; Economics of Managerial Decision Making; Economics – Production and Costs; Business Cycles; Macroeconomic Policy Debates

There is also a six or twelve-month paid work placement, jointly monitored by a UCC staff member and an employee of the placement organisation such as Amazon, Cisco, Dell EMC, IBM, Intel, Microsoft, Newsweaver, Tyco and others.

Year 3 Modules

SELECTION BASED ON STREAM CHOICE
Software Engineering; C-Programming for Microcontrollers; Networks & Data Communications; Web Security; Advanced Java Programming; Advanced Server-side Programming; Client-side-Programming; Middleware; Theory of Computation; Team Software Project; Workplace Technologies & Skills

Year 4 Modules

CORE: Final Year Project

ELECTIVES (BASED ON STREAM CHOICE):
Advanced Software Engineering; Software Systems Engineering; Advanced Computer Architecture; Algorithm Analysis; Artificial Intelligence; Computer Systems Security; Distributed Systems; Functional Programming; Information Retrieval; Introduction to Embedded Systems; Introductory Network Security; Multimedia Compression and Delivery; Parallel and Grid Computing; Principles of Compilation

KEY FACTS
• Many IT companies actively seek computer science graduates
• Compulsory work placement in Third Year adds significantly to the students’ employability
• Graduates are employed by companies such as Apple, Amazon, Cisco Systems, Credit Suisse, Dell EMC, First Derivatives, Glanbia, Google, IBM, Janssen, Pilz, Siemens and Xerox plus more, as IT and business analysts, project managers, software engineers developers, and technical consultants

#uccmakeyourmark
CK402

Introduction
The Biological and Chemical Sciences degree programme is the largest and most flexible entry route for students in science. Through it, students have access to ten degree streams.

Why Study
Biological and Chemical Sciences, with its broad range of opportunities, is the perfect choice for those who enjoy biology and/or chemistry as Leaving Certificate subjects, working in a laboratory environment, and the challenge and excitement of scientific research and development.

Work Placement
Some departments facilitate students in finding relevant summer work experience. There is a work placement in Year 3 of the Chemistry of Pharmaceutical Compounds and Biotechnology streams.

Careers
An extremely wide variety of career opportunities are available to graduates. For further information on career opportunities from each area of study, please see the information for the relevant degree programme.

Degree Outlets
• Applied Plant Biology
• Chemistry
• Chemistry with Forensic Science
• Chemistry of Pharmaceutical Compounds
• Science Education
• Biochemistry
• Biotechnology
• Microbiology
• Neuroscience
• Physiology.

Year 1 Modules
CORE: BC1001 Introduction to Biochemistry and the Biological Basis of Disease (5 credits); BL1002 Cells, Biomolecules, Genetics and Evolution (5 credits); MB1003 Microbiology in Society (5 credits); BL1004 Physiology and Structure of Plants and Animals (5 credits); CM1200 Fundamentals of Modern Chemistry (10 credits); MA1001 & MA1002 Calculus for Science Part 1 & 2 (5 credits each); PY1010 Physics for Biological and Chemical Sciences (10 credits); CM1201 Fundamentals of Modern Chemistry 2a (10 credits)

Years 2, 3 & 4
STUDENTS SELECT ONE DEGREE STREAM (DEPENDING ON CHOICE OF YEAR 1 ELECTIVES) FROM: Applied Plant Biology, Biochemistry, Biotechnology, Chemistry, Chemistry of Pharmaceutical Compounds, Chemistry with Forensic Science, Science Education (Chemistry or Biology Route), Microbiology, Neuroscience, Physiology

Ronan Harrington
Graduate

“The biology route introduced me to a wide range of subjects from genetics and ecology, to computational and molecular biology. I chose Microbiology because I was excited to study a diverse range including the role of various microbes in food production, medicine, biotechnology and environmental applications.”

#uccmakeyourmark
Introduction
The BSc in Biological, Earth and Environmental Sciences represents the different degree outlets in the school of Biological, Earth and Environmental Sciences (BEES). In Year 1, you will receive a solid grounding in the fundamental disciplines that support your choice of degree from Year 2 onwards.

Why Study
Each of the degree programmes in the School of BEES has the option of a work placement module in Year 4. Selecting the work placement module enables students to spend six to-10 weeks in a structured working environment, where they are evaluated both on their contribution to the placement institution and on a report of their experience.

The School of BEES operates an exchange system with North American and European universities which allows students to substitute a year abroad for Year 3 in UCC.

Careers
Please refer to the information on each of the degree outlets for more specific details.

Year 1 Modules
BL1002 Cells, Biomolecules, Genetics & Evolution (5 credits); BL1004 Physiology and Structure of Plants and Animals (5 credits); BL1006 Habitats and Ecosystems (5 credits); CM1003 Introductory Chemistry for Environmental Scientists (10 credits); ER1006 Applied Earth Systems (5 credits); EV1002 The Environment (5 credits); GL1001 Introduction to Geology (5 credits); GL1004 Geological Evolution of Ireland (5 credits); GG1010 Introduction to Physical Geography (5 credits); MA1001 Calculus for Science Part 1 (5 credits); PY1009 Physics for the Environmental Sciences I (5 credits)

Years 2, 3 & 4
STUDENTS SELECT ONE DEGREE STREAM FROM: Applied Plant Biology; Earth Science; Ecology and Environmental Biology; Environmental Science; Geography; Geology; International Field Geosciences; Science Education (Biology route only); Zoology

CONTACT INFORMATION
Dr Barbara Doyle Prestwich
T: +353 (0)21 490 4650
E: bees@ucc.ie
www.ucc.ie/en/bees

KEY FACTS
• The BSc Biological, Earth and Environmental Sciences programme provides an essential grounding in the relevant science disciplines. The degree courses have a strong emphasis on practical components, including fieldwork and laboratory skills, which provide relevant hands-on experience
Introduction
The BSc Genetics Programme aims to produce graduates who have a strong foundation in modern genetics. There is a particular emphasis on the molecular basis of the subject, but all facets of genetics are covered in the degree.

Why Study
The BSc Genetics Programme teaches how genes work in individuals and populations. This knowledge is fundamental to all areas of biological study, as genes carry the information which largely determines what we are and how we function. There is particular emphasis on the molecular basis of genetics, but all facets are covered throughout the degree and graduates get a strong foundation in modern genetics. The final year also includes a three-month project, ten weeks of which are spent in the laboratory, during which the student receives training in the use of genetic approaches to solving a contemporary problem in Biology.

Work Placement
While work placement is not an integrated part of the programme, the staff endeavour to help motivated students to find relevant summer work experience, particularly before the final year. There are also some options for undergraduate experience abroad through the ERASMUS Programme.

Careers
The programme produces graduates with a strong foundation in modern genetics, molecular biology, and functional genomics. The practical applications of these disciplines include biotechnology, medical genetics, and forensics. The Irish Government has identified many areas that draw upon genetic expertise. Government policy remains committed to fostering the development of indigenous biotechnology companies, which will provide further employment opportunities for genetics graduates. UCC graduates, by virtue of their broad training, will also have skills relevant for careers in the pharmaceutical industry, molecular diagnostics, medical research, science journalism, or teaching, and in genetic counselling, after further training.

Further Study
Graduates are eligible to compete for entry into MSc and PhD programmes in Ireland and overseas, in many disciplines including biochemistry, medical genetics, microbiology, medicine, neuroscience, plant science, zoology, and ecology. Graduates will also be eligible to compete for entry to genetic counselling training programmes.

• PhD Biochemistry
• PhD Genetics
• PhD Medicine
• PhD Microbiology
• MSc Biochemistry
• MSc Biotechnology
• MSc Food Microbiology
• MSc Genetic Counselling
• MSc Microbiology
• MSc Molecular Cell Biology with Bioinnovation
• HDip Statistics
• Graduate Entry Medicine.
Year 1 Modules
BC1001 Introduction to Biochemistry and the Biological Basis of Disease (5 credits); BL1002 Cells, Biomolecules, Genetics and Evolution (5 credits); BT1001 Introduction to Biotechnology (5 credits); GN1001 Principles and Methods in Genetics (10 credits); MA1001 & MA1002 Calculus for Science 1 & 2 (5 credits each); MB1003 Microbiology in Society (5 credits); CM1200 Fundamentals of Modern Chemistry Part 1 (10 credits); PY1010 Physics for Biological and Chemical Sciences (10 credits)

Year 2 Modules
CORE: Biomolecules; Principles of Metabolic Pathways; Fundamentals of Modern Chemistry Part 2b; Current Perspectives in Genetics; Fundamentals of Microbiology; Principles of Microbiology; Introductory Molecular Biology; Introduction to Plant Biotechnology; Introduction to Biostatistics; Vertebrate Diversity

ELECTIVES: Mammalian Cell and Tissue Structure; Ecological Plant Physiology

Year 3 Modules
Structural Biochemistry; Cell Signalling; Molecular Biology; Principles of Medical Genetics; Bioinformatics; Literature Project on Genetics; Population and Evolutionary Genetics; Genetic Engineering and Molecular Biotechnology; Molecular Genetics and Genomics; Immunology: Host Response to Pathogens; Genetic Manipulation of Plants; Biostatistics

Year 4 Modules
CORE: Research Project; Cancer Biology; Developmental Genetics; Genomics and Applications; Genetics and Society; Computational Biology; Eukaryotic Molecular Genetics; Biostatistics

ELECTIVES: Medical Microbiology; Advanced Medical Microbiology and Immunology; Advanced Virology and Antiviral Immunity; Advanced Cell Biology

KEY FACTS
• Multidisciplinary course team
• 3-month lab project
• Small classes
• Versatile multi-skilled graduates

#uccmakeyourmark
Chemical Sciences
BSc

Introduction
Chemistry provides a scientific understanding of molecules and how they react together, leading to exciting developments in the use of the materials we see around us.

BSc Chemistry is an excellent pathway to careers in the materials, pharmaceutical or environmental industries and is accredited by the Institute of Chemistry of Ireland and the Royal Society of Chemistry. Chemistry is a truly exciting science and indispensable for facing the many challenges of the future. These include the discovery, design, and synthesis of new pharmaceutical compounds, developing new materials and exploiting the properties of nanomaterials, and assessing the impact of environmental changes and new energy sources & technologies. As people, chemists are enthralled by the complexity, diversity, and beauty of the world at a molecular level.

Why Study
The CK406 entry area gives access to four degree programmes, which are Chemistry, Chemistry with Forensic Science, Chemical Physics, and Science Education.

The four-year degree course is accredited by the Royal Society of Chemistry and its main strengths include:

- research-oriented teaching and innovation
- excellent student experience
- hands-on laboratory experience
- teamwork and collaboration
- competitive skills and employability
- presentation and communication skills.

Careers
Our graduates are highly valued in industry and research alike. Not all chemists wear white coats and there are a variety of options in sectors such as:

- industry
- teaching
- patents
- sales
- management.

Further Study
- PhD
- MSc (Research)
- MSc (Taught).

Year 1 Modules

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<thead>
<tr>
<th>CORE: CM1200 &amp; CM1201 Fundamentals of Modern Chemistry Part 1 &amp; 2 (10 credits each)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELECTIVES (ALL 5 CREDITS): AM1052 Introduction to Mechanics; AM1053 Introduction to Mathematical Modelling; BC1001 Introduction to Biochemistry and the Biological Basis of Disease; BL1002 Cells, Biomolecules, Genetics and Evolution; CS1068 Introductory Programming in Python; GL1001 Introduction to Geology; MA1001 &amp; MA1002 Calculus for Science Parts 1 &amp; 2; MA1058 Introduction to Linear Algebra; MA1059 Calculus; MB1003 Microbiology in Society; PY1010 Physics for Biological and Chemical Sciences (10 credits) or PY1007 Physics for Engineers I &amp; II; PY1052 &amp; PY1053 Introductory Physics I &amp; II (10 credits each)</td>
</tr>
</tbody>
</table>

Year 2, 3 & 4

STUDENTS SELECT ONE DEGREE STREAM FROM:

- Chemistry
- Chemistry with Forensic Science
- Chemical Physics
- Science Education (Chemistry Route only)

Students will need to take specific combinations of modules in Year 1 in order to proceed through these outlets in Year 2.
Mathematical Sciences
BSc

Introduction
Mathematical Sciences allows you to study all aspects of mathematics including Financial Mathematics and Actuarial Science, options with Physics, or a Single Honours in Mathematical Sciences.

Mathematical Science underpins science, technology, engineering, finance, software and countless other modern developments. If you enjoy mathematics then this route offers you an exciting and challenging degree.

Why Study
First year provides a broad introduction to pure mathematics, applied mathematics and statistics. At the end of first year you decide which degree programme you would like to follow. During subsequent years you will build a solid foundation in mathematics, applied mathematics, statistics, and actuarial science/financial mathematics if you take FMAS. You will study new and stimulating topics and also see topics that you studied in school in a new light. You will learn to apply these concepts and techniques in a real world context.

You will gain important programming skills in a mathematical context, experience of working in groups, and acquire written and oral presentation skills through project work and research.

Study Abroad
There are opportunities for study abroad in Year 3 at a variety of universities in Europe and the US.

Careers
Graduates possess technical, computational and numeracy skills, as well as presentation skills and teamwork experience, all of which are highly valued by employers. A mathematical science degree can lead to a wide range of careers, in fields such as management consultancy, banking, actuary, accountancy, options trading, scientific research, software/computing, pharmaceutical and biotechnological industries, engineering-based industries such as electronics.

Further Study
The BSc in Mathematical Sciences can lead to further study such as:
• MSc programmes including MSc in Mathematical Modelling and Self-Learning Systems
• PhD programmes.

Year 1 Modules
CORE: AM1052 Introduction to Mechanics (5 credits); AM1053 Introduction to Mathematical Modelling (5 credits); AM1054 Mathematical Software (5 credits); MA1057 Introduction to Abstract Algebra (5 credits); MA1058 Introduction to Linear Algebra (5 credits); MA1059 Calculus (5 credits); MA1060 Introduction to Analysis (5 credits); ST1051 Introduction to Probability and Statistics (5 credits)

Years 2, 3 & 4
STUDENTS SELECT ONE DEGREE STREAM FROM:
BSc Single Honours
Financial Mathematics and Actuarial Science;
Mathematical Sciences
OR
BSc Joint Honours
Mathematical Sciences and Physics
CK408

Physics and Astrophysics
BSc

**Introduction**
Physics is concerned with the nature and properties of matter and energy. This means that it deals with the most fundamental questions we can ask, from the quantum world on scales smaller than an atom, to the largest distances we can probe with the most powerful telescopes.

**Why Study**
The study of physics appeals to those who are curious about how things work and who enjoy scientific experiments and mathematics. Physics, and technologies developed by physicists, play a major role in chemistry, biology, medicine, electronics, geology, optics, nanotechnology, computer science and engineering. Its concepts challenge the imagination. A physics education develops problem-solving skills and the ability to apply and adapt scientific knowledge within a large range of workplaces.

**Study Abroad**
There are opportunities for study abroad in Year 3 at a variety of universities in the US and Europe. Recently, UCC physics students have spent Year 3 at the University of California, the University of Massachusetts, the University of North Carolina and the University of Marburg.

**Careers**
An education in physics provides problem-solving, analytical, computational, mathematical and IT skills, and can lead to a wide range of careers, in fields such as:
- computer science
- data science and analysis
- education
- the environment
- medicine
- space science
- sustainability
- IT management
- banking and finance
- transport
- technology.

**Further Study**
- Postgraduate Diploma in Applied Science (Applied Physics)
- MSc in Mathematical Modelling and Scientific Computing
- MSc programmes
- PhD programmes.

**Year 1 Modules**

**CORE:**
- OPTION 1
  - Introductory Physics I; Introductory Physics II; Mechanics I; Mechanics II; Mathematical Methods I; Mathematical Methods II; Introduction to Probability and Statistics

- OPTION 2
  - Introductory Physics I; Introductory Physics II; Introduction to Mechanics; Introduction to Linear Algebra; Calculus; Introduction to Analysis; Introduction to Probability and Statistics

- OPTION 3 (For entry into Science Education only)
  - Introductory Physics I; Introductory Physics II; Introduction to Linear Algebra; Calculus; Introduction to Analysis; Introduction to Probability and Statistics

**Years 2, 3 & 4**

**OPTIONS 1 AND 2 - STUDENTS SELECT ONE DEGREE STREAM FROM:**
- Astrophysics; Physics; Chemical Physics; Mathematical Sciences and Physics

**OPTION 3 - STUDENTS SELECT:**
- Science Education (Physics Route only)

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**KEY FACTS**
- The programme at UCC offers excellent education in both experimental and theoretical physics
- Physics, and technologies developed by physicists, play a major role in atmospheric science, chemistry, biology, medicine, electronics, geology, energy, optics, nanotechnology, computer science and engineering
- An education in physics provides problem-solving, analytical, computational, mathematical and IT skills and can lead to a wide range of careers

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www.physics.ucc.ie

**DURATION** 4 Years
**APPROX. INTAKE** 29
**MINIMUM POINTS 2018** 521
**POINTS RANGE 2018** 521–613
**LEAVING CERTIFICATE ENTRY REQUIREMENTS** Minimum grade H5 in two subjects and minimum grade O6/H7 in four other subjects. Subjects must include Irish, English, Maths and a Lab Science subject (Biology, Chemistry, Physics, Physics with Chemistry and Agricultural Science).
**ADDITIONAL REQUIREMENT** H4 in either a Laboratory Science subject, Mathematics, Applied Mathematics or Computer Science is required. If the H4 is in Mathematics, Applied Mathematics or Computer Science an O6/H7 in a Laboratory Science subject is required.
**QQI FET LINKS** www.ucc.ie/en/study/undergrad/fetac/sefs
**APPROX. MATURE INTAKE** 5
**COURSE PAGE ONLINE** www.ucc.ie/en/ck408
CK409

**DURATION** 4 Years
**APPROX. INTAKE** 15
**MINIMUM POINTS 2018** 511
**POINTS RANGE 2018** 511–531
**LEAVING CERTIFICATE ENTRY REQUIREMENTS** H4 in a Lab Science subject (Biology, Chemistry, Physics, Physics with Chemistry and Agricultural Science) and a H4 in Maths or Applied Maths. Minimum grade O6/H7 in four other subjects. Subjects must include Irish and English.

**ADDITIONAL REQUIREMENT** H4 in a lab science subject. H4 in Maths or Applied Maths (if the H4 is in Applied Maths, a H6 in Maths is also required).

**APPROX. MATURE INTAKE** 5
**COURSE PAGE ONLINE** www.ucc.ie/en/study/undergrad/courses/CK409

**CONTACT INFORMATION**
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E: bryan.kelleher@ucc.ie
www.physics.ucc.ie
www.physicalsciences.cit.ie

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**Introduction**

Industrial physicists are problem solvers, able to quickly solve problems in a wide range of industrial settings, devising and employing novel and unconventional techniques as needed. This joint UCC/CIT degree combines fundamental physics with hands-on industrial training for ambitious students targeting careers in some of the most exciting and innovative industries in Ireland and abroad.

**Why Study**

Advanced manufacturing is the core of Ireland’s industrial output and high precision automated manufacturing is a central feature of all modern economies. This degree is ideal for students who wish to gain deep insight into the physics of modern technologies, and who enjoy applying this knowledge in problem solving in real-world environments. With strong employer demand for qualified graduates, this ever-expanding field offers career paths for graduates who wish to use their skills in technical settings and equally those seeking a corporate management path. A joint degree between University College Cork and Cork Institute of Technology, the first two years of the course focus mainly on fundamental physics, and the second two years place emphasis on industrial control technology.

**Work Placement**

All BSc Industrial Physics students are offered a 10-week placement either directly in industry or in a university or research centre laboratory performing industrially related research and development. The placements are most frequently in Ireland and have often led to offers of employment, though they may also be carried out at international sites.

**Careers**

A degree in Industrial Physics can lead to rewarding roles in many sectors such as:
- Pharmaceutical and Bio-pharmaceuticals
- Medical devices
- Food/drinks manufacturing
- Consultancy.

**Further Study**

Graduates may further their studies through Level 9 Master’s degrees, for example the Master of Engineering in Mechanical Engineering at CIT, or Level 10 PhDs, for example at the Tyndall National Institute.
KEY FACTS

- Joint degree blending particular strengths of two institutions
- Long established extended placement scheme with potential employers
- High employer demand for graduates

**Year 1 Modules**

CORE: PY1052 Introduction to Modern Physics 1 (10 credits); PY1053 Introduction to Modern Physics 2 (10 credits); MA1011 Mathematical Methods 1 (5 credits); MA1012 Mathematical Methods 2 (5 credits); CM1006 Chemistry for Physicists and Mathematicians (10 credits);
PY1055 Introduction to Environmental Science (5 credits); PY1056 Instrument Measurement (5 credits); PY1057 Industrial Automation (5 credits)

ELECTIVES: CS1061 Programming in C (5 credits); CS1065 Computer Applications with Visual Basic (5 credits); CS1068 Programming in Python (5 credits)

**Year 2 Modules**

Introduction to Quantum Physics; Electrostatics and Magnetostatics; Introduction to Thermodynamics and Statistical Physics; Introduction to Computational Physics; Experimental Physic; Experimental Methods; Engineering Mechanics with Transform Methods; Mathematics for Engineering; Multivariate Calculus; Introduction to Process Control; Water Quality Instrumentation; Industrial Automation and SCADA

**Year 3 Modules**

Optics; Intermediate Experimental Methods; Electromagnetism; Digital Systems and Interfacing; Industrial Communications and Networks; Process Control Systems; Quality Systems; Programming for Measurement; Air Quality and Gas Analysis Instrumentation; Supervised work placement project

**Year 4 Modules**

Introduction to Lasers and Photonics; Physics of Electronic Devices; Introduction to Condensed Matter Physics; Advanced Signal Processing; Advanced Industrial Automation; Advanced Programming for Measurement; Process Analytical Technology; Advanced Process Control; Air Quality; Major research project; Experimental Physics

#uccmakeyourmark
CK411

DURATION 4 Years  
APPROX. INTAKE 30  
MINIMUM POINTS 2018 455  
POINTS RANGE 2018 455–613  
LEAVING CERTIFICATE ENTRY  
REQUIREMENTS H5 in two subjects, and O6/ H7 in four other subjects from Irish, English, and three other subjects recognised for entry purposes.  
ADDITIONAL REQUIREMENT H3 in Mathematics  
QFIE FET LINKS www.ucc.ie/en/study/undergrad/fetac/sefs  
APPROX. MATURE INTAKE  5  
COURSE PAGE ONLINE www.ucc.ie/en/CK411

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www.ucc.ie/en/compsci/undergraduatecourses

Introduction  
Analytics enables people to make sense out of the huge volumes of data (big data) that confronts us in today’s world. Expertise in data science and analytics involves storing and manipulating relevant data, and then analysing this data to extract the most salient information necessary for decision-making. This BSc programme provides in-depth training in all aspects of the process of turning raw data into actionable information. The computer science modules provide expertise in database management, programming and algorithm design; the mathematical sciences modules provide the fundamental basis for transforming data into information in a principled manner.

Graduates with expertise in this area are in huge demand nationally and internationally in leading multinational corporations, SMEs and government agencies in all sectors of the economy. UCC has a track record in data analytics education and research through its already successful MSc Data Science and Analytics programme and its leading role in the Insight Centre for Data Analytics.

Why Study  
Data Science and Analytics is an emerging field with only a limited number of degree programmes and graduates available to fulfill the increasing demand for these specialist skills.

The BSc in Data Science teaches the scientific principles of data science and analytics and equips you with the practical skills to apply this knowledge to real world problems. You will undertake a six-month paid work placement in year 3, which is complemented by an independent project in year 4, supervised by an academic member of staff.

The aim of the programme is to cultivate your skills and understanding of Data Science and Analytics by teaching you to:  
• analyse problems of a computational and/or quantitative nature, encountered in a range of settings that involve large-scale data, and construct solutions to such problems using the tools and skills of modern data analytics;  
• analyse data selected from a range of domains such as insurance, bio-informatics, marketing, social networking, finance, fraud detection and drug discovery;  
• summarise and communicate computational and statistical models and techniques, and visualise this information in order to best present such summaries to technical and non-technical audiences;  
• work independently on a research project, collating, analysing and reporting on the findings to a broad audience.

Work Placement  
The BSc Data Science and Analytics aims to ensure that graduates are work-ready, and work placement is a core module in year 3. You will complete a work placement from Spring until Autumn. You will work with Career Services to find a suitable placement - they will help you with interviews and keep in contact during the placement.

#uccmakeyourmark
Working in a company setting provides you with additional skills that cannot be taught through lectures or in the laboratory. You will work as part of a team to solve real problems. The work placement is jointly monitored by a UCC staff member and an employee of the company.

**Careers**

Graduates of the BSc Data Science and Analytics will have the option to choose from a range of job opportunities including big data developer; customer analytics; data analytics and reporting; data scientist; data science and modelling; data warehouse specialist; fraud and risk analytics; Google analytics; marketing analytics; performance analytics; process analytics; retail analytics; web analytics; health analytics; sports analytics, etc.

**Further Study**

Graduates can progress to selected taught Masters or a PhD in Mathematical or Computer Science.

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**Year 1 Modules**

**CORE:** CS1106 Introduction to Relational Databases; CS1112 Foundations of Computer Science I; CS1113 Foundations of Computer Science II; CS1117 Introduction to Programming; AM1054 Mathematical Software; MA1058 Introduction to Linear Algebra; MA1059 Calculus; ST1051 Introduction to Probability and Statistics; ST1052 Statistical Programming in R

**ELECTIVES:** AM1053 Introduction to Mathematical Modelling OR ST1401 Introduction to Operations Research

**Year 2 Modules**

**CORE:** CS2208/CS2209 Information Storage and Management I/II; CS2513 Intermediate Programming; CS2514 Introduction to Java; CS2515/CS2516 Algorithms and Data Structures I/II; MA2055 Linear Algebra; MA2071 Multivariable Calculus; ST2053 Introduction to Regression Analysis; ST2054 Probability and Mathematical Statistics

**ELECTIVES:** AM2052 Mathematical Modelling OR ST2402 Modelling and Systems for Decision Making

**Year 3 Modules**

**CORE:** CS3220 Work Placement DSA; CS3306 Workplace Technology and Skills; CS3204 Cloud Infrastructure and Services; CS3318 Advanced Programming with Java; CS3509 Theory of Computation; CS3205 Data Visualization for Analytics Applications; ST3053 Stochastic Modelling I; ST3061 Statistical Theory of Estimation; ST3070 Statistical Theory of Hypothesis Testing; ST3069 Generalised Linear Models

**Year 4 Modules**

**CORE:** CS4701 Analytics Project for Computer Science OR ST4092 Data Analytics Project; CS4704 Algorithms and Data Structures for Analytics; CS4705 Computational Machine Learning; ST4060 Computer Intensive Statistical Analytics I; ST4061 Computer Intensive Statistical Analytics II; ST4069 Multivariate Methods for Data Analysis

**ELECTIVES:** AM4006 Mathematical Modelling of Biological Systems with Differential Equations; AM4010 Topics in Applied Mathematical Modelling; AM3063 Partial Differential Equations with Applications; AM3064 Computational Techniques; ST3054 Survival Analysis; ST4064 Time Series; ST4090 Current Topics in Statistics I; CS4150 Principles of Compilation; CS4405 Multimedia Compression and Delivery; CS4407 Algorithm Analysis; CS4413 Future and Emerging Technologies; CS4614 Introductory Network Security; CS4615 Computer Systems Security; CS4616 Distributed Algorithms; CS4620 Functional Programming I; CS4626 Constraint Programming and Optimisation; CS4710 Programming Paradigms for Big Data

**KEY FACTS**

- Limited number of Data Science and Analytics programmes globally.
- There is huge demand nationally and internationally in leading multinational corporations, SMEs and government agencies and in all sectors of the economy.
- Compulsory work placement in Year 3 adds significantly to the graduate employability.
- UCC has a track record in data analytics education and research through its already successful MSc Data Science and Analytics programme and its leading role in the Insight Centre for Data Analytics.
LOCATION IN THE HEARTLAND OF THE D A I R Y I N D U S T R Y, ITS EXPERTISE IN FOOD SCIENCE, PLANT SCIENCE AND SUSTAINABILITY, ITS EXISTING COLLABORATION AND CLOSE PROXIMITY TO TEAGASC MOOREPARK, ALL PROVIDE FOR A UNIQUE OPPORTUNITY FOR THOSE COMMITTED TO A CAREER IN SUSTAINABLE DAIRY PRODUCTION AND ASSOCIATED INDUSTRIES.

WORK PLACEMENT

Work Placement takes place in the third year between February and June (28 weeks). Placements are organised by Teagasc and students are paid. Students will be mentored by the very best dairy farmers during the busiest time of the dairy farming calendar. Third year work placement will form the basis of a substantial fourth year project consolidating student learning from the entire course and representing assessment based on ‘real world’ application.

CAREERS

The knowledge and experience gained in this course will open up a wide range of job opportunities for successful graduates.

- Primary production
- Enterprise management
- Technical service and consultancy
- Research
- Education
- Banking
- Food industry
- Marketing & communications.

INTRODUCTION

UCC’s Bachelor of Agricultural Science has a unique dairy production focus. It provides students with a strong foundation in the core scientific, economic and sustainability principles underpinning technical efficiency and sustainability in Irish pasture-based dairy production. Delivered by UCC in partnership with Teagasc Moorepark, this course promises a well-defined, comprehensive and relevant curriculum. Teagasc Moorepark is internationally recognized as a Centre of excellence for grass-based dairy research.

Modules will be delivered by experts in Grassland, Animal Nutrition, Breeding, Reproduction, Animal Health, Production Systems, Business Structures, Soil Science and Dairy Farm Infrastructure. The latest knowledge and technologies will be presented in the context of sustainable (financial, environmental and social) dairy production.

WHY STUDY

The Irish dairy industry is in an exciting time of significant expansion, presenting challenges and opportunities for enthusiastic, young, highly skilled graduates. This degree will equip future leaders of the dairy industry with the scientific, technical and business skills needed to drive future expansion and competitiveness. The knowledge and experience gained by graduates will stand out to prospective employers, and offer far reaching job opportunities.

UCC’s accessible and central location in the heartland of the dairy industry, its expertise in food science, plant science and sustainability, its existing collaboration and close proximity to Teagasc Moorepark, all provide for a unique opportunity for those committed to a career in sustainable dairy production and associated industries.

NEW IN 2019

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Careers

The knowledge and experience gained in this course will open up a wide range of job opportunities for successful graduates.

- Primary production
- Enterprise management
- Technical service and consultancy
- Research
- Education
- Banking
- Food industry
- Marketing & communications.

JIM WOULFE

CHIEF EXECUTIVE, DAIRYGOLD

“This collaboration between two leading and long-established institutions presents an important opportunity for students and the industry alike. UCC has a strong tradition in developing Agri dairy industry leaders while the Teagasc Dairy Research Centre at Moorepark is a global leader in agri-science research. In an ever expanding and growing Agri Food industry, Dairygold looks forward to working with many graduates who will have developed invaluable knowledge, skills and expertise via the Agricultural Science Degree.”

#uccmakeyourmark
COLLEGE OF SCIENCE, ENGINEERING AND FOOD SCIENCE

Year 1 Modules

- Fundamentals of Modern Chemistry, Physics for Agriculture & Environmental Science;
- Cells, Biomolecules, Genetics and Evolution; Physiology and Structure of Plants and Animals;
- Introduction to Biochemistry and the Biological Basis of Disease; Calculus for Science Part I;
- Introduction to Food and Agricultural Economics;
- Introduction to International Food Policy;
- Principles of Food Science & Technology;
- Agriculture I (Introduction to Agriculture)

Year 2 Modules

- Biomolecules; Principles of Metabolic Pathways; Introduction to Biostatistics;
- Plant and Animal Genetics; Introduction to Food & Industrial Microbiology;
- Fundamentals of Physiology; Animal Nutrition; Introductory Food Chemistry; Food Constituents B;
- Introduction to Agri-Business Management; Ecological Plant Physiology; Plant Identification; Agriculture II (Sustainable Food Production)

Year 3 Modules

- Population and Evolution Genetics; Grass and Forage Production (including Breeding);
- Milk Production and Quality for Processing;
- Design of Experiments for Agriculture and Animal Scientists;
- Soil Science and Soil/Land Management; Growth & Lactation Physiology;
- Food Science & Technology of Food Systems A;
- Production Economics

Paid work placement takes place in semester 2 of third year

Year 4 Modules

- As well as undertaking a final year research project students will also study Bovine Health, Behaviour and Welfare;
- Bovine Breeding (including Genomics); Animal Nutrition II (including feed conservation);
- Grassland Management; Farm infrastructure, Design and Farm Mechanisation; Production Systems, Analysis and Management;
- Business Structures, Career Progression & HR Management on Farms;
- Bovine Reproduction & Fertility Management;
- Communication, Innovation & Innovation support on Farms;
- Global Food Policy; Sustainable Plant Pest and Disease Management

Further Study

Students will have the option of progression at postgraduate level to an MSc (taught or research) in Science or Agriculture. They will also have the option of progressing into graduate programs such as Graduate-Entry Veterinary Medicine, or pursuing a research PhD in Science or Agriculture.

In addition, students will also have the option to progress into an MSc in Business-related areas (e.g. Economics, Commerce) or to progress into a Business conversion programme.

KEY FACTS

- UCC’s accessible and central location in the heartland of the dairy industry
- Course offered in partnership with Teagasc Moorepark, which is internationally recognized as a Centre of excellence for grass-based dairy research
- Paid Work placement
- Industry leader guest speakers and seminars
- Access to UCC’s internationally recognised Cork University Business School and high-profile research in plant science, zoology and environmental science

#uccmakeyourmark
Biomedical Science
BSc

**JOINT PROGRAMME WITH CIT**

**Introduction**
Biomedical Science is a continually changing profession and involves study of the diverse areas of medical science including biochemistry, microbiology, cellular pathology, haematology and transfusion science. It provides training in cutting-edge technologies to facilitate investigation of disease and medical research and prepares the student for a career in laboratory medicine.

**Why Study**
Biomedical Science is the term for the investigations carried out by Medical Scientists on samples of tissue and body fluids, to diagnose disease and monitor the treatment of patients. Medical Scientists work in partnership with doctors and other healthcare professionals. The aim of the Biomedical Science course is to educate students in biomedical sciences, including the state-of-the-art technologies used in hospitals and research laboratories. It also includes education and training in areas such as haematology and transfusion science, clinical biochemistry, medical microbiology and cellular pathology.

**Work Placement**
Clinical work placement is completed as part of the postgraduate Diploma in Clinical Laboratory Placement.

**Careers**
Graduates who have completed the BSc in Biomedical Science, followed by the postgraduate Diploma in Clinical Laboratory Placement, can work as medical laboratory scientists. Graduates can also work in related areas such as:
- the health-care industry
- biopharmaceutical industry
- research scientists.

**Further Study**
Graduates can apply for entry to a wide range of postgraduate programmes including:
- MSc Molecular Cell Biology
- MSc Biotechnology
- MRes
- PhD Science
- Medicine.

**CAROLINE VAUGHAN**
GRADUATE

“Although I’m not directly involved with patients, much of their treatment is based on information I supply to the nurses and doctors. The quicker we can diagnose patients, the quicker they are treated, which is very satisfying. It is fascinating to look down the microscope at diseases such as leukaemia, malaria and anaemia.”

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**CR320**

**DURATION** 4 Years
**APPROX. INTAKE** 30
**MINIMUM POINTS 2018** 521*
**LEAVING CERTIFICATE ENTRY**
**REQUIREMENTS** H4 in either Physics, Chemistry, Biology or Physics-with-Chemistry (joint). One H5 and four O6/H7 from subjects which are recognised for entry purposes and which must include Mathematics, English and Irish.

**COURSE PAGE ONLINE** www.ucc.ie/en/cr320

**CONTACT INFORMATION**
Dr John Morgan
T: +353 (0)21 490 2004
E: j.morgan@ucc.ie
www.ucc.ie/en/biomed

*Finished on random selection
## Year 1 Modules

**CORE (ALL ARE 5 CREDIT MODULES, EXCEPT FOR PY1008):**
- BM1001 & BM1002 Introduction to Biomedical Science I & II;
- BM1003 Introduction to Cell Biology for Biomedical Scientists;
- BM1004 Creativity, Innovation & Teamwork;
- BM1007 Introduction to Health Science;
- BM1008 Introduction to Human Biology;
- BM1009 & BM1010 Chemistry for Biological Sciences I & II;
- MA1001 & MA1002 Calculus for Science Part I & II;
- PY1008 Physics for Biomedical, Environmental, Food and Nutritional Sciences (10 credits)

## Year 2 Modules

- Introductory Molecular Biology;
- Analytical Chemistry; Bioanalytical Science;
- Introduction to Clinical Biochemistry; Haematology and Transfusion Science;
- Mammalian Cell and Tissue Structure; Biomolecules;
- Principles of Metabolic Pathways; Fundamental of Microbiology;
- Principles of Microbiology;
- Introductory Physiology I & II

## Year 3 Modules

**CORE:**
- Pharmacology;
- Molecular Biology;
- Diagnostic Microbiology;
- Anaemia and Immunohaematology;
- Research and Professionalism;
- Medical Microbiology;
- Immunology: Host Response to Pathogens;
- Transmission and Epidemiology of Infectious Diseases;
- Structural Biochemistry;
- Advanced Metabolism in Health, Disease and Cancer;
- Cell Signalling;
- Cellular Pathology I

## Year 4 Modules

- Transfusion & Transplantation;
- Clinical Biochemistry;
- Quality Management Systems for Biomedical Scientists;
- Statistics in Biomedical Science;
- DNA Diagnostics and Medical Genetics;
- Haematology Disorders;
- Bioinformatics for Biomedical Science;
- Virology;
- Cellular Pathology II;
- Research Project

## Key Facts

- The degree is offered jointly by UCC and CIT.
- To work as a Medical Scientist in a hospital laboratory, you must hold a BSc Honours degree in Biomedical Science and the postgraduate Diploma in Clinical Laboratory Placement.
- The degree, in conjunction with clinical placement, is accredited by both the Academy of Clinical Science and Laboratory Medicine and the Institute of Biomedical Science, allowing you to work as a Medical Scientist in hospital laboratories in Ireland, the UK and elsewhere.
Introduction
Applied Plant Biology (APB) is the study of plants in natural habitats and in agriculture. It explores the preservation of rare species and the supply of food, fuels or medicine to the world. It is also about understanding the molecular basis of growth and the function of plants in an ecosystem.

Why Study
Because they do not move, plants have evolved sophisticated responses to environmental change. This flexibility is harnessed by addressing some of the most pressing problems facing mankind, including climate change, an accelerating rate of species extinction and the need to feed a growing world population. This has created a strong need for plant scientists with a thorough understanding of plant biology across organisational scales, from DNA to vegetation. The APB curriculum integrates the study of plants at the molecular, biochemical, whole-plant and ecosystem level. Courses are research-led and taught through different media including lectures, practical laboratory classes, tutorials, seminars and field visits.

Work Placement
Practical field experience forms an important part of this degree programme. Many APB students obtain work experience with plant-based research groups and companies in Ireland and abroad during the summer vacations. A formal work-experience module is available in Year 4.

Study Abroad
As part of the curriculum students can spend part or all of Year 3 abroad at a partner university (mainly in the EU and North America). Alternatively, there are regular opportunities to undertake the fourth year research project (10 weeks) abroad. Students may be eligible for ERASMUS funding for such exchanges.

Careers
APB graduates have entered a wide range of careers reflecting the breadth of the programme. Some graduates work with plants as plant breeders, crop protection scientists or plant ecologists, while others work in areas such as the biotechnology, food, pharmaceutical, agricultural support, health and environmental protection industries, education or journalism.

Further Study
Many of our graduates continue in higher education (in UCC or elsewhere) to obtain a higher research-based qualification, such as MSc (1-2 years), MRes (1 year) or PhD (3-4 years), opening up even more career opportunities. In this School, we have a number of world-class plant science research teams who recruit the best graduates for postgraduate studies.
Year 1 Modules

REFERENCES TO CK404 ON PAGE 145

Year 2 Modules

Plant and Animal Genetics; Introduction to Plant Biotechnology; Ecological Plant Physiology; Plant Identification; Introduction to Biostatistics; Vertebrate Diversity; Invertebrate Diversity; Fundamentals of Ecology; Practical Ecological Skills; Fundamentals of Microbiology; Principles of Microbiology; Fossils as Living Organisms

Year 3 Modules

CORE: Plant Biology Literature Review; Plant Biology Field Course (residential); Conservation Biology; Plants and Hostile Environments; Evolution and Diversity; Bioactive Natural Products; Biostatistics; Environmental Microbial Genomics

ELECTIVES: Adaptation to Extreme Environments; Animal Behaviour; Introduction to Ecotoxicology; Plant and Animal Genetics; Environmental Systems Microbiology; Micropalaeontology and Polynology; Animal Physiology

Year 4 Modules

CORE: Plant Biology; Research Project; Frontiers in Biology; Research Skills in Biology; Crop Physiology and Climate Change; Food Production; Genetic Manipulation of Plants; The Environmentally Protective Management of Plant Pests and Pathogens; Biostatistics II

ELECTIVES: Advanced Ecotoxicology; Landscape Conservation and Management (Burren residential field course); Biological Work Placement; Biology and Management of Alien Species

KEY FACTS

• A broad degree programme integrating molecular, biochemical, whole-plant and vegetation perspectives
• A degree programme that integrates laboratory and field science
• A small degree programme with direct access to lecturers
• A degree programme that is directly relevant for many of the big challenges of today’s world

#uccmakeyourmark
Astrophysics

BSc

Introduction
Astrophysics applies the laws of physics to the universe, from our solar system to the most distant galaxies. Astrophysicists study big questions, such as the history and composition of the universe, what makes the stars shine, and the nature of black holes in the Milky Way and other galaxies.

Why Study
The study of astrophysics is ideal for those curious about the universe in which we live and the beautiful and exotic objects that populate it. It involves the study of the entire universe, from objects in our local solar system, out to the largest distances we can probe with the most powerful telescopes. Physics concepts, from relativity to quantum mechanics, challenge the imagination, and astrophysics applies them on a grand scale. An astrophysics education develops problem-solving skills and provides a firm knowledge of basic science and the ability to apply and adapt that knowledge within a large range of workplaces.

Work Placement
There is no work placement in the UCC astrophysics degree programme, but there are opportunities for summer research in the physics department, the nearby Tyndall Institute, and other departments in the School of Science, Engineering and Food Science following Year 2 and Year 3.

Study Abroad
There are opportunities for study abroad in Year 3 at a variety of universities in the US and Europe. Recently, UCC physics students have spent Year 3 at the University of California, the University of Massachusetts, the University of North Carolina and the University of Marburg.

Careers
An education in astrophysics provides the same problem-solving, analytical, computational, mathematical and IT skills as a physics degree, and can lead to a wide range of careers in:
• astrophysics
• computer science
• data science and analysis
• education
• energy
• the environment
• space science
• sustainability
• IT management
• banking and finance
• transport
• technology.

Further Study
• Postgraduate Diploma in Applied Science (Applied Physics)
• MSc in Mathematical Modelling and Scientific Computing
• MSc programmes
• PhD programmes.

"As well as the knowledge I gained from my course, I developed a keen problem-solving ability which will stand to me in any career. One of the exciting highlights was some real observing experience, at a 12m research-class telescope, in Greece. It was really amazing to observe first-hand Mars, or the rings of Saturn in some detail!"
**Year 1 Modules**

**YEAR 2 Modules**

**CORE:** Astrophysics and Special Relativity; C/C++ Programming with Applications; Classical Mechanics; Computational Physics; Electrostatics and Magnetostatics; Experimental Physics; Experimental Methods; Fourier Methods; Multivariable Calculus; Quantum Physics; Thermodynamics and Statistical Physics

**ELECTIVES:** Ordinary Differential Equations; Linear Algebra; Mathematical Modelling

**Year 3 Modules**

**CORE:** Computer Modelling and Numerical Techniques; Condensed Matter Physics; Electromagnetism; Experimental Physics; Experimental Methods; Nuclear and Particle Physics; Optics; Quantum Mechanics; Statistical Thermodynamics; Vector and Tensor Methods; Observational Astrophysics

**ELECTIVES:** Mathematical Experimentation and Chaos; Fluid Mechanics; Optimisation and the Calculus of Variations; Computational Techniques

**Year 4 Modules**

**CORE:** Experimental Physics; Galactic and Extragalactic Astrophysics; Gravitation and Cosmology; Stars and the Interstellar Medium; Research Project

**ELECTIVES:** Quantum Optics; Physics of Semiconductor Devices; Advanced Mechanics; Advanced Quantum Mechanics; Advanced Electromagnetism; Advanced Condensed Matter Physics; Atomic and Molecular Physics; Quantum Field Theory; Introduction to Plasma Physics; Introduction to Lasers and Photonics; Advanced Computational Physics; Radiative Processes

**KEY FACTS**

- Astrophysics students obtain experience using a research-grade telescope abroad in Year 3, and have opportunities for summer research experience in the physics department following Years 2 and 3.
- UCC houses the unique historical Crawford Observatory and a new observing facility on top of its science building.
- Astrophysics students obtain the same excellent education in experimental and theoretical physics, and the same problem-solving, analytical, computational, mathematical and IT skills, as UCC physics students, leading to a wide range of careers.
Biochemistry
BSc

Introduction
Biochemistry is the study of living organisms, particularly humans, at the cellular and sub-cellular levels. It is at the heart of advances in molecular biology and biotechnology and their many applications in medicine, agriculture and pharmaceutics. Biochemistry is also an excellent stepping stone for entry into medicine, dentistry and pharmacy.

Why Study
Biochemists investigate how molecular processes go wrong in disease and use this information to develop new diagnosis and new drugs for treating human disease. Because biochemistry is concerned with ‘the molecules of life’, it is central to all areas of human and animal biology.

The aim of the course is:
• to educate students in the broad area of biochemistry, molecular and cell biology, biomedicine and biotechnology
• to provide students with a solid foundation for carrying out research
• to train students in analytical methods
• to develop a solid foundation among students in critical thinking and analysis.

Work Placement
While there is no work placement incorporated into this course, the School of Biochemistry and Cell Biology facilitates students in finding summer laboratory work. In addition, in Year 4, each individual carries out an independent research project, which students find to be a highlight of the course.

Study Abroad
UCC offers a wide range of study abroad options, most particularly in Europe and North America. Please check www.ucc.ie/en/international abroad.

Careers
Biochemistry graduates work in the biotechnology, pharmaceutical, biomedical, environmental monitoring, and medical diagnostic areas. Biochemists also work in the education sector as teachers and lecturers. A large number of BSc graduates opt for further training through MSc and PhD degrees, as this enhances job opportunities and career development prospects.

Further Study
• MSc Biotechnology
• MSc Molecular Cell Biology
• MRes
• PhD Science
• Medicine
• Pharmacy.

FIONA CAHILL
GRADUATE

“I found the biochemistry course very rewarding, particularly in my final year when I was given the opportunity to undertake my own research project. My BSc in Biochemistry was an essential part of my acceptance onto a PhD programme in cancer research at Oxford University.”
Year 1 Modules

REFER TO CK402 ON PAGE 144

Year 2 Modules

CORE: Principles of Human Structure; Mammalian Cell and Tissue Structure; Biomolecules; Principles of Metabolic Pathways; Introduction to Biotechnology; Fundamentals of Microbiology; Principles of Microbiology; Introductory Molecular Biology; Introductory Physiology; Introduction to Biostatistics

ELECTIVES: Main Group and Transition Element Chemistry; Fundamentals of Organic Chemistry; Energetics and Kinetics; Spectroscopy; Introduction to Plant Biotechnology; Vertebrate Diversity; Fundamentals of Ecology

Year 3 Modules

CORE: Structural Biochemistry; Introduction to Cell Biology and Biomembranes; Cell Signalling; Biochemical Immunology; Molecular Biology; Principles of Medical Genetics; Biochemistry of the Central Nervous System; Biophysical and Biochemical Methods; Bioinformatics; Literature Project

ELECTIVES: Medical Microbiology; Virology; Transmission and Epidemiology of Infectious Disease; BioPharmaceutical Engineering; Cell and Epithelial Physiology; Introduction to Pharmacology; Introduction to Toxicology; Chemotherapy and Pharmacology of Inflammation

Year 4 Modules

Advanced Cell Biology; Protein Science; Biochemical Toxicology; Cancer Biology; Biochemical Analysis and Research Methods; Molecular Basis of Brain Disorders; Advanced Metabolism in Health, Disease and Cancer Principles and Applications of Biotechnology; Developmental Genetics; Research Project

KEY FACTS

• Biochemistry graduates enjoy excellent employment opportunities in the biotechnology, pharmaceutical, biomedical, environmental monitoring and medical diagnostic areas
• The School of Biochemistry and Cell Biology is very active in research and highly rated internationally
• Students have the opportunity to engage in research through an independent research project in their final year
• A degree in Biochemistry is an excellent foundation for all careers relating to human health and is a very appropriate foundation degree for graduate medicine

#uccmakeyourmark
Biotechnology
BSc

Introduction
Biotechnology is the specific manipulation of biological organisms to create and/or improve products and processes.

Why Study
Biotechnology has a huge impact in nearly every facet of our everyday lives. It is a modern and dynamic science that focuses on the application of basic research. Biotechnology is a wide-ranging discipline ideal for students who have a broad interest in the application of life sciences for the benefit of mankind. The applications of biotechnology are varied and range from the production of fermented foods to the production of life-saving drugs, i.e. biopharmaceuticals.

Work Placement
Biotechnology provides students with a 5-month work placement in a biotechnology-related company, generally in the Munster area. Placements are arranged with the UCC Student Development and Employability Office who will also provide training in CV preparation and interview technique.

Careers
The BSc Biotechnology will provide an excellent training in modern biotechnology, including molecular biology, food biotechnology, immunology, bioinformatics and process engineering. Graduates pursue careers in a wide range of areas including research (in academia or industry), product development, project management, quality control.

Further Study
• MSc Bioinformatics and Computational Biology
• MSc Food Microbiology
• MSc in Molecular Cell Biology with Innovation
• PhD Microbiology (Research training programme)
• PhD Biochemistry and Cell Biology (Research training programme)
• MSc Microbiology (Research training programme)
• MSc Biochemistry and Cell Biology (Research training programme)
• Graduate Entry Medicine.

#uccmakeyourmark
KEY FACTS

- The BSc Biotechnology is ideal for students with a broad interest in using biology to improve products and processes
- The BSc Biotechnology is the only CK402 Life Sciences outlet that has an obligatory work placement
- The BSc Biotechnology offers a unique combination of microbiology and biochemistry and it is focused on biotechnological applications

### Year 1 Modules
Refer to CK402 on Page 144

### Year 2 Modules
**CORE:** Principles of Human Structure; Mammalian Cell and Tissue Structure; Biomolecules; Introduction to Biotechnology; Principles of Metabolic Pathways; Fundamentals of Microbiology; Principles of Microbiology; Introductory Molecular Biology; Introductory Physiology I & II; Introduction to Biostatistics

**ELECTIVES:** Main Group and Transition Element Chemistry; Fundamentals of Organic Chemistry; Energetics and Kinetics; Spectroscopy; Introduction to Plant Biotechnology; Vertebrate Diversity; Fundamentals of Ecology

### Year 3 Modules
- Structural Biochemistry; Biophysical and Biochemical Methods; Molecular Biology; Bioinformatics; Medical Microbiology; Food and Industrial Microbiology; The Role and Ecology of Microbes in the Environment; Genetic Engineering and Molecular Biotechnology; Immunology; Biochemical Engineering; Introduction to Pharmacology; Literature Project

### Year 4 Modules
- Protein Science; Pharmaceutical and Biomedical Device Microbiology; Principles and Applications of Biotechnology; Food Biotechnology; Advanced Molecular Microbial Biotechnology; Bioprocess Engineering, Work Placement; Research Project; Case Studies in Biotechnology
Chemical Physics
BSc

Introduction
Physics is concerned with the fundamental nature and properties of matter and energy on all scales, from smallest to largest, while chemistry is mainly concerned with atomic and molecular substances, and how they react with each other. Chemical Physics combines these two core disciplines of natural sciences.

Why Study
Chemical Physics sits at the intersection of chemistry and physics, aiming to understand the structure, energies and transformations of matter and its dynamics at a molecular level. The BSc Chemical Physics degree at UCC provides a solid grounding in both physics and chemistry, and is ideally suited to students who are curious about how and why the world works at a molecular level. With a broad education in the physical sciences, highly developed problem-solving and analytical skills, and extensive training in experimental methods, graduates of chemical physics may be assured of excellent employment prospects in industry, government, research and teaching.

Work Placement
There is no work placement in the UCC chemical physics degree programme, but there are opportunities for summer research in the physics department, the nearby Tyndall Institute and other departments in the School of Science, Engineering and Food Science following Year 2 and Year 3.

Study Abroad
There are opportunities for study abroad in Year 3 at a variety of universities in the US and Europe. Recently, UCC physics students have spent Year 3 at Illinois Institute of Technology, the University of California, the University of Massachusetts, the University of North Carolina and the University of Marburg.

Careers
An education in physics and chemistry provides problem-solving, analytical, computational, mathematical and IT skills, and can lead to a wide range of careers in:

• industry
• government
• research
• teaching
• in fields such as atmospheric and environmental science
• basic science
• biophysics
• chemistry
• chemical engineering
• computer science
• big data science and analysis
• education
• energy
• the environment
• medicine
• sustainability
• technology.

Further Study
• Postgraduate Diploma in Applied Science
• MSc in Mathematical Modelling and Scientific Computing
• MSc programmes
• PhD programmes.
Year 1 Modules

REFER TO CK406 AND CK408 ON PAGES 148 AND 150

Year 2 Modules

CORE: Computational Physics; Electrostatics and Magnetostatics; Energetics and Kinetics; Experimental Methods; Fourier Methods; Main Group and Transition Element Chemistry; Quantum Physics Spectroscopy; Structure, Bonding and Quantum Mechanics; Thermodynamics and Statistical Physics; Multivariable Calculus

ELECTIVES: States of Matter; Organic Chemistry for Environmental Scientists

Year 3 Modules

C/C++ Programming with Applications; Computer Modelling and Numerical Techniques; Condensed Matter Physics; Electromagnetism; Environmental Chemistry and Analysis; Experimental Methods; Materials Chemistry; Optics; Physical Chemistry; Quantum Mechanics; Scientific Communication and Information Literacy Skills

Year 4 Modules

CORE: Atomic and Molecular Physics; Advanced Computational Physics; Advanced Chemistry Research Project; Advanced Physics Research Project

ELECTIVES: Lasers, Photochemistry and Spectroscopy; Interfaces, Microscopy and Modelling; Advanced Nano Materials; Atmospheric Chemistry and Air Pollution; Advanced Quantum Mechanics; Advanced Electromagnetism; Advanced Condensed Matter Physics; Introduction to Lasers and Photonics; Physics of Semiconductor Devices; Radiative Processes

KEY FACTS

• In many ways, physics is the most fundamental of sciences, and chemistry applies physics to a range of processes at the molecular level. The Chemical Physics degree programme offers a unique combination of these two

• The skills developed in problem-solving, analytical, computational, mathematical, laboratory and IT can lead to a wide range of careers in fields such as atmospheric science, biology, chemistry, medicine, electronics, geology, energy, optics, computer science and engineering
Chemistry
BSc

Introduction
BSc Chemistry is an excellent pathway to careers in the materials industry, pharmaceutical industry or environmental industries and is accredited by the Institute of Chemistry of Ireland and the Royal Society of Chemistry. However, there are many careers options for skilled chemists.

Why Study
The four-year degree course is accredited by the Royal Society of Chemistry and its main strengths include:

• competitive skills and employability
• excellent student experience
• hands-on experience
• teamwork and collaboration
• research oriented teaching and innovation
• presentation and communication skills.

Work Placement
There is no work placement in the UCC Ck406 degree programme, but there are opportunities for summer research in the chemistry department, the nearby Tyndall Institute and other departments in the School of Science, Engineering and Food Science following Year 2 and Year 3.

Careers
Not all chemists wear white coats and chemistry graduates from UCC are in high demand at home and abroad. Few industries are more profitable, pay as well and are as recession proof as the pharmaceutical and chemical industries and these continue to be growing sectors in the Irish economy. The pharmaceutical, materials and microelectronics industries in Ireland produce in excess of half the export income of the country. All these sectors rely on Chemistry graduates for their future growth. Chemists are employed in product development and process research, quality control and assurance, as well as environmental monitoring and control.

A Chemistry degree also provides individuals with the skills required in areas as diverse as electronic manufacturing, food industries and government laboratories. In addition most chemical companies offer in-house training in management, finance control, sales and patents, and careers may be developed in a non-chemistry direction.

Further Study
• PhD
• MSc(Res)
• MSc(taught).

CHRISTINA O’NEILL
3RD YEAR CHEMISTRY

“At first I thought I’d choose the biology route and then fell in love with chemistry and so I’m delighted that we were given the freedom to explore. We got the opportunity to make aspirin in one of our labs, and it was particularly interesting to see the process that goes into such an everyday item. It fascinated me and convinced me that chemistry was really right for me. What I really like about chemistry is that it is not all theory, there’s a lot of problem solving and maths involved, two things I’ve always loved.”
### Year 1 Modules

REFER TO CK402 AND CK406 ON PAGES 144 AND 148

### Year 2 Modules

**CORE:** Main Group & Transition Element Chemistry; Fundamentals of Organic Chemistry; Energetics and Kinetics; States of Matter; Structures & Reactions of Main Group Compounds; Aromatics, Carbonyls and Alkenes; Spectroscopy; Structure, Bonding and Quantum Mechanics

**ELECTIVES:** Numerical Methods and Programming; Biomolecules; Principles of Metabolic Pathways; Crystallography, Optics and Mineralogy; Intermediate Calculus for Scientists; Linear Algebra, Molecular Biology; Physiology; Quantum Physics; Thermodynamics and Statistical Physics; Biostatistics

### Year 3 Modules

Inorganic Chemistry; Synthesis, Structure and Reactivity of Organic Compounds; Physical Chemistry; Analytical Chemistry; Environmental Chemistry and Analysis; Materials Chemistry; Pharmaceutical Chemistry; Scientific Communication and Information Literacy Skills

### Year 4 Modules

**CORE:** Advanced Inorganic Chemistry; Advanced Organic Synthesis, Biosynthesis and Reactivity; Lasers, Photochemistry & Spectroscopy; Interfaces, Microscopy & Modelling; Advanced Analytical Chemistry; Advanced Research Projects

**ELECTIVES:** Advanced Nano Materials; Advanced Pharmaceutical Chemistry; Atmospheric Chemistry and Air Pollution

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**GERARD BARRETT**  
CHEMISTRY GRADUATE

“I apply what I learned in the lab to my role as a financial crime investigator. Reviewing a problem and appreciating all possible outcomes is something that all employers want. My UCC chemistry degree has afforded me the skills to excel in my career, proving no graduate is restricted to a future in science.”

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**KEY FACTS**

- BSc Chemistry is a comprehensive course in core areas of chemistry that provides an excellent foundation for employment, or for specialised, further study.
- In the final year students undertake an original research project, working as part of an existing research team within the department, or in an associated research centre.
Chemistry with Forensic Science
BSc

Introduction
BSc Chemistry with Forensic Science is an interdisciplinary degree based on chemistry with a strong combination of disciplines essential for a forensic scientist or a crime scene investigator. These include biochemistry, genetics, toxicology, psychology, pharmacology and pathology. A great emphasis is put on the development of practical and communication skills.

Why Study
The four-year degree course is approved by the Institute of Chemistry Ireland. Main strengths include:
• competitive skills and employability
• excellent student experience
• hands-on laboratory experience
• teamwork and collaboration
• research oriented teaching and innovation
• presentation and communication skills.

Forensic modules have practical examinations and Year 4 includes a research project in either chemical, forensic or related sciences, using state-of-the-art facilities.

Study Abroad
There may be opportunities for summer projects in the School of Chemistry which is an active participant in undergraduate student-exchange programmes, with numerous partner universities across Europe.

Careers
The course offers a unique combination of skills in chemistry, biochemistry and disciplines related to forensic science. Transferable skills of graduates include problem solving, communicating science, reporting, time-management and teamwork. Types of jobs graduates get include:
• crime scene investigator (CSI)
• analytical chemist
• laboratory technician, or manager.

The types of companies our students work for include:
• chemical industry and R&D
• forensic laboratories
• pharmaceutical, and other chemistry-related industries
• quality assurance & control laboratories.

Further Study
Graduates can go on to study an MSc or PhD in chemistry, forensic science, or related discipline.

ELEANOR TOWNSEND
GRADUATE, 2013
BSC CHEMISTRY WITH FORENSIC SCIENCE

“As a British national, I chose UCC to study for my undergraduate degree because the course is unique, and contains the perfect balance of chemistry and forensic science. The Department has great resources and the staff were very supportive. I really enjoyed my time and would definitely recommend UCC as a top class university.”
Year 1 Modules

REFER TO CK402 AND CK406 ENTRIES ON PAGES 144 AND 148

Year 2 Modules

Biomolecules, Introduction to Forensic Science; Current Perspectives in Genetics; Fundamentals of Organic Chemistry; Main Group and Transition Element Chemistry; Energetics and Kinetics; States of Matter; Structures and Reactions of Main Group Compounds; Aromatics, Carbonyls and Alkenes; Spectroscopy; Structure, Bonding and Quantum Mechanics

Year 3 Modules

Forensic Analysis; Forensic Psychology; Toxicology; Pharmaceutical Chemistry; Inorganic Chemistry; Physical Chemistry; Analytical Chemistry; Synthesis, Structure and Reactivity of Organic Compounds; Archaeological Approaches in Forensic Science

Year 4 Modules

Forensic Genetics and Molecular Biology; Forensic and Legal Medicine; Research Project; Advanced Inorganic Chemistry; Lasers, Photochemistry & Spectroscopy; Interfaces, Microscopy & Modelling; Advanced Methods of Forensic Science; Advanced Analytical Chemistry; Advanced Pharmaceutical Chemistry

KEY FACTS

- The employment rate of the graduates of this course is virtually 100%
- Graduates are either in employment (50%), or in further study (50%)
Chemistry of Pharmaceutical Compounds

BSc

Introduction
The BSc Chemistry of Pharmaceutical Compounds (CPC) degree is an interdisciplinary degree focusing on the chemistry and biology of most importance to the pharmaceutical industry.

Why Study
The CPC degree is an excellent pathway to careers in the pharmaceutical industry. Uniquely, CPC covers both the chemistry and the biology underpinning the pharmaceutical industry. Core subjects include organic, analytical and pharmaceutical chemistry; biochemistry and pharmacology. They are supported by modules on physical and inorganic chemistry, physiology, mathematics and physics. Final year research projects are carried out on pharmaceutical chemistry and biochemistry. CPC includes a five-month work placement. Industry experts lecture on pharmaceutical technology, regulatory issues and the industry in Ireland. The CPC degree is accredited by the Institute of Chemistry of Ireland and the Royal Society of Chemistry.

Work Placement
The CPC degree includes a five-month industry placement between the end of third year and the start of fourth year. The UCC Careers Service supports students in the preparation and organisation of industrial placement interviews. Feedback on the CPC placements from both students and companies is excellent. CPC industrial placements have included sites in the UK and the Netherlands, although most placements are in Ireland.

Careers
The pharmaceutical industry is a major employer of CPC graduates, especially in pharmaceutical process support and development, supply-chain management, HR and financial management, and drug discovery research. CPC is on the Auto-Qual list for the Teaching Council, for eligibility to apply for PDE for teaching of biology and chemistry.

Further Study
PhD in Organic or Pharmaceutical Chemistry.

DR CATHERINE SLATTERY
CPC GRADUATE 2008

“CPC was the perfect course for me as it offered a great mix of chemistry and biology modules with a strong emphasis on laboratory practical classes and technical learning. One of the highlights of my CPC experience was the 5 month work placement I spent in the UK at Pfizer and I am currently working as a process development and commercialization chemist in MSD”
**Year 1 Modules**

REFER TO CK402 ON PAGE 144

**Year 2 Modules**

Biomolecules; Principles of Metabolic Pathways; Main Group and Transition Element Chemistry; Fundamentals of Organic Chemistry; Energetics and Kinetics; States of Matter; Structures and Reactions of Main Group Compounds; Aromatics, Carbonyls and Alkenes; Spectroscopy; Structure, Bonding and Quantum Mechanics; Introductory Molecular Biology; Physiology

**Year 3 Modules**

Structural Biochemistry; Molecular Biology; Synthesis, Structure and Reactivity of Organic Compounds; Analytical Chemistry; Natural Products and Reaction Mechanisms; Pharmaceutical Chemistry; Pharmaceutical Solids and Technology; Pharmacology; Toxicology; Chemotherapy and Pharmacology of Inflammation

**Year 4 Modules**

CORE: Protein Science; Advanced Organic Synthesis, Biosynthesis and Reactivity; Physical Organic Chemistry; Advanced Pharmaceutical Chemistry; Pharmaceutical Chemistry Drug Design and Development; Work Placement; Neuropharmacology; Applied Pharmacology & Toxicology

ELECTIVES: Range of Research Projects

**KEY FACTS**

- The CPC degree is fully accredited by the Institute of Chemistry of Ireland and the Royal Society of Chemistry
- The CPC degree is an excellent route to careers in the pharmaceutical industry
- The CPC degree offers a five-month work placement scheme between third and fourth years
Introduction
Earth Science is a unique approach to studying the physical system of the Earth, combining aspects of physical geography and geology, to investigate how our planet functions, how it can be wisely managed and how it might change under different environmental conditions.

Why Study
Key thematic areas that students cover include geomorphology; weather and climate, oceans and coastal zones, Earth’s resources, rocks, minerals and fossils, applied geology, the use of computers for map making, and spatial data analysis. Students undertake a range of field studies in each year of study in different geological and geographical locations, allowing them to gain the practical skills required of Earth scientists in the workplace. The research project, on a topic of their own choosing, encourages students to develop and test their own ideas, and to gain independence in thinking and reaching conclusions based on data they have collected.

Work Placement
Students have the option of organising for themselves a six-week work placement during the summer between Year 3 and Year 4. This placement can be in any industry associated with Earth Science, for example the Environmental Protection Agency, a port authority or a mine.

Study Abroad
Students have the option of spending all or part of Year 3 at one of UCC’s partner universities in Europe under the ERASMUS scheme, or in North America.

Careers
Earth scientists are employed in a variety of careers that draw upon their field, laboratory and computing skills and experience. Typical careers for Earth science graduates include:
• mineral and water exploration
• water resource management
• geotechnical services
• resource conservation
• mapping and planning
• natural hazards and disaster management
• oceanography and marine science.

Further Study
Earth Science graduates in recent years have gone directly into PhD programmes, or have undertaken postgraduate studies in:
• geographical information systems and remote sensing
• coastal and marine management
• geological and environmental hazards
• carbon management and carbon finance
• climate sciences.

ROISIN MARY MULVEY
FINAL YEAR STUDENT

“One of my favourite aspects of this course is the fieldtrips. They’re brilliant for putting everything we learn during lectures into context in the real world. They can be hard work but I’ve really enjoyed them and made some great friends because of those trips. Also practical classes gave hands on experience in using different equipment and computer software.”
#uccmakeyourmark

## Year 1 Modules

REFER TO CK404 ON PAGE 145

## Year 2 Modules

**CORE:** Field Training; Quaternary Environments and Geomorphology; The Atmospheric Environment; Biogeography; Geographical Research Methods; Crystallography, Optics and Mineralogy; Sedimentological Processes and Sedimentary Petrology; Igneous and Metamorphic Petrology; Structural Geology; Geohazards and Research Skills; Fossils as Living Organisms

**ELECTIVES:** Environmental Archaeology; Introductory Programming in Python; The Environment and Human Health; Calculus for Science; Ecological Plant Physiology; Fluids; Physics for the Environmental Sciences; Introduction to Biostatistics

## Year 3 Modules

**CORE:** Field Training; Earth Science Literature Review; Geoinformatics; Geographies of Environment and Sustainability; Coastal and Marine Geomorphology; Dynamic Climatology; Environmental Economic Geography; Applied Structural Geology; Sedimentary Environments; Geological Map Interpretation; Micropalaeontology and Palynology

**ELECTIVES:** Introduction to Environmental Archaeology; Valuing the Environment; Introduction to Energy Engineering; Human Remains for Archaeologists; Archaeo-palynology; Conservation Biology

## Year 4 Modules

**CORE:** Research Project; Advanced Geographical information Systems; Environmental Remote Sensing; Applied Geophysics; Climate Variability and Change

**ELECTIVES:** Practical Offshore Marine Science; Earth Science Work Placement; Petroleum Geology and Basin Analysis; Regional and Local Planning Issues and Policies; Food Geography; Geohazards and Research Skills; Advanced Field Geoscience Techniques; Exceptional Glimpses of Ancient Life; Stratigraphy; Geological Map Interpretation

## KEY FACTS

- This programme combines the expertise and resources of the geography and geology departments
- There is a high component of fieldwork, with one residential fieldtrip each year (for which there are additional fees)
- There is a large element of practical work which reinforces teaching and reading
- Students have choice in the modules they take as well as the topic of their literature review and final research project
Ecology and Environmental Biology

Introduction
The BSc Ecology and Environmental Biology degree is the only one of its kind in Ireland. It is the study of the interactions between animals, plants and microbes and their environment. It includes the study of how individual organisms interact in communities and how communities interact with the surrounding ecosystem.

Why Study
The degree addresses such questions as: what controls animal and plant distribution, abundance and biodiversity? How do nutrients and energy move around ecosystems? How do species interact with each other? It examines the biology of various habitats from marine and freshwater, to terrestrial habitats and the soil. It uses the understanding of basic ecological principles and concepts to predict and manage environmental change. It includes subjects such as: conservation, pest control, wildlife and fisheries management, pollution and ecotoxicology.

Work Placement
A Work Placement module is offered as an optional part of the fourth year curriculum. Students can carry out this work placement during the summer prior to the final year.

Study Abroad
Practical ecological studies are emphasised by field courses run at residential field centres outside UCC and abroad (Portugal and Scotland). Students undertaking the Ecology and Environmental Biology degree can avail of an exchange to other EU countries (under the ERASMUS scheme). Exchange opportunities also exist with the University of Singapore and a number of universities in the US where students have an opportunity to spend some or all of the third year of their degree.

Careers
A degree in Ecology and Environmental Biology allows you to work in many different fields such as:
- research in universities or industry
- research in government agencies such as OPW, EPA, ERU, Forestry, Fisheries
- consultancy
- journalism
- teaching
- administration in civil service, county councils or industry
- environmental scientists in industry, agriculture, aquaculture and fisheries and government
- management conservation, working in habitat management, nature reserves, landscape planning, and fisheries.

Further Study
Ecology and Environmental Biology graduates can pursue research at MSc and PhD level, both at UCC or in other national and international institutions.

LORRAINE GUERIN
BSC ECOLOGY AND ENVIRONMENTAL BIOLOGY 2015

“I really enjoyed studying Ecology. I received a well-rounded introduction into the life sciences with an emphasis on field work and research skills. I also had freedom to focus on my own particular interests. In 3rd year I had the opportunity to study abroad at the University of Montana in the United States – an invaluable experience of both academic and personal growth for me.”
## Year 1 Modules
Refer to CK404 on page 145

## Year 2 Modules
- Fundamentals of Ecology; Practical Ecological Skills; Fossils as Living Organisms; Ecological Plant Physiology; Plant Identification; Introduction to Biostatistics; Vertebrate Diversity; Invertebrate Diversity; Practical Invertebrate Skills; Plant and Animal Genetics; Practical Environmental Science; Environment and Public Health

## Year 3 Modules
- **CORE:** Introduction to Ecotoxicology; Practical Field Ecology (residential); Literature Review; Evolution and Diversity; Conservation Biology; Ecology and Hydrology of Wetland Systems; Biostatistics
- **ELECTIVES:** Micropalaeontology and Palynology; Valuing the Environment; Plants and Hostile Environments; Advanced Vertebrate Biology; Animal Behaviour; Sustainable use of Freshwater; Adaptations to Extreme Environments

## Year 4 Modules
- **CORE:** Advanced Ecotoxicology; Biology and Management of Alien Species; Research Project; Frontiers in Biology; Research Skills in Biology; Biostatistics; Environmental Impact Assessments; Landscape Conservation and Management or Temperate Marine Biology (residential field courses)
- **ELECTIVES:** Biological Work Placement; Market Forces and the Environment; Food Production; Environmentally Protective Management of Plant Pests and Pathogens; Crop Physiology and Climate Change; Evolutionary Ecology

## Key Facts
- Ecology and Environmental Biology is unique in Ireland and was established in response to increasing awareness of environmental and wildlife issues
- A degree in Ecology and Environmental Biology provides you with experience in a wide range of scientific techniques relevant to addressing current environmental issues
- There is a high component of fieldwork, with a residential fieldtrip in Years 3 and 4
- You will learn laboratory techniques relevant to other biological fields including biochemistry, biotechnology, environmental sciences, aquaculture, fisheries and zoology

#uccmakeyourmark
Environmental Science
BSc

Introduction
Environmental Science is the study of physical, chemical and biological processes of the Earth and of human interactions with these processes. It uses a multi-disciplinary perspective to consider approaches to protecting, preserving and managing the environment.

Why Study
Environmental Science has become more important in recent years because of the need to protect the natural and human environment for present and future generations.

Environmental issues such as climate change, the conservation of biodiversity, management of waste and natural resources, production of energy, and protection of human health, are now high on the agenda of all governments. This has resulted in more stringent regulations and standards and a need for increased understanding of the impact of human interaction on the environment. Environmental scientists who take a multi-disciplinary approach to dealing with current and future environmental issues are in demand.

Work Placement
A work experience module is available to Year 4 students, enabling them to spend 6-10 weeks during the summer vacation in a structured working environment where they are evaluated both on their contribution to the placement institution and on a report of their experience.

Study Abroad
The School of Biological, Earth and Environmental Sciences operates an exchange system, mainly with North American and European universities, that allows students to substitute one semester or a full year abroad in Year 3.

Careers
Graduates of Environmental Science are eligible for any job that requires an honours degree in a science subject, but are particularly suitable for posts in:

- environmental consultancies
- environment and waste divisions of local authorities
- the Environmental Protection Agency
- environment divisions of chemical, pharmaceutical, food and other industries
- non-Governmental organisations
- government departments concerned with natural resources, heritage, environment and land use.

Further Study
The multi-disciplinary nature of the Environmental Science degree enables graduates to pursue a wide range of specialised postgraduate programmes, including:

- environmental engineering
- water resources management
- environmental analytical chemistry
- environmental sustainability
- biodiversity and conservation management
- ecological assessments.

Connor Dennehy
Graduate, 2010

“I can say with some confidence that there are few degrees out there that can provide such an in-depth level of knowledge on such a wide array of subjects. I provide water technology market intelligence to our client base, which comprises large multinationals, venture capital and private equity firms, and start-up water technology firms.”
YEAR 1 MODULES

REFER TO CK404 ON PAGE 145

YEAR 2 MODULES

Practical Ecological Skills; Fundamentals of Ecology; Mathematical Modelling for Biological and Environmental Scientists; Introductory Organic Chemistry for Environmental Sciences; Practical Environmental Science; The Environment and Human Health; Quaternary Environments and Geomorphology; Introduction to Geoinformatics; Introductory Sedimentology for Non-Geologists; Physics for the Environmental Sciences; Introduction to Biostatistics; Invertebrate Diversity

YEAR 3 MODULES

CORE: Conservation Biology; Environmental Chemistry and Analysis; Environmental Science in the Field; Environmental Science Literature Review; Ecology and Hydrology of Wetland Systems; Sustainable Use of Freshwater; Environmental Remote Sensing; Environmental Physics; Biostatistics

ELECTIVES: Introduction to Ecotoxicology; Practical Invertebrate Skills; Analytical Chemistry; The Atmospheric Environment; Coastal and Marine Geomorphology; Advanced Geographical Information Systems; Geohazards and Research Skills; Valuing the Environment; Plants & Hostile Environments; Sedimentary Environments

YEAR 4 MODULES

CORE: Environmental Science Research Project; Environmental Monitoring and Assessment; Environmental Impact Assessments; Environmental Risk Assessment and Auditing

ELECTIVES: Advanced Ecotoxicology; Landscape Conservation and Management; Biology and Management of Alien Species; Advanced Analytical Chemistry; Atmospheric Chemistry and Air Pollution; Practical Offshore Marine Science; Environmental Work Placement; Climate Variability and Change; Market Forces and the Environment; Food Production; Environmentally Protective Management of Plant Pests and Pathogens; Crop Physiology and Climate Change; Biostatistics

KEY FACTS

• A broad multi-disciplinary perspective of the environment, with an option to specialise in one discipline if you wish
• Hands-on experience in the field and laboratory, including visits to industrial and other relevant sites, and lectures and workshops from environmental practitioners and potential employers
• High success rate for employment after graduation
• Opportunities for studying abroad or carrying out work placement

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Financial Mathematics and Actuarial Science
BSc

Introduction
Actuarial Science is the discipline which assesses risk in the insurance and financial industries. The applications of actuarial science are quite diverse, ranging from assessment of life risks to the costing of insurance premiums, the formulation of investment strategies, and the design of pension plans.

Why Study
There has been a revolution in the extent of the application of mathematics to finance and investment. This has been driven by breakthroughs in the mathematical valuation of complicated financial transactions. Financial decision-making has been transformed by the development of sophisticated mathematical models, and their computer implementations, that have in turn allowed the introduction of financial and insurance products of increasing complexity. These developments have led to increasing demand by the finance and insurance industry for graduate mathematicians who are knowledgeable about Financial Mathematics.

Careers
Designing solutions to mathematical problems involving financial risk or future uncertainty, places graduates among the most highly-valued professionals in the financial world. This, together with the increasing sophistication of modern financial products, has led to an increasing demand for graduates from the areas of Financial Mathematics and Actuarial Science.

Further Study
• One year full time (or two years part-time) professional diplomas
• Research MSc
• PhD.

Niall O’Mahony
BSc Financial Mathematics & Actuarial Science, Year 4.

“The wide range of skills taught on the course, and the supportive nature and industry knowledge the lecturers possess, enabled me to excel very quickly. Choosing FMAS equipped me with the professional skills and knowledge for a promising career in the actuarial industry.”
### Year 1 Modules

REFER TO CK407 ON PAGE 149

### Year 2 Modules

Fourier Methods; Mathematical Analysis; Ordinary Differential Equations; Linear Algebra; Multivariable Calculus; Discrete Time Financial Models; Financial Mathematics; Financial Modelling for Actuarial Science; Regression Analysis; Probability & Mathematical Statistics

### Year 3 Modules

**CORE:** C/C++ Programming with Applications; Mathematical Analysis; Derivatives, Securities & Option Pricing; Financial Modelling for Actuarial Science; Stochastic Modelling; Generalised Linear Models; Statistical Theory of Estimation; Statistical Theory of Hypothesis Testing

**ELECTIVES:** International Finance; Mathematical Modelling; Computer Modelling & Numerical Techniques; Vector & Tensor Methods; Partial Differential Equations with Applications; Computational Techniques; Complex Analysis; Metric Spaces & Topology; Principles of Market Analysis; Survival Analysis; Stochastic & Survival Models for Actuarial Science; Methods of Reporting in Actuarial Science

**NOTE:** Choice of Electives in Year 3 will have a direct bearing on the number of recommendations for exemptions from professional actuarial examinations for which a FMAS graduate may be eligible

### Year 4 Modules

**CORE:** Measure Theory & Martingales; Continuous Time Financial Models; Computational Finance; Stochastic Modelling; Statistical Methods in Insurance; Time Series

**ELECTIVES:** Securities Analysis; Empirical & Behavioural Finance; Corporate Financing; International Finance; Vector & Tensor Methods; Nonlinear Dynamics & Control; Partial Differential Equations with Applications; Computational Techniques; Topics in Applied Mathematics; Applied Stochastic Differential Equations; Perturbation & Asymptotic Methods; Complex Analysis; Metric Spaces & Topology; Functional Analysis; Project; Topics in Modern Algebra; Topics in Differential Geometry; Survival Analysis; Stochastic & Survival Models for Actuarial Science; Financial Mathematics Project; Methods of Reporting in Actuarial Science; Statistical Consulting; Statistical Methods in Insurance; Practical Implementation of Statistical Analysis Techniques; Contingencies; Computational Statistical Methods for Actuarial Science

### KEY FACTS

- The programme provides a solid education in the principles of financial mathematics and actuarial science and a grounding in the core disciplines of the mathematical sciences
- The programme emphasises the fundamental mathematics and statistics that support financial mathematics and actuarial science as well as the developing interactions between financial mathematics and actuarial science
- The breadth of the programme avoids early over-specialisation and provides valuable education in key areas of the financial and insurance industry

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Introduction
The BSc Geography programme explores the physical and human systems of the Earth to investigate how the planet functions and how people manage its resources. Geographers also consider how the Earth and its inhabitants might be affected by, and respond to, changing environmental conditions.

Why Study
The BSc Geography provides insights into the links between the physical, human and environmental processes on planet Earth and explores the major issues facing society in the 21st century, such as climate change; water, food and energy security; land degradation; and migration and economic changes. Geographers at UCC develop a wide range of technical, computing, laboratory, field and desktop skills which equip them to do a range of different jobs. Geography at UCC provides you with a broad understanding of the human, environmental and natural issues facing society with a focus on real-world questions.

Study Abroad
Students have the option of spending all or part of third year at one of UCC’s partner universities in Europe under the ERASMUS scheme, or in North America.

Careers
Geographers are employed in a variety of careers that draw upon their field, laboratory and computing skills and experience. Typical careers for geography graduates include:
- resource conservation
- mapping and planning
- development and conservation
- nature and heritage
- environmental management
- teaching.

Further Study
Geography graduates in recent years have undertaken postgraduate studies in:
- Geographical Information Systems and Remote Sensing
- Coastal and Marine Management
- Climate Sciences.

“I am delighted that I chose to do the BSc in Geography – there are a lot of great opportunities for someone who has studied the range of modules that I have”
**Year 1 Modules**

REFER TO CK404 ON PAGE 145

**Year 2 Modules**

CORE: Quaternary Environments and Geomorphology; The Atmospheric Environment; Biogeography; Geographical Research Methods; Environmental Analysis: Field Data Course; Economic and Rural Geography; Cities of Diversity; Geography of Tourism; Contemporary Human Migration and European Settlement & Society

ELECTIVES: Crystallography, Optics and Mineralogy; Sedimentological Processes and Sedimentary Petrology; Igneous and Metamorphic Petrology; Structural Geology; Geohazards and Research Skills; Fossils as Living Organisms; Physics for the Environmental Sciences; Vertebrate Diversity; invertebrate Diversity; Fundamentals of Ecology; Introduction to Environmental Archaeology; Calculus for Science; Python Programming

**Year 3 Modules**

CORE: Introduction to Geoinformatics; Geographies of Environment and Sustainability; Coastal and Marine Geomorphology; Fieldwork, Climate Variability and Change; Geography Literature Review; Geography as Human Ecology

ELECTIVES: Conservation Biology; Mechanics of Soil; Economic and Rural Geography; Geographical Ideas; Global Urbanism; Geographies of the Irish Diaspora; Environmental Economic Geography; Geohazards and Research Skills; Sedimentary Environments; Landscape Paleoecology and Palynology; Energy Engineering; Valuing the Environment

**Year 4 Modules**

CORE: Practical Offshore Marine Science; Advanced Geographical information Systems; Regional and Local Planning Issues and Policies; Climate Variability and Change; Environmental Remote Sensing; Research Project; Food Geography

ELECTIVES: Contemporary Studies of the European Union; Geography of Heritage; Historical Geographies of the City; Environmental Economic Geography; Petroleum Geology and Basin Analysis; Applied Geophysics; Exceptional Glimpses of Ancient Life; Market Forces and The Environment; Work Placement

**KEY FACTS**

- This programme provides an in-depth study of the relationships between the physical, human and environmental processes on our planet
- There is a high component of fieldwork
- There is a large element of practical work which reinforces teaching and reading
- Students have an element of choice in the modules they take, as well as the topic of their literature review and their final research project
Geology
BSc

Introduction
Geology is the study of the chemical and physical composition, structure and evolution, over 4,500 million years, of the Earth’s history. It allows understanding of the formation of natural resources such as coal, oil, gas, groundwater and mineral deposits; of climate change, and of natural geohazards like earthquakes and tsunamis.

Why Study
Year 1 comprises modules in geology, geography, earth science, biological sciences, environmental science, mathematics, chemistry and physics. In Years 2 and 3 there are a series of courses designed to cover all the main branches of geology. Fieldwork, for which there are additional fees, forms an integral aspect of all geology courses at UCC. In the summer of Year 3, and before the start of Year 4, a major field-based research project is undertaken in an area of choice, in Ireland or abroad. Several aspects of geology are treated up to specialised levels, in Year 4.

Study Abroad
Students have the option of organising for themselves a 6-week work placement during the summer between Years 3 and 4. This placement can be in any industry associated with Geology, for example, an oil company.

Careers
In recent years, graduates have gained employment in the area of environmental geology and exploration and have worked at home or abroad in diverse fields such as infrastructure and engineering projects, geotechnical site investigations, hydrogeology, landfill management and environmental impact and protection. Currently our graduates are in high demand and are being actively recruited by hydrocarbon and mineral exploration companies, guaranteeing unrivalled opportunities to work overseas.

Further Study
UCC Geology graduates can pursue geological research at MSc, MRes and PhD level in a range of focused topics in geology, such as:

• environmental geology
• palaeontology
• volcanic studies
• crustal geology and geochemistry
• structural geology
• marine geology
• sea bed mapping.

HANNAH MCGILLYCUDDY
GRADUATE 2013

“Studying Geology at UCC was one of the best things I’ve ever done. The work is hard but well worth the effort, the friends you make become family (hard not to when you go on so many field trips with them). The Geology staff are friendly and helpful, going above and beyond to help you. Geology is one of those rare courses where your future will be unlikely to include a 9-5 office job and opportunities are endless to see the world.”

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## Year 1 Modules

**CORE:** Quaternary Environments and Geomorphology; The Atmospheric Environment; Biogeography; Coastal and Marine Geomorphology; Crystallography, Optics and Mineralogy; Sedimentological Processes and Sedimentary Petrology; Igneous and Metamorphic Petrology; Easter Field Course; Structural Geology; Geohazards and Research Skills; Fossils as Living Organisms

**ELECTIVES:** The Environment and Human Health; Environmental Archaeology; Fluids; Calculus for Science; Physics for the Environmental Sciences

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## Year 2 Modules

**CORE:**
- Evolution for Geologists
- Advanced Structural Geology
- Geohazards and Research Skills
- Sedimentary Environments
- Stratigraphy
- Geological Map Interpretation
- Crustal Evolution of NW Britain
- Igneous and Metamorphic Petrology
- Micropalaeontology and Palynology

**ELECTIVES:**
- Archaeo-palynology
- Conservation Biology
- Geoinformatics
- Coastal and Marine Geomorphology

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## Year 3 Modules

**CORE:**
- Evolution for Geologists
- Advanced Structural Geology
- Geohazards and Research Skills
- Sedimentary Environments
- Stratigraphy
- Geological Map Interpretation
- Crustal Evolution of NW Britain
- Igneous and Metamorphic Petrology
- Micropalaeontology and Palynology

**ELECTIVES:**
- Archaeo-palynology
- Conservation Biology
- Geoinformatics
- Coastal and Marine Geomorphology

## Year 4 Modules

**CORE:** Advanced Field Geoscience Techniques; Research Project or Geology Mapping Project

**ELECTIVES:**
- Practical Offshore Marine Science
- Petroleum Geology and Basin Analysis
- Applied Geophysics
- Advanced Igneous Processes
- Economic Geology
- Geological Work Placement
- Exceptional Glimpses of Ancient Life
- Geochemistry

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### KEY FACTS

- The course has a strong focus on field skills, which makes graduates highly employable.
- A combination of instruction and assessment methods are used to bring out the best in students.
International Field Geosciences
BSc

Introduction
This joint degree programme utilises the natural field geoscience laboratories in Europe and the western United States as the basis for an undergraduate programme. The core curriculum is identical to the BSc Geology at UCC, except for Year 3 (60 credits) which is spent abroad at the University of Montana.

Why Study
The BSc International Field Geosciences (IFG) is a joint Bachelor of Science undergraduate degree that focuses on the documentation, interpretation and synthesis of critical geological issues in the field.

The degree rests upon a backbone of existing modules that are the foundation of current geology courses at UCC and the University of Montana, complemented by an emphasis on the development of field-based learning in an intercultural setting.

Work Placement
Year 3 is spent studying geoscience modules at the University of Montana. In addition, a work placement module is available as an elective in the fourth year of the degree which enables students to spend 6 to 10 weeks in a structured working environment.

Careers
In recent years, graduates have gained employment in the area of environmental geology and have worked at home or abroad in diverse fields such as infrastructure and engineering projects, geotechnical site investigations, hydrogeology, landfill management and environmental impact and protection. Currently our graduates are in high demand and are being actively recruited by hydrocarbon and mineral exploration companies, guaranteeing unrivalled opportunities to work overseas.

Further Study
UCC international field geoscience graduates can pursue geological research at MSc, MRes and PhD level in a range of focused topics in geosciences, such as: environmental geology, palaeontology, volcanic studies, crustal geology and geochemistry, structural geology, marine geology, and sea-bed mapping.

Kathleen Nolan
BSc International Field Geosciences 2011

“I am a BP Geoscientist, working in the heart of the North Sea oil and gas industry. The hard work I put in whilst doing the IFG degree won me a scholarship to do MSc by Research in Petroleum Geosciences at the University of Manchester. Having the IFG qualification on my CV makes me stand out from the crowd.”

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Year 1 Modules

REFER TO CK404 ON PAGE 145

Year 2 Modules

CORE: Crystallography, Optics and Mineralogy; Sedimentological Processes and Sedimentary Petrology; Igneous and Metamorphic Petrology; Easter Field Course; Structural Geology; Geohazards and Research Skills; Fossils as Living Organisms

ELECTIVES: French; German; Spanish; Quaternary Environments and Geomorphology; The Atmospheric Environment; Biogeography; Coastal and Marine Geomorphology

Year 3 Modules

Year spent at the University of Montana studying various topics in the geosciences

Year 4 Modules

CORE: Mapping Project or Research Project; Advanced Field Geosciences or Crustal Evolution of NW England (residential field course)

ELECTIVES: Evolution for Geologists; Practical Offshore Marine Science; Advanced Structural Geology; Stratigraphy; Geological Map Interpretation; Igneous and Metamorphic Petrology; Micropalaeontology and Palynology; Petroleum Geology and Basin Analysis; Applied Geophysics; Advanced Igneous Processes; Economic Geology; Geological Work Placement; Exceptional Glimpses of Ancient Life; Geochemistry

KEY FACTS

- The International Field Geosciences (IFG) is a joint Bachelor of Science undergraduate degree with University of Montana
- The degree focuses on documentation, interpretation and synthesis of critical geological issues in the field
- IFG curriculum is identical to the BSc Geology except for year 3 which is spent studying at the University of Montana
Introduction
Mathematical Sciences underpins science, technology, engineering, finance, software and countless other modern developments. It is an exciting and challenging degree, which opens up a wide variety of routes to rewarding and well-paid employment. If you enjoy Maths at school then this is the degree for you.

Why Study
A solid foundation in mathematics, applied mathematics and statistics is laid down in the first two years. You meet new and stimulating topics and revisit topics that you studied in school in a new light. You learn to apply these concepts and techniques in a real-world context. In later years you choose to study the areas of mathematics you find most interesting.

You gain important programming skills in a mathematical context, experience of working in groups, and you acquire written and oral presentation skills through project work and research.

Study Abroad
There are opportunities for study abroad in Year 3 at a variety of universities in Europe and the US.

Careers
Graduates possess technical, computational and numeracy skills, as well as desirable soft skills, such as oral and written presentation skills and teamwork experience, all of which are highly valued by a range of employers.

Recent graduates work in management consultancy, actuary, finance, options trading, scientific research, software/computing, pharmaceutical and biotechnological industries and engineering-based industries such as electronics and photonics.

Further Study
The BSc in Mathematical Sciences can lead to further study such as:

- MSc programmes including MSc in Mathematical Modelling and Self-Learning Systems
- PhD programmes.

Work Placement
While the course does not include any formal placement, students are encouraged to seek a summer internship at the end of their third year. Staff are experienced in helping students to source suitable positions through well-established contacts with companies in Ireland.

Catherine Costigan

“I chose this course because I loved maths in school and the subjects offered in UCC really appealed to me. The lecturers are really helpful and encouraged us to work together. I am currently doing a Masters in Mathematical Science and Scientific Computing and the skills I gained doing Mathematical Science have helped me a great deal.”
Year 1 Modules

REFER TO CK407 ON PAGE 149

Year 2 Modules

Mathematical Modelling; C/C++ Programming with Applications; Computer Modelling & Numerical Techniques; Fourier Methods; Mathematical Experimentation & Chaos; Mathematical Analysis; Ordinary Differential Equations; Linear Algebra; Multivariable Calculus; Regression Analysis; Probability & Mathematical Statistics

Year 3 Modules

CORE: Vector and Tensor Methods; Partial Differential Equations with Applications; Computational Techniques; Statistical Theory of Estimation; Statistical Theory of Hypothesis Testing; Mathematical Analysis; Ring & Field Theory

ELECTIVES: Fluid Mechanics; Analysis and Control of Nonlinear Systems; Optimisation and the Calculus of Variations; Complex Analysis; Metric Spaces and Topology; Modern Algebra; Differential Geometry; Stochastic Modelling; Survival Analysis; Generalised Linear Models; Stochastic and Survival Models for Actuarial Science; Practical Implementation of Statistical Analysis Techniques

Year 4 Modules

ELECTIVES: Topics in Applied Mathematics; Applied Stochastic Differential Equations; Partial Differential Equations with Applications; Perturbation and Asymptotic Methods; Functional Analysis; Measure Theory and Martingales; Topics in Mathematics; Topics in Modern Algebra; Topics in Differential Geometry; Stochastic Modelling; Survival Analysis; Stochastic and Survival Models for Actuarial Science; Statistical Consulting; Statistical Methods in Insurance; Practical Implementation of Statistical Analysis Techniques; Time Series; Contingencies; Multivariate Methods for Data Analysis; Analysis and Control of Non-Linear Systems; Bifurcation Theory and Chaos

KEY FACTS

• You enter the jobs market with a top class numerate degree from one of the strongest mathematical sciences departments in the country
• The emphasis on developing problem solving skills across a range of disciplines is highly regarded by employers
• Our students have an excellent track record in career development and in postgraduate study
• We have strong links with local, national and international companies, and a strong international reputation in research
Mathematical Sciences and Physics

BSc

Introduction
Mathematics provides tools for understanding physical phenomena. Physics is concerned with the nature and properties of matter and energy, from the quantum world on scales smaller than an atom, to the largest distances probed with the most powerful telescopes. Both subjects underpin much of modern technology.

Why Study
Mathematical models are used to describe real-world phenomena from nature, technology and society. Physics encompasses the study of the entire universe, from the largest galaxies to the nature of matter itself. Mathematics and Physics together can be used to study a wide range of topics, spanning economics to ecology and medicine to meteorology. An education in Mathematics and Physics develops firm foundations in analytical thinking and problem-solving. These skills are highly sought in a variety of careers.

Work Placement
There is no formal work placement in the Mathematical Sciences and Physics degree programme. However, there are opportunities for summer research in the Schools of Mathematical Sciences and Physics, as well as in the Tyndall Institute and other departments in the College of Science, Engineering and Food Science.

Study Abroad
There are opportunities for study abroad in Year 3 at a variety of universities in Europe and the US.

Careers
An education in Mathematics and Physics provides problem-solving, analytical, computational, mathematical and IT skills, and can lead to a wide range of careers, in fields such as:

- computer science
- data science and analysis
- education
- energy
- the environment
- medicine
- space science
- sustainability
- IT management
- meteorology
- banking and finance
- transport
- technology.

Further Study
BSc in Mathematical Sciences and Physics can lead to a variety of postgraduate studies:

- Postgraduate Diploma in Applied Science (Applied Physics)
- MSc programmes including MSc in Mathematical Modelling and Self-Learning Systems
- PhD programmes.

Colm Coughlan
Graduate 2010, BSc (Joint Hons), Applied Maths & Physics.

“I found the degree excellent. The applied maths and physics modules gave me the tactical and computational skills that I now need to conduct cutting-edge research. Those skills are highly sought after in industries such as computing, finance and engineering.”
Year 1 Modules

**CORE:** Introduction to Mathematical Modelling; Mathematical Software; Introduction to Abstract Algebra; Introductory Physics I; Introductory Physics II

**FOR ALL OTHER MODULES REFER TO CK407 AND CK408 ENTRIES ON PAGES 149 AND 150**

Year 2 Modules

Mathematical Modelling; C/C++ Programming with Applications; Computer Modelling and Numerical Techniques; Fourier Methods; Mathematical Analysis I; Linear Algebra; Multivariable Calculus; Classical Mechanics; Introduction to Quantum Physics; Electrostatics and Magnetostatics; Introduction to Astrophysics and Special Relativity; Experimental Physics I

Year 3 Modules

**CORE:** Vector and Tensor Methods; Mathematical Analysis II; Introduction to Thermodynamics and Statistical Physics; Quantum Mechanics; Electromagnetism; Statistical Thermodynamics; Experimental Physics II

**ELECTIVES:** Optics, Introduction to Condensed Matter Physics; Nuclear and Particle Physics; Observational Astrophysics; Mathematical Experimentation and Chaos; Fluid Mechanics; Analysis and Control of Nonlinear Systems; Optimisation and the Calculus of Variations; Partial Differential Equations with Applications I; Computational Techniques; Ordinary Differential Equations; Ring and Field Theory;

Complex Analysis; Metric Spaces and Topology; Introduction to Modern Algebra; Introduction to Differential Geometry; Probability and Mathematical Statistics

Year 4 Modules

**ELECTIVES:** Project; Research Project; Topics in Applied Mathematics; Bifurcation Theory and Chaos; Applied Stochastic Differential Equations; Partial Differential Equations with Applications II; Perturbation and Asymptotic Methods; Fluid Mechanics I; Analysis and Control of Nonlinear Systems; Optimisation and the Calculus of Variations; Partial Differential Equations with Applications I; Computational Techniques; Functional Analysis; Measure Theory and Martingales; Topics in Mathematics; Topics in Modern Algebra; Topics in Differential Geometry; Ring and Field Theory; Complex Analysis; Metric Spaces and Topology; Introduction to Modern Algebra; Introduction to Differential Geometry; Introduction to Regression Analysis; Stochastic Modelling I; Generalised Linear Models; Stochastic Modelling II; Optics; Introduction to Condensed Matter Physics; Nuclear and Particle Physics; Observational Astrophysics; Advanced Quantum Mechanics; Advanced Electromagnetism; Advanced Condensed Matter Physics; Atomic and Molecular 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; Gravitation and Cosmology; Experimental Physics III; Quantum Optics; Physics of Semiconductor Devices

**KEY FACTS**

- An education in Mathematics and Physics provides problem-solving, analytical, experimental, and computer-programming skills
- Graduates enter the job market with a unique set of skills that are highly sought in a variety of careers
- This degree provides a solid foundation for postgraduate studies in Fundamental and Applied Sciences
Introduction
Microbiology is an important and varied discipline that covers the vast majority of life forms on earth. The word micro, comes from the Greek-word mikros, meaning small. Microbiology describes the study of organisms that are usually invisible to the naked eye, including bacteria, protozoa, fungi, viruses, helminths and prions.

Why Study
Microbiology sits neatly on the interface between fundamental science and applied science/biotechnology, and this degree caters for students with diverse interests.

The most important aspect of the degree is its relevance to society. Whether it’s regarding issues of the food or pharma industries, the environment, or medicine, microbiology is centrally important and is rarely far from the news. This relevance in diverse spheres means graduates have little difficulty in pursuing careers in research and industry.

Careers
The UCC BSc Microbiology degree provides excellent training for a career in the microbiology, biotechnology, food, environmental, medical, pharmaceutical and veterinary sectors.

Graduates have specialised skills in practical and theoretical microbiology that have direct relevance to industry, as well as additional skills in problem-solving, data-handling and presentation, that can be applied in many different sectors.

About 50% of graduates go on to immediate employment, many in companies in the Cork area, but others in international locations. Other graduates choose to pursue higher degrees (MSc or PhD).

Further Study
• MSc Bioinformatics and Computational Biology
• MSc Food Microbiology
• MSc Biotechnology
• MSc in Molecular Cell Biology with Bioinnovation
• PhD Microbiology (Research training programme)
• MSc Microbiology (Research training programme)
• Graduate Entry Medicine.
<table>
<thead>
<tr>
<th>Year 1 Modules</th>
<th>Year 2 Modules</th>
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<tbody>
<tr>
<td>REFER TO CK402 ON PAGE 144</td>
<td>CORE: Biomolecules; Principles of Metabolic Pathways; Introductory Molecular Biology; Principles of Human Structure; Mammalian Cell and Tissue Structure; Introductory Physiology; Introduction to Biostatistics; Fundamentals of Microbiology; Principles of Microbiology; Introduction to Biotechnology</td>
</tr>
<tr>
<td><strong>Year 2 Modules</strong></td>
<td><strong>Year 3 Modules</strong></td>
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<tr>
<td><strong>Year 3 Modules</strong></td>
<td>Virology; Food &amp; Industrial Microbiology; The Role and Ecology of Microbes in the Environment; Genetic Engineering &amp; Molecular Biotechnology; Molecular Genetics &amp; Genomics; Immunology; Transmission &amp; Epidemiology of Infectious Diseases; Methods in Microbiology; Themes in Microbe-Host Interactions; Medical Microbiology</td>
</tr>
<tr>
<td><strong>Year 4 Modules</strong></td>
<td>CORE: Computational Biology; Eukaryotic Molecular Genetics; Molecular Biology &amp; Physiology of Bacteria; Research Frontiers in Microbiology; Research Project</td>
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<tr>
<td><strong>ELECTIVES:</strong> Main Group and Transition Element Chemistry; Fundamentals of Organic Chemistry; Energetics and Kinetics; Spectroscopy; Introduction to Plant Biotechnology; Vertebrate Diversity; Fundamentals of Ecology</td>
<td><strong>ELECTIVES:</strong> Programming in Python; Food Fermentation &amp; Mycology; Microbial Food Safety; Food Biotechnology; Microbial Diversity and Molecular Ecology; Advanced Medical Microbiology and Immunology; Advanced Virology and Antiviral Immunity</td>
</tr>
</tbody>
</table>

**Key Facts**

- Microbiology graduates have a choice of working in diverse industries, pursuing further training or research careers.
- 95% of UCC microbiology graduates either secure a job or commence further education shortly after graduation.
- The School of Microbiology has the highest research standing of any microbiology department in Ireland. Students are taught by academic staff who are international experts in their research field.
- A microbiology degree is a foundation for a future career in microbiology, molecular biology, bioinformatics, cell biology or biotechnology.

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**Dr Heather Mclaughlin**

**Visiting Student 2005, PhD Microbiology, 2011.**

“I came to Ireland to study as part of my BSc Microbiology at the University of Texas. I was impressed with the quality of the research environment and the priority they place on being internationally competitive.”
Neuroscience
BSc

Introduction
Neuroscience studies the nervous system in health and disease throughout the lifespan, from development to ageing and is one of the most challenging and exciting fields of science. It spans the disciplines of molecular and cellular biology through to behaviour, psychology and clinical neuroscience.

Why Study
Neuroscience is an area of enormous current and future significance. It is one of the most rapidly-expanding fields in biological science. The neuroscience degree covers the structure and function of the nervous system, from molecules and cells to the behaviour of the whole organism. Neuroscience is a multidisciplinary subject, encompassing anatomy, physiology, biochemistry, pharmacology and psychology. The nervous system is examined in the context of the body as a whole. A major challenge in neuroscience research is the development of effective treatments for neurological diseases.

Careers
Career opportunities in neuroscience reflect the worldwide expansion of interest in this field. This broad-based course provides graduates with general scientific training, similar to that in other honours science degree courses. It also provides graduates with specific, relevant training for employment in basic and applied biomedical and neuroscience research and in biological and neuroscience education. Graduates also achieve employment in pharmaceutical sales and marketing and in scientific consulting and publishing.

Further Study
PhD, MSc, medicine, physiotherapy, radiography, occupational therapy, speech therapy, MBA.

SARAH ROCHE
BSC NEUROSCIENCE GRADUATE, 2010

“The BSc Neuroscience course offered me an exciting opportunity to study one of the most fascinating systems in the human body. Graduating from this course was the beginning of a stimulating and rewarding career at the cutting-edge of science.”
Year 1 Modules

REFER TO CK402 ON PAGE 144

Year 2 Modules

CORE: Biomolecules; Principles of Metabolic Pathways; Introductory Molecular Biology; Fundamentals of Microbiology; Principles of Microbiology; Principles of Human Structure; Mammalian Cell and Tissue Structure; Introductory Physiology; Introduction to Biostatistics

ELECTIVES: Main Group and Transition Element Chemistry; Fundamentals of Organic Chemistry; Energetics and Kinetics; Introduction to Plant Biotechnology; Vertebrate Diversity; Introduction to Biotechnology; Fundamentals of Modern Chemistry; Spectroscopy; Fundamentals of Ecology

Year 3 Modules

CORE: Research Methodology in Neuroscience & Biomedical Science; Neurobiology of Regulatory Systems; Human Regional Neuroanatomy; Human Embryology & Developmental Anatomy; Library Project; Human Nervous System; Neurobiology of Disease; Molecular Biology; Biochemistry of the Central Nervous System; Pharmacology

ELECTIVES: Human Topographical Anatomy; Biological Bases of Behaviour; Introduction to Neuroscience; Perception and Attention; Neurophysiology

Year 4 Modules

CORE: Developmental Neurobiology; Behavioural and Cognitive Neuroscience; Research Project; Medical Imaging & Biomedical Devices in the Neurosciences; Advanced Topics in Neuroscience; Advanced Research Methodology in Neuroscience; Molecular Basis of Brain Disorders; Neuropharmacology

KEY FACTS

• Multidisciplinary degree involving molecular and cellular biology, anatomy, biochemistry, pharmacology, psychology and clinical neuroscience
• Broad-based course integrating general scientific training with specific relevant skills-sets for employment in basic and applied biomedical and neuroscience research, as well as biological and neuroscience education
• Research-led teaching by strongly-active neuroscience researchers
• Well-established record of graduate employment in a wide range of academic and industrial settings
Physics

BSc

Introduction
Physics is concerned with the nature and properties of matter and energy. This means it deals with the most fundamental questions we can ask, from the quantum world on scales smaller than an atom, to the largest distances we can probe with the most powerful telescopes.

Why Study
The study of physics appeals to those who are curious about how things work and who enjoy scientific experiments and mathematics. It explores the entire universe, from the largest galaxies to the nature of matter itself. Physics, and technologies developed by physicists, play a major role in chemistry, biology, medicine, electronics, geology, optics, nanotechnology, computer science and engineering. Its concepts, from relativity to quantum mechanics, challenge the imagination. A physics education develops problem-solving skills and provides a firm knowledge of basic science and the ability to apply and adapt that knowledge, within a large range of workplaces.

Study Abroad
There are opportunities for study abroad in Year 3 at a variety of universities in the US and Europe. Recently, UCC physics students have spent Year 3 at the University of California, the University of Massachusetts, the University of North Carolina and the University of Marburg.

Careers
An education in physics provides problem-solving, analytical, computational, mathematical and IT skills, and can lead to a wide range of careers, in fields such as basic science, computer science, data science and analysis, education, energy, the environment, medicine, space science, sustainability, IT management, banking and finance, transport and technology.

Further Study
• Postgraduate Diploma in Applied Science (Applied Physics)
• MSc in Mathematical Modelling and Scientific Computing
• MSc programmes
• PhD programmes.

Work Placement
There is no work placement in the UCC physics degree programme, but there are opportunities for summer research in the physics department, the nearby Tyndall Institute, and other departments in the School of Science, Engineering and Food Science, following Year 2 and Year 3.
Year 1 Modules

Refer to CK408 on page 150

Year 2 Modules

Core: Astrophysics and Special Relativity; C/C++ Programming with Applications; Classical Mechanics; Computational Physics; Electrostatics and Magnetostatics; Experimental Physics; Experimental Methods; Fourier Methods; Multivariable Calculus; Quantum Physics; Thermodynamics and Statistical Physics

Electives: Ordinary Differential Equations; Linear Algebra; Mathematical Modelling

Year 3 Modules

Core: Computer Modelling and Numerical Techniques; Condensed Matter Physics; Electromagnetism; Experimental Physics; Experimental Methods II; Nuclear and Particle Physics; Optics; Quantum Mechanics; Statistical Thermodynamics; Vector and Tensor Methods

Electives: Mathematical Experimentation & Chaos; Fluid Mechanics; Optimisation and the Calculus of Variations; Computational Techniques; Observational Astrophysics

Year 4 Modules

Core: Research Project; Experimental Physics

Electives: Observational Astrophysics; Advanced Mechanics; Advanced Quantum Mechanics; Advanced Electromagnetism; Advanced Condensed Matter Physics; Atomic and Molecular Physics; Quantum Field Theory; Plasma Physics; Lasers and Photonics; Advanced Computational Physics; Stars and the Interstellar Medium; Galactic and Extragalactic Astrophysics; Gravitation and Cosmology; Experimental Physics; Physics and Semiconductor Devices

Key Facts

- In many ways, the principles of physics underlie all sciences, and the UCC programme offers excellent education in both experimental and theoretical physics
- Physics, and technologies developed by physicists, play a major role in atmospheric science, chemistry, biology, medicine, electronics, geology, energy, optics, nanotechnology, computer science and engineering
- An education in physics provides problem-solving, analytical, computational, mathematical and IT skills, and can lead to a wide range of careers in these and many other fields
Physiology
BSc

Introduction
Physiology is the study of how humans and other animals function at all levels - the whole body, the cells it is composed of, and the molecular processes happening inside those cells.

Why Study
An understanding of normal physiology forms the basis for the practice of human and veterinary medicine and much of dentistry. Physiology is distinctive among the biological sciences in that it takes an integrated, holistic view of the whole organism, bringing together knowledge from a range of disciplines including chemistry, physics, anatomy and biochemistry, to create an overall understanding of the living organism.

Careers
Physiology graduates are well placed to enter biomedical research. Currently there is increasing demand from the pharmaceutical industry for scientists with an understanding of whole-body function and the relevant research skills to apply that understanding. A number of physiology graduates have also embarked on training and careers in the clinical therapies and in pharmaceutical sales and management.

Further Study
A degree in physiology is an ideal entry qualification for the following programmes:
• Medicine
• Postgraduate Diploma in Education (teaching)
• PhD (research careers)
• Taught MSc courses include forensic medicine, molecular pathology, speech and language therapy and sports science.
Year 1 Modules

REFER TO CK402 ON PAGE 144

Year 2 Modules

CORE: Biomolecules; Principles of Metabolic Pathways; Introductory Molecular Biology; Principles of Human Structure; Mammalian Cell and Tissue Structure; Introductory Physiology; Introduction to Biostatistics; Fundamentals of Microbiology; Principles of Microbiology

ELECTIVES: Main Group and Transition Element Chemistry; Fundamentals of Organic Chemistry; Energetics and Kinetics; Spectroscopy; Introduction to Plant Biotechnology; Vertebrate Diversity; Fundamentals of Ecology; Aromatics, Carbonyls and Alkenes

Year 3 Modules

CORE: Research Methodology in Neuroscience and Biomedical Science; Biochemical Immunology; Cell and Epithelial Physiology; Bioenergetics and Endocrinology; Neurophysiology; Cardiovascular Physiology; Respiratory Physiology; Renal Physiology; Digestive Physiology; Literature Review, Experimental Design and Data Analysis; Pharmacology

ELECTIVES: Toxicology; Chemotherapy and Pharmacology of Inflammation

Year 4 Modules

CORE: Research Project

ELECTIVES: Molecular Physiology of Channels; Regulation of Epithelial Transport; Gene Targeting Tools for Physiology; Thermoreception and Temperature Regulation; Applied Cardiovascular and Respiratory Physiology; Control of Breathing in Health and Disease; Learning and Memory; Physiology of Calcium Signalling; Physiology and Pathophysiology of Vascular Endothelium; Endocrine and Gastrointestinal Physiology

#uccmakeyourmark
Science Education  
BSc(Ed)

Introduction
The BSc(Ed) is a four-year undergraduate degree which covers the study of both science and education. Graduates are fully qualified to teach their specialist subject to Leaving Certificate level and to teach biology, chemistry and physics to Junior Certificate Science level.

Why Study
Science teaching is a very challenging and worthwhile career, especially for those who enjoyed learning the subject in school and who think they would like the activity of classroom and laboratory teaching. It offers graduates the opportunity to take up a career which allows them to inspire young people. This degree is fully recognised by the Teaching Council which is a big advantage, as it means graduates do not have to undertake any additional qualifications such as the PME (Professional Master of Education).

Work Placement
In Year 2 and Year 3 students participate in teaching practice placement in secondary schools over a 10 week period, teaching for two hours per week with one hour of mentoring. In Year 4, the school placement module involves teaching over the entire school year for four hours per week or a minimum of 100 hours.

Careers
Graduates have gone onto successful careers in:
- science teaching at secondary school level
- researching in science education
- lecturing in science education.

Further Study
- Masters degree in Science Education, MEd(Sc)
- Masters degree in Education, MEd
- PhD in Science Education.

KEVIN BUCKLEY  
GRADUATE

“I found it a huge advantage to be a fully qualified science teacher in four years. The structure allowed me to take a common first year science course before registering for the BSc(Ed) in Year 2. This allowed me the option of either a career as a scientist or in science teaching.”

#uccmakeyourmark
Year 1 Modules

REFER TO CK402, CK404, CK406 AND CK408 ENTRIES ON PAGES 144, 145, 148 AND 150

Year 2 Modules

ROUTE 1 CHEMISTRY
Main Group and Transition Element Chemistry; Fundamentals of Organic Chemistry; Energetics and Kinetics; Aromatics, Carbonyls and Alkenes; Spectroscopy; Structure, Bonding and Quantum Mechanics
EDUCATION Science Education; Teaching Practice Placement

ROUTE 2 PHYSICS
Classical Mechanics; Quantum Physics; Electrostatics and Magnetostatics; Thermodynamics and Statistical Physics; Astrophysics and Special Relativity; Experimental Physics
EDUCATION Science Education; Teaching Practice Placement

ROUTE 3 BIOLOGY
Habitats and Ecosystems; Biomolecules; Fundamentals of Microbiology; Principles of Microbiology; Molecular Biology; Physics for the Environmental Sciences* or Plant Biotechnology
EDUCATION Science Education; Teaching Practice Placement

*Students who enter through CK404 take Physics for the Environmental Sciences. Students who enter through CK402 choose Plant Biotechnology

Year 3 Modules

ROUTE 1 CHEMISTRY
Physical Chemistry I & II; Inorganic Chemistry; Synthesis, Structure and Reactivity of Organic Compounds
EDUCATION Science Education; Teaching Practice Placement

ROUTE 2 PHYSICS
Optics; Quantum Mechanics; Electromagnetism; Condensed Matter Physics; Nuclear and Particle Physics; Experimental Physics
EDUCATION Science Education; Teaching Practice Placement

ROUTE 3 BIOLOGY
Conservation Biology; Medical Microbiology; Environmental Microbial Genomics; Plants and Hostile Environments; Plant and Animal Genetics; Adaptations to Extreme Environments
EDUCATION Science Education; Teaching Practice Placement

Year 4 Modules

Science Education; Teaching Practice Placement

KEY FACTS

• Graduates are fully qualified science teachers in four years
• A common first-year entry allows students to settle into college and think about a career in science teaching
• Outstanding purpose-built science education laboratories available in the Eureka Centre, UCC

#uccmakeyourmark
Introduction
Zoology is a core discipline for the biological sciences and environmental and earth-system sciences, and plays an important role in modern developments in biotechnology, genetics, animal behaviour and physiology, parasitology, and ecology. It is also fundamental in applied fields such as environmental biology, pest and disease management, aquaculture and fisheries.

Why Study
The breadth of knowledge in animal biology is reflected in the range of courses taught in the Zoology degree. These include form and function of all major animal groups, biodiversity, comparative physiology, cell biology, diseases and pathology, aquatic biology, behaviour, genetics, ecology, conservation, ornithology and evolution. Research and field courses form an important part of the degree. Courses are research-led and taught through several different media, including lectures, practical laboratory classes, tutorials, seminars, and field visits. In addition, practical zoological and ecological studies are supported by field courses run at residential field centres outside UCC in Ireland and abroad (Portugal and Scotland).

Work Placement
A Work Placement module is offered as an optional part of the fourth year curriculum. Students can carry out this work placement during the summer prior to the final year.

Study Abroad
Practical studies are emphasised by field courses run at residential field centres outside UCC and abroad (Portugal). Students undertaking the Zoology degree can avail of an exchange with other EU countries, which allows students to study at specified EU universities. Exchange opportunities also exist with the University of Singapore and a number of universities in the USA where students have an opportunity to spend some or all of the third year of their degree.

Careers
A Zoology degree provides a sound scientific knowledge of animal biology and the necessary skills and qualifications for a career in a wide range of disciplines. Zoology graduates are well-equipped for careers ranging from field based environmental research, conservation and management, agriculture and pest control, and aquaculture and fisheries to more laboratory based disciplines such as genetics, biochemistry, pathology and toxicology. Job opportunities in these fields exist in education, research, management, or consultancy posts at universities, government agencies or private companies. A zoological training is relevant for other biological disciplines, in industry and teaching.
**Further Study**
Students with a second-class honours degree can study for an MSc (Master of Science). Students with either a first-class honours or a second-class honours, Grade I degree, may pursue a PhD degree.

There are also professional diplomas on offer, as well as research programmes such as MSc and PhD degrees.

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**Year 1 Modules**

REFER TO CK404 ON PAGE 145

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**Year 2 Modules**

**CORE:** Plant and Animal Genetics; Practical Ecological Skills; Vertebrate Diversity; Invertebrate Diversity; Ecological Plant Physiology; Introduction to Biostatistics; Fundamentals of Ecology; Fossils as Living Organisms; Plant Biotechnology

**ELECTIVES:** Plant Identification; Environmental and Public Health; Calculus for Science; Reviewing Scientific Literature

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**Year 3 Modules**

**CORE:** Practical Field Ecology (residential field course); Literature Review; Evolution & Diversity; Biostatistics; Advanced Vertebrate Biology; Conservation Biology; Adaptations to Extreme Environments; Animal Behaviour

**ELECTIVES:** Ecotoxicology; Micropalaeontology & Palynology; Plants & Hostile Environments; Ecology and Hydrology of Wetland Systems

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**Year 4 Modules**

**CORE:** Research Project; Frontiers in Biology; Research Skills in Biology; Biostatistics; Biology of Marine Mammals; Food Production; Evolutionary Ecology; Landscape Conservation and Management or Temperate Marine Biology (residential field courses)

**ELECTIVES:** Advanced Ecotoxicology; Biology & Management of Alien Species; Biological Work Placement; Crop Physiology and Climate Change; Environmentally Protective Management of Plant Pests & Pathogens

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**KEY FACTS**

- A breadth of knowledge of scientific areas covering all aspects of animal life
- There is a high component of fieldwork, with a residential fieldtrip in Years 3 and 4
- A large element of practical work reinforces teaching and reading
- High success rate for employment after graduation.
- Opportunities for studying abroad or carrying out work placement
Food Marketing and Entrepreneurship
BSc

Introduction
This programme combines business with food science disciplines to provide graduates with the skills to work in an exciting, fast-paced industry. It is designed to consider the challenges faced by businesses and to expose students to concepts and theories that help explain how the business world operates.

Why Study
If you are interested in understanding the business world and science in business, this is the programme for you. The interplay of business concepts and food science are explored from the perspectives of consumers, business and policy makers to provide an overarching view of the entrepreneurial environment. Practical application of theories of business, in the form of group and individual projects, is an integral part of the learning experience. Thus you will learn skills in strategic decision-making, innovation, enterprise and knowledge management. These are delivered through an integrated range of subjects that support successful personal and business development.

Work Placement
An integral part of this programme is a six-month industrial placement during Year 3. The placement will give you the opportunity to learn how to work to a high professional standard drawing on your knowledge and skills in performing tasks in specific work contexts. Students have worked in social media marketing, PR marketing, new product development, supply chain, and buying amongst other areas. On placement you will develop additional capabilities, as you face and deal with new challenges and responsibilities, preparing you for the transition into the workplace.

Placement opportunities are both national and international and past placements have included: Nestlé, Cully & Sully, Bord Bia, Musgrave Group, Glenilen, Kepak Group and Dairygold.

Careers
Graduates from the BSc will be equipped to find employment in a thriving national and international food sector. The skills acquired will ensure that graduates can position themselves to exploit career opportunities within fast-moving consumer goods markets both here and abroad.

International growth will underpin demand for graduates in areas such as consumer research, product marketing, key account and supply-chain management not only in Ireland, but worldwide. And with suitable experience there is always the prospect of setting up your own business.

Further Study
With this degree graduates are eligible to enter a broad range of postgraduate programmes of study in the business area.

REBECCA MACLEHOSE
2017 GRADUATE

“I am currently living in New York, and have secured a position with the Marketing team at Proximo Spirits. I am working across seven different spirit brands, including Bushmills Whiskey and Jose Cuervo Tequila. (And absolutely loving it!) I loved my experience on the programme. I had the opportunity to work with fantastic fellow students and lecturers while strengthening my passion for the food. During the course, I developed so many of the skills that I now realise are needed to survive in the working world of food.”

CONTACT INFORMATION
Department of Food Business & Development
T:+353 (0)21 490 2570
E: foodbusiness@ucc.ie
www.ucc.ie/en/foodbus

DURATION 4 Years
APPROX. INTAKE 28
MINIMUM POINTS 2018 445
POINTS RANGE 2018 445–567
LEAVING CERTIFICATE ENTRY REQUIREMENTS H5 in two subjects, and O6/H7 in four other subjects in the Leaving Certificate from Irish, English, Mathematics, and three other subjects recognised for entry purposes

APPROX. MATURE INTAKE 4

COURSE PAGE ONLINE www.ucc.ie/en/ck502

QQI FET LINKS www.ucc.ie/en/study/undergrad/tetac/sefs

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Year 1 Modules

ALL 5 CREDITS: AC1102 Financial Accounting; EC1500 Economic Analysis for Food Business Part 1; EC1503 Economic Analysis for Food Business Part 2; FE1030 Introduction to International Food Policy; FE1016 Introduction to Food Business; FE1017 Introduction to Food Marketing; FE2200 Introduction to Food Supply Chain Management; FS1011 Introduction to Food Science and Technology; LW1108 Introduction to the Legal System; LW1109 Introduction to Business Law; MA1100 Introductory Mathematics for Business I; MB1901 Introduction to Food and Industrial Microbiology

ELECTIVES: Transferrable skills – Food Business and Development research project; Work Placement

Year 2 Modules

Introduction to Management Accounting; Placement module; Food Economics; Principles of Food Science and Technology; Topics in Food Quality and Legislation B; Introduction to Information Systems; Information Systems for the Networked Enterprise; Fundamentals of Nutrition; Introduction to Business Statistics; Methods of Business Statistics; Quantitative Research for Food; People and Organisation

Year 3 Modules

CORE: Market-oriented New Food Product Innovation; Food Market Research Methods; Food Enterprise Management; Food Marketing Management; Science and Technology of Food Systems; Food and Industrial Microbiology; Sensory Analysis of Food; Enterprise and Innovation; Fundamentals of Nutrition

ELECTIVES: Financial Reporting; Food Security and the Developing World; Co-operative Business and the Rural Economy; Cereals and Related Beverages B; Entrepreneurial Business Start-ups; Advanced Food Packaging

Year 4 Modules

CORE: Accounting in Business; Global Food Policy; Consumer Behaviour in Food Markets; International Food Retail Marketing; Global Food Supply Chain Management; Food Marketing and Entrepreneurship; Strategic Marketing; Strategic Management; Public Health Nutrition

ELECTIVES: Financial Reporting; Food Security and the Developing World; Co-operative Business and the Rural Economy; Cereals and Related Beverages B; Entrepreneurial Business Start-ups; Advanced Food Packaging

KEY FACTS

• Technical knowledge, in both business and science, is enhanced and challenged through project work and work placement. The ability to communicate and present in a professional manner is also developed.
• The programme also develops an ability to gather market intelligence, interpret data from multiple sources, and judge and realise market opportunities, while also enhancing knowledge of the science of food and its significance in the regulatory and business environment.
CK504

Nutritional Sciences
BSc

DURATION 4 Years
APPROX. INTAKE 36
MINIMUM POINTS 2018 507
POINTS RANGE 2018 507–590
LEAVING CERTIFICATE ENTRY REQUIREMENTS Minimum grade H5 in two subjects and minimum grade O6/H7 in four other subjects. Subjects must include Irish, English, Maths and a Lab Science subject (Biology, Chemistry, Physics, Physics with Chemistry and Agricultural Science).
ADDITIONAL REQUIREMENT H4 in either a Laboratory Science subject, Mathematics, Applied Mathematics or Computer Science is required. If the H4 is in Mathematics, Applied Mathematics or Computer Science an O6/H7 in a Laboratory Science subject is required.

QQI/FET LINKS www.ucc.ie/en/study/undergrad/fetac/sefs
APPROX. MATURE INTAKE 2
COURSE PAGE ONLINE www.ucc.ie/en/ck504

CONTACT INFORMATION
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www.ucc.ie/en/fns

Introduction
Nutrition is the study of food as it impacts our health. The BSc Nutritional Sciences programme combines scientific disciplines to provide a thorough understanding of the role of diet in disease prevention and in the promotion of optimum physical and mental development and maintenance of health throughout life.

Why Study
Today, much of the world still lives under the shadow of under-nutrition. Yet we also face a growing epidemic of largely preventable diet-related chronic diseases, including obesity, cardiovascular disease, cancer, type II diabetes and osteoporosis. Tackling this double-burden of malnutrition is one of the major challenges facing the world this century. The BSc Nutritional Sciences programme is ideal for those interested in a rewarding career in food, nutrition and human biology, enabling them to make a lasting contribution by focusing on the causes of malnutrition, disease prevention and the promotion of health across all sectors of society.

Work Placement & Study Abroad
In Year 3 (April–September), there is a six-month food industry work placement. This gives invaluable work experience, facilitating the application of theory to practical situations, and the development of essential transferrable skills, including teamwork, decision-making, initiative, organisation and communication skills. Many leading Irish and international food companies participate in this programme.

Careers
Our graduates work in a wide range of industries and other areas of responsibility including:
• food, healthcare, pharmaceuticals
• governmental/non-governmental agencies.

The course does not qualify graduates to work as a dietician but many students go on to pursue one to two-year postgraduate courses in dietetics in the UK.

Further Study
• Public health nutrition
• Clinical nutrition
• Dietetics
• Molecular nutrition/nutrigenomics
• Sports nutrition
• Global/international nutrition
• Animal nutrition
• Food regulatory affairs.

KATE MCGRATH
STUDENT

“Nutrition is a fascinating and rewarding area of study and I’d recommend it to anyone interested in the relationship between diet and health. You study a wide range of subjects geared towards making you a real expert in the discipline.”
Year 1 Modules

- BC1001 Introduction to Biochemistry and the Biological Basis of Disease (5 credits)
- BL1002 Cells, Biomolecules, Genetics and Evolution (5 credits)
- BL1004 Physiology and Structure of Plants and Animals (5 credits)
- CM1005 Introductory Chemistry for Food and Nutritional Sciences (15 credits)
- MA1001 & MA1002 Calculus for Science Parts 1 & 2 (5 credits each)
- NT1001 Introductory Nutrition (5 credits)
- NT1002 Human Nutrition: Energy and Macronutrients (5 credits)
- PY1008 Physics for Biomedical, Environmental, Food and Nutritional Sciences (10 credits)

Year 2 Modules

- Biomolecules; Principles of Metabolic Pathways
- Introductory Food Chemistry: Food Constituents
- Fundamentals of Microbiology; Principles of Microbiology; Introductory Molecular Biology
- Human Nutrition: Minerals and Vitamins
- Animal Nutrition: Nutrition in Growth, Development and Ageing
- Introductory Physiology
- Introduction to Biostatistics

Year 3 Modules

- Science and Technology of Food Systems
- Food and Industrial Microbiology
- Food Toxicology
- Determinants of Food Choice and Eating Behaviour
- Research and Analytical Techniques in Nutrition
- Library Project
- Assessment of Nutritional Status
- Sensory Evaluation of Foods
- Work Placement

Year 4 Modules

- Immunology: Host Response to Pathogens
- Nutrition and Public Health
- Advanced Nutrient Metabolism
- Sports and Exercise Nutrition
- Advanced Minerals and Trace Elements in Nutrition
- Emerging Issues in Nutrition
- Research Project
- Human Nutrition in the Developing World
- Advanced Vitamins and Bioactive Dietary Components
- Introduction to Toxicology

Key Facts

- This course blends basic sciences, food science, human biology and nutrition in a unique and interesting way to give you the knowledge, skills and training you need to work as a nutritional scientist.
- As a nutritional scientist, you will increase knowledge of the relationship between diet, health and disease through research, and apply that knowledge through the provision of sound nutritional advice, and safe wholesome and nutritious food to the public.
- Lecturers are internationally recognised researchers and are deeply committed to excellence in teaching.
- Graduates have excellent opportunities for employment and for further career specialisation.

AoiFe Barron
Student

“This course gives you an excellent foundation in nutrition and offers a very valuable work placement module which allows you to gain professional experience in the field.”
Introduction
Food Science is the study of the structure, behaviour and interactions of key food components. Food scientists apply a multi-disciplinary and science-led approach to design technologies to improve food products and to produce new innovative products, in order to meet consumer demand for nutritious and high quality foods.

Why Study
If you are interested in developing new and innovative food products to meet the demands of the modern consumer, be it in the areas of healthy eating, athletic performance or disease prevention, the BSc Food Science is the perfect course for you. The diverse scope of subjects covered provides students with a unique blend of scientific and technical skills designed to meet the needs of careers in the food industry, ranging from research and development, to food processing and production. UCC has an international reputation for excellence in food education and research, with state-of-the-art teaching and research facilities, focused exclusively on food.

Work Placement
All students undertake a six-month work placement in third year. This provides you with an opportunity to gain industry experience and acquire key transferable skills in communication, organisation and management. It creates a platform for you to apply your learning in a real world environment, greatly enhancing your employability as a young graduate.

Dr Sinead Fitzsimons
GRADUATE, SENIOR R&D SCIENTIST, DAIRYGOLD

“The practical nature of the course and its applicability to so many areas ensured I did not limit my career prospects. It was fascinating to learn about the characteristics of various foods. I also found the work experience very useful as it allowed me to gain skills that I use to this day.”

DR SINEAD FITZSIMONS
GRADUATE, SENIOR R&D SCIENTIST, DAIRYGOLD

“The practical nature of the course and its applicability to so many areas ensured I did not limit my career prospects. It was fascinating to learn about the characteristics of various foods. I also found the work experience very useful as it allowed me to gain skills that I use to this day.”

Careers
Graduates from this course have a strong track record of acquiring senior positions in national and international food companies. The diverse skillset means that graduates are equipped to work in a wide range of positions, such as food production and management, quality assurance, food research and food product innovation and development.

Further Study
Graduates from this programme have many opportunities to advance to MSc and PhD post graduate programmes in food-related areas.
Year 1 Modules

BC1001 Introduction to Biochemistry and Biological Basis of Disease. (5 credits); MB1003 Microbiology in Society (5 credits); BL1004 Physiology and Structure of Plants and Animals (5 credits); CM1005 Introductory Chemistry for Food and Nutritional Sciences (15 credits); FS1005 Food Technology, Culture and Ethics (5 credits) FS1006 Success Skills for Food Scientists (5 credits); MA1001 & MA1002 Calculus for Science Parts 1 & 2 (5 credits each); PY1008 Physics for Biomedical, Environmental, Food and Nutritional Sciences (10 credits)

Year 2 Modules

Biomolecules; Principles of Metabolic Pathways; Introductory Food Chemistry; Topics in Food Quality and Legislation; Fundamental of Microbiology; Principles of Microbiology; Principles of Nutrition; Process Engineering Principles; Unit Operations in Process & Chemical Engineering; Introduction to Biostatistics

Year 3 Modules

CORE: Chemistry of Food Proteins; Chemistry and Technology of Oils and Fats; Sensory Analysis, Flavour and Colour; Macromolecules and Rheology; Food Processing and Preservation; Dairy Product Technology; Fundamentals of Food Packaging; Food and Industrial Microbiology

ELECTIVES: Work Placement; Food Industry Skills

Year 4 Modules

CORE: Cereals and Related Beverages; Food Shelf Life Control; Advanced Food Packaging; Dairy Science and Technology; Meat Science and Technology; Topics in Food Science; Food Biopolymer Ingredients and Mixtures; Microbial Food Safety; Topics in Nutrition and Food Toxicology

ELECTIVES: Research Project and Advanced Analytical Methods or Team Product Development Project; Food Product Development and Innovation

KEY FACTS

- Graduates have excellent job prospects. A survey by the Careers Services indicated that 79% of graduates in 2015, had gone straight to employment
- UCC has a long-established international reputation for excellence in food education and research and has state-of-the-art facilities for teaching and research in food
- The six-month work placement greatly enhances the employability of graduates
- The programme has a good balance between laboratory work, where students get exposure to the practical applications of food science, and lectures
- This is the first programme outside the UK to be accredited by the Institute of Food Science and Technology
Introduction
This programme is concerned with global issues, particularly those affecting the developing world. These include inequality, human rights, health, education, migration, environment, global warming, international aid, and the fight against global hunger and poverty. It provides the skills for a career in international development, including languages, research techniques and project management.

Why Study
Today’s world faces multiple challenges, including inequality within and between countries, climate change, poverty and hunger, conflict and human rights abuse. Meeting these challenges requires forward-looking and creative individuals with an international perspective, who can work across traditional disciplines such as economics, social studies, health, agriculture, education, law and the environment. The BSc International Development and Food Policy programme provides the theoretical understanding and practical skills required to work in this important field, or to advance to more specialised study, through an exciting mix of lectures, group projects, individual assignments and work experience.

Work Placement
In Year 3, students undertake a five-month work placement with a development organisation, usually based in Africa, Asia or Latin America. This is a valuable opportunity to add practical experience to classroom-based learning and to experience life in a developing country.

Careers
Graduates find careers in:
- Irish-based Non-Governmental Organisations (NGOs) in the development field
- International organisations
- Governmental agencies (e.g. Irish Aid)
- Campaigning organisations (e.g. environmental or human rights)
- Development-related research
- Development education.

Further Study
Graduates of this programme undertake further study at master’s (and occasionally doctoral) level, in fields such as:
- Global Health
- Human Rights Law
- Soil and Water Conservation
- Anthropology of Food
- Development Studies
- Food Security
- Environment and Conservation
- Migration Studies.

“Africa Direct is always happy to provide placement opportunities for students from the BSc. International Development and Food Policy. The standard of students has been very high and they have also worked productively for partners.”

JOHN SLATTERY
AFRICA DIRECT

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Year 1 Modules

CORE: FE1006 Poverty and Development (5 credits); FE1008 Data in Development Studies (5 credits); FE1013 & FE1018 Introduction to Development Studies Parts I & II (5 credits each); FE1014 Communication and Facilitation Skills in Development (5 credits); FE1015 Rural Development Theory, Policy and Practice (10 credits); FE1019 Introduction to Food and Agricultural Economics (5 credits); FE1020 Principles of Agricultural and Resource Economics (5 credits); FE1023 Socio-Economic Concepts for International Development and Food Policy (5 credits)

ELECTIVES: CH1001 Chinese Language (Mandarin) I (10 credits); FR1105 Threshold French (5 credits) plus FR1107 French for Reading Purposes I (5 credits); FE1021 & FE1022 Development, Conflict and Peace I & II (5 credits each); GV1204 Democracy, Ideology and Utopia (5 credits); GV1400 Local Development and Public Health (5 credits); GV1102 Introduction to Government and Politics (5 credits); FE1016 Introduction to Food Business (5 credits); MG1000 Foundations of Management and Organisational Behaviour (5 credits)

Year 2 Modules

CORE: Food Economics; Globalisation and Development; Sustainable Livelihoods; Food Supply-Chain Management; Human Rights Law; Race, Ethnicity, Migration and Nationalism; Statistics for Development; International Food Policy

ELECTIVES: French; Spanish; Development Conflict and Peace; The Democratic Imagination; Citizen Participation; Introduction to Theories and Practices of Health Promotion; Public Health Issues; Fundamentals of Nutrition 1 & 2; International Security; Public Management Concepts; People and Organisation

Year 3 Modules

CORE: Programme Planning and Management; Development Management and Organisations; Gender and Development; Socio-Economic Research in Development; Agriculture and Natural Resource Use in the Developing World; SME and Local Development; Work Placement

ELECTIVES: Micro-Finance and Development; Food Marketing; International Relations of Asia

Year 4 Modules

CORE: Advanced Programme Planning and Policy Processes; Global Food Policy; Macro-Economics; Humanitarian Action in Development; Contemporary Issues in Development; Dissertation

ELECTIVES: Rural Development Policy; Co-operative Business and the Rural Economy; Markets, Society and Social Policy; Spanish; Global Governance; Policy Health and Development; Promoting Health within Communities; Cooperative Banking; European Food Business

KEY FACTS

- Course input from development practitioners
- Mix of theoretical and practical skills
- Multi-disciplinary staff with a wealth of international experience
- International work experience with a recognised development organisation

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Careers
Depending on the engineering programme selected after Year 1, graduates may progress to careers in:
• automation engineering
• civil and structural engineering
• environmental engineering
• electronic systems engineering
• information technology
• integrated circuit design
• management consultancy
• power generation, transmission and distribution
• process and chemical engineering
• renewable energy generation.

Further Study
Postgraduate research degrees (Master’s and PhD) are available in all engineering disciplines in UCC. Taught postgraduate programmes are also offered in:
• Mechanical Engineering
• Pharmaceutical and Biopharmaceutical Engineering
• Electrical and Electronic Engineering
• Sustainable Energy Engineering.

Study Abroad
All engineering students in UCC have the opportunity to spend a period in an institution abroad, receiving full credits for the work done there towards the degree.
## Engineering

### YEAR 1: Explore your Options

| Modules | Mathematics for Engineers; Chemistry for Engineers; Engineering Computation and Problem Solving; Engineering Thermodynamics; Mechanics; Physics for Engineers; Introduction to Process & Chemical Engineering; Introduction to Energy Engineering and Engineering Ethics; Introduction to Structural and Civil Engineering |

### YEAR 2: Choose your pathway

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<th>Degree Outlets</th>
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### YEAR 3: Focus on your chosen pathway

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### YEAR 4:

- **Graduate with BE in Year 4**
- **Choose your route – ME or BE**
  - **BE Route:** Continue on pathway and graduate with BE in Year 4
  - **ME Route:** Apply to transfer to ME in YEAR 4, undertake extended work placement and Graduate with ME in Year 5

- **Graduate with BE in Year 4**
- **Graduate with BE in Year 4**
Civil, Structural and Environmental Engineering

Introduction
Civil, Structural and Environmental engineers design, construct and operate a wide range of environmental infrastructure, vital to the needs of a modern economy. All the infrastructure around us, including roads, bridges, hospitals, universities, airports, water and wastewater and energy facilities, is the product of civil, structural and environmental engineering.

Why Study
Civil, Structural and Environmental Engineering is essential to economic development and graduates have rewarding, well-remunerated careers. Civil, Structural and Environmental Engineering Graduates are highly sought-after not only by the engineering sector, but also by employers in such diverse areas as finance, information communication technology, energy, and research and development.

Careers
Civil, Structural & Environmental engineering graduates progress to a wide range of rewarding careers in many sectors including:
• civil and structural engineering design (Malachy Walsh & Partners; Ove Arup; RPS Group)
• engineering project management (Project Management Group)
• management consultancy (McKinsey & Co.; KPMG; Accenture)
• renewable energy (Element Power)
• environmental engineering (Fehilly Timoney).

Year 1 Modules
REFER TO CK600 ON PAGE 214-15

Year 2 Modules
Structural Design – Elements and Systems; Engineering Mechanics with Transform Methods; Numerical Methods and Programming; Solid and Structural Mechanics; Fluids; Measurement and Surveying; Modelling and Visualisation; Heat and Mass Transfer; Mathematics for Engineering

Year 3 Modules
CORE: Computer Aided Design; Solid & Structural Mechanics; Mechanics of Soils; Construction Project Management; Hydraulics; Geology for Engineers; Applied Probability and Statistics
ELECTIVES: Environmental Engineering; Energy in Buildings; Information Modelling and Analysis; Materials and Sustainability; Sustainable Energy; Management and Organisation; Enterprise Planning and Processes

CHOOSE ONE OF FOUR STREAMS CONTINUED TO 4TH YEAR:
(A) Structural Engineering and Construction;
(B) Environmental Engineering (Wet);
(C) Building Energy Engineering;
(D) IT in Architecture, Engineering and Construction

Year 4 Modules
CORE: Design Studio; Dissertation; Architecture and Planning; Structural Analysis; Geotechnical Engineering; Water and Wastewater Treatment
YOU WILL CONTINUE THE CHOSEN STREAM FROM YEAR 3
ELECTIVES: Civil Engineering Systems; Design Studio; Applied Elasticity; Transportation and Energy; Traffic and Highways; Environmental Hydrodynamics; Harbour and Coastal Engineering; Biomedical Design; Fire & Safety Engineering; Work Placement; Entrepreneurship Practice and Opportunity Recognition; Bridge Engineering; Entrepreneurial Business Start-Ups
Electrical and Electronic Engineering  
BE/ME

Introduction
Electrical and Electronic Engineering applies scientific knowledge to develop a broad range of technological products and services that underpin modern society. These include the generation and distribution of electricity, the development of renewable energy systems, industrial automation and control, telecommunications including broadband and mobile systems and medical systems.

Why Study
BE Electrical and Electronic Engineering is a four-year professional engineering course designed to prepare students for employment in the electrical and electronic sectors in Ireland and abroad. It has a broad curriculum with strong practical content, including a work placement. It has an excellent record for graduate employment.

Careers
The BE Hons (Electrical and Electronic) degree is recognised internationally and graduates have developed successful careers within the electrical, electronic and energy engineering industries and beyond.

The skills acquired during this course are appreciated by a wide range of employers, offering students the possibility of embarking on a career in many other areas, including:
• computing  
• management consultancy  
• financial services  
• scientific and engineering research.

Further Study
At the end of 3rd year you can continue on your chosen pathway and graduate in 4th year with a BE. Alternatively at the end of 3rd year you can apply to transfer to the ME and graduate in 5th year with an ME.

Year 1 Modules
Refer to CK600 on page 214-15

Year 2 Modules
Linear Circuit Analysis; Numerical Methods and Programming; Mathematics for Engineering; Non-Linear Circuit Analysis; Digital Electronics; Semiconductor Materials and Devices; Signals and Systems; Power Engineering

Year 3 Modules
Electronic Circuit Design; Electronic Embedded Systems; Control Engineering; Electromagnetic Fields for Engineers; Telecommunications; Digital Integrated Circuits; Introduction to Electrical Power Systems; Introduction to Electric Drives; Analogue Integrated Circuits; Signal Processing; Mechanical Systems

Study Abroad Option

Year 4 Modules

Core: Transmission lines; Photonic Systems; Entrepreneurial Business Start-Ups; BE Project

Electives: Power Electronics Drives and Energy Conversion; Control Engineering; Biomedical Design; Robotics; Photovoltaic Systems; Digital IC Design; Analogue IC Design; Telecommunications; Digital Signal Processing; Industrial Automation and Control; Electrical Power Systems; RF IC Design; Processing of Integrated Circuits; Optical Electronics

Key Facts
• The programme has well-equipped laboratories and a wide range of hardware and software for the design of modern high-performance electronic systems
• Staff undertake research at the highest level and many opportunities exist for follow-on postgraduate studies
• UCC has close links with Ireland’s largest ICT research centre, the Tyndall National Institute, opening up further possibilities for postgraduate studies/research
• The course is built on a solid scientific foundation but also has a strong emphasis on practical content, a work placement at the end of Year 3 and the final-year project

Caitlin Keane
Graduate

“Electrical & Electronic Engineering is very relevant to today’s job market. The degree is challenging, it’s very interesting and it’s great fun. The facilities in the Electrical Engineering building, the development labs and computer labs, are fantastic. All the material is really interesting, and there is never a dull moment.”
Introduction
A major challenge of the 21st century is ensuring that the planet’s growing population has access to affordable, reliable and clean energy. Energy engineering graduates are required to generate, convert, transmit and supply useful energy to meet our present and long-term needs for electricity, mobility and heating and cooling.

Why Study
The BE (Energy) is the longest-established energy engineering degree programme in Ireland and the only one accredited by Engineers Ireland. A combination of solid engineering fundamentals is covered in the first two years of the BE Energy course (e.g. thermodynamics, fluids, and electrical systems). Advanced energy engineering topics are covered in the final two years (including power electronics, control systems, wind, solar photovoltaic and ocean energy, and energy systems).

A degree in energy engineering is suitable for anyone who enjoys solving problems and wants a rewarding and enjoyable career at the forefront of one of the 21st century’s most important industries.

Careers
A degree from UCC in energy engineering opens up a wide range of careers, not only in energy engineering, but in any sector where technical ability and problem-solving skills are sought after. Some of our graduates are working in the following sectors:
- electricity transmission & distribution (Eirgrid plc; ESB International)
- energy services (Energy Services Ltd.; Fingleton White, Enercon Windfarm Services Ireland Ltd)
- finance (KPMG, First Derivatives; Accenture)
- project engineering (Jones Engineering Consultants; Roadstone Wood Ltd).

Year 1 Modules
REFER TO CK600 ON PAGE 214-15

Year 2 Modules
Numerical Methods and Programming; Solid and Structural Mechanics; Fluids; Linear Circuit Analysis; Non-linear Circuit Analysis; Signals and Systems; Power Engineering; Heat and Mass Transfer; Engineering Statistics

Year 3 Modules
Construction Project Management; Hydraulics; Introduction to Electrical Power Systems; Introduction to Electric Drives; Control Engineering; Mechanical Systems; Applied Thermodynamics and Work Transfer; Primary Energy Engineering; Energy in Buildings; Energy Engineering in the Commercial World and Work Placement; Sustainable Energy; Transportation and Energy

Year 4 Modules
CORE: Power Electronics, Drives and Energy Conversion; Electrical Power Systems; Entrepreneurial Business Start-Ups; Biomass Energy; Energy Systems in Buildings; Computer Aided Design (Heating, Ventilation and Air Conditioning); Energy Engineering Project

ELECTIVES: Wind Energy; Ocean Energy; Photovoltaic Systems; Control Engineering; Industrial Automation and Control; Energy Systems Modelling
Process and Chemical Engineering

Introduction
Process and Chemical Engineers are involved in the design, modification and operation of processes to produce products across a broad range of process industries, including food production, bulk chemicals, pharmaceuticals, fuels and plastics.

Why Study
Process and Chemical engineering helps provide a pathway towards meeting societal requirements around energy provision, food production, water supply, waste management, consumer goods and healthcare products.

Careers
The degree is internationally accredited and over the past several years all students have gained employment within six to nine months after graduating, (Careers Service First Destination Report). Some of the areas where graduates have strong employment prospects are in:
- food and drinks industry
- bio/pharmaceuticals
- environmental and technical services
- finance and management
- medical devices
- engineering design
- consultancy sectors.

Year 1 Modules
REFER TO CK600 ON PAGE 214-15

Year 2 Modules
Engineering Mechanics with Transform Methods; Numerical Methods and Programming; Fluids; Introduction to Organic Chemistry for Process and Chemical Engineers; Engineering Thermodynamics; Heat Transfer; Communication in Engineering; Introduction to Biochemical Engineering; Phase Equilibrium and Mass Transfer; Chemical Reaction Engineering; Plant Design and Commissioning; Chemical Process Equipment: Design and Integrity

Year 3 Modules
CORE: Organic Chemistry for Process and Chemical Engineering; Fundamentals of Organic Chemistry; Applied Thermodynamics and Fluid Mechanics; Unit Operations and Particle Technology; Engineering Materials and Process Machinery Dynamics; Process Dynamics and Control; Safety and Environmental Protection; Sustainability in Process Engineering; Pharmaceutical Process Validation; Work Placement
ELECTIVES: Energy in Buildings; Pharmaceutical Engineering

Year 4 Modules
CORE: Advanced Process Design; Optimisation and Continuous Process Improvement; Safety and Environmental Protection; Research Project; Design Project; Mechanical Design of Process Equipment; Food and Bioprocess Engineering; Complex Reaction Systems; Advanced Separation Processes
ELECTIVES: Biomass Energy; BioPharmaceutical Engineering

KEY FACTS
- Excellent staff-student interaction
- Dynamic course content reflecting an evolving industrial environment
- Modules on key topics of Process and Chemical Engineering, and the development of soft skills such as team-working, problem-solving, and presentation skills throughout the programme, including a dedicated module on communication skills in Year 2

AILBHE CONNOLLY
STUDENT
“I chose Process & Chemical Engineering at UCC because it is highly regarded, accredited by both the Institution of Chemical Engineers and Engineers Ireland. I also loved the idea of a six-month salaried work placement. I secured a job with Zenith Technologies, where I did my work placement.”

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COURSE PAGE ONLINE
www.ucc.ie/en/ck600/process

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Introduction
Architecture, which has been practiced for thousands of years, explores new ways of living, investigates new technologies and materials, and works to create new buildings, towns and landscapes that are environmentally sustainable. Architecture combines art and technology, in designing and building structures and their surroundings within a social and cultural context.

Why Study
This course is delivered by the Cork Centre for Architectural Education, a collaboration between UCC and the Cork Institute of Technology. It has been designed in response to the guidelines of the UNESCO/ UIA Charter for Architectural Education, the European Qualifications Directive (2005/36/EC) relating to the Architectural Profession, and the Royal Institute of Architects of Ireland (RIAI) education policy.

Combined with the Master of Architecture, the BSc in Architecture is accredited by the RIAI. Together with two years’ work experience in an architect’s office, and a Postgraduate Certificate in Architectural Professional Practice and Experience, graduates are able to register as professional architects.

Work Placement
There is currently no work placement module on the Architecture course. Students are normally expected to gain professional experience before registering for the Masters in Architecture programme. Students will also be expected to participate in class field trips, visiting project sites, and also study trips to Irish and other European cities.

Study Abroad
The CCAE has Erasmus links with colleges in Estonia, Austria and Italy and study-abroad partnerships with Washington State University, USA.

Careers
Architecture itself provides exciting and widely varied career opportunities. Graduates may specialise in certain types of buildings, or concentrate on a particular area such as architectural design, urban design, technology, architectural conservation, and computer-based modelling.

Graduates may work individually or as part of a team, in private practice, or in the architectural section of a commercial organisation, a government department or local authority.
Further Study
The BSc (Hons) Architecture programme combined with the Master of Architecture is accredited by the RIAI. Together with two years’ work experience in an architect’s office and a Postgraduate Certificate in Architectural Professional Practice and Experience, this will enable registration as a professional architect.

Legal protection of the title of Architect, is provided by the Irish Building Control Act 2007.

Key Facts
• This exciting and innovative honours degree has been developed with the support of the local architectural profession and in consultation with the Royal Institute of Architects of Ireland (RIAI)
• Graduates of this course get rich experience of working in teams, working to deadlines, developing abilities in verbal and graphic communication and, most importantly, skills in creativity, design and innovation — the essential ingredients for success in the contemporary economy

Year 1 Modules
AT1001 & AT1005 Design Studio 1 & 2 (15 credits each); AT1003 & AT1006 Construction, Materials and Structures 1 & 2 (5 credits each); AT1009 & AT1010 Applied Technology Studio 1 & 2 (5 credits each); AT1004 & AT1008 History and Theory of Architecture 1 & 2 (5 credits each)

Year 2 Modules
Design Studio; Construction, Materials and Structures; History and Theory of Architecture; Environmental Design; Applied Technology Studio

Year 3 Modules
Design Studio; Conservation; Applied Technology Studio; Environmental Design; History and Theory of Architecture; Landscape

Year 4 Modules
Design Studio; Dissertation; Architectural Technology; Professional Practice and Management