UCD Science

Undergraduate Courses 2018

Non-EU Edition

Science SCU1

Computer Science CSSA

Actuarial & Financial Studies BSS3

University College Dublin

Ireland's Global University

Contents

Career Opportunities

Career Opportunities 6-13

BSS3 Actuarial & Financial Studies 14

Actuarial & Financial Studies 15

CSSA Computer Science 16

Computer Science 17

Computer Science with Data Science 18

SCU1 Science 19

Biological, Biomedical & Biomolecular Sciences (BBB)

Biochemistry & Molecular Biology 20

Cell & Molecular Biology 21

Environmental Biology 22

Genetics 23

Microbiology 24

Neuroscience 25

Pharmacology 26

Physiology 27

Plant Biology 28

Zoology 29

Chemistry & Chemical Sciences (CCS)

Chemistry 30

Chemistry with Biophysical Chemistry 31

Chemistry with Environmental & Sustainable Chemistry 32

Medicinal Chemistry & Chemical Biology 33

Mathematical, Physical & Geological Sciences (MPG)

Applied & Computational Mathematics 34

Financial Mathematics 35

Mathematics 36

Statistics 37

Physics 38

Physics with Astronomy & Space Science 39

Theoretical Physics 40

Geology 41

How to Apply to UCD 42

Welcome to UCD Science

University College Dublin has a long and proud history of education, research and high achievement. Set in the heart of the beautiful Belfield campus in south Dublin the UCD O'Brien Centre for Science provides a vibrant and state-of-the-art centre of learning, welcoming students and staff from all corners of the world. UCD boasts the most innovative and diverse Science programme in the country, providing knowledge in disciplines encompassing biology, chemistry, physics, geology and earth science, mathematics and computer science. Our academic staff are not only expert teachers but are also highly reputed world-class researchers, and indeed our research interests and strengths inform our undergraduate and postgraduate degree programmes. UCD Science graduates are in great demand in Science and Science-related jobs both in Ireland and overseas, and an undergraduate degree in Science lays strong foundations for a wide variety of careers.

For international students the choice of university is a daunting one, and this is something that we recognise at UCD. In order to ensure that our university and degree programmes are the right fit for your needs, UCD Science staff strive to get to know each international student personally, from the first point of contact until graduation and beyond. As Vice Principal (International) for UCD Science my role is to support international students through the enquiry and application process, meeting you and your family in your home country, and providing direct links to relevant academic and support staff in our Global Centres and in Dublin. No problem is too trivial for us in this important phase of your career. We look forward to welcoming you to UCD, proudly Ireland's Global University.

Jeremy C. Simpson

Professor Jeremy Simpson
Vice Principal (International),
UCD Science

WHY UCD SCIENCE?

Flexible Curriculum

UCD offers the broadest and most diverse Science programme in Ireland, with degree courses in biological, biomedical, chemical, geological, mathematical, physical and computer sciences, all delivered by lecturers at the forefront of teaching and research.

The curriculum can be adapted to your personal preferences through the unique flexibility of UCD Horizons.

UCD has over 150 clubs and societies as well as a cinema, student residences, excellent sports facilities, a gym and 50-metre swimming pool.

Study Abroad Opportunities

UCD has over 400 exchange partners worldwide and offers students opportunities to study with 29 partner universities throughout Europe.

UCD Jargon Buster

The following are some terms that you will come across when researching courses in **UCD.**

Academic Terms

BSc
Bachelor of Science.

BAFS
Bachelor of Actuarial and Financial Studies.

Degree Subject
Examples of degree subject areas are Microbiology, Physics with Astronomy & Space Science or Chemistry. In SCU1 Science, your degree will eventually be in one of 22 different subjects.

Entry Requirements
The minimum standard in order to be eligible for consideration for admission.

Common Entry
A common entry programme has a single entry point for multiple potential degree options.

Stage
A student progresses through an undergraduate programme in stages. For full-time undergraduate students, a 60-credit stage will normally be completed in one academic year.

Major
A main area of study. A major will show what subject area your degree is in, such as Zoology.

Semester
The academic year is divided into semesters. Undergraduate programmes in UCD have two semesters. Semester 1 runs from September to December and Semester 2 runs from January to May.

Grade Point Average (GPA)
Each grade has a number associated with it, called a grade point. When you have completed all the modules of a Stage, all your grade points are averaged to get a Grade Point Average, or GPA, for that Stage.

Stream
SCU1 Science in UCD has 4 streams. The Streams available in SCU1 Science are Biological, Biomedical & Biomolecular Sciences (BBB), Chemistry & Chemical Sciences (CCS), Mathematical, Physical & Geological Sciences (MPG) and No Preference (NPF). Streams are used to categorise the 22 different subjects available as degree options available in the common entry programme. By meeting the requirements of a particular stream in first year, the subjects within that stream remain available to choose in second year.

Information on Classes

Module
A self-contained unit of teaching and learning, which is usually studied over one semester. Undergraduate modules are normally 5 credits. A standard 5-credit UCD module represents 100-125 hours of student effort including time spent in class, studying and assessment. Modules in UCD are divided into core, option and elective modules.

Core Module
A compulsory module that you must do as part of your programme. You will usually be pre-registered to these modules.

Option Module
A module that is part of your programme but is not compulsory. You will be given a list of option modules to choose from when you register online.

Elective Module
As well as Core and Option modules, UCD students can study Elective modules that either deepen your knowledge in your chosen programme (In-Programme Electives) or allow you to explore subjects outside of your area of study (General Electives). For example, a student in Computer Science could take a Business or language module.

Timetables
Each student will have their own personalised timetable based on their individual module selection. The timetable will be filled with a variety of class types such as lectures, practicals, tutorials etc. An average first year timetable will have 30 hours of class time per week including lectures, practicals and tutorials. Sample timetables for first year are available on the UCD Science website at www.ucd.ie/science/

Practicals
Practical (or laboratory) classes involve carrying out selected experiments, examining scientific material and getting hands-on experience of practical subjects. They generally take place in the afternoons and are of two-to-three hours duration.

Tutorials
Tutorials generally take place in a classroom with a smaller group size than lectures. They provide an opportunity to explore and apply the concepts, skills and competencies in a manner that is not usually possible in larger classroom environments.

Credit
This is a standard way of representing the amount of student effort, the achievement of learning outcomes and educational activity associated with a module. UCD utilises the European Credit Transfer System (ECTS). The ECTS was developed to facilitate educational mobility for students and inter-institutional cooperation amongst higher education institutions within the European Union.

Student Life

Orientation
To help you settle into life at UCD, orientation events are organised for new students prior to the start of term. This includes important academic advice as well as extra-curricular activities to help you settle into life at UCD.

Societies
Student societies are a great way to explore your interests or develop new ones. UCD currently has over 70 active societies so there really is something for everyone, from fun events to guest speakers, plays to debates and comedy nights. An example is the UCD Science Society (SciSoc). SciSoc is one of UCD's biggest societies and it is responsible for a range of events such as the annual "Cycle to Galway", Science Day festival, the Science Ball and many more.

Peer Mentor
Peer Mentors are students in Stage 2 or 3 who very generously give of their time to help welcome and support Stage 1 students. Students are introduced to their Peer Mentor during Orientation.

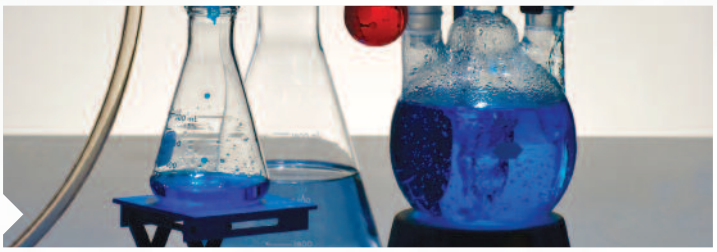
Clubs
UCD sports clubs are at the centre of student sport. Clubs provide a range of opportunities to train, play and compete in sport, no matter your passion, ability or level.

Science Careers Map

This is a summary of some of the opportunities for graduates:

- Pharmaceuticals, Biotechnology, Medical Devices, Clinical Trials, Chemical Industry & Hospitals
- Energy, Climate Conservation & Environment
- Natural Resources
- Computing, Risk, Finance & Analytics
- Semiconductor, Nanotechnology, Meteorology & Space Industry
- Further Education & Research

Pharmaceuticals, Biotechnology, Medical Devices, Clinical Trials, Chemical Industry & Hospitals



Degrees

- BSc Biochemistry & Molecular Biology
- BSc Cell & Molecular Biology
- BSc Genetics
- BSc Microbiology
- BSc Neuroscience
- BSc Pharmacology
- BSc Physiology
- BSc Chemistry
- All BSc Physics Degrees
- BSc Chemistry with Environmental & Sustainable Chemistry
- BSc Medicinal Chemistry & Chemical Biology

Careers

Depending on the degree, careers include:

- QA/QC Analyst
- Analytical Chemist
- Microbiologist
- Environmental Scientist
- Clinical Research Associate
- Biochemist
- Medical Physicist

Energy, Climate Conservation & Environment

Degrees

- BSc Environmental Biology
- BSc Plant Biology
- BSc Zoology
- BSc Chemistry with Biophysical Chemistry
- BSc Chemistry with Environmental & Sustainable Chemistry

Careers

Depending on the degree, careers include:

- Environmental Consultant
- Environmental Officer
- Plant Scientist
- Conservation Scientist
- Environmental Manager
- Emissions Control Manager
- Photovoltaic Engineer

Natural Resources

Degrees

- BSc Geology
- BSc Environmental Biology

Careers

Depending on the degree, careers include:

- Hydrogeologist
- Mineral Geologist
- Environmental Consultant
- Geophysicist
- Marine Geologist
- Petroleum Geologist

The information given is a guide only and does not bind the University in any way.

Science Careers Map

The sectors and job titles below are examples only. Each BSc and BAFS degree maps to different jobs, depending on the qualification and skills required for a particular job.

* *Includes Professional Placement*

Computing, Risk, Finance & Analytics

Degrees

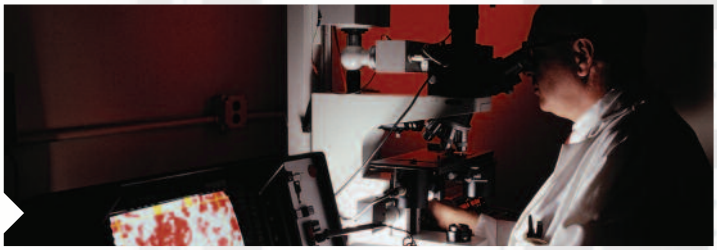
- BSc Computer Science
- BSc Applied & Computational Mathematics
- BAFS Actuarial & Financial Studies*
- BSc Financial Mathematics
- BSc Mathematics
- BSc Mathematical Science
- BSc Statistics
- BSc Physics
- BSc Theoretical Physics
- BSc Physics with Astronomy & Space Science

Careers

Depending on the degree, careers include:

- Software Engineer
- Database Administrator
- Trainee Actuary
- Investment Banker
- Risk Analyst
- Business Analyst
- Financial Analyst

Semiconductor, Nanotechnology, Meteorology & Space Industry



Degrees

- BSc Physics
- BSc Theoretical Physics
- BSc Physics with Astronomy & Space Science
- BSc Chemistry

Careers

Depending on the degree, careers include:

- Semiconductor Engineer
- Meteorologist
- Medical Device Engineer
- Materials Scientist
- Radiation Protection Officer
- Space Program Manager
- Space Scientist
- Space Systems Engineer
- Space Flight Operations Controller

Further Education & Research

Degrees

- PME Science/Maths Teacher
- MSc, PhD – Academia/ Research
- Graduate Veterinary Medicine
- Graduate Medicine
- Graduate Entry to Pharmacy

Careers

Depending on the degree, careers include:

- Science Teacher
- Medical Doctor
- Vet
- Pharmacist

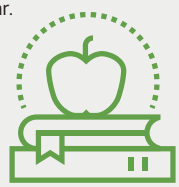
The information given is a guide only and does not bind the University in any way.

UCD Science, Computer Science and Actuarial & Financial Studies Internships

We are committed to helping our students prepare for their careers throughout their time studying at UCD.

Plan Your Career Path

First Year – Get Involved



- Visit the Career Development Centre in your first year. www.ucd.ie/careers
- Check out modules that cover career and professional development and identify modules you might like to take over the coming years.
- Consider the elective module "Prepare for Your Career".

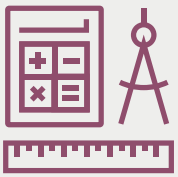
Second and Third Year – Explore Your Career Options

- There is a career development lecture included in biology, biomolecular, maths and chemistry modules in second year which will introduce you to career planning.
- The Career Centre has 562 companies on their database. Identify company talks or workshops you'd like to attend.
- Consider an internship or work placement during your studies.
- Develop a CV and cover letter and develop skills at interviews.

Fourth Year

- Research job opportunities and graduate studies.
- Attend some fairs at UCD or at GradIreland, usually held in the RDS, Dublin.
- Check all deadlines for PhD funding opportunities and for MSc courses. Some are in the first semester of your fourth year so plan ahead.
- Find out which companies have graduate programmes.

Internship Programmes



- We have recently introduced a Professional Science Placement that allows you to validate credits by completing a Summer Internship (3-months) or depending on specific disciplines a longer placement in industry (5-6 months).
  Third year students opting for these disciplines can avail of the Placement programme:
  - Chemistry
  - Biomolecular and Biomedical Science
  - Biology and Environmental Science
  - Computer Science
  - Mathematics
  - Earth Science
  - Physiology
- The Actuarial and Financial Studies degree has a 6 month professional placement built into the programme where students have the opportunity to work in industry.
- Our internship manager, Carla Naltchayan, prepares students for the application process which is competitive in the same way as applying for a graduate course or your first job and sources internship opportunities in each sectors.

Types of Companies

This new professional placement is just starting in 2018 and we are currently in contact with companies such as **Sanofi, Abbott, Top Chem, Aerogen, Pfizer, BMS, Astellas, Helsinn, Baxter, Henkel, SAP, Amazon, Dell, MongoDB, Deloitte, Facebook, Google, Intel, Analog, En Ocean Munich.**

Deloitte. Pfizer Abbott A Promise for Life intel

What Our Students Say

Orla Sherwood, Biochemistry & Molecular Biology

"I completed an internship at the Pasteur Institute, Paris in the area of Microbiology during my third year summer. When I graduate, I hope to complete a Masters in Science Communication."

Clíodhna Connolly, Computer Science*

"I completed a Summer Internship after third year with Deloitte in their Technology Consulting department. For my Fourth Year project I chose to develop a web application called Helping Hand. It connects people with others in their locality to get help with small favours such as asking for a drop of milk. When I graduate, I plan to return to Deloitte in a full-time position."

*The full blog is online at www.myucdblog.com/deloitte-internship/
You can read more about the Deloitte Summer Internship programme at www.deloitte.ie/students

Ireland at a Glance

Ireland is home to many of the world's top companies and businesses.

Over 1000

Overseas companies have chosen Ireland as their strategic location in Europe.

5 of the top 10

Companies on Forbes' list of The World's Most Innovative Companies have Irish operations according to IDA Ireland

More than 250

Global financial institutions have established operations in Ireland, located in Dublin's International Financial Services Centre

Top Global financial institutions

9 OUT OF 10 GLOBAL PHARMACEUTICAL CORPORATIONS

Ireland is home to operations by some of the world's leading pharmaceutical and biotechnology companies making some of the world's block buster medicines.

TOP 5

Worldwide security software companies are located in Ireland

The 10 Top Ten

"Born on the Internet" companies are based in Ireland

Biotechnology, Biomedical, Pharmaceutical & Chemical Sciences

What Our Graduates Say

Associate Specialist in Quality
Merck Sharp & Dohme
Dr Susan Molloy
BSc Microbiology, PhD

"In part fulfillment of my Bachelor degree, I had the opportunity to carry out an industrial based research project with Pfizer, Dun Laoghaire."

Senior Clinical Project Manager
o4 Research Belfast
Mark Herley
BSc Biochemistry, MSc

"I chose the BSc in Biochemistry due to my interest in science (particularly biotechnology), the reputation of UCD Science and the student lifestyle at the Belfield campus."

Director Merck Sharp & Dohme (MSD)
Merck Sharp & Dohme
Dr Tom O'Ceallaigh
BSc Chemistry, PhD Chemistry

"My degree and PhD in Chemistry from UCD facilitated me with getting a job, leading to my current role in Process Development and Commercialisation with Merck Sharp & Dohme (MSD), a leading pharmaceutical company. I currently lead a team of Chemists and Engineers involved in the development of new drug substances and technology transfers."

Technology Transfer Lead
Eli Lilly
Dr Theresa Ahern
BSc Industrial Chemistry, PhD Chemistry
MSc Biopharmaceutical Science

"My degree and PhD in Chemistry gave me the opportunity to work with Eli Lilly, a leading chemical and biotechnology company. I am a technology transfer lead for biotechnology new product introductions from the development facility in Indianapolis to the commercial manufacturing facility at Lilly, Kinsale."

PhD Medical Physicist
St James's Hospital
Dr Seán Cournane
BSc Theoretical Physics,
MSc Physical Sciences in Medicine

"Diagnostic imaging (such as x-ray, MRI, ultrasound and nuclear medicine imaging) is a practical application of physics used for diagnosing and treating patients."

Energy, Climate, Natural Resources & Environment

What Our Graduates Say

BBC Natural History Unit
Ferne Corrigan
BSc Zoology

"I completed my Zoology degree in 2011 and went straight into my MA in Wildlife Documentary Production. I am about to start my new job with the BBC's Natural History Unit as a runner on a children's natural history series."

Senior Scientist
EPA's Office of Radiological Protection
Ms Stephanie Long
BSc Experimental Physics
MSc Experimental Physics

"Radon is a naturally occurring radioactive gas that is the second cause of lung cancer in Ireland after smoking. Our work includes research on the behaviour of radon in the environment."

Environmental Officer
BirdWatch Ireland
Domhnall Finch
BSc Environmental Biology

"I have been interested in the environment as long as I can remember. This is why I went on to do a BSc Environmental Biology in UCD. Through UCD I was able to conduct my undergraduate research project in South Africa."

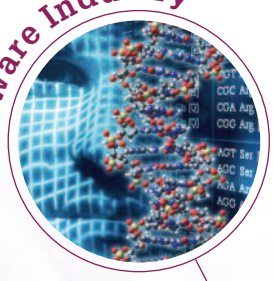
Graduate Geologist
EnQuest plc, UK
Peter McArdle
BSc Geology
MSc Integrated Petroleum Geoscience

"I work on the mature Brent province Heather Field. My job focuses on finding infill drilling targets, working with engineers and drillers to plan new wells."

Research Manager
Aquamarine Power
Dr Kenneth Doherty
BSc Experimental Physics and Applied Mathematics, PhD

"By studying Applied Mathematics at UCD, I am well equipped with the mathematical and computational skills to achieve my goals."

Computing, Risk, Finance & Analytics



What Our Graduates Say

Solaris QA Engineer
Sun Microsystems
Chris Quinn
BSc Computer Science

"UCD provided exposure to a variety of different operating systems and programming languages throughout the course; knowledge which was to come in particularly handy out in the real working world."

Head of Technology
Accenture Ireland
Hilary O'Meara
BSc Computer Science

"I believe my Computer Science degree was an exceptional platform from which to launch my career, as I not only learned technology skills, but developed a passion for the industry. I am proud to be a UCD Computer Science graduate."

FIA
Santander Insurance Ireland
Elena McIlroy De La Rosa
BAFS, FSAI

"The BAFS degree at UCD is undoubtedly the best Actuarial course in Ireland. Small classes, tough exams, work and play hard."

Statistician
Creme Global
Sylwia Sterecka
BSc Mathematical Science

"I developed problem solving skills and learned how to apply my knowledge in practice by analysing data using software for statistical analysis. These skills proved to be particularly valuable to employers."

Investment Analyst
Seroba Kernel Life Sciences
Jennifer McKeever
BSc Pharmacology
MSc Business & Biotechnology

"The analytical skills and scientific rationale that I acquired during my undergraduate degree have been of significant value to me upon entering the workforce."

Semiconductor, Nanotechnology, Meteorology & Space Industry

What Our Graduates Say

Process Engineer
Intel
Dr Michael Carroll
BSc Chemistry, PhD Chemistry

"My BSc Honours degree and PhD in Chemistry enabled me to obtain a job with Intel, the world leader in semiconductor chip manufacturing. I work as part of a team who strive to develop and improve some of the world's most advanced processes for chip manufacturing."

Researcher
Intel
Dr Fergus Quilligan
BSc Physics

"Physics was an excellent choice for developing the ability to solve problems, a ubiquitous skill in most jobs."

AMPAC-ISP
Dr Ronan Wall
BSc, PhD Physics

"I graduated from UCD Physics with a BSc in 1996 and, following a PhD in Nuclear Physics at Manchester University, landed a job as a Mission Systems Engineer at EADS Astrium. I now work as a Programme Manager for AMPAC-ISP at its Dublin HQ, being responsible for spacecraft propulsion development programmes such as a new European High Thrust engine."

Chief Scientist
Met Éireann's Valentia Observatory
Keith Lambkin
BSc Experimental Physics
MSc High Performance Computers
MSc Meteorology

"I am now Chief Scientist at Met Éireann's Valentia Observatory. Among other responsibilities, I currently manage Ireland's Ozone, Magnetic and Weather Balloon programmes. Travelling the world on business is always a great bonus!"

Deputy Head of Forecasting
Met Éireann
Ms Evelyn Cusack
BSc, MSc Physics

"The main function of a forecaster involves providing weather forecasts and warnings to the general public and special interest clients in order to save lives and property."

BSS3
Actuarial & Financial Studies

The BSS3 Actuarial & Financial Studies course will prepare you for a professional career in the actuarial or financial professions.

Maximum exemptions

from Core Technical series examinations (CT1:8) as well as the Core Applications CA1 examination of the Institute and Faculty of Actuaries.

Professional work placement in Third Year

Students have completed their third-year work placements in a variety of companies including Allianz, Aon Hewitt, Susquehanna (SIG), Deloitte, Central Bank of Ireland, Irish Life, Zurich and Willis. The placements last at least six months.

Frequently Asked Questions

Q: How long does it take to become a qualified actuary?

A: Students must successfully complete 15 professional exams and complete a work-based skills framework with their employer which includes a Learning Log. The exams are held twice a year. It typically takes 3 to 6 years to complete the exams, depending on the extent to which you can claim exemptions on the basis of relevant third-level qualifications. The UCD Actuarial & Financial Studies programme offers the maximum exemptions available from the professional exams.

Q: How can I find out more information?

A: The Society of Actuaries in Ireland is the professional body representing the actuarial profession in Ireland. The Society is dedicated to serving the public by fostering the highest standards of professionalism and competence in actuarial practice.

Further information on becoming an actuary is available at the Society of Actuaries at https://web.actuaries.ie/

Actuarial & Financial Studies

BSS3

Sample pathway for a degree in Actuarial & Financial Studies *

YEAR 1 — ENGAGE WITH THE PRINCIPLES

MATHEMATICS
Topics include:

- Linear Algebra in the Mathematical and Physical Sciences
- Numbers & Functions
- Calculus in the Mathematical and Physical Sciences
- Statistical Modelling

COMPUTER SCIENCE
Topics include:

- Introduction to Programming

BUSINESS
Topics include:

- Principles of Microeconomics
- Principles of Macroeconomics
- Financial Accounting

- Two Elective modules

YEAR 2 — CHOOSE YOUR SUBJECTS

ACTUARIAL & FINANCIAL STUDIES
Topics include:

- Principles of Finance
- Linear Models
- Analytics Modelling
- Financial & Actuarial Mathematics
- Probability Theory
- Inferential Statistics
- Two Elective modules

YEAR 3 — FOCUS ON YOUR CHOSEN SUBJECT

ACTUARIAL & FINANCIAL STUDIES – *Topics include:*

- Advanced Corporate Finance
- Models – Stochastic Models
- Time Series Analysis
- Models – Survival
- Information Management for Actuaries
- BAFS Professional Work Placement (at least 6 months)
- One Elective module

YEAR 4 — REFINE YOUR KNOWLEDGE

ACTUARIAL & FINANCIAL STUDIES – *Topics include:*

- Actuarial Risk Management
- Actuarial Statistics
- Financial Economics
- Actuarial Mathematics
- One Elective Module
- One Option

BAFS (Honours) Actuarial and Financial Studies

Industry

- Insurance Actuarial Trainee in the following areas:
  - Life
  - Pensions
  - Health
  - General Insurance
  - Banking or Finance
  - Business Analyst
  - Financial Analyst

PhD

- Students can pursue a PhD in Ireland or abroad in areas as diverse as: Mathematics, Statistics and Actuarial studies

Conversion Courses

- MSc Data & Computational Science
- MSc Mathematical Science
- MSc Mathematics
- MSc Statistics

**See pages 4 and 5 for information on the terminology used above. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.*

- Learn how actuaries understand the nature of risk and find ways to manage it
- Develop the analytical skills and business knowledge necessary to design and manage programmes that control risk for the insurance and pension sectors

> The wide recognition of the BAFS course was really useful in applying for jobs. The BAFS course was great preparation for the further actuarial exams and left me with a very sound technical knowledge in this area. Doing the work placement on the BAFS course was a huge help, and meant I could settle into the work environment very quickly.
>
> **Sean Roe, Graduate**

i

UCD School of Mathematics and Statistics

internationaladmissions@ucd.ie
+353 1 716 2583
facebook.com/UCDScience
twitter.com/ucdscience

www.ucd.ie/international

CSSA
Computer Science
Computer Science with Data Science

The CSSA Computer Science course is mainly a software engineering degree and is suitable for students with or without previous programming experience.

Total immersion software engineering degree

70% Software Engineering

30% Mathematics **in first year**

At the end of **Year 2,** choose to major in either Computer Science or Computer Science with Data Science

Learn programming languages such as Java, Perl and Ruby; mark-up languages such as HTML, XML; Internet technologies such as ASP, PHP and Flash; and graphics languages such as OpenGL and VRML. Students will also use both Windows and Linux/Unix operating systems.

Frequently Asked Questions

Q: Do I need to have prior experience of programming?

A: No. The Computer Science degree is mainly a software engineering degree and is suitable for students with or without previous programming experience. There is no assumption that students have prior programming experience and all students will take introductory programming modules in first year.

Q: Where can I practice programming to see if I enjoy it?

A: There are many excellent resources available online to try out programming and Computer Science. Beginners can use resources such as MIT's Scratch or Greenfoot. Students looking to advance their knowledge can also use resources such as Coursera and edX to sample free online courses in Computer Science.

Computer Science

CSSA

Sample pathway for a degree in Computer Science *

YEAR 1 — ENGAGE WITH THE PRINCIPLES

COMPUTER SCIENCE
Topics include:

- Algorithmic Problem-Solving
- Computer Programming
- Introduction to Computer Architecture
- Formal Foundations
- Computer Science in Practice
- Software Engineering Project 1

MATHEMATICS
Topics include:

- Matrix Algebra
- Foundations of Mathematics for Computer Science

- Two Elective modules

YEAR 2 — BROADEN YOUR KNOWLEDGE

COMPUTER SCIENCE – *Topics include:*

- Data Structures & Algorithms
- Introduction to Java
- Discrete Mathematics for Computer Science
- Software Engineering Project 2
- Linear Algebra II
- Databases and Information Systems I
- Digital Systems
- Introduction to Operating Systems
- Introduction to Functional Programming

- Two Elective modules

YEAR 3 — FOCUS ON YOUR CHOSEN SUBJECT

COMPUTER SCIENCE – *Topics include:*

- Foundations of Computing
- Networks and Internet Systems
- Object-Oriented Programming
- Software Engineering Project 3
- Introduction to Artificial Intelligence
- Program Construction 1
- Computer Graphics 1
- Processor Design
- Graphs and Networks
- Information Theory

- Two Elective modules

YEAR 4 — REFINE YOUR KNOWLEDGE

COMPUTER SCIENCE – *Topics include:*

- Computer Science Project
- AI for Games and Puzzles
- Spatial Information Systems
- Machine Learning
- Data Mining
- Multimedia Security & Data Hiding
- Distributed Systems
- Advances in Wireless Networking
- Compiler Construction
- Programme Construction II
- Cloud Computing
- Practical Android Programming
- Mobile App Development

BSc (Honours) Computer Science

MSc (Taught)

- MSc Computer Science (Negotiated Learning)
- MSc Digital Investigation & Forensic Computing
- MSc Cognitive Science

Research

Many graduates pursue MSc and PhD studies in Ireland and abroad in diverse areas such as:

- Artificial Intelligence
- Software and Systems Engineering
- Networks and Distributed Systems
- Postdoctoral researcher

Industry

- High-Tech Sector
- Financial Sector
- Consultancies
- R&D
- UCD Tech Start-ups
- Education (Third Level)

Conversion Courses

- Smurfit Business School postgraduate degrees, e.g., Masters in Business Administration; Masters in Business Analytics

**See pages 4 and 5 for information on the terminology used above. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.*

Caroline Keiller, Horea Catanase and Alan Fitzpatrick "visualising a goal" as part of Computer Science module Project Management.
Image by Niall Hayes © UCD

- Develop skills in object-oriented programming languages such as Java and Ruby, the latest Internet technologies, software engineering, mobile application development, database technology and operating systems such as Windows, Unix and Linux

"I chose to study Computer Science at UCD because of my avid interest in technology and the great opportunities it afforded me going forward. I have always been really passionate about technology, and always intended on pursuing a career within the field. Upon graduating I intend on pursuing a career in the technology consultancy field, exercising technical expertise within the business sector."

Ryan Kane, Student

i

UCD School of Computer Science

internationaladmissions@ucd.ie
+353 1 716 2583
facebook.com/UCDScience
twitter.com/ucdscience

www.ucd.ie/international

Computer Science with Data Science

CSSA

- Learn key skills to demonstrate basic knowledge and understanding of the fundamentals of data science.
- Develop the technical depth and the practical experience that you will need to stand out in an increasingly demanding market-place.

Professor Cunningham is Head of the School of Computer Science and Professor of Knowledge and Data Engineering. He has been involved in research in Data Analytics for over 20 years and has published over 200 papers in the area. He is a founding director of the Insight Centre for Data Analytics (insight-centre.org) and the Centre for Applied Data Analytics (ceadar.ie), both located in UCD. Through CeADAR and Insight the UCD School of Computer Science collaborate with over 70 companies on Data Science research.

Professor Pádraig Cunningham, Staff

Sample pathway for a degree in Computer Science with Data Science *

YEAR 1 — ENGAGE WITH THE PRINCIPLES

COMPUTER SCIENCE *Topics include:*

- Algorithmic Problem-Solving
- Computer Programming
- Introduction to Computer Architecture
- Formal Foundations
- Computer Science in Practice
- Software Engineering Project 1

MATHEMATICS *Topics include:*

- Matrix Algebra
- Foundations of Mathematics for Computer Science

- Two Elective modules

YEAR 2 — BROADEN YOUR KNOWLEDGE

COMPUTER SCIENCE WITH DATA SCIENCE – *Topics include:*

- Data Structures & Algorithms
- Introduction to Java
- Discrete Mathematics for Computer Science
- Software Engineering Project 2
- Linear Algebra II
- Databases and Information Systems I
- Digital Systems
- Introduction to Operating Systems
- Introduction to Functional Programming

- Two Elective modules

YEAR 3 — FOCUS ON YOUR CHOSEN SUBJECT

COMPUTER SCIENCE WITH DATA SCIENCE – *Topics include:*

- Data Science in Python
- Introduction to Project Management
- Probability Theory
- Introduction to Artificial Intelligence
- Graphs & Networks
- Data Science in Practice
- Industry Internship
- Information Visualisation
- Programming for Big Data

- Two Elective modules

YEAR 4 — REFINE YOUR KNOWLEDGE

COMPUTER SCIENCE WITH DATA SCIENCE – *Topics include:*

- Data Science Project
- Machine Learning
- Cloud Computing
- Data Mining
- Collective Intelligence
- Multi-Agent Systems
- Parallel and Cluster Computing
- Text Analytics
- Human Language Technology
- Connectionist Computing
- Spatial Information Systems
- Information Security
- Linear Models
- Unix Programming
- Networks and Internet Systems
- Information Theory
- Inferential Statistics

BSc (Honours) Computer Science with Data Science

MSc (Taught)

- MSc Computer Science (Negotiated Learning)
- MSc Digital Investigation & Forensic Computing
- MSc Cognitive Science

Research

Many graduates pursue MSc and PhD studies in Ireland and abroad in diverse areas such as:

- Artificial Intelligence
- Software and Systems Engineering
- Networks and Distributed Systems
- Postdoctoral Research

Industry

- Banking and Financial Services
- Consultancy (e.g. Accenture, Deloitte)
- Internet companies such as Google, PayPal and Facebook
- Established ICT companies such as IBM, Microsoft and Intel
- ICT Startups

Conversion Courses

- Smurfit Business School postgraduate degrees, e.g., Masters in Business Administration; Masters in Business Analytics

**See pages 4 and 5 for information on the terminology used above. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.*

www.ucd.ie/international

i

UCD School of Computer Science

internationaladmissions@ucd.ie
+353 1 716 2583
facebook.com/UCDScience
twitter.com/ucdscience

SCU1
Science

The first year of the SCU1 Science programme is designed to enable you to sample a number of subjects in your chosen area. You can focus on your preferred stream immediately or explore a range of subjects.

COMMON ENTRY:
1 Course Code, 22 different degrees

Did You Know?
All SCU1 Science students are guaranteed a degree from within a stream of their choice.

TIME
Time to change your mind in First Year

4 Year
Honours BSc course

No Preference
Students who want to sample a number of degree options from different streams can choose **SCU1 No Preference.**

Frequently Asked Questions

Q: Is SCU1 Science a General Science degree?

A: No. The SCU1 Science course is a Level 8 BSc Honours degree of four years. Students enter by a single route and graduate with a BSc Honours degree in one of 22 different subjects, for example, BSc Theoretical Physics, BSc Mathematics, BSc Chemistry.

Q: Does common entry mean all students take a common first year?

A: Common entry does not mean that all students take a common first year. The advantage of a common entry course is that you can choose to specialise from first year or you can leave your options open. The number of compulsory modules in First Year for each stream has been kept low to allow you the option to try out other subjects that you may not be familiar with or to deepen your interest in the areas that you wish to pursue to degree level.

Biochemistry & Molecular Biology

SCU1 Option: Biological, Biomedical and Biomolecular Science (BBB)

Blood cell preparation in the UCD Conway Institute.
Image by Naheda Alkazemi © UCD

Develop practical skills in:

- Protein and DNA isolation and analysis
- Molecular Biology techniques used in pharmaceutical and biotechnology
- Clinical trials tests such as immunoassays used in hospital laboratories

"I completed a summer studentship in neurochemistry in Dr Gethin McBean's lab. My research project investigated the molecular basis of neurodegeneration in a rare genetic disorder, called Cystinosis. This pilot project investigated whether there is the possibility that cysteine accumulation, exhibited in Cystinosis, leads to reduced levels of the major antioxidant glutathione in brain glial cells."

Dylan Ryan, Student

Sample pathway for a degree in Biochemistry & Molecular Biology *

YEAR 1 — ENGAGE WITH THE PRINCIPLES

BIOLOGY *Topics include:*
- Biology in Action
- Life on Earth
- Cell Biology & Genetics
- Biomedical Sciences

CHEMISTRY *Topics include:*
- The Basis of Organic and Biological Chemistry

MATHEMATICS *Topics include:*
- Mathematics for the Biological & Chemical Sciences

- Two Elective modules
- One Small-Group Project

YEAR 2 — CHOOSE YOUR SUBJECTS

BIOCHEMISTRY & MOLECULAR BIOLOGY *Topics include:*
- Principles of Biochemistry
- Molecular Genetics and Biotechnology
- Biomolecular Laboratory Skills
- Metabolic and Immune Systems
- Chemistry for Biologists

MICROBIOLOGY *Topics include:*
- Principles of Microbiology
- Research Methods for Science

PHARMACOLOGY *Topics include:*
- Biomedical Science of Drugs

- Two Elective modules

YEAR 3 — FOCUS ON YOUR CHOSEN SUBJECT

BIOCHEMISTRY & MOLECULAR BIOLOGY – *Topics include:*
- Metabolism and Disease
- Biochemist's Toolkit
- Advanced Cell Biology
- Cell Signalling
- Regulation of Gene Expression
- Molecular Basis of Disease
- Proteins and Enzymes
- Genomics and Proteomics

- Two Elective modules

YEAR 4 — REFINE YOUR KNOWLEDGE

BIOCHEMISTRY & MOLECULAR BIOLOGY – *Topics include:*
- Biochemistry Career Skills
- Advanced Neurochemistry
- Advanced Cell Signalling
- Biochemical Research Strategies
- Biochemistry Research Project
- Protein Structure & Analysis
- Three optional modules on topics such as cancer, genetics, microbiology and pharmacology

BSc (Honours) Biochemistry & Molecular Biology

MSc (Taught)
- MSc Biotechnology
- MSc Biotechnology & Business
- MSc Molecular Medicine
- MSc Biological & Biomolecular Science (NL)
- MSc Biotherapeutics
- MSc Biotherapeutics & Business

PhD
- Students can pursue a PhD in universities in Ireland or abroad in areas as diverse as medical research, drug development and biomedical science

Industry
- Pharmaceutical Companies
- Food sector
- Biotechnology sector
- Chemical Industries

Conversion Courses
- Professional Master of Education (PME)
- Graduate Veterinary Medicine
- Graduate Medicine
- Master of Business Administration
- Master in Management

**See pages 4 and 5 for information on the terminology used above. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.*

www.ucd.ie/international

UCD School of Biomolecular and Biomedical Science

internationaladmissions@ucd.ie
+353 1 716 2583
facebook.com/UCDScience
twitter.com/ucdscience

Cell & Molecular Biology

SCU1 Option: Biological, Biomedical and Biomolecular Science (BBB)

Sample pathway for a degree in Cell & Molecular Biology *

YEAR 1 — ENGAGE WITH THE PRINCIPLES

BIOLOGY
Topics include:
- Biology in Action
- Life on Earth
- Cell Biology & Genetics
- Biomedical Sciences

CHEMISTRY
Topics include:
- The Basis of Organic and Biological Chemistry

MATHEMATICS
Topics include:
- Mathematics for the Biological & Chemical Sciences

- Two Elective modules
- One Small-Group Project

YEAR 2 — CHOOSE YOUR SUBJECTS

CELL & MOLECULAR BIOLOGY
Topics include:
- Biological Systems
- Principles of Cell Biology
- Principles of Genetics
- Chemistry for Biologists
- Biomolecular Laboratory Skills

MICROBIOLOGY
Topics include:
- Metabolic and Immune Systems
- Principles of Microbiology

GENETICS
Topics include:
- Principles of Genetics
- Molecular Genetics and Biotechnology

- Two Elective modules

YEAR 3 — FOCUS ON YOUR CHOSEN SUBJECT

CELL & MOLECULAR BIOLOGY – *Topics include:*
- Advanced Cell Biology
- Research Methods in Cell Biology
- Genetics
- Regulation of Gene Expression
- Developmental Biology
- Plant Cell Growth and Signalling
- Molecular Basis of Disease
- Working with Biological Data
- Two Elective modules

YEAR 4 — REFINE YOUR KNOWLEDGE

CELL & MOLECULAR BIOLOGY – *Topics include:*
- Membrane Trafficking
- Programmed Cell Death
- Cell Signalling
- Epithelial Transport
- Biological Imaging
- Cell Biology Research Project
- Human Genetics & Disease

BSc (Honours) Cell & Molecular Biology

MSc (Taught)
- MSc Biological & Biomolecular Science (NL)
- MSc Molecular Medicine
- MSc Biotechnology
- MSc Biotechnology & Business
- MSc Plant Biology & Biotechnology

PhD
- Students can pursue a PhD in universities in Ireland or abroad in areas as diverse as cell & molecular biology, biochemistry, genetics, systems biology and biomolecular science

Industry
- Pharmaceutical and Biotechnology companies
- Semi-State bodies such as BIM, Teagasc
- Hospital laboratories
- Genetic Counselling
- Forensic Science

Conversion Courses
- Professional Master of Education (PME)
- Graduate Veterinary Medicine
- Graduate Medicine
- Master of Business Administration
- Master in Management

**See pages 4 and 5 for information on the terminology used above. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.*

Niamh Morgan studying mammalian cells under a fluorescence wide field microscope.
Image by Niall Hayes © UCD

- Learn why healthy cells become cancerous, what happens at a cellular level in diseases and the basic concept of genetics
- Develop practical skills in microscopy, cellular assays and diagnostic techniques used in industry, hospitals and research labs

> Upon completion of my Cell and Molecular Biology degree, I pursued a Masters in Management at University College London, with the intention to combine both to eventually manage a venture capital trust with a pharmaceutical focus. My degree has given me the necessary skills to carefully interpret and assess existing literature, problem solve, critically evaluate, and manage my time effectively.
>
> **Paula Burke, Graduate**

i

UCD School of Biology and Environmental Science

internationaladmissions@ucd.ie
+353 1 716 2583
facebook.com/UCDScience
twitter.com/ucdscience

www.ucd.ie/international

Environmental Biology

SCU1 Option: Biological, Biomedical and Biomolecular Science (BBB)

Rare Festoon butterfly taken on a third year field trip to Spain.
Image by Dr Tasman Crowe © UCD

- Learn how environmental biology is central to our ability to understand and manage the world's environmental problems
- Develop practical skills in field-based sampling of plants and animals in their natural environments in Ireland, Spain and Costa Rica

"Science at UCD was my top choice. I knew then that I was interested in biology, chemistry and environmental science. After graduating with a BSc in Environmental Biology from UCD, I obtained a PhD position in the Department of Microbiology at Cornell University, USA. Currently I am working on my thesis, which focuses on the molecular interactions between fungi and bacteria.

Olga Lastovetsky, Graduate"

Sample pathway for a degree in Environmental Biology *

YEAR 1 — ENGAGE WITH THE PRINCIPLES

BIOLOGY *Topics include:*
- Biology in Action
- Life on Earth
- Cell Biology & Genetics
- Biomedical Sciences

CHEMISTRY *Topics include:*
- The Basis of Organic and Biological Chemistry

MATHEMATICS *Topics include:*
- Mathematics for the Biological & Chemical Sciences

- Two Elective modules
- One Small-Group Project

YEAR 2 — CHOOSE YOUR SUBJECTS

ENVIRONMENTAL BIOLOGY *Topics include:*
- Principles of Environmental Biology and Ecology
- Biological Systems
- Evolutionary Biology
- Microbial Interactions
- Global Environmental Change
- Forests, Climate and Carbon
- Applied Plant Biology

ZOOLOGY *Topics include:*
- Principles of Zoology
- Animal Behaviour
- Molecular Genetics and Biotechnology

PLANT BIOLOGY *Topics include:*
- Principles of Plant Biology and Biotechnology

- Two Elective modules

YEAR 3 — FOCUS ON YOUR CHOSEN SUBJECT

ENVIRONMENTAL BIOLOGY – *Topics include:*
- Systems Ecology
- Biogeography and Field Biology
- Diversity of Vertebrates
- Diversity of Plant Form & Function
- Ecology & Environmental Microbiology
- Wildlife and Fisheries Management
- Two Elective modules

YEAR 4 — REFINE YOUR KNOWLEDGE

ENVIRONMENTAL BIOLOGY – *Topics include:*
- Environmental Biology Research Project
- Marine Community Ecology
- Bioassessment of Freshwaters
- Biological Invasions
- Insect-Plant Interactions
- Ecological Modelling and QGIS
- Biodiversity
- Foodborne Pathogens
- Tropical Field Ecology
- Environmental Impact Assessment
- Peatlands and Environmental Change

BSc (Honours) Environmental Biology

MSc (Taught)
- MSc Applied Environmental Science
- MSc World Heritage Management
- MSc Plant Biology & Biotechnology

PhD
- Students can pursue a PhD in universities in Ireland or abroad in areas such as ecology, microbiology, fisheries, conservation biology, environmental management and global change

Industry
- National Parks and Wildlife Services
- Environmental Management with State agencies, companies or consultancies
- Semi-State bodies such as the EPA and BIM and NGOs such as An Taisce
- Conservation Organisations
- Agriculture and Aquaculture

Conversion Courses
- Professional Master of Education (PME)
- Graduate Veterinary Medicine
- Graduate Medicine
- Master of Business Administration
- Master in Management

**See pages 4 and 5 for information on the terminology used above. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.*

www.ucd.ie/international

UCD School of Biology and Environmental Science

internationaladmissions@ucd.ie
+353 1 716 2583
facebook.com/UCDScience
twitter.com/ucdscience

Genetics

SCU1 Option: Biological, Biomedical and Biomolecular Science (BBB)

Sample pathway for a degree in Genetics *

YEAR 1 — ENGAGE WITH THE PRINCIPLES

BIOLOGY
Topics include:
- Biology in Action
- Life on Earth
- Cell Biology & Genetics
- Biomedical Sciences

CHEMISTRY
Topics include:
- The Basis of Organic and Biological Chemistry

MATHEMATICS
Topics include:
- Mathematics for the Biological & Chemical Sciences

- Two Elective modules
- One Small-Group Project

YEAR 2 — CHOOSE YOUR SUBJECTS

GENETICS
Topics include:
- Chemistry for Biologists
- Molecular Genetics and Biotechnology
- Principles of Genetics
- Metabolic and Immune Systems
- Biomolecular Laboratory Skills

MICROBIOLOGY
Topics include:
- Principles of Microbiology: Medicine, Environment and Biotechnology

ZOOLOGY
Topics include:
- Biological Systems
- Principles of Zoology
- Animal Behaviour
- Evolutionary Biology

- Two Elective modules

YEAR 3 — FOCUS ON YOUR CHOSEN SUBJECT

GENETICS – *Topics include:*
- Regulation of Gene Expression
- Bioinformatics
- Genome Structure
- Genetics
- Animal Development
- Genomics & Proteomics
- Genetic Basis of Disease
- Evolutionary Biology
- Two Elective modules

YEAR 4 — REFINE YOUR KNOWLEDGE

GENETICS – *Topics include:*
- Genetics Disease & Behaviour
- Gene Regulation
- Systems Microbiology
- Model Organism Genetics
- Genetics Research Project

BSc (Honours) Genetics

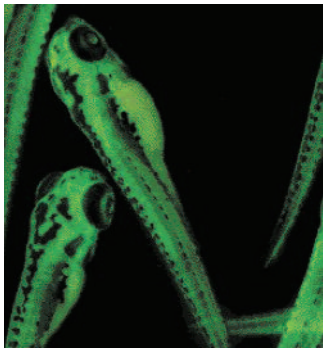
MSc (Taught)
- MSc Biotechnology
- MSc Biotechnology & Business
- MSc Plant Biology & Biotechnology
- MSc Biotherapeutics
- MSc Biological & Biomolecular Science (NL)
- MSc Biotherapeutics & Business

PhD
- Students can pursue a PhD in universities in Ireland or abroad in areas as diverse as biotechnology, cell biology, biomedical and health science and bioinformatics

Industry
- Biotechnology, pharmaceutical, and genomics companies
- Hospital labs
- Forensic Science labs
- Agribiotech and horticulture

Conversion Courses
- Professional Master of Education (PME)
- Graduate Veterinary Medicine
- Graduate Medicine
- Master of Business Administration
- Master in Management

**See pages 4 and 5 for information on the terminology used above. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.*



These are transgenic zebrafish larvae (5 days old, 3mm long) that express green fluorescent protein in all their blood vessels. The zebrafish is our animal model to study retinal development and disease.
Image by Dr Yolanda Alvarez © UCD

- Explore molecular genetics and molecular biology, which are core components of modern biology and medicine, and form the basis of biotechnology

> "The most valuable part of the course was the thesis project I undertook in my final year. Although this was, at times, a really challenging placement I found great satisfaction and enjoyment from optimising experiments, learning new skills and making new discoveries. I knew that this was the career path I wanted to take and I am now a PhD student in Infectious Disease at the University of Cambridge."
>
> **Amie Regan, Graduate**

i

UCD School of Biomolecular and Biomedical Science

internationaladmissions@ucd.ie
+353 1 716 2583
facebook.com/UCDScience
twitter.com/ucdscience

www.ucd.ie/international

Microbiology

SCU1 Option: Biological, Biomedical and Biomolecular Science (BBB)

Emma Cullen in a Microbiology practical in the new UCD O'Brien Centre for Science

- Learn about microbes that cause diseases, clean up environmental spills and produce antibiotics
- Understand how we engineer fungi and bacteria to produce a vast array of compounds, ranging from antibiotics and hormones to washing powder

"I am now working in a highly innovative start-up company called StableLab, where I develop rapid diagnostic solutions for the equine industry. The work is challenging, but I really enjoy it as I'm given a lot of creative freedom. Seeing a product that I've worked on making its way to market and subsequently improving the lives of horses is hugely rewarding."

Di-Sien Chan, Graduate

Sample pathway for a degree in Microbiology *

YEAR 1 — ENGAGE WITH THE PRINCIPLES

BIOLOGY *Topics include:*
- Biology in Action
- Life on Earth
- Cell Biology & Genetics
- Biomedical Sciences

CHEMISTRY *Topics include:*
- The Basis of Organic and Biological Chemistry

MATHEMATICS *Topics include:*
- Mathematics for the Biological & Chemical Sciences

- Two Elective modules
- One Small-Group Project

YEAR 2 — CHOOSE YOUR SUBJECTS

MICROBIOLOGY *Topics include:*
- Chemistry for Biologists
- Molecular Genetics and Biotechnology
- Biomolecular Laboratory Skills
- Metabolic and Immune Systems
- Principles of Microbiology: Medicine, Environment and Biotechnology

CELL & MOLECULAR BIOLOGY *Topics include:*
- Biological Systems
- Principles of Cell and Molecular Biology

GENETICS *Topics include:*
- Principles of Genetics

- Two Elective modules

YEAR 3 — FOCUS ON YOUR CHOSEN SUBJECT

MICROBIOLOGY – *Topics include:*
- Regulation of Gene Expression
- Microbial Cell Factory
- Applied Microbiology
- Microbial Diversity & Growth
- Microbial Physiology
- Medical Microbiology
- Skills in Microbiology
- Ecology & Environmental Microbiology
- Two Elective modules

YEAR 4 — REFINE YOUR KNOWLEDGE

MICROBIOLOGY – *Topics include:*
- Microbiology Research Project
- Ecological & Environmental Microbiology
- Systems Microbiology
- Foodborne Pathogens
- Microbial Pathogenicity
- Enzyme Technology & Protein Engineering
- Bioprocessing
- Natural Product Synthesis
- Host Defense Mech. In Health

BSc (Honours) Microbiology

MSc (Taught)
- MSc Biotechnology
- MSc Biotechnology & Business
- MSc Environmental Management
- MSc Toxicology & Regulatory Affairs
- MSc Plant Biology & Biotechnology
- MSc Biotherapeutics

PhD
- Students can pursue a PhD in universities in Ireland or abroad in areas as diverse as Biotechnology, Environmental Biology, Medical and Veterinary Sciences

Industry
- Pharmaceutical Companies
- Food and food-related companies
- (Veterinary) Hospitals and related laboratories
- Government agencies including the EPA and county councils

Conversion Courses
- Professional Master of Education (PME)
- Graduate Veterinary Medicine
- Graduate Medicine
- Medical Scientist
- Master of Business Administration

**See pages 4 and 5 for information on the terminology used above. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.*

www.ucd.ie/international

i

UCD School of Biomolecular and Biomedical Science

internationaladmissions@ucd.ie
+353 1 716 2583
facebook.com/UCDScience
twitter.com/ucdscience

Neuroscience

SCU1 Option: Biological, Biomedical and Biomolecular Science (BBB)

Sample pathway for a degree in Neuroscience *

YEAR 1 — ENGAGE WITH THE PRINCIPLES

BIOLOGY *Topics include:*
- Biology in Action
- Life on Earth
- Cell Biology & Genetics
- Biomedical Sciences

CHEMISTRY *Topics include:*
- The Basis of Organic and Biological Chemistry

MATHEMATICS *Topics include:*
- Mathematics for the Biological & Chemical Sciences

- Two Elective modules
- One Small-Group Project

YEAR 2 — CHOOSE YOUR SUBJECTS

NEUROSCIENCE *Topics include:*
- Chemistry for Biologists
- Molecular Genetics and Biotechnology
- Biomolecular Laboratory Skills
- Metabolic and Immune Systems
- Principles of Neuroscience

PHYSIOLOGY *Topics include:*
- Introduction to Physiology
- Organs and Systems Physiology

PHARMACOLOGY *Topics include:*
- Biomedical Science of Drugs

GENETICS *Topics include:*
- Principles of Plant Biology and Biotechnology

- Two Elective modules

YEAR 3 — FOCUS ON YOUR CHOSEN SUBJECT

NEUROSCIENCE – *Topics include:*
- Cell Signalling
- Drugs used in CNS diseases
- Nervous System Development
- Membrane Biology
- Biostatistics
- Sensory Neuroscience
- Genetic Basis of Disease
- Higher Cortical Function

- Two Elective modules

YEAR 4 — REFINE YOUR KNOWLEDGE

NEUROSCIENCE – *Topics include:*
- Synaptic Plasticity
- Advanced Topics in Neural Development
- Neuroscience Research Project
- Advanced Neuropharmacology
- Advanced Neurochemistry
- Molecular Neuroimmunology
- Genetics of Disease & Behaviour
- Synaptic Signalling
- Emerging Therapies

BSc (Honours) Neuroscience

MSc (Taught)
- MSc Biotechnology
- MSc Biotechnology & Business
- MSc Biotherapeutics
- MSc Biotherapeutics & Business

PhD
- Students can pursue a PhD in universities in Ireland or abroad in Neuroscience or in areas as diverse as biotechnology, cell biology, biomedical and health science.

Industry
- Biotechnology companies
- Hospital laboratories
- Forensic Science laboratories
- Pharmaceutical companies

Conversion Courses
- Professional Master of Education (PME)
- Graduate Veterinary Medicine
- Graduate Medicine
- Master of Business Administration
- Master in Management

**See pages 4 and 5 for information on the terminology used above. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.*

Examining embryos at different stages of development.
Image by Ciara O'Hanlon © UCD

- Learn how to employ state-of-the-art techniques to study the nervous system at the molecular, cellular and behavioural levels

"I discovered that I was fascinated by the brain and nervous system, so I chose Neuroscience as my final degree subject. My course offers a combination of practical and theoretical studies, ranging from lectures on the ground-breaking research taking place in neurodegenerative disease, to monitoring my own brain waves via an electroencephalogram in the lab."

Katie O'Byrne, Student

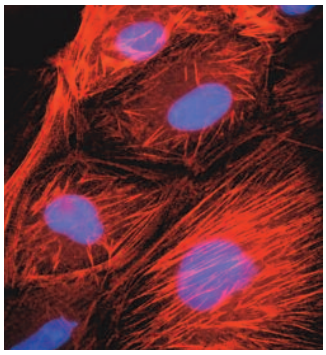
UCD School of Biomolecular and Biomedical Science

internationaladmissions@ucd.ie
+353 1 716 2583
facebook.com/UCDScience
twitter.com/ucdscience

www.ucd.ie/international

Pharmacology

SCU1 Option: Biological, Biomedical and Biomolecular Science (BBB)



The process of cell changes called EMT (epithelial mesenchymal transdifferentiation) that occur when kidney epithelial cells are treated with drugs. Image by Tara McMorrow and Eric Campbell © UCD

- Study how drugs work at a molecular level, what the body does to drugs and the effects of drugs on the different body systems
- Understand the actions of drugs used in the cardiovascular, respiratory, renal, endocrine and central nervous systems

"My keen interest in biomedical science and healthcare led me to choose Pharmacology at UCD. I acquired a strong scientific background during my degree, which facilitated a smooth transition into my postgraduate studies in my MSc Biotechnology & Business (UCD). I obtained an internship in a life science venture capital firm upon graduating from my MSc and was subsequently made permanent.
Jennifer McKeever, Graduate"

Sample pathway for a degree in Pharmacology *

YEAR 1 — ENGAGE WITH THE PRINCIPLES

BIOLOGY *Topics include:*
- Biology in Action
- Life on Earth
- Cell Biology & Genetics
- Biomedical Sciences

CHEMISTRY *Topics include:*
- The Basis of Organic and Biological Chemistry

MATHEMATICS *Topics include:*
- Mathematics for the Biological & Chemical Sciences

- Two Elective modules
- One Small-Group Project

YEAR 2 — CHOOSE YOUR SUBJECTS

PHARMACOLOGY *Topics include:*
- Chemistry for Biologists
- Molecular Genetics and Biotechnology
- Metabolic and Immune Systems
- Biomolecular Laboratory Skills
- Pharmacology: Biomedical Science of Drugs

PHYSIOLOGY *Topics include:*
- Introduction to Physiology
- Organs and Systems Physiology

MICROBIOLOGY *Topics include:*
- Principles of Microbiology: Medicine, Environment and Biotechnology

- Two Elective modules

YEAR 3 — FOCUS ON YOUR CHOSEN SUBJECT

PHARMACOLOGY – *Topics include:*
- Cell Signalling
- Biostatistics
- Drug action in body systems
- Chemotherapeutic agents
- Drugs used in CNS diseases
- Advanced CNS Pharmacology
- Toxicology
- Molecular Pharmacology
- Two Elective modules

YEAR 4 — REFINE YOUR KNOWLEDGE

PHARMACOLOGY – *Topics include:*
- Advanced Neuropharmacology
- Adv. Cardiovascular Pharmacology
- Finding new Pharmaceuticals
- Adv. Pharmacology of Cancer
- Emerging Therapies
- Advanced Renal Pharmacology
- Gene Regulation
- Drug Discovery & Development
- Pharmacology Research Project

BSc (Honours) Pharmacology

MSc (Taught)
- MSc Biotechnology
- MSc Biotechnology & Business
- MSc Biotherapeutics
- MSc Toxicology & Regulatory Affairs

PhD
- Students can pursue a PhD in universities in Ireland or abroad in areas as diverse as drug development and biomedical science

Industry
- Pharmaceutical Companies
- Drug regulatory bodies such as the Irish Medicines Board
- Biotechnology sector
- Chemical safety and toxicology

Conversion Courses
- Professional Master of Education (PME)
- Graduate Veterinary Medicine
- Graduate Medicine
- Master of Business Administration
- Master in Management

**See pages 4 and 5 for information on the terminology used above. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.*

www.ucd.ie/international

i

UCD School of Biomolecular and Biomedical Science

internationaladmissions@ucd.ie
+353 1 716 2583
facebook.com/UCDScience
twitter.com/ucdscience

Physiology

SCU1 Option: Biological, Biomedical and Biomolecular Science (BBB)

Sample pathway for a degree in Physiology *

YEAR 1 — ENGAGE WITH THE PRINCIPLES

BIOLOGY
Topics include:
- Biology in Action
- Diversity of Life
- Cell Biology & Genetics
- Biomedical Sciences

CHEMISTRY
Topics include:
- The Basis of Organic and Biological Chemistry

MATHEMATICS
Topics include:
- Mathematics for the Biological & Chemical Sciences

- Two Elective modules
- One Small-Group Project

YEAR 2 — CHOOSE YOUR SUBJECTS

PHYSIOLOGY
Topics include:
- Chemistry for Biologists
- Molecular Genetics and Biotechnology
- Biomolecular Laboratory Skills
- Introduction to Physiology
- Organs and Systems Physiology
- Metabolic and Immune systems
- Neurophysiology

NEUROSCIENCE
Topics include:
- Principles of Neuroscience

MICROBIOLOGY
Topics include:
- Principles of Microbiology: Medicine, Environment and Biotechnology

- Two Elective modules

YEAR 3 — FOCUS ON YOUR CHOSEN SUBJECT

PHYSIOLOGY – *Topics include:*
- Cardiovascular System
- Biostatistics
- Experimental Physiology
- Endocrine/Reproductive Physiology
- Digestion, Absorption and Excretion
- Membrane Biology
- Higher Cortical Function
- Respiratory Physiology
- Two Elective modules

YEAR 4 — REFINE YOUR KNOWLEDGE

PHYSIOLOGY – *Topics include:*
- Lung Function Under Stress
- Control of Vascular Resistance
- Physiology Research Project
- Physiological Basis of Disease
- Haemostasis and Thrombosis
- Adaptation to Hypoxia
- Integrated Animal Physiology

BSc (Honours) Physiology

MSc
- Students can pursue a Taught Masters or Research Masters in universities in Ireland or abroad in any physiological discipline or a diverse range of medical or other biological areas

PhD
- Students can pursue a PhD in universities in Ireland or abroad in any physiological discipline or a diverse range of medical or other biological areas

Industry
- Pharmaceutical Research (Laboratory)
- Clinical Research Associate
- Pharmaceutical Industry Sales

Conversion Courses
- Professional Master of Education (PME)
- Graduate Entry Veterinary Medicine
- Graduate Entry Medicine
- Graduate Entry Physiotherapy

**See pages 4 and 5 for information on the terminology used above. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.*

Physiology students working on an experiment in the Conway institute. Image by Niall Hayes © UCD

- Understand normal and abnormal processes within the body in health and disease
- Explore various body organs and their functions as well as an understanding of the structure and function of key biomolecules

"I completed a summer project, which involved learning essential lab skills and gaining experience in a laboratory setting by looking for a new experimental technique to identify changes to lung structure in an animal model of lung disease. The biggest benefit of completing the summer project was gaining essential lab experience, which has now developed my enthusiasm for research."
Stephen Murphy, Student

i

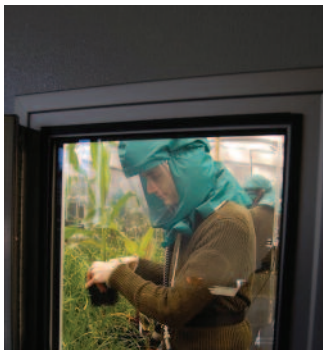
UCD School of Medicine

internationaladmissions@ucd.ie
+353 1 716 2583
facebook.com/UCDScience
twitter.com/ucdscience

www.ucd.ie/international

Plant Biology

SCU1 Option: Biological, Biomedical and Biomolecular Science (BBB)



Experiment on maize in the Programme for Experimental Atmospheres and Climate (PÉAC) lab at UCD.
Image by Peter Lang © UCD

- Understand how plants are a vital component of the biosphere and are responsible for the environmental conditions essential for all life on Earth
- Develop skills to study how plants and plant cells grow and develop

"My UCD degree has provided me with the opportunity to work abroad and it has also allowed me to travel all over Europe and even to China as part of my current research."

Padraic Flood, Graduate

Sample pathway for a degree in Plant Biology *

YEAR 1 — ENGAGE WITH THE PRINCIPLES

BIOLOGY *Topics include:*
- Biology in Action
- Life on Earth
- Cell Biology & Genetics
- Biomedical Sciences

CHEMISTRY *Topics include:*
- The Basis of Organic and Biological Chemistry

MATHEMATICS *Topics include:*
- Mathematics for the Biological & Chemical Sciences

- Two Elective modules
- One Small-Group Project

YEAR 2 — CHOOSE YOUR SUBJECTS

PLANT BIOLOGY *Topics include:*
- Chemistry for Biologists
- Biological Systems
- Principles of Plant Biology and Biotechnology
- Applied Plant Biology
- Principles of Cell and Molecular Biology

ENVIRONMENTAL BIOLOGY *Topics include:*
- Principles of Environmental Biology and Ecology

ZOOLOGY *Topics include:*
- Principles of Zoology
- Animal Behaviour
- Molecular Genetics and Biotechnology

- Two Elective modules

YEAR 3 — FOCUS ON YOUR CHOSEN SUBJECT

PLANT BIOLOGY – *Topics include:*
- Plant Diseases
- Plant Form & Function
- Plant Biotechnology
- Plant Growth & Nutrients
- Plant Cell Growth & Signalling
- Working with Biological Data
- Genetics
- Systems Ecology
- Two Elective modules

YEAR 4 — REFINE YOUR KNOWLEDGE

PLANT BIOLOGY – *Topics include:*
- Plant Atmosphere Climate Interactions
- Peatlands and Env. Changes
- Plant Biology Research Project
- Environmental Impact Assessments
- Developmental Plant Genetics
- Cell Signalling in Plants
- Plants and Stress
- Different Photosynthetic Pathways

BSc (Honours) Plant Biology

MSc (Taught)
- MSc Applied Environmental Science
- MSc World Heritage Management
- MSc Plant Biology & Biotechnology

PhD
- Students can pursue a PhD in universities in Ireland or abroad in areas as diverse as climate change, marine biology or cell and molecular biology.

Industry
- National Parks and Wildlife Services
- State and Semi-State bodies
- Conservation Bodies
- Agriculture and Aquaculture
- Environmental Management

Conversion Courses
- Professional Master of Education (PME)
- Graduate Medicine
- Master of Business Administration
- Master in Management
- Graduate Veterinary Medicine

**See pages 4 and 5 for information on the terminology used above. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.*

www.ucd.ie/international

UCD School of Biology and Environmental Science

internationaladmissions@ucd.ie
+353 1 716 2583
facebook.com/UCDScience
twitter.com/ucdscience

Zoology

SCU1 Option: Biological, Biomedical and Biomolecular Science (BBB)

Sample pathway for a degree in Zoology *

YEAR 1 — ENGAGE WITH THE PRINCIPLES

BIOLOGY
Topics include:
- Biology in Action
- Life on Earth
- Cell Biology & Genetics
- Biomedical Sciences

CHEMISTRY
Topics include:
- The Basis of Organic and Biological Chemistry

MATHEMATICS
Topics include:
- Mathematics for the Biological & Chemical Sciences

- Two Elective modules
- One Small-Group Project

YEAR 2 — CHOOSE YOUR SUBJECTS

ZOOLOGY
Topics include:
- Principles of Zoology
- Biological Systems
- Animal Behaviour
- Molecular Genetics and Biotechnology
- Chemistry for Biologists

ENVIRONMENTAL BIOLOGY
Topics include:
- Principles of Environmental Biology and Ecology

GENETICS
Topics include:
- Principles of Genetics
- Metabolic and Immune Systems
- Biomolecular Laboratory Skills

- Two Elective modules

YEAR 3 — FOCUS ON YOUR CHOSEN SUBJECT

ZOOLOGY – *Topics include:*
- Systems Ecology
- Working with Biological Data
- Diversity of Vertebrates
- Evolutionary Biology
- Functional Morphology
- Arthropoda
- Diversity of Invertebrates
- Field courses in Ireland and Spain
- Two Elective modules

YEAR 4 — REFINE YOUR KNOWLEDGE

ZOOLOGY – *Topics include:*
- Biological Invasions
- Zoology Research Project
- Marine Community Ecology
- Bioassessent of Freshwaters
- Biodiversity
- Molecular Phylogenetics and Evolution
- Physiology of epithelial transport

BSc (Honours) Zoology

MSc (Taught)
- MSc Applied Environmental Science
- MSc World Heritage Management
- MSc Plant Biology & Biotechnology

PhD
- Students can pursue a PhD in universities in Ireland or abroad in areas as diverse as evolution and population biology and cell and molecular biology

Industry
- National Parks and Wildlife Services
- Semi-State bodies such as the ESB, BIM and Salmon Research Trust
- Conservation Bodies
- Agriculture and Aquaculture
- Environmental Management

Conversion Courses
- Professional Master of Education (PME)
- Graduate Veterinary Medicine
- Graduate Medicine
- Master of Business Administration
- Master in Management

**See pages 4 and 5 for information on the terminology used above. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.*

An image taken on a field trip with students from the School of Biology & Environmental Science.
Image by Dr Jon Yearsley © UCD

- Learn about animals from the level of individual molecules to how animals interact with one another and their environment
- Develop key practical skills in field work, behavioural observation, species identification, genetic analysis, physiology and anatomy

"The field trip to Southern Spain involved exploration of terrestrial and marine sites. The most exciting part of the trip, for me, was encountering so many animals I had never come across in Ireland. I really appreciated being able to get some hands-on, in-field experience, while at the same time getting to know both my classmates and my lecturers that bit better."

Irene Sullivan, Graduate

i

UCD School of Biology and Environmental Science

internationaladmissions@ucd.ie
+353 1 716 2583
facebook.com/UCDScience
twitter.com/ucdscience

www.ucd.ie/international

Chemistry

SCU1 Option: Chemistry & Chemical Sciences (CCS)

Preparing an experiment in Chemistry.

- Understand the important role chemistry plays in controlling the conversion of matter into useful substances such as new materials, sensors and medicines
- Develop skills in modern synthesis and analysis techniques used in the pharmaceutical and chemistry industries

"Having an internationally renowned university on my CV certainly helped me to get a job in a Biotech company in London. UCD is well recognised in the UK and this has led to my role at the cutting edge of anti-cancer research developing and synthesising new drug molecules which have huge potential to be used in the clinic.

Dr Elizabeth Dunny, Graduate

Sample pathway for a degree in Chemistry *

YEAR 1 — ENGAGE WITH THE PRINCIPLES

CHEMISTRY
Topics include:

- The Basis of Organic and Biological Chemistry
- The Basis of Physical Chemistry
- The Molecular World

MATHEMATICS
Topics include:

- Mathematics for the Biological & Chemical Sciences

- One Small-Group Project
- Two Elective modules

YEAR 2 — CHOOSE YOUR SUBJECTS

CHEMISTRY
Topics include:

- The Basis of Inorganic Chemistry
- Organic Chemistry
- Physical Chemistry
- Inorganic Chemistry

MEDICINAL CHEMISTRY & CHEMICAL BIOLOGY
Topics include:

- Molecular Genetics and Biotechnology
- Principles of Biochemistry
- Medicinal Chemistry & Chemical Biology
- Pharmacology: Biomedical Science of Drugs
- Biomolecular Laboratory Skills

- Two Elective modules

YEAR 3 — FOCUS ON YOUR CHOSEN SUBJECT

CHEMISTRY – *Topics include:*

- Quantum Mechanics
- Carbonyl Chemistry & Synthesis
- Chemical Kinetics
- Mechanism & Stereochemistry

- Instrumental Analysis
- Organometallic & Solid State Chemistry
- Main Group Chemistry & Bonding
- Symmetry & Computational Chemistry

- Two Elective modules

YEAR 4 — REFINE YOUR KNOWLEDGE

CHEMISTRY – *Topics include:*

- Methods in Organic Synthesis
- Chemical Thermodynamics
- Research Project

- Electrochemistry
- Reactivity & Change
- Nanochemistry

- Advanced Inorganic Chemistry
- Methods in Organic Synthesis 2
- Modern Methods and Catalysis

BSc (Honours) Chemistry

PhD

Students can pursue a PhD in Ireland or abroad in areas as diverse as:

- Pharmaceutical design
- Atmospheric kinetics
- Biological aspects of nanoscience
- Energy generation
- Pollution control
- Novel material synthesis
- Polymer chemistry
- Materials analysis bio-inorganic chemistry
- Computational studies

Industry

Most graduates work in the pharmaceutical or chemical industries. Positions range from manufacturing chemists to quality control/ analysis/assurance, research and development and raw materials/product analysis in manufacturing.

- 2nd level or 3rd level Teaching
- State Labs such as the Forensic laboratory
- ESB and Bord Gáis
- Environmental Protection Agency
- Medical device industry
- Patent law
- Healthcare industry

**See pages 4 and 5 for information on the terminology used above. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.*

www.ucd.ie/international

i

UCD School of Chemistry

internationaladmissions@ucd.ie
+353 1 716 2583
facebook.com/UCDScience
twitter.com/ucdscience

Chemistry with Biophysical Chemistry

SCU1 Option: Chemistry & Chemical Sciences (CCS)

Sample pathway for a degree in Chemistry with Biophysical Chemistry *

YEAR 1 — ENGAGE WITH THE PRINCIPLES

CHEMISTRY *Topics include:*
- The Basis of Organic and Biological Chemistry
- The Basis of Physical Chemistry
- The Molecular World

MATHEMATICS *Topics include:*
- Mathematics for the Biological & Chemical Sciences

BIOLOGY *Topics include:*
- Cell Biology & Genetics

- Two Elective modules
- One Small-Group Project

YEAR 2 — CHOOSE YOUR SUBJECTS

CHEMISTRY WITH BIOPHYSICAL CHEMISTRY *Topics include:*
- Biophysical Chemistry
- Physical Chemistry
- Inorganic Chemistry
- Organic Chemistry

CHEMISTRY *Topics include:*
- Students who choose Chemistry with Biophysical Chemistry as their main subject for second year also cover the requirements for Chemistry.

- Two Elective modules

YEAR 3 — FOCUS ON YOUR CHOSEN SUBJECT

CHEMISTRY WITH BIOPHYSICAL CHEMISTRY – *Topics include:*
- Instrumental Analysis
- Carbonyl Chemistry & Synthesis
- Quantum Mechanics
- Mechanism & Stereochemistry
- Nano-Assemblies and Interfaces
- Organometallic & Solid State Chemistry
- Main Group Chemistry & Bonding
- Symmetry & Computational Chemistry
- Optional modules in Biomolecular, Organic and Inorganic Chemistry

- Two Elective modules

YEAR 4 — REFINE YOUR KNOWLEDGE

CHEMISTRY WITH BIOPHYSICAL CHEMISTRY – *Topics include:*
- Research Project in Biophysical Chemistry
- Metals in Biology
- Electrochemistry
- Biophysical Chemistry
- Advanced Kinetics and Thermodynamics
- Nanochemistry
- Optional modules in Biomolecular, Organic and Inorganic Chemistry

BSc (Honours) Chemistry with Biophysical Chemistry

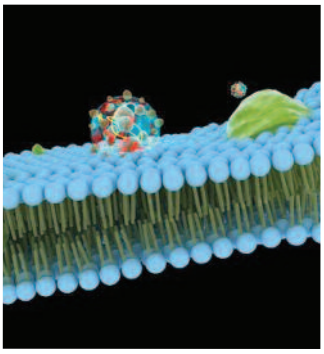
PhD

Students can pursue a PhD in Ireland or abroad in areas as diverse as:
- Pharmaceutical and biomedical biomolecular formulations design
- Bio-processing and bio-engineering
- Bio-nanotechnology
- Forensic science
- Food and agro technologies
- Energy generation
- Novel materials and materials analysis
- Polymer chemistry

Industry
- Pharmaceutical, Biomedical, Medical Device Industry
- Biotechnology, Food Technology, Agrochemistry
- Fine Chemical, Chemical Development
- Personal Care, Cosmetics, Environmental Protection, Paints and Coatings/ Petrochemistry
- Patenting
- Science-based Sales, Marketing, Finance

Conversion Courses
- Professional Master of Education (PME)
- Graduate Veterinary Medicine
- Graduate Medicine
- Master of Business Administration
- Master in Management

**See pages 4 and 5 for information on the terminology used above. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.*



A nanoparticle with encapsulated active ingredient is penetrating a cell membrane. Image and copyright of Nanobotmodels Company (info@nanobotmodels.com).

- Develop theoretical and practical skills in exploiting the physical and chemical principles of the biomolecular world in modern industrial and biomedical applications

"In the summer after third year, I did a summer internship in Associate Professor Dr Vitaly Buckin's lab in UCD which I found really interesting as well as very helpful in preparing me for the final year research project. This, as well as my thesis research in my final year, led me to realise that I'd like to pursue further research in a PhD which is what I hope to continue into in the coming year."

Rian Lynch, Student

i

UCD School of Chemistry

internationaladmissions@ucd.ie
+353 1 716 2583
facebook.com/UCDScience
twitter.com/ucdscience

www.ucd.ie/international

Chemistry with Environmental & Sustainable Chemistry

SCU1 Option: Chemistry & Chemical Sciences (CCS)

- Learn the basis of 'Green Chemistry' and what happens, at a molecular level, when chemicals interact with the environment
- Discover techniques to produce energy and commodity chemicals sustainably

"Currently my research spans Environmental Chemistry, where we study catalysts to remove pollutants from car exhausts, Green Chemistry, where we improve processes used in polymer production, and Chemistry in Sustainable Energy generation, which focuses on materials for solar hydrogen production and storage and synthesis of biofuel."

Associate Professor James Sullivan, Staff

Sample pathway for a degree in Chemistry with Environmental & Sustainable Chemistry *

YEAR 1 — ENGAGE WITH THE PRINCIPLES

CHEMISTRY *Topics include:*
- The Basis of Organic and Biological Chemistry
- The Basis of Physical Chemistry
- The Molecular World

MATHEMATICS *Topics include:*
- Mathematics for the Biological & Chemical Sciences

- One Small-Group Project
- Two Elective modules

YEAR 2 — CHOOSE YOUR SUBJECTS

CHEMISTRY WITH ENVIRONMENTAL & SUSTAINABLE CHEMISTRY *Topics include:*
- Environmental and Sustainable Chemistry
- Inorganic Chemistry
- Physical Chemistry
- Environmental Geochemistry

CHEMISTRY *Topics include:*
- The Basis of Inorganic Chemistry
- Organic Chemistry
- Chemical Biology
- Biophysical Chemistry

- Two Elective modules

YEAR 3 — FOCUS ON YOUR CHOSEN SUBJECT

CHEMISTRY WITH ENVIRONMENTAL & SUSTAINABLE CHEMISTRY – *Topics include:*
- Quantum Mechanics
- Carbonyl Chemistry & Synthesis
- Self-Assembly of Biomolecules
- Mechanism & Stereochemistry
- Instrumental Analysis
- Organometallic & Solid State Chemistry
- Main Group Chemistry & Bonding
- Symmetry & Computational Chemistry
- Two Elective modules

YEAR 4 — REFINE YOUR KNOWLEDGE

CHEMISTRY WITH ENVIRONMENTAL & SUSTAINABLE CHEMISTRY – *Topics include:*
- Green and Sustainable Chemistry
- Research Project in Sus./Env. Chem
- Methods in Organic Synthesis
- Chemical Thermodynamics
- Nanochemistry
- Electrochemistry
- Reactivity & Change
- Modern Methods and Catalysis
- Advanced Inorganic Chemistry
- Methods in Organic Synthesis 2
- Industrial Internship

BSc (Honours) Chemistry with Environmental & Sustainable Chemistry

Apart from the positions that a chemistry degree would qualify a student for (see below), graduates in this degree would be uniquely qualified to work in fields related to Environmental Protection (e.g., the Environmental Protection Agency), Green Chemistry and Sustainable Energy generation.

PhD

Students can pursue a PhD in Ireland or abroad in areas as diverse as:
- Pharmaceutical design
- Atmospheric kinetics
- Biological aspects of nanoscience
- Energy generation
- Pollution control
- Novel material synthesis
- Polymer chemistry
- Materials analysis bio-inorganic chemistry
- Computational studies

Industry

Most graduates work in the pharmaceutical or chemical industries. Positions range from manufacturing chemists to quality control/ analysis/assurance, research and development and raw materials/product analysis in manufacturing.
- 2nd level or 3rd level Teaching
- State Labs such as the Forensic laboratory
- ESB and Bord Gáis
- Medical device industry
- Patent law
- Healthcare industry

**See pages 4 and 5 for information on the terminology used above. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.*

www.ucd.ie/international

i

UCD School of Chemistry

internationaladmissions@ucd.ie
+353 1 716 2583
facebook.com/UCDScience
twitter.com/ucdscience

Medicinal Chemistry & Chemical Biology

SCU1 Option: Chemistry & Chemical Sciences (CCS)

Sample pathway for a degree in Medicinal Chemistry & Chemical Biology *

YEAR 1 — ENGAGE WITH THE PRINCIPLES

CHEMISTRY
Topics include:
- The Basis of Organic and Biological Chemistry
- The Basis of Physical Chemistry
- The Basic of Inorganic Chemistry
- The Molecular World

MATHEMATICS
Topics include:
- Mathematics for the Biological & Chemical Sciences

BIOLOGY
Topics include:
- Cell Biology & Genetics

- Two Elective modules
- One Small-Group Project

YEAR 2 — CHOOSE YOUR SUBJECTS

MEDICINAL CHEMISTRY & CHEMICAL BIOLOGY
Topics include:
- Molecular Genetics and Biotechnology
- Principals of Biochemistry
- Medicinal Chemistry & Chemical Biology
- Pharmacology: Biomedical Science of Drugs
- Biomolecular Laboratory Skills
- Organic Chemistry
- Physical Chemistry
- Inorganic Chemistry

CHEMISTRY
Topics include:
- Students who choose Medicinal Chemistry & Chemical Biology as their main subject for second year also cover the requirements for Chemistry.

- Two Elective modules

YEAR 3 — FOCUS ON YOUR CHOSEN SUBJECT

MEDICINAL CHEMISTRY & CHEMICAL BIOLOGY – *Topics include:*
- Chemical Biology of Natural Products
- Chemical Biology of Macromolecules
- Carbonyl Chemistry & Synthesis
- Medicinal Chemistry
- Structure Determination & Heterocyclic Chemistry
- Microbial Cell Factory/Chemists
- Mechanism & Stereochemistry
- Biochemist's Toolkit

- Two Elective modules

YEAR 4 — REFINE YOUR KNOWLEDGE

MEDICINAL CHEMISTRY & CHEMICAL BIOLOGY – *Topics include:*
- Metals in Biology
- Methods in Organic Synthesis
- Modern Methods of Catalysis
- Research Project
- Special topics in Medicinal Chemistry and Chemical Biology

BSc (Honours) Medicinal Chemistry & Chemical Biology

PhD
- Students can pursue a PhD in universities in Ireland or abroad in areas as diverse as Chemistry, Chemical Biology, Medicinal Chemistry, and Biochemistry

Industry
- Pharmaceuticals and Biopharmaceuticals
- Cosmetics Food Technology
- Fine Chemicals
- Chemical Development
- Patenting
- Science-based Sales, Marketing, Finance

Conversion Courses
- Professional Master of Education (PME)
- Graduate Veterinary Medicine
- Graduate Medicine
- Master of Business Administration
- Master in Management

**See pages 4 and 5 for information on the terminology used above. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.*

- Learn how to apply the tools of Chemistry to study biological systems
- Develop experience in techniques and instrumentation used in the pharmaceutical industry, e.g., the synthesis, identification and analysis of chemicals

"I enjoyed practical lab work, drug development, organic chemistry and aspects of pharmacology that I probably would not have realised if I had chosen a specialisation straight out of school. I hope to do a masters in organic chemistry or instrumental analysis when I graduate."

Tricia Madden, Student

i

UCD School of Chemistry

internationaladmissions@ucd.ie
+353 1 716 2583
facebook.com/UCDScience
twitter.com/ucdscience

www.ucd.ie/international

Applied & Computational Mathematics

SCU1 Option: Mathematical, Physical & Geological Sciences (MPG)

- Discover how Applied and Computational Mathematics is fundamental in providing uniquely powerful ways to describe, analyse and advance the physical and life sciences, engineering, technology, business and finance

Sample pathway for a degree in Applied & Computational Mathematics *

YEAR 1 — ENGAGE WITH THE PRINCIPLES

APPLIED & COMPUTATIONAL MATHEMATICS
Topics include:

- Applied Mathematics: Mechanics and Methods
- Applications of Differential Equations

MATHEMATICS
Topics include:

- Calculus in the Mathematical and Physical Sciences
- Mathematical Analysis
- Linear Algebra in the Mathematical and Physical Sciences
- Mathematical Modelling in the Sciences
- Introduction to Statistical Modelling
- Two Elective modules
- One Small-Group Project

YEAR 2 — CHOOSE YOUR SUBJECTS

APPLIED & COMPUTATIONAL MATHEMATICS
Topics include:

- Computational Science
- Vector Integral and Differential Calculus
- Oscillations in Mechanical Systems
- Classical Mechanics and Special Relativity

MATHEMATICS
Topics include:

- Linear Algebra 2
- Groups, Rings & Fields
- Calculus of Several Variables
- Two Elective modules

YEAR 3 — FOCUS ON YOUR CHOSEN SUBJECT

APPLIED & COMPUTATIONAL MATHEMATICS – *Topics include:*

- Analytic Mechanics
- Dynamical Systems
- Functions of One Complex Variable
- Partial Differential Equations
- Advanced Mathematical Methods
- Foundations of Fluid Mechanics
- Foundations of Quantum Mechanics
- Two Elective modules

YEAR 4 — REFINE YOUR KNOWLEDGE

APPLIED & COMPUTATIONAL MATHEMATICS – *Topics include:*

- Differential Geometry
- General Relativity and Cosmology
- Numerical Algorithms
- Electrodynamics and Gauge Theory
- Environmental Fluid Mechanics
- Research Project
- Stochastic Methods
- Functional Analysis

BSc (Honours) Applied & Computational Mathematics

MSc (Taught)

- MSc Mathematical Science
- MSc Climate Change & Impact
- MSc Applied Mathematics and Theoretical Physics
- MSc Computational Physics
- MSc Data & Computational Science

PhD

Students can pursue a PhD in universities in Ireland or abroad in areas as diverse as:

- Meteorology and Climate
- Mathematical Biology
- Fluid Mechanics
- Integrable Systems
- General Relativity
- Computational Science

Industry

A wide variety of career opportunities are open with new application areas discovered constantly. Technology areas include:

- Data Analytics
- Finance
- Energy
- Environment
- Communication
- Computing

Conversion Courses

- Professional Master of Education (PME)
- Graduate Engineering
- Masters in Management

**See pages 4 and 5 for information on the terminology used above. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.*

"Applied and Computational Mathematics gave the perfect balance between physical problems, maths problems and programming. You also learn how to apply these methods to real life physical systems. As well as being interesting, one of the great things about studying a subject that you like so much is that you get to meet a lot of other people who share your passion for the subject."

Shane Walsh, Student

www.ucd.ie/international

UCD School of Mathematics and Statistics

internationaladmissions@ucd.ie
+353 1 716 2583
facebook.com/UCDScience
twitter.com/ucdscience

Financial Mathematics

SCU1 Option: Mathematical, Physical & Geological Sciences (MPG)

Sample pathway for a degree in Financial Mathematics *

YEAR 1 — ENGAGE WITH THE PRINCIPLES

MATHEMATICS
Topics include:
- Calculus in the Mathematical and Physical Sciences
- Linear Algebra in the Mathematical and Physical Sciences
- Numbers and Functions
- Mathematical Analysis

STATISTICS
Topics include:
- Statistical Modelling

APPLIED & COMPUTATIONAL MATHEMATICS
Topics include:
- Applications of Differential Equations

- Two Elective modules
- One Small-Group Project

YEAR 2 — CHOOSE YOUR SUBJECTS

FINANCIAL MATHEMATICS
Topics include:
- Foundations of Financial Mathematics
- Business Economics
- Calculus of Several Variables
- Linear Algebra
- Theory of Games
- Principles of Finance

STATISTICS
Topics include:
- Inferential Statistics
- Probability Theory

APPLIED AND COMPUTATIONAL MATHEMATICS
Topics include:
- Computational Science
- Vector Integral & Differential Equations

- Two Elective modules

YEAR 3 — FOCUS ON YOUR CHOSEN SUBJECT

FINANCIAL MATHEMATICS – *Topics include:*
- Fundamentals of Actuarial and Financial Mathematics
- Computational Finance
- Partial Differential Equations
- Metric Spaces
- Measure Theory and Integration
- Time Series
- Stochastic Models
- Advanced Corporate Finance
- Linear Models
- Dynamical Systems

YEAR 4 — REFINE YOUR KNOWLEDGE

FINANCIAL MATHEMATICS – *Topics include:*
- Actuarial Reporting
- Statistical Data Mining
- Quantitative Methods
- Bayesian Analysis
- Advanced Computational Science
- Financial Economics
- Monte Carlo Inference
- Stochastic Analysis

BSc (Honours) Financial Mathematics

MSc (Taught)
- MSc Mathematics
- MSc Mathematical Science
- MSc Statistics
- MSc Actuarial Science
- MSc Business Analytics
- MSc Data Analytics
- MSc Quantitative Finance

PhD
- Graduates can pursue a PhD in algorithmic trading, or stochastic differential equations, for example.

Industry
- Quantitative positions in the financial sector
- Risk modelling in banking and insurance
- Computing in business, technology, research and academia
- Trainee Actuary

Conversion Courses
- Professional Master in Education (PME)
- MSc Computer Science (conversion)

**See pages 4 and 5 for information on the terminology used above. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.*

- Develop strong mathematical, problem-solving and analytical skills used in banking and finance
- Learn the mathematical theories that underpin financial models, as well as computational expertise in the algorithms that price financial products

"The course provides a thorough preparation on the main topics of Mathematical Finance. The contents of the various modules do not neglect any aspect of the wide range of skills required to work in today's financial sector, from the rigour required by the purest Mathematical Theories to the most important applications of Bayesian Statistics, Stochastic Analysis and Numerical Methods needed by practitioners in the Financial Industry. According to the 2016 QS World University Rankings by Subject, Mathematics, Statistics and Operational Research at UCD are ranked 1st in Ireland"

Dr Adamaria Perrotta, Staff

i

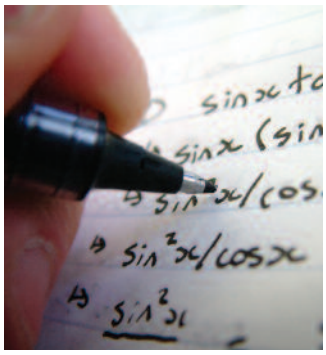
UCD School of Mathematics and Statistics

internationaladmissions@ucd.ie
+353 1 716 2583
facebook.com/UCDScience
twitter.com/ucdscience

www.ucd.ie/international

Mathematics

SCU1 Option: Mathematical, Physical & Geological Sciences (MPG)



- Master the language and concepts of modern mathematical thinking
- Develop a high level of competence in its applications

Sample pathway for a degree in Mathematics *

YEAR 1 — ENGAGE WITH THE PRINCIPLES

MATHEMATICS
Topics include:

- Calculus in the Mathematical and Physical Sciences
- Numbers & Functions
- Linear Algebra in the Mathematical and Physical Sciences
- Mathematical Analysis
- Introduction to Applications of Differential Equations
- Introduction to Statistical Modelling
- Two Elective modules
- One Small-Group Project

YEAR 2 — CHOOSE YOUR SUBJECTS

MATHEMATICS
Topics include:

- Linear Algebra 2
- Calculus of Several Variables
- Groups, Rings & Fields

APPLIED & COMPUTATIONAL MATHEMATICS (OPTIONAL)
Topics include:

- Computational Science
- Vector Integral and Differential Calculus
- Oscillations and Waves
- Classical Mechanics and Special Relativity

STATISTICS (OPTIONAL)
Topics include:

- Probability Theory
- Stochastic Models

- Two Elective modules

YEAR 3 — FOCUS ON YOUR CHOSEN SUBJECT

MATHEMATICS – *Topics include:*

- Galois Theory
- Functions of One Complex Variable
- Cryptography
- Number Theory
- Metric Spaces
- Algorithms
- Set Theory
- Mathematical Logic
- Two Elective modules

YEAR 4 — REFINE YOUR KNOWLEDGE

MATHEMATICS – *Topics include:*

- Differential Geometry
- Combinatorics
- Numerical Analysis
- Measure Theory
- Ring Theory
- Functional Analysis

"Maths requires a lot of critical thinking and rigorous understanding, and the lecturers in UCD certainly encourage this. Lecturers here are very good at transmitting their enthusiasm for their subject to the students. What's really great about UCD is that the maths lecturers are approachable, and are both willing and keen to answer any questions you may have."

Caitríona Byrne, Student

BSc (Honours) Mathematics

MSc (Taught)

- MSc Mathematical Science
- MSc Actuarial Science

PhD

- Students can pursue a PhD in universities in Ireland or abroad

Industry

- Banking & Finance
- Mathematical Modelling
- Information and Communications Technology
- Actuarial Science

Conversion Courses

- Professional Master of Education (PME)
- Masters in Actuarial Science
- MSc Business Analytics
- MSc Quantitative Finance

**See pages 4 and 5 for information on the terminology used above. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.*

www.ucd.ie/international

i

UCD School of Mathematics and Statistics

internationaladmissions@ucd.ie
+353 1 716 2583
facebook.com/UCDScience
twitter.com/ucdscience

Statistics

SCU1 Option: Mathematical, Physical & Geological Sciences (MPG)

Sample pathway for a degree in Statistics *

YEAR 1 — ENGAGE WITH THE PRINCIPLES

STATISTICS
Topics include:

- Applications of Differential Equations
- Statistical Modelling
- Research Methods for Science

MATHEMATICS
Topics include:

- Calculus in the Mathematical and Physical Sciences
- Linear Algebra in the Mathematical and Physical Sciences
- Mathematical Analysis
- Numbers & Functions

- Two Elective modules
- One Small-Group Project

YEAR 2 — CHOOSE YOUR SUBJECTS

STATISTICS
Topics include:

- Probability Theory
- Inferential Statistics
- Linear Models

MATHEMATICS
Topics include:

- Calculus of Several Variables
- Computational Science

- Two Elective modules

YEAR 3 — FOCUS ON YOUR CHOSEN SUBJECT

STATISTICS – *Topics include:*

- Statistical Data Mining
- Survey Sampling
- Linear Algebra 2
- Data Structures & Algorithms
- Time Series
- Survival Models
- Bayesian Analysis
- Design of Experiments
- Two Elective modules

YEAR 4 — REFINE YOUR KNOWLEDGE

STATISTICS – *Topics include:*

- Stochastic Models
- Multivariate Analysis
- Monte Carlo Inference
- Actuarial Statistics
- Applied Statistical Modelling
- Nonparametric Statistics
- Categorical Data Analysis
- Data Programming

BSc (Honours) Statistics

MSc (Taught)

- MSc Statistics
- MSc Actuarial Science
- MSc Meteorology

PhD

- Students can pursue a PhD in universities in Ireland or abroad in areas as diverse as Bayesian Statistics, Pharmaceutical, Medical and Educational Statistics, Epidemiology, Econometrics, Environmental and ecological modelling

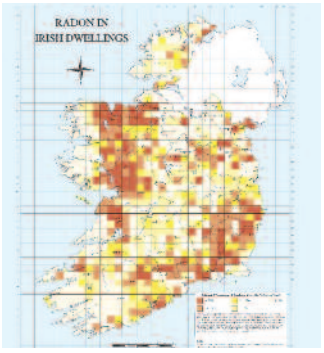
Industry

- Data Analytics and Business Analytics
- Data Science
- Pharmaceutical
- Actuarial Science
- Banking & Finance
- Insurance
- CSO

Conversion Courses

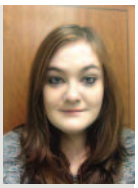
- Professional Master of Education (PME)
- Graduate Diploma in Actuarial Science
- MSc Quantitative Finance

**See pages 4 and 5 for information on the terminology used above. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.*



A map of Ireland showing radon in Irish dwellings.
Map by the EPA's Office of Radiological Protection

- Learn how statistics is used in areas as diverse as biotechnology, finance, marketing, science, medicine and even psychology



"The data analytics I have learned are currently some of the most highly sought after skills by employers, and can be applied to a broad range of areas including finance, insurance, marketing and pharmaceutical companies. If it wasn't for the flexibility of the UCD Science programme I would never have ventured into Statistics, and would have missed out on the chance to enter into the area of Mathematics I now love."
Melanie Dwayne, Student

i

UCD School of Mathematics and Statistics

internationaladmissions@ucd.ie
+353 1 716 2583
facebook.com/UCDScience
twitter.com/ucdscience

www.ucd.ie/international

Physics

SCU1 Option: Mathematical, Physical & Geological Sciences (MPG)

Physics students in the new undergraduate Physics laboratory.

- Learn how to investigate the physical world from the outermost reaches of the universe to the innermost parts of the atom
- Develop skills in how to interpret the physical world, carry out experiments and compare results critically with predictions from theory

"I completed the Advanced Laboratory Development internship in the UCD School of Physics in the Summer of 2013 when I was in the third year of my degree. I tested new laboratories and modified them to make use of equipment already available in the lab. I spent a large part of the internship modifying third year electronics laboratories to include the use of Arduino.

Olivia Carrington, Student"

Sample pathway for a degree in Physics *

YEAR 1 — ENGAGE WITH THE PRINCIPLES

PHYSICS
Topics include:

- Foundations of Physics
- Frontiers of Physics
- Thermal Physics and Materials
- Quanta, Particles and Relativity

MATHEMATICS
Topics include:

- Calculus in the Mathematical and Physical Sciences
- Linear Algebra in the Mathematical and Physical Sciences

APPLIED & COMPUTATIONAL MATHEMATICS
Topics include:

- Applied Mathematics: Mechanics and Methods

- Two Elective modules
- One Small-Group Project

YEAR 2 — CHOOSE YOUR SUBJECTS

PHYSICS
Topics include:

- Electronics and Devices
- Introductory Quantum Mechanics
- Fields, Waves and Light
- Methods for Physicists

Physics students also study the following topics in Mathematics:

- Calculus of Several Variables
- Vector Integral & Differential Calculus
- Computational Science

PHYSICS WITH ASTRONOMY & SPACE SCIENCE
Topics include:

Students who chose Physics as their main subject for second year may also cover the requirements for Physics with Astronomy and Space Science

- Astronomy & Space Science
- Exploring the Solar System

- Two Elective modules

YEAR 3 — FOCUS ON YOUR CHOSEN SUBJECT

PHYSICS – *Topics include:*

- Classical Mechanics & Relativity
- Optics & Lasers
- Electromagnetism
- Advanced Laboratory
- Thermodynamics & Statistical Physics
- Nuclear Physics
- Quantum Mechanics
- Stellar Astrophysics & Astronomical Techniques

- Two Elective modules

YEAR 4 — REFINE YOUR KNOWLEDGE

PHYSICS – *Topics include:*

- Applied Quantum Mechanics
- Advanced Quantum Mechanics
- Applied Optics
- General Relativity & Cosmology
- High Energy Particle Physics
- Advanced Laboratory
- Computational Biophysics
- Theoretical Astrophysics
- Condensed Matter Physics
- Medical Physics
- Galaxies & Observational Cosmology
- Quantum Field Theory
- Advanced Statistical Physics

BSc (Honours) Physics

MSc

- MSc NanoBio Science
- MSc Meteorology
- MSc Space Science & Technology
- MSc Research
- MSc Physics (NL)
- MSc Nanotechnology
- MSc Applied Mathematics & Computational Physics
- MSc Computational Physics

PhD

- Students can pursue a PhD in universities in Ireland or abroad in areas as diverse as atomic physics, computational nanobio physics, particle physics, biophysics, nuclear physics, medical physics, theoretical physics and astrophysics

Industry

- Energy Technology Sector
- Medical Physics & Biotechnology
- Material Science & Nanotechnology
- Geoscience & Exploration
- ICT Industry
- Financial Sector
- Meteorology

Conversion Courses

- Professional Master of Education (PME)
- MA Economics
- Graduate Medicine
- Master in Business Administration
- Master in Management

**See pages 4 and 5 for information on the terminology used above. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.*

www.ucd.ie/international

i

UCD School of Physics

internationaladmissions@ucd.ie
+353 1 716 2583
facebook.com/UCDScience
twitter.com/ucdscience

Physics with Astronomy & Space Science

SCU1 Option: Mathematical, Physical & Geological Sciences (MPG)

Sample pathway for a degree in Physics with Astronomy & Space Science *

YEAR 1 — ENGAGE WITH THE PRINCIPLES

PHYSICS
Topics include:
- Foundations of Physics
- Frontiers of Physics
- Astronomy & Space Science
- Thermal Physics and Materials
- Quanta, Particles and Relativity

MATHEMATICS
Topics include:
- Calculus in the Mathematical and Physical Sciences
- Linear Algebra in the Mathematical and Physical Sciences

APPLIED & COMPUTATIONAL MATHEMATICS
Topics include:
- Applied Mathematics: Mechanics and Methods

- Two Elective modules
- One Small-Group Project

YEAR 2 — CHOOSE YOUR SUBJECTS

PHYSICS WITH ASTRONOMY & SPACE SCIENCE
Topics include:
- Electronics and Devices
- Introductory Quantum Mechanics
- Fields, Waves and Light
- Exploring the Solar System
- Methods for Physicists

Students also study the following topics in Mathematics:
- Calculus of Several Variables
- Vector Integral & Differential Calculus
- Computational Science

PHYSICS
Topics include:
- Students who choose Physics with Astronomy & Space Science as their main subject for second year also cover the requirements for Physics.

- Two Elective modules

YEAR 3 — FOCUS ON YOUR CHOSEN SUBJECT

PHYSICS WITH ASTRONOMY & SPACE SCIENCE – *Topics include:*
- Classical Mechanics & Relativity
- Stellar Astrophysics & Astronomical Techniques
- Nuclear Physics
- Physics with Astronomy and Space Science Lab
- Quantum Mechanics
- Thermodynamics & Statistical Physics
- Electromagnetism
- Two Elective modules

YEAR 4 — REFINE YOUR KNOWLEDGE

PHYSICS WITH ASTRONOMY & SPACE SCIENCE – *Topics include:*
- Galaxies & Obs. Cosmology
- Space Mission Design or Astronomy Field Trip to Tenerife
- Theoretical Astrophysics
- Physics with Astronomy and Space Science Lab
- General Relativity & Cosmology
- Applied Quantum Mechanics
- Condensed Matter Physics
- Optics & Lasers
- Computational Biophysics
- High Energy Particle Physics
- Advanced Quantum Mechanics
- Medical Physics
- Quantum Field Theory
- Advanced Statistical Physics

BSc (Honours) Physics with Astronomy & Space Science

MSc
- MSc NanoBio Science
- MSc Meteorology
- MSc Space Science & Technology
- MSc Research
- MSc Physics (NL)
- MSc Nanotechnology
- MSc Applied Mathematics & Computational Physics
- MSc Computational Physics

PhD
- Students can pursue a PhD in universities in Ireland or abroad in areas as diverse as space science, astrophysics, atomic physics, computational nanobio physics, particle physics, biophysics, nuclear physics, medical physics and theoretical physics

Industry
- Space Industry
- Medical Physics & Biotechnology
- Energy Technology Sector
- Meteorology
- ICT Industry
- Financial Sector
- Geoscience & Exploration
- Material Science & Nanotechnology

Conversion Courses
- Professional Master of Education (PME)
- MA in Economics
- Graduate Medicine
- Master of Business Administration
- Master in Management

**See pages 4 and 5 for information on the terminology used above. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.*

Star Trails around Polaris on top of the IAC-80 telescope at Teide Observatory.

- Develop practical skills by learning how to design a satellite or make astronomical observations using a variety of telescopes

> I now carry out research in solar astrophysics and 'space weather' (the practical impacts of the Sun on human activities in space), using experiments on spacecraft and numerical models that I have helped to develop.
>
> **Dr Simon Plunkett, Graduate**

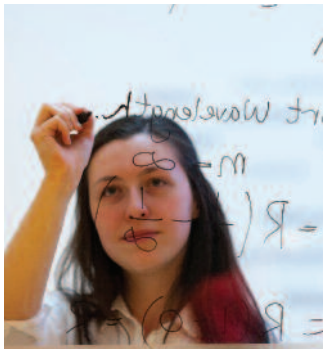
UCD School of Physics

internationaladmissions@ucd.ie
+353 1 716 2583
facebook.com/UCDScience
twitter.com/ucdscience

www.ucd.ie/international

Theoretical Physics

SCU1 Option: Mathematical, Physical & Geological Sciences (MPG)



Physics student Lána writing the Rydberg formula for the wavelengths of Hydrogen atomic transitions.

- Learn to understand and predict the behaviour of physical systems ranging from subatomic to astronomical scales using advanced mathematics

"Theoretical physics at UCD provided me, not only with a solid grounding in both experimental and mathematical physics, but also with some of the most enjoyable years of my life, including a two-month internship at NASA.

Dr Joe Fitzsimons, Graduate"

Sample pathway for a degree in Theoretical Physics *

YEAR 1 — ENGAGE WITH THE PRINCIPLES

PHYSICS *Topics include:*

- Foundations of Physics
- Frontiers of Physics
- Thermal Physics and Materials
- Quanta, Particles and Relativity

MATHEMATICS *Topics include:*

- Calculus in the Mathematical and Physical Sciences
- Linear Algebra in the Mathematical and Physical Sciences

APPLIED & COMPUTATIONAL MATHEMATICS *Topics include:*

- Applied Mathematics: Mechanics and Methods
- Applications of Differential Equations

- Two Elective modules
- One Small-Group Project

YEAR 2 — CHOOSE YOUR SUBJECTS

THEORETICAL PHYSICS – *Topics include:*

- Electronics and Devices
- Introductory Quantum Mechanics
- Fields, Waves and Light
- Methods for Physicists
- Calculus of Several Variables

- Oscillations and Waves
- Classical Mechanics and Special Relativity
- Vector Integral and Differential Calculus
- Computational Science

PHYSICS *Topics include:*

- Students who choose Theoretical Physics as their main subject for second year also cover the requirements for Physics.

- Two Elective modules

YEAR 3 — FOCUS ON YOUR CHOSEN SUBJECT

THEORETICAL PHYSICS – *Topics include:*

- Analytical Mechanics
- Partial Differential Equations
- Electromagnetism
- Foundations of Fluid Mechanics

- Thermodynamics & Statistical Physics
- Quantum Mechanics
- Functions of One Complex Variable
- Advanced Laboratory

- Two Elective modules

YEAR 4 — REFINE YOUR KNOWLEDGE

THEORETICAL PHYSICS – *Topics include:*

- Applied Quantum Mechanics
- Advanced Mathematical Methods
- High Energy Particle Physics
- Nuclear Physics

- General Relativity & Cosmology
- Quantum Theory of Condensed Matter
- Projects in Theoretical Physics

- Computational Biophysics
- Relativistic Quantum Mechanics
- Theoretical Astrophysics
- Quantum Field Theory
- Advanced Statistical Physics

BSc (Honours) Theoretical Physics

MSc

- MSc NanoBio Science
- MSc Meteorology
- MSc Space Science & Technology
- MSc Research
- MSc Physics (NL)
- MSc Nanotechnology
- MSc Applied Mathematics & Computational Physics
- MSc Computational Physics

PhD

- Students can pursue a PhD in universities in Ireland or abroad in areas as diverse as theoretical physics, atomic physics, computational nanobio physics, particle physics, biophysics, nuclear physics, medical physics and astrophysics

Industry

- Financial Sector
- ICT industry
- Material Science & Nanotechnology
- Medical Physics and Biotechnology
- Geoscience & Exploration
- Energy Technology Sector
- Meteorology

Conversion Courses

- Professional Master of Education (PME)
- MA Economics
- Graduate Medicine
- Master of Business Administration
- Master in Management

**See pages 4 and 5 for information on the terminology used above. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.*

www.ucd.ie/international

i

UCD School of Physics

internationaladmissions@ucd.ie
+353 1 716 2583
facebook.com/UCDScience
twitter.com/ucdscience

Geology

SCU1 Option: Mathematical, Physical & Geological Sciences

Sample pathway for a degree in Geology *

YEAR 1 — ENGAGE WITH THE PRINCIPLES

GEOLOGY – *Topics include:*

- Introduction to Earth Sciences
- Earth Science and Materials
- Earth And Humanity
- Mathematics for the Sciences

MATHEMATICS – *Topics include:*

- Geology and Earth Science involve applying 'traditional' science subjects to the study of the past, present and future of the Earth System
- Explore across the range of scientific disciplines available to study in UCD

- Two Elective modules
- One Small-Group Project

YEAR 2 — CHOOSE YOUR SUBJECTS

GEOLOGY – *Topics include:*

- Earth Structure & Surface Processes
- Investigating Minerals
- Geomaterials and Geoenergy
- Field Geology
- Global Environmental Change

- We do not require that students take a specific combination of additional modules
- Subject to regulations, students are free to select relevant Science modules that they are interested in

- Two Elective modules

YEAR 3 — FOCUS ON YOUR CHOSEN SUBJECT

GEOLOGY – *Topics include:*

- Geological Structures
- Sedimentary Environments
- Igneous & Metamorphic Petrology
- Geological Fieldwork

- Applied Palaeontology
- Quantitative Geosciences
- Precambrian Geology & Geotectonics
- Low Temperature Geochemistry

- Two Elective modules

- Selected students have the opportunity to gain valuable workplace experience via an internship in commercial companies

YEAR 4 — REFINE YOUR KNOWLEDGE

GEOLOGY – *Topics include:*

- Geobiology
- Basin Analysis
- Petrology & Ore Geology
- Geological Fieldwork
- Geophysics & GIS
- Research Seminars
- Field Mapping Research Project

- Emphasis on independent learning and research, including a field-based project
- Many modules contain laboratory-based projects and field-based research
- Breadth of course ensures graduates have a wide range of future career options within and outside the discipline

Other Options

MSc (Taught)

Our Geology graduates are routinely sought for careers outside Earth Science including:

- Management consultancy
- Education
- Financial services

PhD

- Students can pursue a PhD in universities in Ireland or abroad in areas as diverse as hydrocarbon and mineral exploration, volcanic and earthquake hazards, palaeobiology, environmental geochemistry, geophysics and climate change

Industry

- Resources (oil and mineral exploration and development)
- Environmental consultancy companies
- Hydrogeology and water resources
- Geological Surveys, Environmental Protection Agencies
- Engineering Geology
- Oceanography and Marine Geology

Conversion Courses

- Master of Business Administration
- Master in Management

**See pages 4 and 5 for information on the terminology used above. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.*

Second year field class in the Doolough valley, Co. Mayo.

- A broadly-based BSc with emphasis on field courses and research projects in Ireland and abroad structured for a wide range of employment options in the Earth and Environmental Sectors.

"I followed my Geology BSc degree with a Masters in Environment Engineering technology. I now work in Sydney with an international engineering consultancy on large-scale contaminated land remediation projects."
Aoife McKenna, Graduate

"My Geology BSc provided me with a great understanding of geological principles, and knowledge across the spectrum of the subject. Following my degree, I secured employment with a mineral exploration company in Ireland. The strong laboratory and field components were highly enjoyable parts of the learning experience at UCD, and have been vital as my job involves exploring and prospecting in a geologically diverse region."
Cian O'Meara, Graduate

i

UCD School of Earth Sciences

internationaladmissions@ucd.ie
+353 1 716 2583
facebook.com/UCDScience
twitter.com/ucdscience

www.ucd.ie/international

How to apply to UCD

Depending on your country of origin there are a number of ways that you can apply for a place on UCD undergraduate degree programmes. For the most up-to-date information, please refer to the UCD International web pages or contact internationaladmissions@ucd.ie

Information on Subject Choices

SCU1 Biological, Biomedical and Biomolecular Sciences (BBB) Subjects

- In Year 2, students must select a minimum of 2 subjects. If both subjects are selected from among Pharmacology, Neuroscience, Physiology and Genetics, students must then select an additional subject that is not in that list. The Year 2 subjects listed on each subject page illustrate the most popular subjects students combine.
- In first year, students may have to take introductory modules in Biology, Chemistry or Mathematics, depending on their secondary school results.

SCU1 Chemistry and Chemical Sciences (CCS) Subjects

- In Year 2, students must select a minimum of 2 subjects. The Year 2 subjects listed on each subject page illustrate the most popular subjects students combine.
- In first year, students may have to take introductory modules in Biology, Chemistry or Mathematics, depending on their secondary school results.

SCU1 Mathematical, Physical and Geological Sciences (MPG)

Mathematical Subjects

- In Year 2, students must select a minimum of 2 subjects. The Year 2 subjects listed on each subject page illustrate the most popular subjects students combine.
- Important Advice: We recommend that all students studying any of the Mathematical subjects should have a minimum Grade HB3 in Leaving Certificate Higher Level Mathematics (A-Level Grade B).

Physics Subjects

- In Year 2, students must select a minimum of 2 subjects. The Year 2 subjects listed on each subject page illustrate the most popular subjects students combine.

Geology

- In Year 2, students must select a minimum of 2 subjects. The Year 2 subjects listed on each subject page illustrate the most popular subjects students combine.
- In first year, students may have to take introductory modules in Biology, Chemistry or Mathematics, depending on their secondary school results.

CSSA Computer Science

- The topics shown indicate the course pathways for Computer Science and Computer Science with Data Science, listing some of the topics that students can study.
- No prior knowledge of programming is required.
- Small group work is facilitated in an active learning lab that encourages students to work in teams and build their problem-solving skills.
- The BSc Computer Science with Data Science follows the same first two years as the BSc Computer Science. At the end of Year 2, students must select either Computer Science or Computer Science with Data Science as their degree subject.

BSS3 Actuarial and Financial Studies

- The topics shown indicate the course pathway for Actuarial and Financial Studies, listing some of the topics that students can study.
- In Years 1-3, students take 10 Science modules and 2 elective modules. A professional work placement in a financial institution or insurance company is integrated into third year and equates to half the year's work.
- Should a student achieve a sufficiently high standard in the degree, they will gain some (or all) exemptions from the Core Technical series examinations (CT1:8) as well as the Core Applications CA1 examination of the Institute of Actuaries, or the Faculty of Actuaries.

UCD Science

UCD DUBLIN

myUCD Blogs

Learn about life in UCD from our student bloggers

www.myucdblog.com/

Science Careers

Discover more about Science Careers on our careers page

www.ucd.ie/science/careers/

Ireland's Global University

Visit our dedicated International website to get top tips for students coming to study in Ireland

www.ucd.ie/international/

Frequently Asked Questions

Take a look at our FAQ page for answers to common questions

www.ucd.ie/science/study/undergraduatesciencedegrees/faqs/

International prospective students can arrange a campus tour to get a feel for life at UCD. Further information is available at **www.ucd.ie/international/study-at-ucd-global/meet-ucd/campus-tours/**

Mr Gary Dunne
T: (01) 716 2637
E: gary.dunne@ucd.ie

Dr Orla Donoghue
T: (01) 716 2311
E: orla.donoghue@ucd.ie

This booklet (Version 15 2018 Non-EU Edition) is intended to assist prospective UCD students and the information is given in good faith. It is not, however, an official publication of the university and does not bind the university in any way. The information provided in this booklet is correct at the time of going to press but degree programmes are subject to continuing development and the university reserves the right to make changes at any time, before or after a student's admission.

University College Dublin

www.ucd.ie/science

facebook.com/UCDScience

@UCDScience