UCD Science
Undergraduate Courses 2017

DN200 Science
DN201 Computer Science
DN230 Actuarial and Financial Studies

University College Dublin
Ireland’s Global University
## Contents

### DN200 SCIENCE

<table>
<thead>
<tr>
<th>Biological, Biomedical &amp; Biomolecular Sciences (BBB)</th>
<th>Chemistry &amp; Chemical Sciences (CCS)</th>
<th>Mathematical, Physical &amp; Geological Sciences (MPG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biochemistry &amp; Molecular Biology 12</td>
<td>Chemistry 23</td>
<td>Applied &amp; Computational Mathematics 28</td>
</tr>
<tr>
<td>Cell &amp; Molecular Biology 13</td>
<td>Chemistry with Biophysical Chemistry 24</td>
<td>Financial Mathematics 29</td>
</tr>
<tr>
<td>Environmental Biology 14</td>
<td>Chemistry with Environmental &amp; Sustainable Chemistry 25</td>
<td>Mathematics 30</td>
</tr>
<tr>
<td>Genetics 15</td>
<td>Medicinal Chemistry &amp; Chemical Biology 26</td>
<td>Mathematical Science 31</td>
</tr>
<tr>
<td>Microbiology 16</td>
<td>Chemistry &amp; Mathematics Education 27</td>
<td>Statistics 32</td>
</tr>
<tr>
<td>Neuroscience 17</td>
<td></td>
<td>Applied Mathematics &amp; Mathematics Education 33</td>
</tr>
<tr>
<td>Pharmacology 18</td>
<td></td>
<td>Physics 35</td>
</tr>
<tr>
<td>Physiology 19</td>
<td></td>
<td>Physics with Astronomy &amp; Space Science 36</td>
</tr>
<tr>
<td>Plant Biology 20</td>
<td></td>
<td>Theoretical Physics 37</td>
</tr>
<tr>
<td>Zoology 21</td>
<td></td>
<td>Physics and Mathematics Education 38</td>
</tr>
<tr>
<td>Biology &amp; Mathematics Education 22</td>
<td></td>
<td>Geology 39</td>
</tr>
</tbody>
</table>

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[Image -0x-0 to 595x842]
<table>
<thead>
<tr>
<th>DN201</th>
<th>DN230</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Computer Science</strong></td>
<td><strong>Actuarial &amp; Financial Studies</strong></td>
</tr>
<tr>
<td>Computer Science</td>
<td>Actuarial &amp; Financial Studies</td>
</tr>
<tr>
<td>Computer Science with Data Science</td>
<td></td>
</tr>
</tbody>
</table>

**Career Opportunities**

| Why choose UCD for Science? | 4 |
| Map Your Career | 6 |
| Biotechnology, Biomedical, Pharmaceutical & Chemical Sciences | 8 |
| Energy, Climate, Natural Resources & Environment | 9 |
| Computing, Risk, Finance & Analytics | 10 |
| Semiconductor, Nanotechnology, Meteorology & Space Industry | 11 |

**Information on Subject Choices** 42

**Science Events Calendar** 43
Why Choose to Study Science at University College Dublin (UCD)?

UCD is ranked within the top 1% of institutions worldwide.

Dynamic campus with over 150 clubs & societies, gym & 50 metre swimming pool.

Study exchanges available worldwide, including UK, Canada, USA, Australia & Europe.
UCD O’Brien Centre for Science
– Largest capital investment in Science in history of Irish State
– State-of-the-art labs, active learning environments, lecture theatres and classrooms

DN200 Science
– Common Entry: 1 CAO Code, 27 different degrees
– 4 Year Honours BSc course
– Focus on your preferred stream immediately (BBB, CCS or MPG) or explore a range of subjects in First Year (No Preference)
– Time to change your mind in First Year
– Make an informed decision about your degree major at the end of Second Year
– Study one degree major in Third and Fourth Year

DN201 Computer Science
– 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

DN230 Actuarial & Financial Studies
– 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

Graduate Studies
– Taught Masters
– Diplomas & Certificate programmes
– Research Masters
– PhD programmes

Science Careers
– Biotechnology, Biomedical, Pharmaceutical & Chemical Sciences
– Energy, Climate, Natural Resources & Environment
– Computing, Risk, Finance & Analytics
– Semiconductor, Nanotechnology, Meteorology & Space Industry
Science Careers

Pharmaceuticals, Biotechnology, Medical Devices, Clinical Trials, Chemical Industry & Hospitals
- QA/QC Analyst
- Analytical Chemist
- Microbiologist
- Environmental Scientist
- Clinical Research Associate
- Biochemist
- Medical Physicist

Energy, Climate, Conservation & Environment
- Environmental Consultant
- Environmental Officer
- Plant Scientist
- Conservation Scientist
- Environmental Manager
- Emissions Control Manager
- Photovoltaic Engineer

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

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

The tables below give examples only of some salaries from the 2015 Annual Salary Survey from Morgan McKinley (www.morganmckinley.ie) in specific areas open to Science graduates.

Science and Pharmaceuticals

<table>
<thead>
<tr>
<th>ROLE</th>
<th>YEARS EXP.</th>
<th>DUBLIN €</th>
<th>CORK €</th>
<th>LIMERICK €</th>
<th>WATERFORD €</th>
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<tr>
<td>Process Chemist</td>
<td>0 – 3</td>
<td>30,000 – 38,000</td>
<td>30,000 – 35,000</td>
<td>30,000 – 35,000</td>
<td>30,000 – 35,000</td>
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<tr>
<td>Microbiologist</td>
<td>0 – 3</td>
<td>38,000 – 45,000</td>
<td>35,000 – 43,000</td>
<td>35,000 – 43,000</td>
<td>35,000 – 43,000</td>
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<tr>
<td>Biochemist</td>
<td>0 – 3</td>
<td>35,000 – 45,000</td>
<td>33,000 – 45,000</td>
<td>33,000 – 45,000</td>
<td>33,000 – 45,000</td>
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<tr>
<td>Documentation Officer</td>
<td>0 – 3</td>
<td>28,000 – 32,000</td>
<td>23,000 – 28,000</td>
<td>23,000 – 28,000</td>
<td>23,000 – 28,000</td>
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<tr>
<td>Analytical Chemist</td>
<td>0 – 3</td>
<td>32,000 – 36,000</td>
<td>28,000 – 31,000</td>
<td>28,000 – 31,000</td>
<td>28,000 – 31,000</td>
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Information Technology

<table>
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<th>ROLE</th>
<th>YEARS EXP.</th>
<th>DUBLIN €</th>
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<tbody>
<tr>
<td>Technical Writer</td>
<td>0 – 3</td>
<td>30,000 – 35,000</td>
</tr>
<tr>
<td>QA/Test Engineer</td>
<td>0 – 3</td>
<td>35,000 – 40,000</td>
</tr>
<tr>
<td>Web/Graphic Designer</td>
<td>0 – 3</td>
<td>40,000 – 45,000</td>
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<tr>
<td>Android Developer</td>
<td>0 – 3</td>
<td>28,000 – 42,000</td>
</tr>
<tr>
<td>SQL Database Administrator</td>
<td>0 – 3</td>
<td>30,000 – 40,000</td>
</tr>
</tbody>
</table>

The information on salaries and job titles is a guide only and does not bind the University in any way.
The sectors and job titles above are examples only. Each BSc and BAFS degree maps to different jobs, depending on the qualification and skills required for a particular job.

Graduates working for a number of years can progress their career towards more senior roles in management and this information is included in the full report. These salaries are indicative only, are provided as examples and do not bind the University in any way.

**Banking and Insurance**

<table>
<thead>
<tr>
<th>ROLE</th>
<th>YEARS EXP.</th>
<th>DUBLIN €</th>
<th>CORK €</th>
<th>LIMERICK €</th>
<th>WATERFORD €</th>
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<tr>
<td>Financial Analyst</td>
<td>0 – 3</td>
<td>45,000 - 55,000</td>
<td>40,000 - 48,000</td>
<td>35,000 - 40,000</td>
<td>35,000 - 40,000</td>
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<tr>
<td></td>
<td>3 – 5</td>
<td>55,000 - 65,000</td>
<td>48,000 - 55,000</td>
<td>40,000 - 50,000</td>
<td>40,000 - 50,000</td>
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<td>30,000 - 45,000</td>
<td>29,000 - 44,000</td>
<td>28,000 - 43,000</td>
<td>28,000 - 43,000</td>
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<tr>
<td></td>
<td>3 – 5</td>
<td>70,000 - 80,000</td>
<td>65,000 - 80,000</td>
<td>65,000 - 80,000</td>
<td>65,000 - 80,000</td>
</tr>
<tr>
<td>Part Qualified Actuary</td>
<td>0 – 3</td>
<td>45,000 - 70,000</td>
<td>35,000 - 55,000</td>
<td>35,000 - 50,000</td>
<td>35,000 - 50,000</td>
</tr>
<tr>
<td></td>
<td>3 – 5</td>
<td>70,000 - 130,000</td>
<td>80,000 - 110,000</td>
<td>80,000 - 110,000</td>
<td>80,000 - 110,000</td>
</tr>
</tbody>
</table>

The information on salaries and job titles is a guide only and does not bind the University in any way.
What Our Graduates Say

Senior Clinical Project Manager
o4 Research Belfast
Mark Herley
BSc (Hons) 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.”

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.”

Associate Specialist in Quality
Merck Sharp & Dohme
Dr Susan Molloy
BSc (Hons) 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.”

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.”

PhD Medical Physicist
St James’s Hospital
Dr Sean Cournane
BSc (Hons) 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 (Hons) 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.”

**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

“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.”

**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.”

**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.”

**Environmental Consultant**
Resource and Waste Management

**Government Agencies**

**Heritage and Education**

**Conservation and Wildlife**
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.”

**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.”

**Investment Analyst**
Seroba Kernel Life Sciences
Jennifer McKeever
BSc (Hons) Pharmacology, MSc

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

**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.”

**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.”
Semiconductor, Nanotechnology, Meteorology & Space Industry

What Our Graduates Say

**Researcher**

**Intel**
Dr Fergus Quilligan
BSc (Hons) Physics, PhD

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

**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!"

**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."

**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."

**Deputy Head of Forecasting**

**Met Éireann**
Ms Evelyn Cusack
BSc (Hons) Physics, MSc in 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."
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 cystine accumulation, exhibited in Cystinosis, leads to altered thiol redox homeostasis, glutamate neurotransmitter homeostasis and reduced levels of the major antioxidant glutathione in brain glial cells.

Dylan Ryan, Student

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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 cystine accumulation, exhibited in Cystinosis, leads to altered thiol redox homeostasis, glutamate neurotransmitter homeostasis and reduced levels of the major antioxidant glutathione in brain glial cells.

Dylan Ryan, Student

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Biochemistry & Molecular Biology

CAO code: DN200 Option: Biological, Biomedical and Biomolecular Science (BBB)
Cell & Molecular Biology
CAO code: DN200 Option: Biological, Biomedical and Biomolecular Science (BBB)

**Sample pathway for a degree in Cell & Molecular Biology**

**YEAR 1**

**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**

**CELL & MOLECULAR BIOLOGY**
Topics include:
- Metabolic and Immune Systems
- Principles of Microbiology
- Principles of Genetics
- Molecular Genetics and Biotechnology

**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:
- 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:
- Advanced Cell Biology
- Research Methods in Cell Biology
- Genetics
- Membrane Trafficking
- Programmed Cell Death
- Cell Signalling
- Epithelial Transport
- Epigenetics
- Biological Imaging
- Research Project
- Human Genetics & Disease

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

**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

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

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*See page 42 for more information on subject choices. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.

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**Professor Jeremy Simpson**
UCD School of Biology and Environmental Science

[Email]
[Phone]
[Facebook]
[Twitter]
Environmental Biology

CAO code: DN200 Option: Biological, Biomedical and Biomolecular Science (BBB)

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 and Spain.

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

www.ucd.ie/myucd/environmentalbiology

Dr Tom Wilkinson
UCD School of Biology and Environmental Science
tom.wilkinson@ucd.ie
+353 1 716 2264
facebook.com/UCDScience
twitter.com/ucdscience

*See page 42 for more information on subject choices. 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

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**Sample pathway for a degree in Genetics**

### YEAR 1

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

**CHEMISTRY**
- The Basis of Organic and Biological Chemistry

**MATHEMATICS**
- Mathematics for the Biological & Chemical Sciences

- Two Elective modules
- One Small-Group Project

### YEAR 2

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

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

**ZOOLOGY**
- 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:
- Epigenetics
- Genetics Disease & Behaviour
- Gene Regulation
- Systems Microbiology
- Model Organism Genetics
- Genetics Research Project

- Two Elective modules

**MSc (Taught)**
- MSc Biotechnology
- MSc Biotechnology & Business
- MSc Plant Biology & Biotechnology
- MSc Biocatalysis
- MSc Biomedical & 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
- 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

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*See page 42 for more information on subject choices. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.

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**Professor Geraldine Butler**  
UCD School of Biomolecular and Biomedical Science  
gbutler@ucd.ie  
+353 1 716 6885  
facebook.com/UCDScience  
twitter.com/ucdscience
**Microbiology**

CAO code: DN200  Option: Biological, Biomedical and Biomolecular Science (BBB)

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### Sample pathway for a degree in Microbiology *

<table>
<thead>
<tr>
<th>YEAR</th>
<th>ENGAGE WITH THE PRINCIPLES</th>
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<tbody>
<tr>
<td></td>
<td><strong>BIOLOGY</strong></td>
</tr>
<tr>
<td>YEAR 1</td>
<td>Topics include:</td>
</tr>
<tr>
<td></td>
<td>- Biology in Action</td>
</tr>
<tr>
<td></td>
<td>- Life on Earth</td>
</tr>
<tr>
<td></td>
<td>- Cell Biology &amp; Genetics</td>
</tr>
<tr>
<td></td>
<td>- Biomedical Sciences</td>
</tr>
</tbody>
</table>

| YEAR 2 | **CHEMISTRY** |
|        | Topics include: |
|        | - The Basis of Organic and Biological Chemistry |

| YEAR 2 | **MATHEMATICS** |
|        | Topics include: |
|        | - Mathematics for the Biological & Chemical Sciences |

| YEAR 3 | **CHOOSE YOUR SUBJECTS** |
|        | **MICROBIOLOGY** |
|        | Topics include: |
|        | - Chemistry for Biologists |
|        | - Molecular Genetics and Biotechnology |
|        | - Metabolic and Immune Systems |
|        | - Principles of Microbiology: Medicine, Environment and Biotechnology |

| YEAR 3 | **CELL & MOLECULAR BIOLOGY** |
|        | Topics include: |
|        | - Biological Systems |
|        | - Cell and Molecular Biology - Principles |

| YEAR 3 | **GENETICS** |
|        | Topics include: |
|        | - Principles of Genetics |

| YEAR 4 | **FOCUS ON YOUR CHOSEN SUBJECT** |
|        | **MICROBIOLOGY** |
|        | Topics include: |
|        | - Regulation of Gene Expression |
|        | - Microbial Cell Factory |
|        | - Applied Microbiology |
|        | - Microbial Diversity & Growth |
|        | - Microbial Physiology |

| YEAR 4 | **REFINE YOUR KNOWLEDGE** |
|        | **MICROBIOLOGY** |
|        | Topics include: |
|        | - Medical Microbiology |
|        | - Skills in Microbiology |
|        | - Ecology & Environmental Microbiology |

| YEAR 4 | **BSc (Honours) Microbiology** |
|        | - Microbiology Research Project |
|        | - Ecological & Environmental Microbiology |
|        | - Systems Microbiology |

**MSc (Taught)**

- MSc Biotechnology
- MSc Biotechnology & Business
- MSc Environmental Management
- MSc Toxicology & Regulatory Affairs
- MSc Plant Biology
- MSc Biotherapeutics
- Students can pursue a PhD in universities in Ireland or abroad in areas as diverse as Biotechnology, Environmental Biology, Medical and Veterinary Sciences

**PhD**

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

**Industry**

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

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*See page 42 for more information on subject choices. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.

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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

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

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**www.ucd.ie/myucd/microbiology**

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twitter.com/ucdscience
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 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
Pharmacology

CAO code: DN200 Option: Biological, Biomedical and Biomolecular Science (BBB)

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

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

YEAR 3

FOCUS ON YOUR CHOSEN SUBJECT

PHARMACOLOGY – Topics include:
  - Cell Signalling
  - Biostatistics
  - Drug action in body systems
  - Chemotherapeutic agents

YEAR 4

REFINE YOUR KNOWLEDGE

PHARMACOLOGY – Topics include:
  - Drugs used in CNS diseases
  - Advanced CNS Pharmacology
  - Toxicology
  - Molecular Pharmacology

PHARMACOLOGY
- Topics include:
  - Advanced Neuropharmacology
  - Adv. Cardiovascular Pharmacology
  - Finding new Pharmaceuticals

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 page 42 for more information on subject choices. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.

---

Jennifer Mckeever, Graduate

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

---

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

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www.ucd.ie/myucd/pharmacology

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twitter.com/ucdscience
Physiology

CAO code: DN200 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
- Biomedical 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
- Autonomic Nervous System

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

Conversion Courses

*See page 42 for more information on subject choices. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.

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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
**Plant Biology**

CAO code: DN200  Option: Biological, Biomedical and Biomolecular Science (BBB)

---

**Sample pathway for a degree in Plant Biology**

**YEAR 1**

**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

---

**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

---

**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

---

**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

---

**Year 4**

**Refine Your Knowledge**

**Plant Biology** – Topics include:
- Plant Atmosphere Climate Interactions
- Peatlands and Env. Changes
- 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 page 42 for more information on subject choices. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.

---

**“**

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

---

**www.ucd.ie/myucd/plantbiology**

**Dr Paul McCabe**
UCD School of Biology and Environmental Science

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20
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, Student

“
Biology and Mathematics Education

CAO code: DN200 Option: Biological, Biomedical and Biomolecular Science (BBB)

Sample pathway to become a Biology and Mathematics teacher *

**YEAR 1**

**EDUCATION**
Topics include:
- Teaching and Learning Mathematics

**BIOLOGY**
Topics include:
- Biology in Action
- Life on Earth
- Cell Biology and Genetics

**MATHEMATICS**
Topics include:
- Linear Algebra
- Calculus
- Statistical Modelling

**SCIENCE**
- Chemistry
- Physics
- One Small-Group Project
- Elective Modules

**YEAR 2**

**EDUCATION**
Topics include:
- Education Issues and Ideas
- Science and Mathematics Pedagogy

**BIOLOGY**
Topics include:
- Principles of Plant Biology and Biotechnology
- Principles of Environmental Biology and Ecology
- Laboratory Skills
- Molecular Genetics and Biotechnology

**MATHEMATICS**
Topics include:
- Calculus of Several Variables
- Mathematical Modelling
- Analysis
- Elective Modules

**YEAR 3**

**EDUCATION**
Topics include:
- Collaborative Pedagogy in Mathematics Education
- Schools and Society

**SCHOOL PLACEMENT**
- Post-Primary Placement
- University – Peer-Assisted Tutoring

**BIOLOGY**
Topics include:
- Systems Ecology
- Functional Morphology
- Regulation of Gene Expression
- Microbiology

**MATHEMATICS**
Topics include:
- Algebraic Structures
- Probability Theory
- Geometry

**YEAR 4**

**PREPARE FOR PROFESSIONAL PRACTICE**

**EDUCATION**
Topics include:
- Pedagogical Approaches to Mathematics and Science
- Curriculum and Assessment
- Psychology for Teaching and Learning

**SCHOOL PLACEMENT**
- Year-Long Placement in Post-Primary School
- Classroom Teaching
- Broad Experience of Wider School Context

**BIOLOGY AND MATHEMATICS**
Topics include:
- Biochemistry
- Proteins and Enzymes
- Differential Equations with Computer Algebra

**YEAR 5**

**PREPARE FOR PROFESSIONAL PRACTICE**

**EDUCATION**
Topics include:
- Research Methods
- Professional Dissertation

**SCHOOL PLACEMENT**
- Year-Long Placement in Post-Primary School
- Experience Both Teaching and Non-Teaching Activities
- Further Development of Professional Practice Portfolio

**MSc Mathematics and Science Education**

**QUALIFIED TO TEACH**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Leaving Certificate</th>
<th>Junior Certificate</th>
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<tr>
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<tr>
<td>Science</td>
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</tr>
</tbody>
</table>

*See page 42 for more information on subject choices. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.

Having taken the Maths and Biology Education modules in First and Second Year I have made my decision to become a teacher. The education modules are interactive and enjoyable and I am looking forward to pursuing this education pathway to MSc level.

Deirdre Creegan, Student

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www.ucd.ie/myucd/biomathed
Preparing an experiment in Chemistry.

Mathematics

- Mathematics for the Biological & Chemical Sciences
- One Small-Group Project
- Two Elective modules

Choose Your Subjects

Chemistry

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

Medical Chemistry & Chemical Biology

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

Focus on Your Chosen Subject

Chemistry – Topics include:

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

Refine Your Knowledge

Chemistry – Topics include:

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

Sample pathway for a degree in Chemistry *

Year 1

Engage with the Principles

Chemistry

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

Mathematics

- Mathematics for the Biological & Chemical Sciences
- One Small-Group Project
- Two Elective modules

Year 2

Choose Your Subjects

Chemistry

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

Medical Chemistry & Chemical Biology

- 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

Year 4

Refine Your Knowledge

Chemistry – Topics include:

- Methods in Organic Synthesis
- Chemical Thermodynamics
- Research Project

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 page 42 for more information on subject choices. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.

Dr Michael Casey
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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

www.ucd.ie/myucd/chemistry
Chemistry with Biophysical Chemistry

CAO code: DN200 Option: Chemistry & Chemical Sciences (CCS)

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

*See page 42 for more information on subject choices. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.

In the summer after third year, I did a summer internship in the 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

www.ucd.ie/myucd/biophysicalchemistry

Sample pathway for a degree in Chemistry with Biophysical Chemistry*

<table>
<thead>
<tr>
<th>YEAR 1</th>
<th>CHEMISTRY</th>
<th>Topics include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- The Basis of Organic and Biological Chemistry</td>
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<tr>
<td>- The Basis of Physical Chemistry</td>
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<tr>
<td>- The Molecular World</td>
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<table>
<thead>
<tr>
<th>YEAR 2</th>
<th>CHEMISTRY WITH BIOPHYSICAL CHEMISTRY</th>
<th>Topics include:</th>
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<tbody>
<tr>
<td>- Biophysical Chemistry</td>
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<td>- Physical Chemistry</td>
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<tr>
<td>- Organic Chemistry</td>
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<tr>
<th>YEAR 3</th>
<th>CHEMISTRY WITH BIOPHYSICAL CHEMISTRY</th>
<th>Topics include:</th>
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<tr>
<td>- Instrumental Analysis</td>
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<td></td>
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<tr>
<td>- Carbonyl Chemistry &amp; Synthesis</td>
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<tr>
<td>- Quantum Mechanics</td>
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<tr>
<td>- Mechanism &amp; Stereochemistry</td>
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<tr>
<th>YEAR 4</th>
<th>CHEMISTRY WITH BIOPHYSICAL CHEMISTRY</th>
<th>Topics include:</th>
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<tbody>
<tr>
<td>- Research Project in Biophysical Chemistry</td>
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<tr>
<td>- Metals in Biology</td>
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<tr>
<td>- Electrochemistry</td>
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</tbody>
</table>

| BSc (Honours) Chemistry with Biophysical Chemistry |
|---|---|---|
| PhD | Industry | Conversion Courses |

- Biophysical Chemistry
- Advanced Kinetics and Thermodynamics
- Nanochemistry

- Pharmaceuticals, Biomedicals, 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

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

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Chemistry with Environmental & Sustainable Chemistry

CAO code: DN200 Option: Chemistry & Chemical Sciences (CCS)

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

**YEAR 1**

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

**MATHEMATICS**
- Mathematics for the Biological & Chemical Sciences

**YEAR 2**

**CHOSE YOUR SUBJECTS**

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

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

**YEAR 3**

**FOCUS ON YOUR CHOSEN SUBJECT**

**CHEMISTRY WITH ENVIRONMENTAL & SUSTAINABLE CHEMISTRY**
- Quantum Mechanics
- Carbonyl Chemistry & Synthesis
- Self-Assembly of Biomolecules
- Mechanism & Stereochemistry

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

**YEAR 4**

**REFINE YOUR KNOWLEDGE**

**CHEMISTRY WITH ENVIRONMENTAL & SUSTAINABLE CHEMISTRY**
- Green and Sustainable Chemistry
- Research Project in Sus./Env. Chem
- Methods in Organic Synthesis

**CHEMISTRY**
- Chemical Thermodynamics
- Nanochemistry
- Electrochemistry
- Reactivity & Change

**CHEMISTRY WITH ENVIRONMENTAL & SUSTAINABLE CHEMISTRY**
- Modern Methods and Catalysis
- Advanced Inorganic Chemistry
- Methods in Organic Synthesis 2

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 page 42 for more information on subject choices. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.

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Studying materials which promote the synthesis of sustainable fuels.
Image by Ms Ciara O’Hanlon © UCD.

- 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.

Dr James Sullivan, Staff

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www.ucd.ie/myucd/environmentaland sustainablechemistry
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

UV determination of enzyme kinetics is a key step in the design of industrially relevant biocatalysts.

---

**Medicinal Chemistry & Chemical Biology**

**CAO code: DN200  Option: Chemistry & Chemical Sciences (CCS)**

---

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

<table>
<thead>
<tr>
<th>YEAR 1</th>
<th>ENGAGE WITH THE PRINCIPLES</th>
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<td><strong>CHEMISTRY</strong> Topics include:</td>
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<td><strong>MATHEMATICS</strong> Topics include:</td>
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<td>- Mathematics for the Biological &amp; Chemical Sciences</td>
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<tr>
<td><strong>BIOLOGY</strong> Topics include:</td>
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<tr>
<td>- Cell Biology &amp; Genetics</td>
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<table>
<thead>
<tr>
<th>YEAR 2</th>
<th>CHOOSE YOUR SUBJECTS</th>
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<tbody>
<tr>
<td><strong>MEDICINAL CHEMISTRY &amp; CHEMICAL BIOLOGY</strong> Topics include:</td>
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<tr>
<td>- Molecular Genetics and Biotechnology</td>
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<tr>
<td>- Principals of Biochemistry</td>
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<td><strong>CHEMISTRY</strong> Topics include:</td>
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<td>- Physical Chemistry</td>
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<tr>
<td>- Inorganic Chemistry</td>
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</table>
| **Students who choose Medicinal Chemistry & Chemical Biology as their main subject for second year also cover the requirements for Chemistry.**

<table>
<thead>
<tr>
<th>YEAR 3</th>
<th>FOCUS ON YOUR CHOSEN SUBJECT</th>
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<tbody>
<tr>
<td><strong>MEDICINAL CHEMISTRY &amp; CHEMICAL BIOLOGY</strong> – Topics include:</td>
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<td>- Chemical Biology of Natural Products</td>
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<td>- Chemical Biology of Macromolecules</td>
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<td>- Carbonyl Chemistry &amp; Synthesis</td>
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<td>- Medicinal Chemistry</td>
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<tr>
<td>- Structure Determination &amp; Heterocyclic Chemistry</td>
<td></td>
</tr>
<tr>
<td>- Microbial Cell Factory/Chemists</td>
<td></td>
</tr>
<tr>
<td>- Mechanism &amp; Stereochemistry</td>
<td></td>
</tr>
<tr>
<td>- Biochemist’s Toolkit</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>YEAR 4</th>
<th>REFINE YOUR KNOWLEDGE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MEDICINAL CHEMISTRY &amp; CHEMICAL BIOLOGY</strong> – Topics include:</td>
<td></td>
</tr>
<tr>
<td>- Metals in Biology</td>
<td></td>
</tr>
<tr>
<td>- Methods in Organic Synthesis</td>
<td></td>
</tr>
<tr>
<td>- Modern Methods of Catalysis</td>
<td></td>
</tr>
<tr>
<td>- Research Project</td>
<td></td>
</tr>
<tr>
<td>- Special topics in Medicinal Chemistry and Chemical Biology</td>
<td></td>
</tr>
</tbody>
</table>

**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 page 42 for more information on subject choices. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.*

---

**Professor Stefan Oscarson**

UCD School of Chemistry

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twitter.com/ucdscience
Chemistry and Mathematics Education

CAO code: DN200 Option: Chemistry & Chemical Sciences (CCS)

Sample pathway to become a Chemistry and Mathematics teacher *

**YEAR 1**

**ENGAGE WITH THE PRINCIPLES**

**EDUCATION**
Topics include:
- Teaching and Learning Mathematics

**CHEMISTRY**
Topics include:
- Introductory Chemistry
- Organic Chemistry and Chemical Biology

**MATHEMATICS**
Topics include:
- Linear Algebra
- Calculus
- Statistical Modelling

**SCIENCE**
- Biology
- Physics
- One Small-Group Project
- Elective Modules

**YEAR 2**

**CHOOSE YOUR SUBJECTS**

**EDUCATION**
Topics include:
- Education Issues and Ideas
- Science and Mathematics Pedagogy

**CHEMISTRY**
Topics include:
- Physical Chemistry
- Organic Chemistry
- Inorganic Chemistry

**MATHEMATICS**
Topics include:
- Calculus of Several Variables
- Mathematical Modelling
- Analysis

**YEAR 3**

**REFINE YOUR KNOWLEDGE**

**EDUCATION**
Topics include:
- Collaborative Pedagogy in Mathematics Education
- Schools and Society

**SCHOOL PLACEMENT**
- Post-Primary Placement
- University – Peer-Assisted Tutoring

**CHEMISTRY**
Topics include:
- Instrumental Analysis
- Mechanism and Stereochemistry
- Main Group Chemistry and Bonding
- Chemical Thermodynamics

**MATHEMATICS**
Topics include:
- Algebraic Structures
- Probability Theory
- Geometry

**YEAR 4**

**PREPARE FOR PROFESSIONAL PRACTICE**

**EDUCATION**
Topics include:
- Pedagogical Approaches to Mathematics and Science
- Curriculum and Assessment
- Psychology for Teaching and Learning

**SCHOOL PLACEMENT**
- Year-Long Placement in Post-Primary School
- Classroom Teaching
- Broad Experience of Wider School Context

**CHEMISTRY AND MATHEMATICS**
Topics include:
- Carbonyl Chemistry and Synthesis
- Differential Equations with Computer Algebra

**YEAR 5**

**BSc Mathematics, Chemistry and Education**

**PREPARE FOR PROFESSIONAL PRACTICE**

**EDUCATION**
Topics include:
- Research Methods
- Professional Dissertation

**SCHOOL PLACEMENT**
- Year-Long Placement in Post-Primary School
- Experience Both Teaching and Non-Teaching Activities
- Further Development of Professional Practice Portfolio

**MSc Mathematics and Science Education**

**QUALIFIED TO TEACH**
- Chemistry: Leaving Certificate
- Mathematics: Leaving Certificate
- Science: Junior Certificate

---

*See page 42 for more information on subject choices. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.

---

Dr Maria Meehan
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---

“UCD Science DN200 was the course for me. Top-notch staff and facilities allowed me to discover that teaching is the path I want to pursue. It's great to be a part of the new generation of teachers which will lead the way in Maths and Science for years to come.

Conor Moran, Student

---

www.ucd.ie/myucd/chemmathed
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.

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
Financial Mathematics
CAO code: DN200  Option: Mathematical, Physical & Geological Sciences (MPG)

Sample pathway for a degree in Financial Mathematics *

<table>
<thead>
<tr>
<th>YEAR 1</th>
<th>ENGAGE WITH THE PRINCIPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MATHEMATICS</strong></td>
<td><strong>APPLIED &amp; COMPUTATIONAL MATHEMATICS</strong></td>
</tr>
<tr>
<td>Topics include:</td>
<td>Topics include:</td>
</tr>
<tr>
<td>- Calculus in the Mathematical and Physical Sciences</td>
<td>- Applications of Differential Equations</td>
</tr>
<tr>
<td>- Linear Algebra in the Mathematical and Physical Sciences</td>
<td>-</td>
</tr>
<tr>
<td>- Numbers and Functions</td>
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<tr>
<td>- Mathematical Analysis</td>
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</table>

<table>
<thead>
<tr>
<th>YEAR 2</th>
<th>CHOOSE YOUR SUBJECTS</th>
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</thead>
<tbody>
<tr>
<td><strong>FINANCIAL MATHEMATICS</strong></td>
<td><strong>STATISTICS</strong></td>
</tr>
<tr>
<td>Topics include:</td>
<td>Topics include:</td>
</tr>
<tr>
<td>- Foundations of Financial Mathematics</td>
<td>- Inferential Statistics</td>
</tr>
<tr>
<td>- Optimisation in Finance</td>
<td>- Probability Theory</td>
</tr>
<tr>
<td>- Calculus of Several Variables</td>
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<tr>
<td>- Linear Algebra</td>
<td>-</td>
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<tr>
<td>- Theory of Games</td>
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<tr>
<td>- Principles of Finance</td>
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</table>

<table>
<thead>
<tr>
<th>YEAR 3</th>
<th>FOCUS ON YOUR CHOSEN SUBJECT</th>
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<tbody>
<tr>
<td><strong>FINANCIAL MATHEMATICS –</strong></td>
<td><strong>STATISTICS</strong></td>
</tr>
<tr>
<td>Topics include:</td>
<td>Topics include:</td>
</tr>
<tr>
<td>- Metric Spaces</td>
<td>- Inferential Statistics</td>
</tr>
<tr>
<td>- Measure Theory and Integration</td>
<td>- Probability Theory</td>
</tr>
<tr>
<td>- Time Series</td>
<td>-</td>
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<tr>
<td>- Stochastic Models</td>
<td>-</td>
</tr>
<tr>
<td>- Advanced Corporate Finance</td>
<td>-</td>
</tr>
<tr>
<td>- Linear Models</td>
<td>-</td>
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<tr>
<td>- Dynamical Systems</td>
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<table>
<thead>
<tr>
<th>YEAR 4</th>
<th>REFINES YOUR KNOWLEDGE</th>
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</thead>
<tbody>
<tr>
<td><strong>FINANCIAL MATHEMATICS –</strong></td>
<td><strong>FINANCIAL MATHEMATICS</strong></td>
</tr>
<tr>
<td>Topics include:</td>
<td>Topics include:</td>
</tr>
<tr>
<td>- Actuarial Reporting</td>
<td>- Bayesian Analysis</td>
</tr>
<tr>
<td>- Statistical Data Mining</td>
<td>- Advanced Computational Science</td>
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<tr>
<td>- Quantitative Methods</td>
<td>- Financial Economics</td>
</tr>
<tr>
<td>- Stochastic Models</td>
<td>-</td>
</tr>
<tr>
<td>- Advanced Corporate Finance</td>
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<td>- Linear Models</td>
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</tr>
<tr>
<td>- Dynamical Systems</td>
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</tbody>
</table>

**BSc (Honours) Financial Mathematics**

<table>
<thead>
<tr>
<th>MSc (Taught)</th>
<th>PhD</th>
<th>Industry</th>
<th>Conversion Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>- MSc Mathematics</td>
<td>- Graduates can pursue a PhD in algorithmic trading, or stochastic differential equations, for example.</td>
<td>- Quantitative positions in the financial sector</td>
<td>- Professional Master in Education (PME)</td>
</tr>
<tr>
<td>- MSc Mathematical Sciences</td>
<td></td>
<td>- Risk modelling in banking and insurance</td>
<td>- MSc Computer Science (conversion)</td>
</tr>
<tr>
<td>- MSc Statistics</td>
<td></td>
<td>- Computing in business, technology, research and academia</td>
<td></td>
</tr>
<tr>
<td>- MSc Actuarial Science</td>
<td></td>
<td>- Trainee Actuary</td>
<td></td>
</tr>
<tr>
<td>- MSc Business Analytics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- MSc Data Analytics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- MSc Quantitative Finance</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*See page 42 for more information on subject choices. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.

---

**Professor Gary McGuire**
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This degree in Financial Mathematics is taught by mathematicians and statisticians with a broad range of expertise, such as Bayesian statistics and stochastic analysis, topics which are used constantly in the financial sector. According to the 2016 QS World University Rankings by Subject, Mathematics and Statistics & Operational Research at UCD are ranked 1st in Ireland.

[Link to UCD website]
# Mathematics

**CAO code: DN200 Option: Mathematical, Physical & Geological Sciences (MPG)**

## Sample pathway for a degree in Mathematics *

### YEAR 1

**ENGAGE WITH THE PRINCIPLES**

<table>
<thead>
<tr>
<th>MATHEMATICS</th>
<th></th>
<th><strong>APPLIED &amp; COMPUTATIONAL MATHEMATICS (OPTIONAL)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Topics include:</strong></td>
<td></td>
<td><strong>Topics include:</strong></td>
</tr>
<tr>
<td>- Calculus in the Mathematical and Physical Sciences</td>
<td></td>
<td>- Computational Science</td>
</tr>
<tr>
<td>- Numbers &amp; Functions</td>
<td></td>
<td>- Vector Integral and Differential Calculus</td>
</tr>
<tr>
<td>- Linear Algebra in the Mathematical and Physical Sciences</td>
<td></td>
<td>- Oscillations and Waves</td>
</tr>
<tr>
<td>- Mathematical Analysis</td>
<td></td>
<td>- Classical Mechanics and Special Relativity</td>
</tr>
<tr>
<td>- Introduction to Applications of Differential Equations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Introduction to Statistical Modelling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Two Elective modules</td>
<td></td>
<td>- Probability Theory</td>
</tr>
<tr>
<td>- One Small-Group Project</td>
<td></td>
<td>- Stochastic Models</td>
</tr>
</tbody>
</table>

### YEAR 2

**CHOOSE YOUR SUBJECTS**

<table>
<thead>
<tr>
<th>MATHEMATICS</th>
<th></th>
<th><strong>APPLIED &amp; COMPUTATIONAL MATHEMATICS (OPTIONAL)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Topics include:</strong></td>
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<td><strong>Topics include:</strong></td>
</tr>
<tr>
<td>- Linear Algebra 2</td>
<td></td>
<td>- Computational Science</td>
</tr>
<tr>
<td>- Calculus of Several Variables</td>
<td></td>
<td>- Vector Integral and Differential Calculus</td>
</tr>
<tr>
<td>- Groups, Rings &amp; Fields</td>
<td></td>
<td>- Oscillations and Waves</td>
</tr>
<tr>
<td>- Two Elective modules</td>
<td></td>
<td>- Classical Mechanics and Special Relativity</td>
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### YEAR 3

**FOCUS ON YOUR CHOSEN SUBJECT**

<table>
<thead>
<tr>
<th>MATHEMATICS</th>
<th></th>
<th><strong>APPLIED &amp; COMPUTATIONAL MATHEMATICS (OPTIONAL)</strong></th>
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<tbody>
<tr>
<td><strong>Topics include:</strong></td>
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<td><strong>Topics include:</strong></td>
</tr>
<tr>
<td>- Field and Galois Theory</td>
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<td>- Computational Science</td>
</tr>
<tr>
<td>- Functions of One Complex Variable</td>
<td></td>
<td>- Vector Integral and Differential Calculus</td>
</tr>
<tr>
<td>- Cryptography</td>
<td></td>
<td>- Oscillations and Waves</td>
</tr>
<tr>
<td>- Number Theory</td>
<td></td>
<td>- Classical Mechanics and Special Relativity</td>
</tr>
<tr>
<td>- Metric Spaces</td>
<td></td>
<td>- Two Elective modules</td>
</tr>
<tr>
<td>- Algorithms</td>
<td></td>
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<tr>
<td>- Set Theory</td>
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<tr>
<td>- Mathematical Logic</td>
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</table>

### YEAR 4

**REFINE YOUR KNOWLEDGE**

<table>
<thead>
<tr>
<th>MATHEMATICS</th>
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<th><strong>APPLIED &amp; COMPUTATIONAL MATHEMATICS (OPTIONAL)</strong></th>
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</thead>
<tbody>
<tr>
<td><strong>Topics include:</strong></td>
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<td><strong>Topics include:</strong></td>
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<tr>
<td>- Differential Geometry</td>
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<td>- Computational Science</td>
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<tr>
<td>- Combinatorics</td>
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<td>- Vector Integral and Differential Calculus</td>
</tr>
<tr>
<td>- Two Elective modules</td>
<td></td>
<td>- Oscillations and Waves</td>
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</table>

## BSc (Honours) Mathematics

<table>
<thead>
<tr>
<th><strong>MSc (Taught)</strong></th>
<th></th>
<th><strong>PhD</strong></th>
<th></th>
<th><strong>Industry</strong></th>
<th></th>
<th><strong>Conversion Courses</strong></th>
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</thead>
<tbody>
<tr>
<td>- MSc Mathematics</td>
<td></td>
<td>- Students can pursue a PhD in universities in Ireland or abroad</td>
<td></td>
<td>- Banking &amp; Finance</td>
<td></td>
<td>- Professional Master of Education (PME)</td>
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<tr>
<td>- MSc Mathematical Sciences</td>
<td></td>
<td></td>
<td></td>
<td>- Mathematical Modelling</td>
<td></td>
<td>- Masters in Actuarial Science</td>
</tr>
<tr>
<td>- MSc Actuarial Science</td>
<td></td>
<td></td>
<td></td>
<td>- Information and Communications Technology</td>
<td></td>
<td>- MSc Business Analytics</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>- Actuarial Science</td>
<td></td>
<td>- MSc Quantitative Finance</td>
</tr>
</tbody>
</table>

*See page 42 for more information on subject choices. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.

## CAO code: DN200 Option: Mathematical, Physical & Geological Sciences (MPG)

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

---

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*

---

**www.ucd.ie/myucd/mathematics**

---

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twitter.com/ucdscience
Mathematical Science

CAO code: DN200 Option: Mathematical, Physical & Geological Sciences (MPG)

Sample pathway for a degree in Mathematical Science *

<table>
<thead>
<tr>
<th>YEAR 1</th>
<th>ENGAGE WITH THE PRINCIPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATHEMATICS</td>
<td>Topics include:</td>
</tr>
<tr>
<td>- Calculus in the Mathematical and Physical Sciences</td>
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<tr>
<td>- Linear Algebra in the Mathematical and Physical Sciences</td>
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</tr>
<tr>
<td>- Mathematical Analysis</td>
<td></td>
</tr>
<tr>
<td>- Numbers &amp; Functions</td>
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</tr>
</tbody>
</table>

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

| STATISTICS | Topics include: |
| - Statistical Modelling |

<table>
<thead>
<tr>
<th>YEAR 2</th>
<th>CHOOSE YOUR SUBJECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATHEMATICAL SCIENCE</td>
<td>Topics include:</td>
</tr>
<tr>
<td>- Linear Algebra 2</td>
<td></td>
</tr>
<tr>
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</tr>
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<td>- Groups, Rings &amp; Fields</td>
<td></td>
</tr>
<tr>
<td>- Probability Theory</td>
<td></td>
</tr>
<tr>
<td>- Linear Models</td>
<td></td>
</tr>
</tbody>
</table>

| APPLIED & COMPUTATIONAL MATHEMATICS | Topics include: |
| - Vector Integral and Differential Calculus |
| - Computational Science |
| - Classical Mechanics and Special Relativity |
| - Inferential Statistics |

| STATISTICS | Topics include: |
| - Two Elective modules |
| One Small-Group Project |

<table>
<thead>
<tr>
<th>YEAR 3</th>
<th>FOCUS ON YOUR CHOSEN SUBJECT</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATHEMATICAL SCIENCE</td>
<td>Topics include:</td>
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<tr>
<td>- Metric Spaces</td>
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<tr>
<td>- Functions of One Complex Variable</td>
<td></td>
</tr>
<tr>
<td>- Time Series Analysis</td>
<td></td>
</tr>
</tbody>
</table>

| APPLIED & COMPUTATIONAL MATHEMATICS | Topics include: |
| - Foundations of Quantum Mechanics |
| - Foundations of Fluid Mechanics |
| - Advanced Computational Science |
| - Dynamical Systems |

| STATISTICS | Topics include: |
| - Two Elective modules |

<table>
<thead>
<tr>
<th>YEAR 4</th>
<th>REFINISH YOUR KNOWLEDGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATHEMATICAL SCIENCE</td>
<td>Topics include:</td>
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<tr>
<td>- Measure and Integration</td>
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<tr>
<td>- Field and Galois Theory</td>
<td></td>
</tr>
<tr>
<td>- Functional Analysis</td>
<td></td>
</tr>
</tbody>
</table>

| APPLIED & COMPUTATIONAL MATHEMATICS | Topics include: |
| - Relativistic Quantum Mechanics |
| - General Relativity and Cosmology |
| - Environmental Fluid Mechanics |

| STATISTICS | Topics include: |
| - Monte Carlo Inference |
| - Bayesian Analysis |
| - Applied Statistical Modelling |

<p>| BSc (Honours) Mathematical Science |</p>
<table>
<thead>
<tr>
<th>MSc (Taught)</th>
<th>PhD</th>
<th>Industry</th>
<th>Conversion Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>- MSc Mathematics</td>
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<td></td>
</tr>
<tr>
<td>- Actuarial Science</td>
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</tr>
</tbody>
</table>

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

*See page 42 for more information on subject choices. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.

Dr Kevin Hutchinson
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twitter.com/ucdscience

I hope to find a job in statistics where I can apply my statistical, data modelling skills and my applied maths modelling skills; I don’t really mind where I apply them – a short list of potential fields in which I could work includes finance, insurance, pharmaceutical companies, marketing, polling companies…anywhere there are data, they need statisticians!

Conor Cronin, Student

www.ucd.ie/myucd/mathematicalscience
Statistics

CAO code: DN200 Option: Mathematical, Physical & Geological Sciences (MPG)

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

www.ucd.ie/myucd/statistics

Professor Brendan Murphy
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twitter.com/ucdscience

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

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

YEAR 2

CHOOSE YOUR SUBJECTS

STATISTICS
Topics include:
- Probability Theory
- Inferential Statistics
- Linear Models

MATHMATICS
Topics include:
- Calculus of Several Variables
- Computational Science

YEAR 3

FOCUS ON YOUR CHOSEN SUBJECT

STATISTICS – Topics include:
- Statistical Data Mining
- Survey Sampling
- Linear Algebra 2

MATHMATICS
- Two Elective modules

YEAR 4

REFINE YOUR KNOWLEDGE

STATISTICS – Topics include:
- Stochastic Models
- Multivariate Analysis
- Monte Carlo Inference

MATHMATICS
- Two Elective modules

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 page 42 for more information on subject choices. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.
**Applied Mathematics and Mathematics Education**

CAO code: DN200  Option: Mathematical, Physical & Geological Sciences (MPG)

---

**Sample pathway to become an Applied Mathematics and Mathematics teacher**

**YEAR 1**

**EDUCATION**
Topics include:
- Teaching and Learning Mathematics

**APPLIED MATHEMATICS**
Topics include:
- Applied Mathematics: Mechanics and Methods
- Applications of Differential Equations

**MATHMATICS**
Topics include:
- Linear Algebra
- Numbers and Functions
- Calculus
- Mathematical Analysis
- Statistical Modelling

**YEAR 2**

**EDUCATION**
Topics include:
- Education Issues and Ideas
- Science and Mathematics Pedagogy

**APPLIED MATHEMATICS**
Topics include:
- Computational Science
- Vector, Integral and Differential Calculus
- Oscillations in Mechanical Systems
- Classical Mechanics and Special Relativity

**MATHMATICS**
Topics include:
- Calculus of Several Variables
- Groups, Rings and Fields
- Linear Algebra

**YEAR 3**

**EDUCATION**
Topics include:
- Collaborative Pedagogy in Mathematics Education
- Schools and Society

**SCHOOL PLACEMENT**
Topics include:
- Post-Primary Placement
- University – Peer-Assisted Tutoring

**APPLIED MATHEMATICS**
Topics include:
- Analytical Mechanics
- Fluid Mechanics

**MATHMATICS**
Topics include:
- Probability Theory
- Financial Maths
- Geometry
- History of Mathematics

**YEAR 4**

**PREPARE FOR PROFESSIONAL PRACTICE**

**EDUCATION**
Topics include:
- Pedagogical Approaches to Mathematics and Science
- Curriculum and Assessment
- Psychology for Teaching and Learning

**SCHOOL PLACEMENT**
Topics include:
- Year-Long Placement in Post-Primary School
- Classroom Teaching
- Broad Experience of Wider School Context

**APPLIED MATHEMATICS AND MATHEMATICS**
Topics include:
- Mathematical Biology
- Differential Equations with Computer Algebra

**YEAR 5**

**BSc Mathematics, Applied Mathematics and Education**

**PREPARE FOR PROFESSIONAL PRACTICE**

**EDUCATION**
Topics include:
- Research Methods
- Professional Dissertation

**SCHOOL PLACEMENT**
Topics include:
- Year-Long Placement in Post-Primary School
- Experience Both Teaching and Non-Teaching Activities
- Further Development of Professional Practice Portfolio

**MSc Mathematics and Science Education**

**QUALIFIED TO TEACH**

- Applied Mathematics Leaving Certificate
- Mathematics Leaving Certificate

---

*See page 42 for more information on subject choices. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.

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Dr Maria Meehan, Staff

www.ucd.ie/myucd/amathed

---
Actuarial & Financial Studies

CAO code: DN230

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

Choose Your Subjects

YEAR 2

ACTUARIAL & FINANCIAL STUDIES
Topics include:
- Principles of Finance
- Linear Models
- Analytics Modelling

YEAR 3

ACTUARIAL & FINANCIAL STUDIES
Topics include:
- Advanced Corporate Finance
- Models – Stochastic Models
- Time Series Analysis

Focus on Your Chosen Subject

YEAR 4

ACTUARIAL & FINANCIAL STUDIES
Topics include:
- Actuarial Risk Management
- Actuarial Statistics

Refine Your Knowledge

BAFS (Honours) Actuarial and Financial Studies

<table>
<thead>
<tr>
<th>Industry</th>
<th>PhD</th>
<th>Conversion Courses</th>
</tr>
</thead>
</table>
| - Insurance
  Actuarial Trainee in the following areas:
  - Life
  - Pensions
  - Health
  - General Insurance
  - Banking or Finance
  - Business Analyst
  - Financial Analyst | - Students can pursue a PhD in Ireland or abroad in areas as diverse as: Mathematics, Statistics and Actuarial studies | - MSc Computational Science
- MSc Mathematical Sciences
- MSc Mathematics
- MSc Statistics |

*See page 42 for more information on subject choices. 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

www.ucd.ie/myucd/actuarialandfinancialstudies

Dr Shane Whelan
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+353 1 716 2583
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twitter.com/ucdscience
Physics

CAO code: DN200 Option: Mathematical, Physical & Geological Sciences (MPG)

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

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

- 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

- Two Elective modules

BSc (Honours) Physics

MSc
- MSc NanoBio Science
- MSc Meteorology
- MSc Space Science and Technology
- MSc Research
- MSc Physics by Negotiated Learning
- 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 page 42 for more information on subject choices. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.

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

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

www.ucd.ie/myucd/physics
Physics with Astronomy & Space Science
CAO code: DN200 Option: Mathematical, Physical & Geological Sciences (MPG)

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

**Engage with the Principles**

**Year 1**
- **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

**Year 2**
- **Physics**
  - Topics include:
    - Students who choose Physics with Astronomy & Space Science as their main subject for second year also cover the requirements for Physics.

- **Elective modules**
- **Small-Group Project**

**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

- **Mathematics**
  - Topics include:
    - Calculus of Several Variables
    - Vector Integral & Differential Calculus
    - Computational Science

- **Elective modules**

**Focus on your chosen subject**

**Year 3**
- **Physics with Astronomy & Space Science**
  - Topics include:
    - Classical Mechanics & Relativity
    - Stellar Astrophysics & Astronomical Techniques
    - Nuclear Physics
    - Physics with Astronomy and Space Science Lab

- **Elective modules**

**Year 4**
- **Physics with Astronomy & Space Science**
  - Topics include:
    - General Relativity & Cosmology
    - Applied Quantum Mechanics
    - Condensed Matter Physics
    - Optics & Lasers
    - Computational Biophysics

- **Elective modules**

**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

**BSc (Honours) Physics with Astronomy & Space Science**

<table>
<thead>
<tr>
<th>MSc</th>
<th>PhD</th>
<th>Industry</th>
<th>Conversion Courses</th>
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</thead>
<tbody>
<tr>
<td>- MSc NanoBio Science</td>
<td>- 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</td>
<td>- Space Industry</td>
<td>- Professional Master of Education (PME)</td>
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<tr>
<td>- MSc Meteorology</td>
<td></td>
<td>- Medical Physics &amp; Biotechnology</td>
<td>- MA in Economics</td>
</tr>
<tr>
<td>- MSc Space Science and Technology</td>
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<td>- Energy Technology</td>
<td>- Graduate Medicine</td>
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<tr>
<td>- MSc Physics by Negotiated Learning</td>
<td></td>
<td>- Meteorology</td>
<td>- Master of Business Administration</td>
</tr>
<tr>
<td>- MSc Nanotechnology</td>
<td></td>
<td>- ICT Industry</td>
<td>- Master in Management</td>
</tr>
<tr>
<td>- MSc Applied Mathematics &amp; Computational Physics</td>
<td></td>
<td>- Financial Sector</td>
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</tr>
<tr>
<td>- MSc Computational Physics</td>
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<td>- Geoscience &amp; Exploration</td>
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<tr>
<td></td>
<td></td>
<td>- Material Science &amp; Nanotechnology</td>
<td></td>
</tr>
</tbody>
</table>

*See page 42 for more information on subject choices. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.*

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

www.ucd.ie/myucd/physicswithastronomyandspacescience

Professor Lorraine Hanlon & Dr John Quinn
UCD School of Physics
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+353 1 716 2214
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twitter.com/ucdscience
Theoretical Physics

CAO code: DN200 Option: Mathematical, Physical & Geological Sciences (MPG)

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

YEAR 2

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

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

- Two Elective modules
- One Small-Group Project

FOCUS ON YOUR CHOSEN SUBJECT

YEAR 3

PHYSICS
Topics include:
- Thermodynamics & Statistical Physics
- Quantum Mechanics
- Functions of One Complex Variable
- Advanced Laboratory

THEORETICAL PHYSICS – Topics include:

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

- Quantum Theory of Condensed Matter
- Projects in Theoretical Physics
- Computational Biophysics
- Relativistic Quantum Mechanics

YEAR 4

THEORETICAL PHYSICS – Topics include:

- Applied Quantum Mechanics
- Advanced Mathematical Methods
- High Energy Particle Physics
- Nuclear Physics
- General Relativity & Cosmology

- Theoretical Astrophysics
- Quantum Field Theory
- Advanced Statistical Physics

REFINE YOUR KNOWLEDGE

BSc (Honours) Theoretical Physics

MSc
- MSc NanoBio Science
- MSc Meteorology
- MSc Space Science and Technology
- MSc Research
- MSc Physics by Negotiated Learning
- 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 nanophysics, 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 page 42 for more information on subject choices. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.

“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

www.ucd.ie/myucd/theoreticalphysics
### Sample pathway to become a Physics and Mathematics teacher *

<table>
<thead>
<tr>
<th>YEAR 1</th>
<th>ENGAGE WITH THE PRINCIPLES</th>
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<tr>
<td>EDUCATION Topics include:</td>
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<tr>
<td>Teaching and Learning Mathematics</td>
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<td>PHYSICS Topics include:</td>
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<td>Foundations of Physics</td>
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<th>CHOOSE YOUR SUBJECTS</th>
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<td>Education Issues and Ideas</td>
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<td>Analysis</td>
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<th>YEAR 3</th>
<th>REFINISH YOUR KNOWLEDGE</th>
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<td>Collaborative Pedagogy in Mathematics Education</td>
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<td>Schools and Society</td>
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<td>SCHOOL PLACEMENT</td>
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<table>
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<tr>
<th>YEAR 4</th>
<th>PREPARE FOR PROFESSIONAL PRACTICE</th>
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<td>EDUCATION Topics include:</td>
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<td>Pedagogical Approaches to Mathematics and Science</td>
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<td>Curriculum and Assessment</td>
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<td>Year-Long Placement in Post-Primary School</td>
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<tr>
<td>Particle Physics</td>
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<td>Differential Equations with Computer Algebra</td>
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<table>
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<tr>
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<td>EDUCATION Topics include:</td>
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<td>Research Methods</td>
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<tr>
<td>Further Development of Professional Practice Portfolio</td>
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<table>
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<tr>
<th>MSc Mathematics and Science Education</th>
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<tbody>
<tr>
<td>Post-Primary School Teacher</td>
</tr>
<tr>
<td>Physics Leaving Certificate</td>
</tr>
<tr>
<td>Mathematics Leaving Certificate</td>
</tr>
<tr>
<td>Science Junior Certificate</td>
</tr>
</tbody>
</table>

*See page 42 for more information on subject choices. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.

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It is essential that there are more teachers of Mathematics and Science who are knowledgeable and passionate about their subjects. The Science and Mathematics Education pathways in DN200 will contribute to the next generation of well-qualified and innovative teachers.

Dr Aoiibhinn Ni Shúilleabháin, Staff

---

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+353 1 716 2581  
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www.ucd.ie/myucd/physmathed

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Students discussing how to prepare a Physics class.
Geology

CAO code: DN200 Option: Mathematical, Physical & Geological Sciences (MPG)

Sample pathway for a degree in Geology *

YEAR 1

**ENGAGE WITH THE PRINCIPLES**

<table>
<thead>
<tr>
<th>GEOLOGY</th>
<th>MATHEMATICS</th>
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<tbody>
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<td>Topics include:</td>
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<tr>
<td>- Introduction to Earth Sciences</td>
<td>- Mathematics for the Biological &amp; Chemical Sciences</td>
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<tr>
<td>- Earth Science &amp; Materials</td>
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<tr>
<td>- Geology in the Field</td>
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<td>- Interactions between People, the Environment and Geology</td>
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</table>

YEAR 2

**CHOOSE YOUR SUBJECTS**

<table>
<thead>
<tr>
<th>GEOLOGY</th>
<th>ENVIRONMENTAL BIOLOGY</th>
<th>CHEMISTRY</th>
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<td>Topics include:</td>
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<tr>
<td>- Sedimentology</td>
<td>- Chemistry for Biologists</td>
<td>- The Basis of Inorganic Chemistry</td>
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<tr>
<td>- Mineralogy &amp; Geochemistry</td>
<td>- Principles of Environmental Biology and Ecology</td>
<td>- Physical Chemistry</td>
</tr>
<tr>
<td>- Structural Geology &amp; Tectonics</td>
<td>OR</td>
<td>- Two Elective modules</td>
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<td>- Field Geology</td>
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<td>- Quantitative Geosciences</td>
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<td>- Global Environmental Change</td>
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YEAR 3

**FOCUS ON YOUR CHOSEN SUBJECT**

<table>
<thead>
<tr>
<th>GEOLOGY</th>
<th>ENVIRONMENTAL BIOLOGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Palaeobiology</td>
<td>- Precambrian Geology &amp; Geotectonics</td>
</tr>
<tr>
<td>- Earth Resources &amp; Applied Geology</td>
<td>- Igneous &amp; Metamorphic Petrology</td>
</tr>
<tr>
<td>- Environmental Geochemistry</td>
<td>- Sedimentary Environments</td>
</tr>
<tr>
<td>- Structural &amp; Petroleum Geology</td>
<td>- Field Geology &amp; Stratigraphy</td>
</tr>
</tbody>
</table>

YEAR 4

**REFINE YOUR KNOWLEDGE**

<table>
<thead>
<tr>
<th>GEOLOGY</th>
<th>ENVIRONMENTAL BIOLOGY</th>
<th>CHEMISTRY</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Basin Analysis</td>
<td>- Geobiology</td>
<td>- Geophysics and GIS</td>
</tr>
<tr>
<td>- Mapwork &amp; Orogenic Belts</td>
<td>- Field Work</td>
<td>- Research Seminars</td>
</tr>
<tr>
<td>- Petrology &amp; Ore Geology</td>
<td>- Field Mapping Research Project</td>
<td></td>
</tr>
</tbody>
</table>

BSc (Honours) Geology

<table>
<thead>
<tr>
<th>MSc (Taught)</th>
<th>PhD</th>
<th>Industry</th>
<th>Conversion Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>- MSc Petroleum Geoscience (UCD)</td>
<td>- 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</td>
<td>- Resources (oil and mineral exploration and development)</td>
<td>- Master of Business Administration</td>
</tr>
<tr>
<td>- MSc Hydrogeology*</td>
<td></td>
<td>- Environmental consultancy companies</td>
<td>- Master in Management</td>
</tr>
<tr>
<td>- MSc Engineering Geology*</td>
<td></td>
<td>- Hydrogeology and water resources</td>
<td></td>
</tr>
<tr>
<td>- MSc Environmental Geology*</td>
<td></td>
<td>- Geological Surveys, Environmental Protection Agencies</td>
<td></td>
</tr>
<tr>
<td>- MSc Oceanography*</td>
<td></td>
<td>- Engineering Geology</td>
<td></td>
</tr>
<tr>
<td>- MSc Mineral Exploration*</td>
<td></td>
<td>- Oceanography and Marine Geology</td>
<td></td>
</tr>
</tbody>
</table>

*Currently offered by several UK universities

*See page 42 for more information on subject choices. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.

AOIFE McKENNA, GRADUATE

“Following my BSc degree and Master’s in Environment Engineering Technology, I worked with an environmental planning consultancy in Ireland. I then relocated to the UK to work with a geo-environmental and geotechnical consultancy. I am currently enjoying living in Sydney and working with an international engineering consultancy on large-scale contaminated land remediation projects.”

AIOIFE MCKENNA, GRADUATE

www.ucd.ie/myucd/geology
Computer Science

CAO code: DN201

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

MATHMATICS
Topics include:
- Matrix Algebra
- Foundations of Mathematics for Computer Science
- Two Elective modules

YEAR 2

CHOOSE YOUR SUBJECTS

COMPUTER SCIENCE – Topics include:
- Data Structures & Algorithms
- Discrete Mathematics for Computer Science
- Software Engineering Project
- Linear Algebra
- Introductory Statistics
- 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

- Operating Systems
- Two Elective modules

YEAR 4

REFINE YOUR KNOWLEDGE

COMPUTER SCIENCE – Topics include:
- Computer Science Project
- AI for Games and Puzzles
- Information Systems

- Machine Learning
- Data Mining
- Multimed Security & Data Hiding

- Distributed Systems
- Advances in Wireless Networking
- Compiler Construction

MSc (Taught)

- MSc Computer Science (by negotiated learning)
- MSc Advanced Software Engineering
- MSc Digital Investigation & Forensic Computing
- MSc Cognitive Science

PhD

- Many graduates pursue PhD studies in Ireland and abroad in diverse areas such as:
  - Artificial Intelligence
  - Software and Systems Engineering
  - Networks and Distributed Systems

Conversion Courses

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

Industry

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

www.ucd.ie/myucd/computerscience

Ryan Kane, Student

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.

I chose

Professor Pádraig Cunningham
UCD School of Computer Science

CSBSc.CourseDirector@ucd.ie
+353 1 716 2483
facebook.com/UCDScience
twitter.com/ucdscience

*See page 42 for more information on subject choices. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.
Computer Science with Data Science
CAO code: DN201

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
  - *Two Elective modules
- **Mathematics**
  - Topics include:
    - Formal Foundations
    - Computer Science in Practice
    - Software Engineering Project
  - *Two Elective modules

**Year 2**

**Choose your Subjects**
- **Computer Science with Data Science**
  - Topics include:
    - Data Structures & Algorithms
    - Discrete Mathematics for Computer Science
    - Software Engineering Project
    - Linear Algebra
  - *Two Elective modules
- **Mathematics**
  - Topics include:
    - Introductory Statistics
    - Data Analysis
    - 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 Project
    - Data Science in Python
    - Introduction to Project Management
    - Unix Programming
  - *Two Elective modules
- **Mathematics**
  - Topics include:
    - Inferential Statistics
    - Probability Theory
    - Two Elective modules

**Year 4**

**Refine your Knowledge**
- **Computer Science with Data Science**
  - Topics include:
    - Data Science Project
    - Machine Learning
    - Cloud Computing (UG)
    - Data Mining
    - Information Visualisation
    - Collective Intelligence
  - *Two Elective modules
- **Mathematics**
  - Topics include:
    - Programming for Big Data
    - Networks and Internet Systems
    - Information Theory
    - Graphs & Networks
  - *Two Elective modules

**BSc (Honours) Computer Science with Data Science**

**MSC (Taught)**
- MSc Computer Science (by negotiated learning)
- MSc Advanced Software Engineering
- MSc Digital Investigation & Forensic Computing
- MSc Cognitive Science

**PhD**
- Many graduates pursue PhD studies in Ireland and abroad in diverse areas such as:
  - Artificial Intelligence
  - Software and Systems Engineering
  - Networks and Distributed Systems

**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 page 42 for more information on subject choices. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.

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

Professor Pádraig 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

[Contact information]

www.ucd.ie/myucd/computerscience datascience
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. This brochure details the application information for EU applicants who apply through the Central Applications Office, also known as the CAO. The CAO processes applications for undergraduate courses in Irish Higher Education Institutions (HEIs).

<table>
<thead>
<tr>
<th>CAO Code &amp; Degree Title</th>
<th>Minimum CAO Entry Points 2015</th>
<th>Minimum CAO Entry Points 2014</th>
<th>Minimum CAO Entry Points 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN200 Science BSc (Hons)</td>
<td>510</td>
<td>515</td>
<td>505</td>
</tr>
<tr>
<td>DN201 Computer Science BSc (Hons)</td>
<td>470</td>
<td>470</td>
<td>470</td>
</tr>
<tr>
<td>DN230 Actuarial and Financial Studies BAfs (Hons)</td>
<td>570</td>
<td>560</td>
<td>560</td>
</tr>
</tbody>
</table>

Information on Subject Choices

DN200 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.

DN200 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.

DN200 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.

DN200 Mathematics and Science Education Degrees

- To teach Junior Certificate Science, students must also take modules in Biology and Physics. These modules can be taken in Years 1, 2 or 3.
- At the end of Year 2, students who decide not to follow a career in teaching can pursue a degree in Chemistry.

Chemistry and Mathematics Education

- To teach Junior Certificate Science, students must also take modules in Biology and Chemistry. These modules can be taken in Years 1, 2 or 3.
- At the end of Year 2, students who decide not to follow a career in teaching can pursue a degree in Physics or Physics with Astronomy and Space Science, depending on the Physics modules they choose in Years 1 and 2.

Physics and Mathematics Education

- In Year 2, students must select a minimum of 2 subjects. The Year 2 subject combinations illustrate the most popular subject students choose to combine with Applied & Computational Mathematics.

Physics and Mathematics Education

- To teach Junior Certificate Science, students must also take modules in Biology and Chemistry. These modules can be taken in Years 1, 2 or 3.
- At the end of Year 2, students who decide not to follow a career in teaching can pursue a degree in Physics or Physics with Astronomy and Space Science, depending on the Physics modules they choose in Years 1 and 2.

Applied Mathematics and Mathematics Education

- In Year 2, students must select a minimum of 2 subjects. The Year 2 subject combinations illustrate the most popular subject students choose to combine with Applied & Computational Mathematics.

DN201 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.

DN230 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 C1 examination of the Institute of Actuaries, or the Faculty of Actuaries.
# UCD Science Events Calendar 2016/17

Create an account on [www.myucd.ie](http://www.myucd.ie) for further information and booking

<table>
<thead>
<tr>
<th>Event</th>
<th>Date &amp; Time</th>
<th>Audience</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCD Science Open Evening</td>
<td>18 October 5:30pm – 8:30pm</td>
<td>6th Years, A-Level students, FETAC applicants, mature applicants, guidance counsellors, parents and teachers</td>
</tr>
<tr>
<td>National Maths Week talks</td>
<td>20 October 6:00pm – 8:00pm</td>
<td>TY, 4th, 5th, 6th Years and A-Level students</td>
</tr>
<tr>
<td>UCD Open Day</td>
<td>5 November 10:00am – 4:00pm</td>
<td>6th Years, A-Level students, FETAC applicants, mature applicants, guidance counsellors, parents and teachers</td>
</tr>
<tr>
<td>UCD Physics Open Evening</td>
<td>8 November 5:30pm – 8:30pm</td>
<td>6th years, A-Level Students, mature applicants</td>
</tr>
<tr>
<td>UCD Chemistry Open Evening</td>
<td>15 November 5:30pm – 8:30pm</td>
<td>6th years, A-Level Students, mature applicants</td>
</tr>
<tr>
<td>UCD Computer Science Open Evening</td>
<td>22 November 5:30pm – 8:30pm</td>
<td>6th years, A-Level Students, mature applicants</td>
</tr>
<tr>
<td>UCD Mathematics, Statistics &amp; BAFS Open Evening</td>
<td>29 November 5:30pm – 8:30pm</td>
<td>6th years, A-Level Students, mature applicants</td>
</tr>
<tr>
<td>UCD Geology Workshop</td>
<td>26 November 10:00am – 4:00pm</td>
<td>5th, 6th years, A-Level Students</td>
</tr>
<tr>
<td>UCD Physics Transition Year Week</td>
<td>5 December – 9 December</td>
<td>TY, 4th Years</td>
</tr>
<tr>
<td>Mathematics Enrichment Classes</td>
<td>January – April Saturday mornings</td>
<td>TY, 4th, 5th, 6th Years</td>
</tr>
<tr>
<td>UCD Science Workshop Week</td>
<td>20 February – 24 February</td>
<td>TY, 4th, 5th, 6th Years</td>
</tr>
<tr>
<td>UCD Particle Physics Masterclass</td>
<td>13 March 9:30am – 4:00pm</td>
<td>TY, 4th Years</td>
</tr>
<tr>
<td>UCD Science, Computer Science &amp; BAFS Open Day</td>
<td>19 April 2:00pm – 4:00pm</td>
<td>6th Years Only</td>
</tr>
<tr>
<td>UCD Science Summer School</td>
<td>7 June 9:00am – 4:00pm</td>
<td>5th Years Only</td>
</tr>
<tr>
<td>UCD Computer Science Summer School</td>
<td>8 June 9:00am – 5:00pm</td>
<td>5th Years Only</td>
</tr>
</tbody>
</table>

Tours of the UCD O’Brien Centre for Science can be arranged for individuals or groups by contacting [gary.dunne@ucd.ie](mailto:gary.dunne@ucd.ie)
This booklet 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.

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E: orla.donoghue@ucd.ie