# UCD SCIENCE

## GRADUATE TAUGHT COURSES ENTRY 2023

Biotechnology, Biomedical, Pharmaceutical & Chemical Sciences
Geoscience, Natural Resources, Climate & Environment
Mathematics, Actuarial Science & Finance
Physics & Nanotechnology
Computer Science

# WELCOME TO UCD SCIENCE

University College Dublin has a long and proud history of education, research and high achievement. Set in the heart of the beautiful Belfield campus in south Dublin, the UCD O'Brien Centre for Science provides a vibrant and state-of-the-art centre of learning, welcoming students and staff from all corners of the world.

UCD boasts the most innovative and diverse Science programme in the country, providing knowledge in disciplines encompassing biology, chemistry, physics, geology and earth science, mathematics and computer science. Our academic staff are expert teachers and are highly reputed world-class researchers, and indeed our research interests and strengths inform our undergraduate and postgraduate degree courses.

UCD Science graduates are in great demand in Science and Science-related jobs both in Ireland and overseas, and an undergraduate degree in science lays strong foundations for a wide variety of careers.

The choice of university and course can be a daunting one, and this is something that we recognise at UCD.

In order to ensure that our university and degree courses are the right fit for your needs, we encourage all prospective students to engage with our series of events and to feel free to contact us if you have any queries. No problem is too trivial for us in this important phase of your career.

We look forward to welcoming you to UCD.

Jeremy C. Simpson

**Professor Jeremy Simpson**
Dean of Science

"UCD boasts the most innovative and diverse Science programme in the country, providing knowledge in disciplines encompassing biology, chemistry, physics, geology and earth science, mathematics and computer science."

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This booklet (Version 2 Entry 2023) 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. Version 2 Update: The MSc Mathematical Science, which was page 30 of Version 1, will not be offered for entry 2023.

# APPLYING TO A UCD GRADUATE COURSE

| | |
|---|---|
| **How do I apply?** | UCD's Graduate Taught courses can be applied for online at **www.ucd.ie/apply**. Courses open for application on 1 October each year and generally remain open for applications until all places are filled. A summary of the process is on the UCD Graduate Admissions website at **www.ucd.ie/graduateadmissions/applytoucd** |
| **When are offers of places made?** | UCD has a rolling admissions policy for graduate taught courses, with decisions issued as soon as possible after a complete application is received. An application is incomplete until you provide all required items on the checklist (including the application fee, if applicable). Generally, courses will remain open to applications until all places are filled. |
| **Are there any scholarships available?** | Student excellence and achievement are recognised in UCD, through a variety of scholarships and awards. Applicants should visit the UCD Graduate Admissions website at **www.ucd.ie/graduateadmissions/feesfundingscholarships** for information. |
| **Where can I find information on fees and accommodation?** | Information is available from the following:<br>• The Fees & Grants website at **www.ucd.ie/students/fees** has answers to many frequently asked questions.<br>• The UCD Residences website at **www.ucd.ie/residences** has information and advice about the accommodation process. |
| **How do I get in contact for more information?** | You can contact us in the following ways:<br>• All applicants are welcome to email the academic or staff member associated with each course. Contact information for each course is at the end of the course pages.<br>• International applicants can email **internationalenquiries@ucd.ie** to speak to UCD Global staff for advice on general admissions queries, fees, visas, accommodation and course information. |

# JARGON BUSTER

## Academic Terms

**MSc**

Master of Science

**Graduate Taught Courses**

Graduate taught courses, such as Graduate Certificates, Graduate Diplomas or taught MA or MSc courses are usually taken by students who hold an undergraduate degree. The majority of the course will involve taking taught modules.

**Research Degrees**

A research degree such as a Masters by Research or PhD involves the sustained and in-depth study of a specific subject, which is then written up as a thesis for examination. Research degrees involve students carrying out their own research and academic study under the one-to-one supervision of an academic supervisor. Masters by Research are typically 1-2 years in duration whereas a PhD is 4 years.

**Negotiated Learning (NL)**

Courses using the negotiated learning (NL) format allow students a high degree of flexibility in terms of module choices allowing "customisation" of the degree. Students meet with an academic to discuss their background and goals to create their academic plan which is customised to the individual student needs and their prior learning experiences.

**Trimester**

The academic year is divided into trimesters – Autumn, Spring and Summer.

## Information on Classes

**Module**

A self-contained unit of teaching and learning, which is usually studied within one trimester. Modules are usually 5 credits. A standard 5-credit UCD module represents 100-125 hours of student effort including time spent in class, studying and assessment.

**Practicals**

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

**Tutorials**

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

**Credit**

This is a standard way of representing the amount of student effort, the achievement of learning outcomes and educational activity associated with a module. UCD utilises the European Credit Transfer System (ECTS).

The ECTS was developed to facilitate educational mobility for students and inter-institutional cooperation amongst higher education institutions within the European Union.

# INTERNSHIPS AND PROFESSIONAL EXPERIENCE AT A GLANCE

Each section includes the main areas that students have gained experience in through internships or professional experience and reflect the main sectors that graduates work in.

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

**Degrees**

- MSc Biotechnology
- MSc Biotechnology & Business
- MSc Biotherapeutics
- MSc Biotherapeutics & Business
- MSc Chemistry (NL)*
- MSc Synthetic Chemistry for the Pharmaceutical & Fine Chemicals Industry
- MSc Regulatory Affairs & Toxicology
- MSc Biological & Biomolecular Science (NL)*
- MSc Plant Biology & Biotechnology
- MSc Medical Physics

**Examples of Internships/ Professional Experience**

### MSc Biotechnology

- Alexion Pharmaceuticals
- Bristol Myres Squibb
- AstraZeneca
- BD
- MSD
- Pfizer
- Biosensia Ltd
- Jazz Pharmaceuticals
- Alltech
- ICON plc
- Assay Genie

### MSc Regulatory Affairs & Toxicology

- Novartis
- Health Products Regulatory Authority
- Perigord Life Science Solutions
- Food Safety Authority of Ireland
- Medical Bureau of Road Safety
- Forensic Science Ireland
- Pfizer
- Alexion Pharmaceuticals
- Deenamic Ltd
- Aspen Pharmacare
- Life Scientific
- Boston Scientific
- BD

## Geoscience, Natural Resources, Climate & Environment

**Degrees**

- MSc Applied Environmental Science
- MSc Environmental Sustainability (Online/NL)*
- MSc Global Change: Ecosystem Science & Policy
- MSc Plant Biology & Biotechnology
- MSc Subsurface Characterisation & Geomodelling

**Examples of Internships/ Professional Experience**

### MSc Applied Environmental Science

- RPS Group
- Dublin City Council
- Minerex Environmental Ltd
- Department of Agriculture, Food and the Marine
- Golder Associates
- Dublin Urban Rivers Life Project

### MSc Global Change: Ecosystem Science & Policy

- BiOrbic
- Kildare County Council
- Sonairte
- An Taisce
- The RISE Foundation

** Negotiated Learning*

## Computing, Risk, Finance & Analytics

**Degrees**

- MSc Computer Science (NL)*
- MSc Computer Science (Conversion)
- MSc Forensic Computing & Cybercrime Investigation
- MSc Actuarial Science
- MSc Statistics
- MSc Computational Physics
- MSc Applied Mathematics & Theoretical Physics
- MSc Data Analytics (Online)
- MSc Data & Computational Science
- MSc Financial Mathematics

**Examples of Internships/ Professional Experience**

**MSc Computer Science (NL)**

- Amazon
- SAP
- Dell
- Ericsson
- HubSpot
- Geowox
- FoodMarble
- HealthBeacon
- Autodesk
- Microsoft
- Equifax
- Groupon
- Workday
- Honeywell
- Intel
- Shutterstock

**MSc Actuarial Science**

- Allianz
- AIG
- Canada Life
- Central Bank of Ireland
- Irish Life
- Mercer
- New Ireland Assurance
- Liberty Mutual
- Greenval Insurance

## Semiconductor, Nanotechnology, Meteorology & Space Industry

**Degrees**

- MSc Space Science & Technology
- MSc Computational Physics
- MSc Applied Mathematics & Theoretical Physics
- MSc Nanotechnology
- MSc NanoBio Science
- MSc Nanomaterials Chemistry
- MSc Physics (NL)*
- MSc Medical Physics

**Examples of Internships/ Professional Experience**

**MSc Space Science & Technology**

- European Space Agency
- European Astronaut Centre
- cosine (Netherlands)
- German Aerospace Center
- Réaltra Space Systems Engineering
- ICEYE
- Skytek Ltd
- Eblana Photonics Ltd
- Arralis Ltd
- ispace
- Mindseed

## Further Education and Research

**Degrees**

MSc degrees can lead to a variety of PhD programmes as well as conversion courses. Depending on the degree, examples of roles include:

- PhD scientist working in industry
- Postdoctoral researcher working in academia

*The internships listed are examples of past placements and are a guide only. Placements are secured through a competitive process and are not guaranteed.*

# INTERNSHIP EXPERIENCES

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

I was afforded the opportunity to work as a Toxicology and Regulatory Affairs Consultant and Researcher in the European Parliament Environment, Public Health & Food Safety Committee. This experience proved to be an invaluable one as it played a large part in my success in getting employed shortly after completing the course.

**Stephanie Earl**
MSc Regulatory Affairs & Toxicology

The course provided me with the opportunity to work as a bulk drug substance technical services intern with Alexion Pharmaceuticals. The technical and cultural experience I gained during the 6-month internship was indispensable in shaping my career path and being successfully rehired after completing my course.

**Kara O'Connor**
MSc Biotechnology

## Geoscience, Natural Resources, Climate & Environment

The MSc coursework paired with my six-week placement at Dublin City Council prepared me for a career in the environmental sector, and gave me proficiency in the collection, processing, analyses, and interpretation of environmental data. The well-rounded curriculum, hands-on field work, and supportive professors at UCD ensured I was well equipped for the competitive job market.

**Betsy Townsend**
MSc Applied Environmental Science

I undertook an internship as an Environmental Scientist with RPS Group, an engineering consultancy firm. The internship provided me with a working knowledge of carrying out Environmental Impact Assessment Reports and introduced me to an environmental consulting environment. The position enabled me to secure a position as a Graduate Environmental Scientist upon completion of the Master's degree.

**Yana Bersunukayeva**
MSc Global Change: Ecosystem Science & Policy

## Semiconductor, Nanotechnology, Meteorology & Space Industry

During my internship in the Flight Software Systems section at ESTEC I designed and tested control software for CHIMERA, a payload of RadCube, a Hungarian CubeSat launched in July 2021. I developed software to detect radiation-induced memory upsets and to test communication between two ultra-wideband radio modules. Following my internship, I was accepted into ESA's Young Graduate Trainee programme, returning to the Flight Software Systems section.

**Meadhbh Griffin**
MSc Space Science & Technology

My internship at InnaLabs Ltd., a world-leading inertial sensors manufacturer, was an amazing learning opportunity that offered me a valuable industrial experience, complementing the knowledge gained in classrooms. Following my internship, I've been hired by InnaLabs as a software engineer to continue to work on its lineup of exciting space projects with ESA and many other customers.

**Rabin William**
MSc Space Science & Technology

## Computing, Risk, Finance & Analytics

Interning at the Central Bank of Ireland was a perfect internship. By working at the regulatory agency, I had the unique opportunity to see a wide variety of actuarial work and, as a result, gain a very broad range of practical actuarial experience. Through my internship with the Central Bank, I have gained the preparation to be successful in my future career as an actuary.

**Shannon McDonnell**
MSc Actuarial Science

The experience at Oliver Wyman Labs has been extremely satisfying thanks to my mentors who are experts in their field. The team that I am a part of has a mix of people from different countries, cultures and varied technical backgrounds and years of experience. I am currently working on designing and developing intelligent crew dashboards for some of Europe's leading airline companies. This experience is the perfect platform to apply what I learnt in the classroom and see how the end project will have an impact in the aviation industry.

**Yash Karle**
MSc Computer Science (Negotiated Learning)

# The Business of **Science & IT** In Ireland

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

**430+**
Global financial institutions have established operations in Ireland, located in Dublin's International Financial Services Centre

**14 OF THE TOP 15**
Medical Technology Companies have Irish operations according to IDA Ireland

**6 OF THE TOP 10**
Worldwide security software companies are located in Ireland

**THE TOP 5**
Global Software Companies are based in Ireland

## Over 1200 multinational corporations have chosen Ireland as their strategic European base

- Accenture
- Airbnb
- Apple
- Dell
- eBay
- Meta
- Google
- HP
- IBM
- Intel
- LinkedIn
- Microsoft
- Salesforce
- Stripe
- Twitter

## 20 of the top 25 global institutions for the financial sector are based in Ireland

- Allianz
- AIG
- Bank of America
- Barclays
- Citco
- Citi
- HSBC
- J.P. Morgan
- PayPal
- Zurich

## 9 of the top 10 global pharmaceutical companies are located in Ireland

Ireland is home to operations by some of the world's leading pharmaceutical, biotechnology and medical devices companies making some of the world's blockbuster medicines

- Abbott
- AbbVie
- Allergan
- Amgen
- GSK
- Johnson & Johnson
- Eli Lilly and Co.
- Medtronic
- MSD
- Novartis
- Pfizer
- Roche
- Sanofi

# MEET OUR **GRADUATES**

A diverse range of careers are available to UCD Science and Computer Science graduates. Depending on your chosen course, you will learn practical skills which can be transferred to industry and research ranging from biotechnology, conservation, natural resources and wildlife to business, space science, technology, financial services and insurance.

**COURTNEY GREENE**
MSC BIOTECHNOLOGY & BUSINESS

**"the MSc Biotechnology & Business course was crucial for my future success"**

As I wanted to work in regulatory management and approval of drugs, the MSc Biotechnology & Business course was crucial for my future success in the pharmaceutical and biotechnology industry. During the Summer Trimester, we had the opportunity to work with a real biotechnology start-up and essentially create a business plan for a molecule, drug or medical device that they were working to bring to market. We presented the business plan to real investors to see if they would be willing to invest hypothetically had this been a real-world scenario. I'm currently working as a Clinical Research Coordinator in paediatric clinical trials across Children's Health Ireland at Crumlin and Temple Street Hospital. I work as part of a multidisciplinary team of researchers, consultants and investigators on both clinical trials and investigator led research studies in cystic fibrosis.

**YANA BERSUNUKAYEVA**
MSC GLOBAL CHANGE: ECOSYSTEM SCIENCE & POLICY

**"This course was an ideal solution to fill in my knowledge gap in environmental policy and law"**

Having completed my undergraduate degree in Environmental Science I gained an invaluable practical approach to the subject. However, I wanted to gain knowledge in the policy aspect of environment. This course was an ideal solution to fill in my knowledge gap in environmental policy and law while also providing me with an opportunity to study abroad in Giessen, Germany. Additionally, as part of the course, I chose to undertake my 2-month internship as an environmental scientist with RPS Group, an engineering consultancy firm. The internship provided me with a working knowledge of carrying out Environmental Impact Assessment Reports (EIARs) and introduced me to an environmental consulting environment. The internship position enabled me to secure a position of Graduate Environmental Scientist upon completion of the course.

**TROY TYSON**
MSC ACTUARIAL SCIENCE

**"It gave me an insight into the typical day of an actuary working in the life insurance sector"**

This course gave me the opportunity to acquire exemptions from the professional examinations of the Institute and Faculty of Actuaries, which are mandatory to become a fully qualified actuary. The research placement portion of the year for me was extremely beneficial with regards to my career as an actuary. It gave me an insight into the typical day of an actuary working in the life insurance sector. I would highly recommend the UCD MSc in Actuarial Science to those in search of a challenging yet rewarding year and looking for the perfect launching pad to their career as an actuary.

**YASH KARLE**
MSC COMPUTER SCIENCE
(NEGOTIATED LEARNING)

**"The perfect platform to apply what I learnt in the classroom and see how the end project will have an impact in the aviation industry."**

The experience at Oliver Wyman Labs has been extremely satisfying thanks to my mentors who are experts in their field. The team that I am a part of has a mix of people from different countries, cultures and varied technical backgrounds and years of experience. I am currently working on designing and developing intelligent crew dash-boards for some of Europe's leading airline companies. This experience is the perfect platform to apply what I learnt in the classroom and see how the end project will have an impact in the aviation industry.

**HANNAH CURRIVAN**
MSC SPACE SCIENCE
& TECHNOLOGY

**"The technical writing skills was the biggest benefit from the course"**

After a placement on the build of Ireland first radio telescope "I-LOFAR", I wanted to continue my career in the area of space. The core modules that I most enjoyed were Satellite Subsystems, Space Sector Professional Skills, and the Space Sector Internship. These modules have helped a lot working in the space industry. For the Space Sector Internship module, I completed a placement with Réaltra Space Systems Engineering. This is where I wrote my master's thesis on "The Reliability Model of the European Space Agency (ESA) PLATO (PLAnetary Transits and Oscillations of stars) mission PLIU (Payload Interface Unit) test breadboard." The technical writing skills was the biggest benefit from the course. Besides carrying out experiments and design of new products, writing highly technical documents is a really important part of working in the space industry. I currently work for InnaLabs ltd as a Space Reliability Engineer working on multiple space products for customers such as ESA, Airbus, Thales, and OHB SE.


**NIAMH CROWLEY**
MSC COMPUTER SCIENCE
(CONVERSION)

**"In the space of 16 busy months, you are taken from the basics to being industry ready"**

I have always had an interest in computers and problem solving but with an undergraduate degree in Primary teaching, I had very little knowledge or experience in the world of technology. I chose the conversion course in UCD for two main reasons: the course didn't focus on one specific area of Computer Science but covered a wide range of topics, and it required no prior understanding of any of these topics and promised to start from the basics. This was important to me as it allowed me to gain experience in many areas such as programming, software engineering, and data analytics. I gained so much experience and confidence from completing this course. In the space of 16 busy months, you are taken from the basics to being industry ready. The content is organised so each module builds on the last and come the Research Practicum in the Summer Trimester, you are ready to tackle a real-world engineering problem with all the knowledge you have accumulated during the course. Upon graduating, I joined the software engineering graduate programme with Accenture and am now working as a software engineer with one of their clients.

University College Dublin
Ireland's Global University

Course code:
X439

BIOTECHNOLOGY, BIOMEDICAL, PHARMACEUTICAL & CHEMICAL SCIENCES

# MSc Biotechnology

1 Year Full Time

Biotechnology encompasses all aspects of the industrial application of living organisms and/or biological techniques. Ireland has an enviable biotechnology sector and is home to 9 of the top 10 global pharmaceutical companies.

The MSc Biotechnology is taught by leading academics in the UCD School of Biomolecular and Biomedical Science. It focuses on broadening your knowledge and understanding of the current technologies and processes in the biotechnology industry, including approaches being applied to further advance the discovery and design of new and highly innovative biotech and pharmaceutical products. It also provides modules on food and environmental biotechnology, as well as industrially relevant expertise in bioprocess technology, regulatory affairs and clinical trials.

In the Summer Trimester you will either complete an internship in a relevant biotechnology company or conduct a research project in the UCD School of Biomolecular and Biomedical Science.

## Course Content and Structure

**90 CREDITS** Taught Masters = **60 CREDITS** Taught Modules + **30 CREDITS** Individual Research Project or Internship

### Modules and Topics (Subject to change and are not guaranteed by UCD)

#### Core Modules

- Biological Imaging
- Multicellular Systems
- Pharmacology and Drug Development
- Medical Device Technology
- Biomedical Diagnostics
- Recombinant DNA Technology
- Food Biotechnology
- Microbial and Animal Cell Culture
- Environmental Biotechnology
- Regulatory Affairs
- Drug Development and Clinical Trials
- Bioprocessing Laboratory Technology

#### Assessment

- Your work will be assessed using a variety of methods including coursework, group and individual reports, written and online exams, and presentations.

## Career Opportunities

This advanced graduate degree in Biotechnology has been developed in consultation with employers and therefore is recognised and valued by them. A key feature is the opportunity to carry out a project in industry which will allow graduates to develop connections with prospective employers, thereby enhancing chances of employment on graduation. You will also have the opportunity to become part of a network of alumni in the field of Biotechnology.

Prospective employers include: Abbott; Allergan; Amgen; Baxter Healthcare; Beckman Coulter; Biotrin International Ltd.; Boston Scientific; Elan Corporation; Eli Lilly and Co.; Celltech; GSK; Icon Clinical Research; Johnson & Johnson Ltd.; Kerry Group Plc.; MSD; Quintiles; Sandoz; Serology Ltd.

## Applicant Profile

- Candidates are expected to have an upper second class honours grade, or international equivalent, in a biology or chemistry primary degree with a significant laboratory component. This includes a BSc in Biotechnology, Biochemistry, Microbiology, Genetics, Neuroscience, Pharmacology, Physiology, Medicinal Chemistry or an equivalent qualification. Graduates with equivalent qualifications in related areas of science and technology or with proven relevant industrial experience will be considered for places.
- Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent, such as TOEFL (iBT) score of 90 or PTE score of 63. Visit the UCD Admissions website for further details. Applicants with an IELTS score of at least 5.5 may apply for admission to the UCD Pre-Masters Pathway programme.

## Graduate Testimonial

**Craig Jakes,**
Research Assistant at NIBRT (National Institute for Bioprocessing Research and Training)

For my summer research project I was offered the opportunity to conduct research in the Food Safety Authority of Ireland (FSAI). My research looked into zoonosis trends in Ireland, which all EU countries are required to monitor. After finishing my research project, I secured employment as a regulatory affairs officer with a scientific company.

## EU Enquiries

**Professor Cormac Murphy**
UCD School of Biomolecular and Biomedical Science
biotech@ucd.ie
www.ucd.ie/courses/msc-biotechnology

## Non-EU Enquiries

internationalenquiries@ucd.ie
www.ucd.ie/global

## Apply Now

This programme receives significant interest so please apply early online at

**www.ucd.ie/apply**



V1 2023

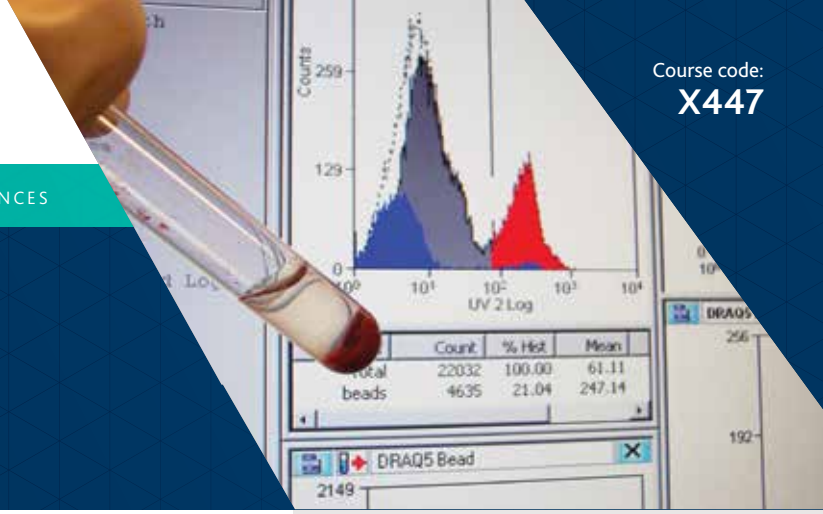
University College Dublin
Ireland's Global University

Course code:
**X447**

BIOTECHNOLOGY, BIOMEDICAL, PHARMACEUTICAL & CHEMICAL SCIENCES

# MSc Biotechnology & Business

1 Year Full Time




Biotechnology encompasses all aspects of the industrial application of living organisms and/or biological techniques. Ireland has an enviable biotechnology sector and is home to 9 of the top 10 global pharmaceutical companies. The MSc Biotechnology & Business is an exciting programme designed for non-business graduates who want to become managers or entrepreneurs in complex business environments in technology and science-based fields.

The MSc Biotechnology & Business provides you with a solid grounding in the science underpinning biotechnology coupled with a comprehensive business education. The programme is the result of a close collaboration between the UCD School of Biomolecular and Biomedical Science and the UCD Michael Smurfit Graduate Business School, which is Ireland's leading business school.

## Course Content and Structure

**90 CREDITS** Taught Masters = **70 CREDITS** Taught Modules + **20 CREDITS** Group Business Plan Research Project

You will spend 50% of your time studying biotechnology and 50% of your time studying business. You may choose optional biotechnology modules to ensure that you specialise in your area of interest. Depending on your chosen subjects you will also gain experimental and theoretical knowledge in the following topics:

### Modules and Topics (Subject to change and are not guaranteed by UCD)

#### Core Modules

- Biotech Case Study
- Professional Career Development
- Business Strategy
- The Business of Biotechnology and Science
- Feasability and Business Plan
- Teams in Biotech Enterprise
- Corporate Finance
- Marketing Management
- Regulatory Affairs in Science

#### Option Modules

- Biomedical Diagnostics and Devices
- Recombinant DNA Technology
- Microbial and Animal Cell Products
- Emerging Issues in Biotechnology
- Food Biotechnology
- Environment Biotechnology

## Career Opportunities

This advanced graduate degree in Biotechnology and Business has been developed in consultation with employers and therefore will be recognised and valued by them. A key feature is the opportunity to carry out a business development plan which will allow graduates to develop connections with prospective employers.

Prospective employers include: Abbott; Allergan; Alpha Technologies; Amgen; Avonmore Foods; Baxter Healthcare; Beckman Coulter; Biotrin International Ltd.; Boston Scientific; Elan Corporation; Eli Lilly and Co.; Celltech; GSK; Icon Clinical Research; ImmunoGen Inc.; Janssen Pharmaceutical Ltd.; Johnson & Johnson Ltd.; Kerry Group Plc.; Medtronic; MSD; Olympus Diagnostica; Quintiles; Quest International; Sandoz.; Seroba Life Sciences; Serology Ltd.

## Applicant Profile

- This programme is intended for applicants with a BSc in a biology- or chemistry-related discipline. An upper second class honours or international equivalent is required.
- Graduates with equivalent qualifications in related areas of science and technology or with proven relevant industrial experience will be considered for places.
- Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent, such as TOEFL (iBT) score of 90 or PTE score of 63. Visit the UCD Admissions website for further details. Applicants with an IELTS score of at least 5.5 may apply for admission to the UCD Pre-Masters Pathway programme.

## Graduate Testimonial

**Jennifer McKeever,**
Senior Analyst at Seroba Life Sciences

During the MSc in Biotechnology & Business, I broadened my knowledge in key modules including medical devices, diagnostics and regulatory affairs, while also developing core business skills in finance, marketing and management. The highlight was developing a business plan for a NovaUCD start-up company. I am currently working as an Investment Analyst in a life sciences venture capital firm.

## EU Enquiries

**Dr Antonio Garzon Vico**
UCD School of Biomolecular and Biomedical Science
biotech@ucd.ie
www.ucd.ie/courses/msc-biotechnology-and-business

## Non-EU Enquiries

internationalenquiries@ucd.ie
www.ucd.ie/global

## Apply Now

This programme receives significant interest so please apply early online at

**www.ucd.ie/apply**



V1 2023

University College Dublin
Ireland's Global University

Course code:
**F102**

BIOTECHNOLOGY, BIOMEDICAL, PHARMACEUTICAL & CHEMICAL SCIENCES

# MSc Biotherapeutics

1 Year Full Time

The MSc in Biotherapeutics educates students on the practical uses of molecular advances in the discovery of protein and other biomolecular drug candidates and their development into biotherapeutics. It will provide you with a comprehensive understanding of the development of biotherapeutics, beginning with pre-clinical modelling and target identification together with antibody engineering, biochemical and biophysical characterisation, and development issues for bioprocessing.

Systems biology of biotechnological processes and approaches to the analysis of proteomics-based discovery data will be covered in detail together with mathematical modelling, bioinformatics analysis and data integration strategies. Regulatory issues and innovation and commercialisation strategies will also be covered. A practical 6-month drug discovery laboratory project will form a significant component of the experience of how drug candidates are identified and brought through the development pipeline.

## Course Content and Structure

**90 CREDITS** Taught Masters = **45 CREDITS** Taught Modules + **45 CREDITS** Project

### Modules and Topics (Subject to change and are not guaranteed by UCD)

#### Autumn Trimester

- Biotherapeutic Discovery and Development I
- Professional Career Development
- Recombinant DNA Technology
- Business of Biotechnology and Science
- Biomedical Diagnostics
- Pharmacology and Drug Development

#### Spring and Summer Trimesters

- Biotherapeutic Discovery and Development II
- Systems Biology in Drug Development
- Professional Career Development
- Bioprocessing Laboratory
- Emerging Issues in Biotechnology
- Regulatory Affairs
- Microbial and Animal Cell Products
- Project – Biotherapeutic Development
- High Content Screening Microscopy

## Career Opportunities

This advanced graduate degree in Biotherapeutics has been developed in consultation with the Biopharmaceutical industry and is recognised and valued by them. A key feature is the undertaking of a significant drug discovery and development laboratory project which is reviewed by industry partners. This engagement is designed to help graduates identify opportunities in the industry at the earliest stage.

Prospective employers include: Novartis, GSK, Eli Lilly and Co., Johnson & Johnson Ltd., Pfizer, Janssen Biologics, AstraZeneca, MSD, Bristol Myers Squibb, Abbott, Sanofi.

## Applicant Profile

- This programme is intended for applicants who have an upper second class honours degree, or the international equivalent, in a biological or chemical science.
- This includes a BSc in Biotechnology, Biochemistry, Microbiology, Genetics, Neuroscience, Physiology, Pharmacology, Medicinal Chemistry or an equivalent qualification.
- Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent, such as TOEFL (iBT) score of 90 or PTE score of 63. Visit the UCD Admissions website for further details. Applicants with an IELTS score of at least 5.5 may apply for admission to the UCD Pre-Masters Pathway programme.

## Faculty Profile

**Associate Professor David O'Connell**
Lecturer in Biochemistry & Pharmacology

My core research focus is on the activity of calcium-binding proteins involved in homeostatic mechanisms in the cell using an integrated platform of proteomic technologies. I have patented a novel affinity tag platform for improved protein immobilisation for purification, biophysical analysis and detection in multiple biopharmaceutical applications.

## EU Enquiries

**Professor Keith Murphy**
UCD School of Biomolecular and Biomedical Science
biotech@ucd.ie
www.ucd.ie/courses/msc-biotherapeutics

## Non-EU Enquiries

internationalenquiries@ucd.ie
www.ucd.ie/global

## Apply Now

This programme receives significant interest so please apply early online at

**www.ucd.ie/apply**



V1 2023

University College Dublin
Ireland's Global University

Course code:
**F103**

BIOTECHNOLOGY, BIOMEDICAL, PHARMACEUTICAL & CHEMICAL SCIENCES

# MSc Biotherapeutics & Business

1 Year Full Time

The MSc in Biotherapeutics and Business educates students on the practical uses of molecular advances in the discovery of proteins and other biomolecular drug candidates and their development into biotherapeutics. It will provide you with a comprehensive understanding of the development of biotherapeutics, beginning with pre-clinical modelling and target identification together with antibody engineering, biochemical and biophysical characterisation, and development issues for bioprocessing.

Regulatory issues, and innovation and commercialisation strategies, will also be covered. You will also receive a comprehensive business education. You will learn to identify and solve business problems in local and international settings, enhance your communication and leadership skills, and improve your ability for independent thinking and developing creative solutions.

## Course Content and Structure

**90 CREDITS** Taught Masters = **60 CREDITS** Taught Modules + **30 CREDITS** Project Modules

### Modules and Topics (Subject to change and are not guaranteed by UCD)

#### Core Modules

- Professional Career Development
- Business Strategy
- The Business of Biotechnology and Science
- Feasability and Business Plan
- Teams in Biotech Enterprise
- Corporate Finance
- Marketing Management
- Biotherapeutic Pipeline 1
- Biotherapeutic Pipeline 2
- Systems Biology in Drug Development
- Biotherapeutics Case Study

#### Option Modules

- Biomedical Diagnostics and Devices
- HCS Microscopy
- Recombinant DNA Technology
- Microbial and Animal Cell Products
- Emerging Issues in Biotechnology
- Regulatory Affairs in Science

## Career Opportunities

This advanced graduate degree in Biotherapeutics and Business has been developed in consultation with employers and therefore will be recognised and valued by them. A key feature is the opportunity to carry out a business development plan, which will allow graduates to develop connections with prospective employers, thereby enhancing chances of employment on graduation.

Prospective employers include: Abbott; Allergan; Amgen; Baxter Healthcare; Eli Lilly and Co.; Dignity Sciences; GSK; Icon Clinical Research; ImmunoGen Inc.; Janssen Pharmaceutical Ltd.; Johnson & Johnson Ltd.; MSD; Quintiles; Quest International; Sandoz; Seroba Life Sciences.

## Applicant Profile

- This programme is intended for applicants who have an upper second class honours degree, or the international equivalent, in a biological or chemical science.
- This includes a BSc in Biotechnology, Biochemistry, Microbiology, Genetics, Neuroscience, Physiology, Pharmacology, Medicinal Chemistry or an equivalent qualification.
- Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent, such as TOEFL (iBT) score of 90 or PTE score of 63. Visit the UCD Admissions website for further details. Applicants with an IELTS score of at least 5.5 may apply for admission to the UCD Pre-Masters Pathway programme.

## Faculty Profile

**Associate Professor David O'Connell**
Lecturer in Biochemistry & Pharmacology

My core research focus is on the activity of calcium-binding proteins involved in homeostatic mechanisms in the cell using an integrated platform of proteomic technologies. I have patented a novel affinity tag platform for improved protein immobilisation for purification, biophysical analysis and detection in multiple biopharmaceutical applications.

## EU Enquiries

**Dr Antonio Garzon Vico**
UCD School of Biomolecular and Biomedical Science
biotech@ucd.ie
www.ucd.ie/courses/biotherapeutics-business

## Non-EU Enquiries

internationalenquiries@ucd.ie
www.ucd.ie/global

## Apply Now

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V1 2023

University College Dublin
Ireland's Global University

Course code:
**F080**

BIOTECHNOLOGY, BIOMEDICAL, PHARMACEUTICAL & CHEMICAL SCIENCES

# MSc Plant Biology & Biotechnology

1 Year Full Time

Rapid developments in our understanding of plants and their significance to our wellbeing has been achieved through advances in a range of disciplines including genetics, genomics, cell biology, physiology, ecology and studies on climate change. Graduates of this one-year MSc will be equipped with the knowledge and skills in these recent advances to rise to the future challenges in academia, industry and policy development. Innovation and entrepreneurship permeate the course as central themes and, in addition, a specific module on entrepreneurship in plant biology is delivered. This MSc covers a wide diversity of both topics and approaches, and is taught by a high-profile research-oriented group of academics.

Researchers from the UCD School of Biology and Environmental Science represent the single largest grouping of plant scientists in Ireland, with research interests ranging from genetics and molecular biology of the cell to plant physiology and ecology.

## Course Content and Structure

**90 CREDITS** Taught Masters = **60 CREDITS** Taught Modules + **30 CREDITS** Research Project / Minor Thesis

### Modules and Topics (Subject to change and are not guaranteed by UCD)

Modules include:

- Entrepreneurship in Plant Biology
- Current Developments in Plant Biology
- Plant Pathology and Biotechnology
- Biological Imaging
- Plant Development
- Programmed Cell Death in Plants
- Plant Phenotyping
- Insect-Plant Interactions
- Biological Invasions
- Plants and Stress

## Career Opportunities

Graduates will have a distinct advantage when applying for PhD studentships or other more advanced graduate training in the area of plant biology and biotechnology. This MSc is ideal for graduates interested in pursuing scientific careers in academia, agriculture and plant science-based or biotechnology industries. Graduates will have opportunities to pursue postgraduate education and research and work in areas such as plant biotechnology, scientific journalism/publishing and for government agencies involved in governmental and non-governmental policy.

## Applicant Profile

- This programme is intended for applicants with a BSc in an appropriate life science discipline. An upper second class honours or international equivalent is required. However, in certain cases/circumstances, applicants with lower second class honours will also be considered.
- Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent, such as TOEFL (iBT) score of 90 or PTE score of 63. Visit the UCD Admissions website for further details. Applicants with an IELTS score of at least 5.5 may apply for admission to the UCD Pre-Masters Pathway programme.

## Faculty Profile

**Dr Rainer Melzer**
UCD School of Biology and Environmental Science

Dr Melzer is mainly interested in flower and fruit development. He is working on a diversity of crops, including barley, wheat, and hemp. His team uses genomics, molecular genetics, and morphological methods to identify the genetic and environmental mechanisms underlying flowering time control, flower development and evolution.

Dr Melzer is internationally well connected and is associate editor for the Journal of Experimental Botany and secretary of the European Society for Evolutionary Developmental Biology.

## EU Enquiries

**Dr Rainer Melzer**
UCD School of Biology and Environmental Science
futurecrops@ucd.ie
www.ucd.ie/courses/msc-plant-biology-biotech

## Non-EU Enquiries

internationalenquiries@ucd.ie
www.ucd.ie/global

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V1 2023

University College Dublin
Ireland's Global University

Course code:
**F104**

BIOTECHNOLOGY, BIOMEDICAL, PHARMACEUTICAL & CHEMICAL SCIENCES

# MSc Biological & Biomolecular Science

1 Year Full Time | Negotiated Learning

The MSc in Biological and Biomolecular Science by Negotiated Learning will broaden your understanding of biological and biomolecular science against a backdrop of learning core technical, methodological and innovation skills relevant to industry and academia. Taught modules from several innovative specialisations are available from the UCD School of Biomolecular and Biomedical Science and the UCD School of Biology and Environmental Science. The programme provides students with an exciting prospect of studying and researching in the interdisciplinary fields of genetics, cell biology, biochemistry, molecular biology, microbiology and biodata analysis. Guidance from expert faculty is provided to tailor a programme that will meet the anticipated requirements of the student's objectives and career goals.

## Course Content and Structure

**90 CREDITS** Taught Masters = **40 CREDITS** Taught Modules + **30 CREDITS** Core Laboratory Skills + **20 CREDITS** Core Professional Skills

### Modules and Topics (Subject to change and are not guaranteed by UCD)

**Course divided into:**

- Core Laboratory Research Skills (30 credits) including techniques such as RT-PCR, western blotting and advanced fluorescent imaging.
- Core Professional Taught Skills Modules (20 credits) including career development, quantitative tools, science writing and communication skills and data management.
- Optional Taught modules (40 credits) involves selecting one of the following specialisations and selecting specific modules within these that meet the student's learning objectives.

**The Specialisations Available:**

- Genetics and Cell Biology: investigates cancer biology, the genetic basis of disease, ageing, cellular signalling, cellular trafficking and transport, model organisms, etc.
- Microbiology and Infection Biology: investigates mechanisms of pathogenic micro-organisms, host response to infection, immunopathologies, host-pathogen interactions, development of diagnostics, applied microbiology, etc.
- Biochemistry and Synthetic Biology: investigates metabolism and disease, protein-protein interactions, cell signalling, protein structure and analysis, etc.

## Career Opportunities

This programme will enable you to choose from a wide range of careers and areas of postgraduate study. This multi-disciplinary course provides a solid grounding for careers in industry, health and research, such as Quality Assurance, Quality Control, Microbiology, Process Control, Technical Transfer, Research and Development, and Regulatory Affairs, Scientific Editor or Writer, Lab Technician or Analyst roles.

An academic staff member will advise you on a specialisation and module choices based on the opportunities you hope to unlock.

## Course Highlights

- This MSc in Biological and Biomolecular Science is the first of its kind offered in Ireland by Negotiated Learning.

## Applicant Profile

- This programme is intended for applicants who have at least an upper second class honours degree, or the international equivalent, in a life science or chemical science. Examples of an appropriate BSc subject include, but are not restricted to, Biotechnology, Biology, Biochemistry, Microbiology, Genetics, Neuroscience, Physiology, Pharmacology, Immunology, Pharmaceutical Chemistry and Medicinal Chemistry.
- Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent, such as TOEFL (iBT) score of 90 or PTE score of 63. Visit the UCD Admissions website for further details. Applicants with an IELTS score of at least 5.5 may apply for admission to the UCD Pre-Masters Pathway programme.

## Faculty Profile

**Dr Joanna Kacprzyk**
Lecturer in Cell Biology & Genetics, UCD School of Biology and Environmental Science

My research is focused on the mechanisms governing cell fate decisions between programmed cell death and survival pathways. Using both plant and mammalian cell culture systems I use fluorescence microscopy, enzymatic assays and RT-PCR to characterise the cellular responses to stress stimuli.

## EU Enquiries

**Dr Joanna Kacprzyk**
UCD School of Biology and Environmental Science
Joanna.kacprzyk@ucd.ie
www.ucd.ie/courses/msc-biological-biomolecular-science

## Non-EU Enquiries

internationalenquiries@ucd.ie
www.ucd.ie/global

## Apply Now

This programme receives significant interest so please apply early online at

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V1 2023

University College Dublin
Ireland's Global University

Course code:
**F167**

BIOTECHNOLOGY, BIOMEDICAL, PHARMACEUTICAL & CHEMICAL SCIENCES

# MSc Regulatory Affairs & Toxicology PD/CPD Toxicology

1 Year Full Time | Part Time/Full Time options

Toxicology is the study of how man-made and naturally occurring substances can have adverse effects on humans, animals, plants, and the environment, and how these effects can be minimised or avoided. Regulatory Affairs is a closely related field which focuses on applying toxicology for the protection of public health in the areas of human medicines, medical devices, biotechnologies, foods, agrichemicals and cosmetics. These courses explore the important role of toxicology in modern society with particular focus on the pharmaceutical, food and chemical industries.

## Course Content and Structure

**90 CREDITS** Taught Masters = **60 CREDITS** Taught Modules + **30 CREDITS** Internship / Research Project

### Modules and Topics (Subject to change and are not guaranteed by UCD)

- Introduction to Regulatory Affairs
- Healthcare and Pharma Reg. Affairs
- Business for Reg. Affairs Professionals
- Essential Pharmacology for Toxicologists
- Experimental Tox and Risk Assessment
- Medical and Forensic Toxicology
- Food and Environmental Toxicology
- Reg Affairs / Toxicology Internship

These modules are delivered by staff of international renown in toxicology and regulatory science. The courses have been developed in close collaboration with the Irish Register of Toxicologists (IRT) and are pre-approved for accreditation towards becoming a registered toxicologist. The core programme team are European Registered Toxicologists (ERT). Across our modules guest lecturers, who are practicing regulatory toxicologists and regulatory affairs specialists, contribute state-of-the-art seminars from a range of sectors including pharmaceuticals, biopharmaceuticals, medical devices, food safety, cosmetics and environmental protection. All students are offered the opportunity to undertake an internship during the programme. Study days and e-learning are utilised to maximise flexibility in how students manage their study time.

## Career Opportunities

This programme provides a comprehensive overview of toxicology, and current toxicological assessments, highlighting current issues in toxicology. Graduates will gain the required level of professional ability to operate as independent toxicologists by developing a sophisticated level of data interpretation, communication skills, excellence in problem solving, and ability to critically evaluate and form judgements on complex toxicological problems.

Currently practising toxicologists will also benefit from undertaking individual modules for continuing professional development (CPD).

## Applicant Profile

- This programme is a graduate programme and applicants must possess a minimum of an upper second class honours undergraduate degree or relevant experience in the area of toxicology/pharmacology.
- Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent, such as TOEFL (iBT) score of 90 or PTE score of 63. Visit the UCD Admissions website for further details.

## Faculty Profile

**Dr Craig Slattery**
UCD School of Biomolecular and Biomedical Science

I am a Lecturer in Toxicology & Regulatory Affairs in the UCD School of Biomolecular and Biomedical Sciences.Previously, I worked as an assessor in Human Medicines at the Health Products Regulatory Authority. I am a Registered Toxicologist and I act as an external assessor for national regulatory bodies, and an external advisor for pharmaceutical and biotechnology companies.

## EU Enquiries

**Dr Craig Slattery**
UCD School of Biomolecular and Biomedical Science
biotech@ucd.ie
www.ucd.ie/courses/msc-toxicology-reg-affairs

## Non-EU Enquiries

internationalenquiries@ucd.ie
www.ucd.ie/global

## Apply Now

This programme receives significant interest so please apply early online at

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V1 2023

University College Dublin
Ireland's Global University

Course code:
**F042**

BIOTECHNOLOGY, BIOMEDICAL, PHARMACEUTICAL & CHEMICAL SCIENCES

# MSc Chemistry

1 Year Full Time/2 Years Part Time

Negotiated Learning

MSc Chemistry (Negotiated Learning) is a flexible programme which offers a diverse array of modules in a variety of Chemistry topics. The programme is suitable for you if you wish to sample different sides of the discipline ranging from the mathematical, through the physical and materials disciplines to the biological ends of the scientific spectrum. Initial academic advice ensures that your module choices can match your career aspirations or areas of interest. If you wish to broaden your understanding of chemistry, you could choose a range of modules across the discipline. If you are interested in progressing to a PhD programme, or into particular industries, you may choose to concentrate on a specific area, e.g., chemical biology, nanochemistry, medicinal, sustainable or materials chemistry.

The UCD School of Chemistry has vibrant research in areas such as catalysis and new transformations, bionano interface, advanced spectroscopy, new materials for magnetic, medicinal, and electronic applications, and carbohydrate chemistry.

## Course Content and Structure

**90 CREDITS** Taught Masters = **60 CREDITS** Taught Modules + **30 CREDITS** Research Project

### Modules and Topics (Subject to change and are not guaranteed by UCD)

Modules on offer cover all the major themes of chemistry including:

- Advanced Synthetic Organic and Inorganic Chemistry
- Materials Chemistry
- Advanced Spectroscopy
- Advanced Crystallography
- Commercialisation of Laboratory Research
- Biological, Medicinal and Pharmaceutical Chemistry
- Sustainable and Environmental Chemistry
- Nanochemistry
- Biophysical Chemistry
- Polymer Chemistry
- Computational Chemistry
- Research Project

During the summer trimester students are placed within the research groups of a member of staff in the School to carry out a 30-credit three-month research project.

*Limited places for a 30 credit industrial placement as an alternative to the research project, are available.*

## Career Opportunities

The MSc Chemistry (Negotiated Learning) provides a basis for graduates to enter the chemical, pharmaceutical, bio-pharmaceutical and materials industries. Analytical services, environmental protection and primary and secondary school teaching present other possible opportunities.

Furthermore, through judicious choice of modules within one particular sub-discipline of chemistry, the programme is an attractive route for some students into a PhD programme.

## Applicant Profile

- This programme is intended for applicants with a Chemistry degree, or a degree with a significant component of chemistry. An upper second class honours undergraduate degree or international equivalent is required.
- Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent, such as TOEFL (iBT) score of 90 or PTE score of 63. Visit the UCD Admissions website for further details. Applicants with an IELTS score of at least 5.5 may apply for admission to the UCD Pre-Masters Pathway programme.

## Faculty Profile

**Dr Xiangming Zhu**
UCD School of Chemistry

This MSc Chemistry (Negotiated Learning) trains students to a high level of knowledge and proficiency in a specialised area of chemistry such as medicinal chemistry, chemical biology, pharmaceutical chemistry, energy and sustainable chemistry, biophysical chemistry or nanotechnology.

## EU Enquiries

**Professor Declan Gilheany**
UCD School of Chemistry
declan.gilheany@ucd.ie
www.ucd.ie/courses/msc-chemistry

## Non-EU Enquiries

internationalenquiries@ucd.ie
www.ucd.ie/global

## Apply Now

This programme receives significant interest so please apply early online at

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V1 2023

University College Dublin
Ireland's Global University

Course code:
**F105**

BIOTECHNOLOGY, BIOMEDICAL, PHARMACEUTICAL & CHEMICAL SCIENCES

# MSc Synthetic Chemistry
## for the Pharmaceutical & Fine Chemicals Industry

1 Year Full Time/2 Years Part Time

This course is designed for Chemistry graduates who are interested in deepening their knowledge of synthetic chemistry with a view to pursuing a career in either the fine chemical or pharmaceutical industries. There is a strong demand for these synthetic chemistry skills. Ireland is home to operations by some of the world's leading pharmaceutical and biotechnology companies making some of the world's blockbuster medicines. You can focus on areas such as the synthesis of organic compounds and drug-like substances, techniques for structure determination, and methods for drug discovery. In addition, you will complete a research project from topics in relevant areas, including catalysis, carbohydrate chemistry and asymmetric synthesis.

## Course Content and Structure

**90 CREDITS** Taught Masters = **60 CREDITS** Taught Modules + **30 CREDITS** Research Project

### Modules and Topics (Subject to change and are not guaranteed by UCD)

The structure of the programme is as follows:

**Autumn Trimester**

- Organic Synthesis
- Metals in Biology
- Topics in Medicinal Chemistry
- Spectroscopic Techniques
- Professional Career Development

**Spring Trimester**

- Organic Synthesis 2
- Modern Methods and Catalysis
- Chemistry Lab to Commercialisation
- Catalytic Asymmetric Synthesis
- Advanced NMR and MS
- Advanced Organic Synthesis and Drug Discovery

**Summer Trimester**

- Research Project

*Limited places for a 30 credit industrial placement as an alternative to the research project, are available.*

## Career Opportunities

The MSc Synthetic Chemistry course provides a basis for graduates to enter the chemical, pharmaceutical, bio-pharmaceutical and materials industries. Analytical services, environmental protection, and primary and secondary school teaching present other possible opportunities.

This course is also a route for some students into a PhD programme. For example, the UCD School of Chemistry has vibrant research in areas such as catalysis, the synthesis of biologically active compounds and the development of new materials for magnetic and electronic applications, and it has strong links with pharmaceutical and fine chemical companies in Ireland and around the world.

## Applicant Profile

- This programme is intended for applicants with a Chemistry degree, or a degree with a significant component of chemistry. An upper second class honours undergraduate degree or international equivalent is required.
- Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent, such as TOEFL (iBT) score of 90 or PTE score of 63. Visit the UCD Admissions website for further details.

## Faculty Profile

**Associate Professor Paul Evans**
UCD School of Chemistry

I am an organic chemist, contributing to teaching and also leading research in the UCD School of Chemistry. My main research interest is in the area of developing new synthetic methods to prepare biologically active small molecules. Targets include fatty acid metabolites and saturated N-heterocycles, and we have prepared both natural products and structural analogues.

## EU Enquiries

**Associate Professor Paul Evans**
UCD School of Chemistry
chemistry@ucd.ie, paul.evans@ucd.ie
www.ucd.ie/courses/msc-synthetic-chemistry

## Non-EU Enquiries

internationalenquiries@ucd.ie
www.ucd.ie/global

## Apply Now

This programme receives significant interest so please apply early online at

**www.ucd.ie/apply**



V1 2023

University College Dublin
Ireland's Global University

Course code:
X062

GEOSCIENCE, NATURAL RESOURCES, CLIMATE & ENVIRONMENT

# MSc Applied Environmental Science

1 Year Full Time

The study of Applied Environmental Science is critical for establishing policies in environmental assessment, evaluating potential change in environmental quality in response to various land use and other activities, and in the development of management and conservation strategies, as well as contributing to policy formulation. This course has a heavy emphasis on practical training in fieldwork, laboratory analyses, information sourcing, data analysis, planning, reporting and communication.

You will work with an interdisciplinary team of experts covering the key aspects of Environmental Science, encompassing marine, freshwater and terrestrial systems. This is the only Applied Environmental Science course in Ireland to include a major input from civil engineering, relating particularly to water quality, hydrology and waste treatment processes.

## Course Content and Structure

**90 CREDITS** Taught Masters = **65 CREDITS** Taught Modules + **5 CREDITS** Placement/Internship + **20 CREDITS** Research Project/Task

### Modules and Topics (Subject to change and are not guaranteed by UCD)

Samples of modules include:

- Water Resources Engineering
- Environmental Impact Assessment
- Quantitative Tools for the Life Sciences
- Freshwater Resources Assessment
- Global Change Ecology
- Wildlife and Resources Management
- Marine/Coastal Ecology
- Soil Ecology
- Environmental Geology
- Ecotoxicology and Air Quality Monitoring
- Vegetation Ecology
- Geographic Information Systems (GIS) and Data Analyses
- Remote Sensing
- Ecological Modelling
- Integrated Municipal Solid Waste Management
- Water, Waste and Environmental Modelling
- Carbon and Sustainability
- Sustainable and Nature Based Water Infrastructure
- Research Project/Task (20 credits)
  This project includes time spent collecting data in the field on a research topic towards the production of journal ready articles, including an internship for at least a 6-week period in the environmental sector (including consultancies, government agencies and industry) over the Summer Trimester.

## Career Opportunities

Our graduates are building successful varied careers in environmental resources assessment, management and protection. A considerable number have been employed in environmental consultancy and national and International government agencies, such as Inland Fisheries Ireland and the Environmental Protection Agency (EPA). Some graduates have also continued their studies at PhD level in the areas of fisheries, biomass fuels, soil, water engineering and invertebrate ecology. The course gives due consideration to key legislative requirements and policy developments.

## Applicant Profile

- This programme is intended for applicants with a primary degree in science, engineering, geography, architecture or a related subject. An upper second class honours or international equivalent is required.
- Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent, such as TOEFL (iBT) score of 90 or PTE score of 63. Visit the UCD Admissions website for further details. Applicants with an IELTS score of at least 5.5 may apply for admission to the UCD Pre-Masters Pathway programme.

## Graduate Testimonials

**Hannah Fearon**
RPS Environmental, Ireland

Overall, the course was an eye-opening experience with a great mixture of lab sessions, field work and lectures. The highlight of this course for me was definitely the opportunity to gain professional work experience and I would encourage anyone interested in following a career in the Environmental sector to seriously consider this course.

**Betsy Townsend**
Physical Scientist, US EPA

The MSc coursework paired with my 6-week placement at Dublin City Council prepared me for a career in the environmental sector, and gave me proficiency in the collection, processing, analyses, and interpretation of environmental data.

## EU Enquiries

**Associate Professor Tancredi Caruso**
UCD School of Biology and Environmental Science
tancredi.caruso@ucd.ie
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## Non-EU Enquiries

internationalenquiries@ucd.ie
www.ucd.ie/global

## Apply Now

This programme receives significant interest so please apply early online at

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V1 2023

University College Dublin
Ireland's Global University

JUSTUS-LIEBIG-UNIVERSITÄT GIESSEN

Course code:
**F038**

GEOSCIENCE, NATURAL RESOURCES, CLIMATE & ENVIRONMENT

# MSc Global Change: Ecosystem Science & Policy

16 Months Full Time | Joint International Degree

Global change refers to planetary-scale changes occurring in complex socio-ecological systems, which are affected by climatic and non-climatic drivers (e.g., changes in human society). Understanding the intricate, medium- to long-term changes in our land, air and water requires advanced scientific knowledge in measurement, modelling and prediction. This should, in turn inform the science-policy interface.

This joint international MSc in Global Change is the response to these global change challenges and will suit graduates wishing to develop a scientific career in ecosystem research as well as those aiming to contribute to evidence-based environmental policy. Students will study at both UCD, Dublin and Justus Liebig University (JLU) Giessen, Germany where you will be involved in active research groups, contributing to their ongoing ecosystem and policy consultancy studies.

## Course Content and Structure

**120 CREDITS** Taught Masters = **70 CREDITS** Taught Modules + **30 CREDITS** Individual Research Project + **20 CREDITS** Work Placement

### Modules and Topics (Subject to change and are not guaranteed by UCD)

The first trimester is based at UCD, followed by a 6-week minimum internship in a company or institution of your choice. The second taught trimester is based in JLU, Giessen, Germany. The last trimester is devoted entirely to a research project (minor thesis) which can be undertaken in either UCD, JLU or another host institution.

Samples of topics available include:

- Global Change: Ecology
- Global Change: Techniques and Adaptation
- Biodiversity Informatics
- Science and Policy
- Environmental Law and Policy (Env. Impact Assessment)
- Policy Consulting
- Resource Economics and Environmental Management

## Career Opportunities

Graduates may pursue roles as policy advisers, scientific analysts or researchers in government, international organisations, NGOs, research institutes or consulting companies. There are also many opportunities for further studies. The skills you acquire, particularly through the completion of the minor thesis, provide a strong foundation for PhD research.

Prospective employers include the Environmental Protection Agency, governmental departments, European Commission; European Environment Agency and International organisations (e.g. Intergovernmental Panel on Climate Change; United Nations Environment Programme; International Union for the Conservation of Nature, Food and Agricultural Organisation).

## Course Highlights

- Graduates receive a joint international degree from two well-established universities, which have combined their complementary and multidisciplinary research profiles and cutting-edge expertise. The course includes a professional work placement (up to 10 weeks) in highly recognised international institutions and a 4-month research project position.

## Applicant Profile

- This programme is intended for applicants with a degree in an appropriate life sciences discipline, such as biology, agriculture or environmental science (including zoology, ecology, biochemistry, geology and physics). A lower second class honours or international equivalent is required.
- Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent, such as TOEFL (iBT) score of 90 or PTE score of 63. Visit the UCD Admissions website for further details.

## Graduate Testimonial

**Lisa Reilly**

One of the best aspects of this course was the variety of modules, from policy to hands-on practical modules which allowed me to find my own interests and build up my skills. The professional work placement gave me first-hand exposure to working in the real world and set my CV apart from other graduates. I studied in both Ireland and Germany and received funding to complete my thesis at the Centre for International Forestry in Indonesia.

## EU Enquiries

**Dr Florence Renou-Wilson**
UCD School of Biology and Environmental Science
globalchange@ucd.ie
www.MasterGlobalChange.org

## Non-EU Enquiries

internationalenquiries@ucd.ie
www.ucd.ie/global

## Apply Now

This programme receives significant interest so please apply early online at

**www.ucd.ie/apply**



V1 2023

University College Dublin
Ireland's Global University

Course code:
**F059**

GEOSCIENCE, NATURAL RESOURCES, CLIMATE & ENVIRONMENT

# MSc/Grad Cert/Grad Dip Environmental Sustainability

Negotiated Learning | Online

Dwindling natural resources and environmental quality issues are challenging businesses to work within a sustainability framework, while at the same time maximising employment provision and profitability. Consequently, there are a growing number of green technology and related enterprises that require a skilled and knowledgeable workforce. Equally, those within the regulation or policy environment must have the knowledge base to address the complexities of the 'sustainability' challenge.

## Course Content and Structure

**30 credits**
Graduate Certificate

**60 credits**
Graduate Diploma

This course is taken online in your own time and you can choose to study for a 30-credit Graduate Certificate, a 60-credit Graduate Diploma or a 90-credit MSc degree.

**90 CREDITS** Msc = **65 CREDITS** Taught Credits + **25 CREDITS** Practicum Research Study Project OR **75 CREDITS** Taught Credits + **15 CREDITS** Practicum Desk Study

### Modules and Topics (Subject to change and are not guaranteed by UCD)

- Sustainable Energy and Environment
- Green Technology Project
- Energy Systems and Climate
- Technical Communications
- People Information and Communication
- Managing the Interface between Science and Policy
- Water Quality Assessment, Protection and Management
- Water Resources Engineering 1 and 2
- Air Pollution
- Environmental Geoscience
- Soil Resources
- Peatlands and Global Change
- Ecology and its Application
- Genetics for Environmental Scientists
- Applied Ecotoxicology
- Impact Assessment Procedures
- Environmental Legislation and Regulation
- Management of Sustainable Fisheries
- Wildlife Management/ Conservation
- Bioinvasions: Impact to Management
- Natural Heritage Conservation
- Data Analysis and Interpretation
- GIS for Environmental Investigations
- Practicum (Research; lab/ field)
- Practicum (Desk Study)

## Career Opportunities

Successful completion of this course will provide you with the professional competitive advantage to choose from careers in the application of green energy technology, environmental engineering, environmental monitoring and protection, resource and waste management, consultancy, research, heritage, conservation and education, either within regulatory bodies or in a wide range of industries, both multinational organisations and small- and medium-sized enterprises. The course also opens up opportunities to pursue further studies including up to PhD level.

## Course Highlights

- The MSc Diploma and Certificate will provide you with the theoretical background, practical training and ancillary workplace skills needed for a successful career in your chosen field.
- The course focuses on delivery of the knowledge and skills required to address sustainability challenges across a broad spectrum of activities such as agriculture, industry, green technology and resource management.

## Applicant Profile

- This programme is intended for applicants with a primary degree in science, engineering, or a related discipline. A lower second class honours degree or international equivalent is required. Applicants with substantial relevant work experience will also be considered.
- Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent, such as TOEFL (iBT) score of 90 or PTE score of 63. Visit the UCD Admissions website for further details.

## Graduate Testimonial

**Susan Vickers**

I found the course refreshing in terms of content, delivery and the online virtual classroom discussions which allowed people on the course to communicate and share ideas. Working professionally full time, and with a young family, I found the online format superb as well as the flexibility that this allowed me.

## EU and Non-EU Enquiries

**Dr Elke Eichelmann**
UCD School of Biology and Environmental Science
sustainabilityonline@ucd.ie
www.ucd.ie/courses/msc-environmental-sustainability

## Apply Now

This programme receives significant interest so please apply early online at

**www.ucd.ie/apply**

University College Dublin
Ireland's Global University

Course code:
**F181**

GEOSCIENCE, NATURAL RESOURCES, CLIMATE & ENVIRONMENT

# MSc Subsurface Characterisation & Geomodelling

1 Year Full Time

This unique and forward-looking MSc is designed to provide you with a solid grounding in key modern principles and methods required for a career in applied geology in our changing world. The course is taught by experts from diverse geoscience disciplines, including pure and applied geology, geophysics, geomodelling and computational geoscience, with experience of the minerals and geoenergy sectors. It focuses on generic aspects of data interpretation, analysis and computer modelling of the deeper and shallow subsurface using real-world data and leading industry software (e.g., Petrel, Leapfrog, ArcGIS).

This sought-after and transferable expertise will provide you with the flexibility needed for a geoscience career in an increasingly populous and resource-constrained world.

## Course Content and Structure

**90 CREDITS** Taught Masters = **60 CREDITS** Taught Modules + **30 CREDITS** Applied Research Project

### Modules and Topics (Subject to change and are not guaranteed by UCD)

The programme combines classroom-based instruction, practical workstation experience, team-based exercises and field visits. It also includes a three-month applied research project.

- Applied Geoscience
- 3D Mapping and Modelling
- Stratigraphic Prediction
- Rock Engineering
- Applied Structural Geology
- Geophysical Methods
- Geostatistics
- Geomodelling
- Geocomputation
- Drilling and Well Logging
- Geofluids and Geomechanics
- Quaternary Geology
- Remote Sensing
- Fractured Rock Characterisation
- Team-Based Modelling Exercises
- Field Skills

## Career Opportunities

The course is industry facing and designed to equip you for a career in a broad range of industries and research organisations requiring digital subsurface characterisation and modelling.

Application areas include mineral resources, the energy sector including oil and gas, geothermal, groundwater, carbon sequestration and storage, geotechnical services, national geological surveys and waste management. You will also receive training in the range of soft skills (e.g. reporting, programming) required by industry.

## Applicant Profile

- This programme is intended for applicants who have an upper second class honours BSc or international equivalent in Geology, Earth Science or Geoscience.
- Consideration will be given to applicants with similar qualifications in cognate areas (e.g. Geophysics/ Physical Geography), and to those with significant and relevant work experience but who do not meet this criterion.
- Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent. Visit the UCD Admissions website for further details.

## Faculty Profile

**Associate Professor Tom Manzocchi**
UCD School of Earth Sciences

Understanding and predicting the movement of geological fluids in the shallow crust requires consideration of 3D geological structure over microscopic to kilometre scale-ranges. My research focuses on developing methods for representing geological structure in fluid flow models. Usually there are only very limited observational constraints about the subsurface, so the challenge is to include realistic uncertainty in the geomodel, whilst also representing the key features that influence the flow process of interest.

## EU Enquiries

**Associate Professor Tom Manzocchi**
UCD School of Earth Sciences
tom.manzocchi@ucd.ie
www.ucd.ie/earthsciences/study/mscsubsurface

## Non-EU Enquiries

internationalenquiries@ucd.ie
www.ucd.ie/global

## Apply Now

This programme receives significant interest so please apply early online at

**www.ucd.ie/apply**



V1 2023

University College Dublin
Ireland's Global University

Course code:
**F034**

MATHEMATICS, ACTUARIAL SCIENCE & FINANCE

# MSc Actuarial Science

1 Year Full Time

The MSc Actuarial Science is designed for students from quantitative disciplines who wish to train as an actuary upon completion of the programme. The MSc can help fast track your career as an actuary by supporting you through the initial examinations of the Institute and Faculty of Actuaries (IFoA), UK and is fully accredited by the IFoA, UK.

The programme provides a solid foundation in mathematics, statistics, economics and finance for future actuarial studies. You will also have the opportunity to undertake a dissertation in a topical area of actuarial science under the supervision of a member of the UCD School of Mathematics and Statistics. The programme is suitable for students with no prior exemptions and for students who wish to add to any exemptions they already have.

## Course Content and Structure

**90 CREDITS** Taught Masters = **60/70 CREDITS** Taught Modules + **30/20 CREDITS** Research Project

### Modules and Topics (Subject to change and are not guaranteed by UCD)

The MSc in Actuarial Science covers the Core Principles subjects (CS1, CS2, CM1, CM2, CB1, CB2) and Core Practicals subject CP1 of the examinations of the Institute and Faculty of Actuaries, UK.

The Core Principles subjects are:

- Actuarial Statistics (CS1)
- Risk Modelling and Survival Analysis (CS2)
- Actuarial Mathematics (CM1)
- Financial Engineering and Loss Reserving (CM2)
- Business Finance (CB1)
- Business Economics (CB2)

Depending on your subject choices in trimesters 1 and 2 you may also undertake advanced modules in finance at the UCD Michael Smurfit Graduate Business School. Module topics may include regulation, corporate governance, ethics in finance, asset valuation, and financial management. There will be opportunities for some students to complete their thesis as a paid research placement with an actuarial company.

## Career Opportunities

As a graduate you can look forward to a career ranging from the traditional areas of insurance and pension consultancy to the rapidly expanding areas of investment and risk management. Throughout your actuarial career you can rely on the support and guidance of the actuarial profession, and upon qualification you can expect a rewarding career that will continue to offer opportunities for further development.

## Applicant Profile

- This programme is intended for applicants with a degree in a quantitative area such as mathematics, statistics, computer science, engineering or economics and/or finance. An upper second class honours or international equivalent is required.
- We will, however, consider applications from prospective students who do not meet these entry requirements provided they can demonstrate an ability and commitment to study actuarial science.
- Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent, such as TOEFL (iBT) score of 90 or PTE score of 63. Visit the UCD Admissions website for further details.

## Graduate Testimonial

**Troy Tyson**
Trainee actuary in New Ireland Assurance

This course gave me the opportunity to acquire exemptions from the professional examinations of the Institute and Faculty of Actuaries, which are mandatory to become a fully qualified actuary. The research placement portion of the year for me was extremely beneficial with regards to my career as an actuary. It gave me an insight into the typical day of an actuary working in the insurance sector.

## EU Enquiries

**Programme Administrator**
UCD School of Mathematics and Statistics
smspostgrads@ucd.ie
www.ucd.ie/courses/msc-actuarial-science

## Non-EU Enquiries

internationalenquiries@ucd.ie
www.ucd.ie/global

## Apply Now

This programme receives significant interest so please apply early online at

**www.ucd.ie/apply**



V1 2023

University College Dublin
Ireland's Global University

Course code:
**F036**

MATHEMATICS, ACTUARIAL SCIENCE & FINANCE

# Graduate Diploma Actuarial Science

1 Year Full Time

The Graduate Diploma in Actuarial Science is designed for students from quantitative disciplines who ultimately wish to train as an actuary upon completion of the programme. The Graduate Diploma can help fast track your career as an actuary by supporting you through the initial examinations of the Institute and Faculty of Actuaries, UK.

The programme provides a solid foundation in mathematics, statistics, economics and finance for future actuarial studies. The programme is suitable for students with no prior exemptions and for students who wish to add to any exemptions they already have.

## Course Content and Structure

**60 CREDITS** Graduate Diploma = **60 CREDITS** Taught Modules

### Modules and Topics (Subject to change and are not guaranteed by UCD)

There is no option to complete the Graduate Diploma on a part-time basis. Depending on your subject choices in the Autumn and Spring Trimesters, you may also undertake advanced modules in finance at the UCD Michael Smurfit Graduate Business School.

The Graduate Diploma in Actuarial Science covers the Core Principles subjects (CS1, CS2, CM1, CM2, CB1, CB2) of the examinations of the Institute and Faculty of Actuaries, UK.

### Core Principles subjects:

- Actuarial Statistics (CS1)
- Risk Modelling and Survival Analysis (CS2)
- Actuarial Mathematics (CM1)
- Financial Engineering and Loss Reserving (CM2)
- Business Finance (CB1)
- Business Economics (CB2)

## Career Opportunities

Upon successfully completing the Graduate Diploma in Actuarial Science you can look forward to a career ranging from the traditional areas of insurance and pension consultancy to the rapidly expanding areas of investment and risk management. Successful graduates can expect early responsibility in their chosen career and the opportunity to work in a variety of challenging roles.

Throughout your actuarial career you can rely on the support and guidance of the Actuarial Profession and upon qualification you can expect a rewarding career that will continue to offer opportunities for further development.

## Applicant Profile

- This programme is intended for applicants with a degree in a quantitative area such as mathematics, statistics, computer science, engineering or economics and/or finance. An upper second class honours or international equivalent is required.
- We will, however, consider applications from prospective students who do not meet these entry requirements provided they can demonstrate an ability and commitment to study actuarial science.
- Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent, such as TOEFL (iBT) score of 90 or PTE score of 63. Visit the UCD Admissions website for further details.

## Graduate Testimonial

**Alex Clarke**
Actuarial Trainee, Lloyd's of London

The quality of the education was excellent, arising from the level of experience and dedication of the lecturers. Within three weeks of completing my final exam I had four job offers and chose what I felt was the most interesting area for me.

## EU Enquiries

**Programme Administrator**
UCD School of Mathematics and Statistics
smspostgrads@ucd.ie
www.ucd.ie/courses/gdip-actuarial-science

## Non-EU Enquiries

internationalenquiries@ucd.ie
www.ucd.ie/global

## Apply Now

This programme receives significant interest so please apply early online at

**www.ucd.ie/apply**



V1 2023

University College Dublin
Ireland's Global University

Course codes:
**F084**
**F057**

MATHEMATICS, ACTUARIAL SCIENCE & FINANCE

# MSc/Professional Diploma Data Analytics

3 Years/9 Months Part Time | Online


This online course will help you analyse and understand the large data sets that are regularly being created via the huge growth in freely available online information. There is an increasing demand for graduates with these valuable skills in a wide range of industries, and currently a shortage of qualified graduates. There are no lectures to attend as the courses are delivered completely online.

Students will be given videos, online demonstrations, and interactive games to enhance their learning, with regular feedback and interaction with course tutors. This provides flexibility to students who can learn wherever they like at a pace that suits them. Students will attend a UCD exam centre at the end of each trimester for exams.

## Course Content and Structure

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **90 CREDITS** Taught Masters (Online) | = | **90 CREDITS** Taught Modules | | **20 CREDITS** Professional Diploma (Online) | = | **20 CREDITS** Taught Modules |

The first year of both programmes is designed to introduce you to statistical and mathematical concepts in Data Analytics and Data Mining, and to start you on statistical programming with data. The second year of the MSc is split between understanding the theory behind statistical models for data via predictive analytics, and dealing with data sets at scale using multivariate techniques. The final year of the MSc covers some advanced statistical modelling methods. A provisional list of topics is as follows:

### Modules and Topics (Subject to change and are not guaranteed by UCD)

#### Statistics Modules

- Machine Learning and AI
- Predictive Analytics
- Multivariate Analysis
- Time Series Analysis
- Stochastic models
- Bayesian Analysis
- Network Analysis

#### Computing Modules

- Monte Carlo
- R
- C
- Python
- SAS

## Career Opportunities

Data Analysts are in strong demand from industry; those who are successful in completing the course are highly employable in fields as diverse as pharmaceuticals, finance and insurance, as well as cloud computing. Some examples of prospective employers include:

- ICT companies (e.g., Google, eBay, Meta, Amazon, Paddy Power)
- The pharmaceutical industry (e.g., Janssen, MSD, GSK)
- The financial services industry (e.g., Bank of Ireland, AXA, EY, Accenture, Deloitte)

## Applicant Profile

- This programme is intended for applicants with a degree in a numerate subject. An upper second class honours or international equivalent is required.
- Those without this requirement, but with equivalent experience in industry, will also be considered on a case-by-case basis, or can apply for the Professional Certificate in Mathematics for Data Analytics and Statistics which leads directly into the Data Analytics programme.
- Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent, such as TOEFL (iBT) score of 90 or PTE score of 63. Visit the UCD Admissions website for further details.

## Graduate Testimonial

**Fergal Kelly**
Data Analyst in the Central Bank of Ireland

I wanted to re-skill so that I could move to a different role and the content and online aspect of the masters was perfect for me. I wouldn't have been able to commit to going into a university on set nights for 3 years. I also would like to commend all the lecturers and tutors who always responded on time to questions. I've been able to make a contribution to my new team pretty much straight away.

## EU Enquiries

**Programme Administrator**
UCD School of Mathematics and Statistics
dataanalyticsonline@ucd.ie
www.ucd.ie/courses/msc-data-analytics

## Non-EU Enquiries

internationalenquiries@ucd.ie
www.ucd.ie/global

## Apply Now

This programme receives significant interest so please apply early online at

**www.ucd.ie/apply**



V1 2023

University College Dublin
Ireland's Global University

Course code:
**T306**

MATHEMATICS, ACTUARIAL SCIENCE & FINANCE

# MSc Data & Computational Science

1 Year Full Time

The MSc Data & Computational Science course is aimed at students who wish to gain a deep understanding of applied mathematics, statistics and computational science at the graduate level. The course will equip such students with the skills necessary to carry out research in these computationally based sciences and will prepare them well for a career either in the industry or in academia. The taught modules in the course provide a thorough grounding in the areas of applied mathematics, statistics and computational science; all students complete project work in data and computational science with the option of (supervised) research dissertation.

We expect our students to gain a thorough understanding of data and computational science at the graduate level, as well as a broad understanding of currently relevant areas of active research and to become autonomous learners and researchers capable of setting their own research agenda.

## Course Content and Structure

| | | | | |
|---|---|---|---|---|
| **RESEARCH** Stream | = | **60 TAUGHT CREDITS** Autumn/Spring Trimester | + | **30 CREDITS** Research Project Summer Trimester |
| **TAUGHT** Stream | = | **90 TAUGHT CREDITS** Autumn/Spring/Summer trimester | | |

### Modules and Topics (Subject to change and are not guaranteed by UCD)

**Core Modules**
**Computational Science and Mathematics:**

- Optimisation in Machine Learning
- Applied Matrix Theory
- Uncertainty Quantification
- Data Programming with Python
- Data Programming with R

**Core Modules**
**Statistics and Data Analytics:**

- Probability and Statistics
- Predictive Analytics
- Multivariate Analysis
- Statistical Machine Learning
- Bayesian Analysis

**Optional Modules:**

- Machine Learning and AI
- Scientific Computing
- High-performance Computing
- Mathematica for Research
- Numerical Algorithms
- Time Series Analysis
- Monte Carlo Inference

## Career Opportunities

Our graduates will be suitably qualified for research at the PhD level at the interface of applied mathematics, statistics and computational science. They will be valued for their technical knowledge and research skills. Equally, our graduates will be in demand by employers for their acquired skills in data analytics and computational and statistical modelling.

Recent past graduates from this programme and other similar past programmes in the School work in firms including, ICT companies (e.g. Amazon, Meta, Geowox, Sage, Version 1, Vodafone), the financial services industry (e.g. Allianz, Aon, Deloitte, Fidelity Investments, KPMG, Permanent TSB) and other data-intensive businesses (e.g. Accenture, IBM, Intel).

## Applicant Profile

- This programme is intended for applicants who have an upper second class honours degree or higher, or the international equivalent, in a highly quantitative subject such as Mathematics, Physics, Statistics, or Engineering.
- Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent, such as TOEFL (iBT) score of 90 or PTE score of 63. Visit the UCD Admissions website for further details.

## Graduate Testimonial

**Cian O'Callaghan**
Paddy Power

I would thoroughly recommend the MSc Data & Computational Science to students interested in pursuing a career/further studies in data science. The lecturers and tutors are both extremely knowledgeable and approachable. The course strikes a balance between understanding the theory behind computational and machine learning algorithms and applying this theory to real-world problems.

## EU Enquiries

**Programme Administrator**
UCD School of Mathematics and Statistics

dataandcomp@ucd.ie
www.ucd.ie/courses/msc-data-computational

## Non-EU Enquiries

internationalenquiries@ucd.ie
www.ucd.ie/global

## Apply Now

This programme receives significant interest so please apply early online at

**www.ucd.ie/apply**



V1 2023

University College Dublin
Ireland's Global University

Course code:
T341

MATHEMATICS, ACTUARIAL SCIENCE & FINANCE

# MSc Financial Mathematics

1 Year Full Time

The MSc in Financial Mathematics is designed for students with an undergraduate degree in Mathematics or a related field, who wish to gain a competitive advantage in the financial sector by acquiring the strong mathematical and statistical background demanded by high-level quantitative roles. The proposed programme will equip students with the relevant contemporary knowledge and skills, including new digital innovations such as machine learning with financial applications, computational finance and statistical and data analysis. In the Summer Trimester students will explore their theoretical and applied knowledge in greater depth by completing a dissertation or they will be able to apply their theoretical knowledge to real-world situations via a work placement with a financial firm. Among our industry partners we list: AIB, FINCAD (Zafin Capital Markets Group) and Grant Thornton Advisory, Quantitative Risk.

## Course Content and Structure

In the Autumn and Spring Trimesters, you will take a mixture of face-to-face and online modules (indicative module list below). In the Summer Trimester, you will have the opportunity to take up a summer work placement with a Dublin-based financial firm, or a dissertation supervised by a member of faculty. Upon completion of the programme, you will be able to understand, critique and judge the suitability of a number of advanced financial mathematical models, manipulate, analyse and discern the reliability of financial data sets, and be acquainted with industry practice.

**90 CREDITS** Taught Masters = **60 CREDITS** Taught Modules + **30 CREDITS** Summer Work Placement or Dissertation

### Modules and Topics (Subject to change and are not guaranteed by UCD)

#### Core Modules

- Stochastic Calculus
- Advanced Financial Models
- Counterparty Credit Risk
- Financial Risk Measurement and Management

#### Option Modules

- Computational Finance
- Statistical Machine Learning
- Optimization for Machine Learning
- Data Programming with Python
- Introduction to Relational Databases and SQL Programming
- Data Programming with R
- Measure Theory and Integration
- PDEs in Financial Maths
- Big Data Programming
- Advanced Econometrics: Time Series
- Behavioural Economics
- Energy Economics and Policy

## Career Opportunities

Graduates with training in Financial Mathematics can cover upper-level quantitative roles in several sub-sectors such as:

- Quantitative analysis in financial firms and hedge funds
- Risk modelling in banking and insurance
- Computational modelling in fintech
- Research and academia

## Applicant Profile

- This programme is intended for applicants with a degree in Financial Mathematics, Mathematics, Applied Mathematics or Statistics. An upper second class honours or international equivalent is required.
- Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent, such as TOEFL (iBT) score of 90 or PTE score of 63. Visit the UCD Admissions website for further details.

## Faculty Profile

**Assistant Professor Adamaria Perrotta**
UCD School of Mathematics and Statistics

I have a PhD in Mathematics and I taught Mathematical Analysis with real-world applications for 6 years, which deepened my interest in Applied Mathematics. After that I moved to the financial industry, working for 5 years as a business analyst in the Derivatives Pricing and Risk Management Department of an advisory firm. Since 2016 I have been a lecturer in Financial Mathematics and Computational Finance. My research interests are related to financial mathematical modelling and computational finance.

## EU Enquiries

**Programme Administrator**
UCD School of Mathematics and Statistics

smspostgrads@ucd.ie
www.ucd.ie/courses/msc-financial-mathematics

## Non-EU Enquiries

internationalenquiries@ucd.ie
www.ucd.ie/global

## Apply Now

This programme receives significant interest so please apply early online at

**www.ucd.ie/apply**



V1 2023

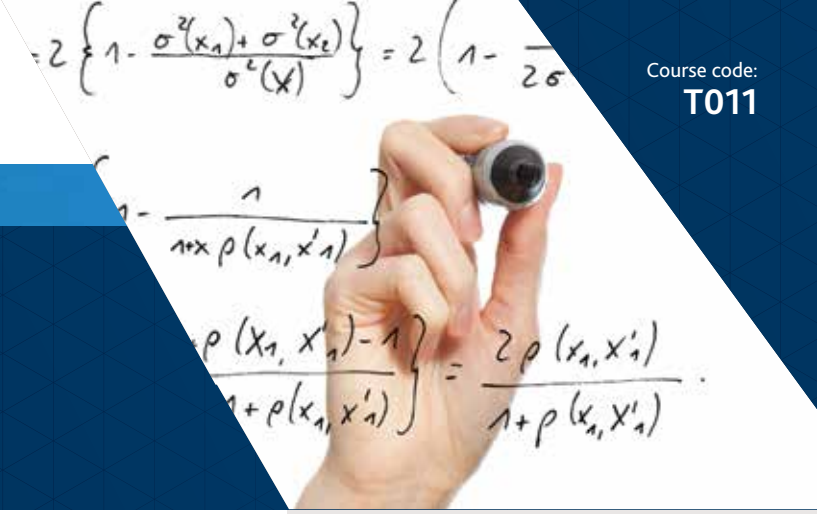
University College Dublin
Ireland's Global University

Course code:
**T011**

MATHEMATICS, ACTUARIAL SCIENCE & FINANCE

# Higher Diploma Mathematical Science

1 Year Full Time



This Higher Diploma in Mathematical Science offers the opportunity for graduates with a degree in a subject other than mathematics to achieve a more advanced mathematical training. Taking the Higher Diploma in Mathematical Science will allow you to complete the core components of a BSc Honours Degree in Mathematics or Mathematical Science. This course would equip you with the necessary background to pursue an MSc degree in Mathematics or Mathematical Sciences.

The UCD School of Mathematics and Statistics is a dynamic, multidisciplinary school spanning the disciplines of Mathematics, Applied and Computational Mathematics, Statistics and Actuarial Science. The School engages in research of international renown and teaches students across all disciplines.

## Course Content and Structure

**60 CREDITS** Higher Diploma = **60 CREDITS** Taught Modules

### Modules and Topics (Subject to change and are not guaranteed by UCD)

Students in the Mathematical stream choose modules from a selection of Mathematics courses. Students in the Mathematical Sciences stream select modules within both the subjects of Mathematics and Applied and Computational Mathematics. Below is a representative list of modules available to you. Modules offered change from year to year and include:

- Mathematical Analysis
- Calculus of Several Variables
- Graphs and Networks
- Linear Algebra 2
- Functions of One Complex Variable
- Number Theory
- Groups, Rings and Fields
- Set Theory
- Group Theory
- Intro to Coding Theory
- Metric Spaces
- Galois Theory
- Measure Theory and Integration
- Intro to Topology
- Advanced Mathematical Methods
- Dynamical Systems
- Foundations of Fluid Mechanics
- Foundations of Quantum Mechanics
- Electrodynamics and Gauge Theory
- Potential Theory and Electrostatics

## Career Opportunities

Some of the careers chosen by our graduates include working as researchers in mathematics (both in academia and industry), actuarial consultants, risk analysts, meteorologists, IT consultants, and second- and third-level teaching.

Prospective employers include Aquamarine Power, Alcatel-Lucent, Bureau Veritas, Campbell Scientific, Google, IBM, IFSC, Intel, Lloyds, Marine Institute, Met Éireann, Microsoft, Nokia, Norkom, Numerica Corporation, OpenHydro, Paddy Power, Philips, RIM, Simula Research and the Tyndall National Institute.

## Applicant Profile

- The mathematics stream of this programme is especially intended for applicants with a degree in mathematical studies, economics and finance, a three-year honours degree in mathematics or a cognate discipline with a high mathematical content. An upper second class honours or the international equivalent is required.
- The applied and computational mathematics stream of this programme is especially intended for science and engineering graduates who have scored highly in their mathematics, applied mathematics or mathematical physics courses. An upper second class honours or the international equivalent is required.
- Other graduates who believe that their mathematical training provides sufficient background to cope with the programme may apply for entry to the Programme Coordinator.
- Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent, such as TOEFL (iBT) score of 90 or PTE score of 63. Visit the UCD Admissions website for further details.

## Graduate Testimonial

**Dr Alison Sneyd**
After completing a degree in Mathematical Studies at UCD, I decided to do the HDip in Mathematical Science because it gave me the qualification I needed to pursue a PhD in mathematics. The HDip increased my understanding of a wide variety of topics in mathematics and was very beneficial to my future studies.

## EU Enquiries

**Programme Administrator**
UCD School of Mathematics and Statistics
smspostgrads@ucd.ie
www.ucd.ie/courses/hdip-mathematical-science

## Non-EU Enquiries

internationalenquiries@ucd.ie
www.ucd.ie/global

## Apply Now

This programme receives significant interest so please apply early online at

**www.ucd.ie/apply**



V1 2023

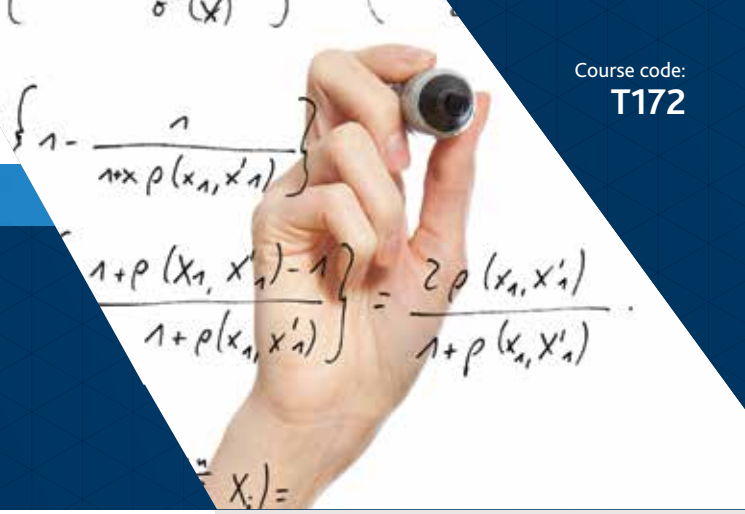
University College Dublin
Ireland's Global University

Course code:
**T172**

MATHEMATICS, ACTUARIAL SCIENCE & FINANCE

# Higher Diploma Mathematical Studies

1 Year Full Time



This programme is for you if you have a passion for mathematics, for problem solving and for deep understanding of the structures which underlie much of everyday experience. The programme may be of particular benefit to teachers or potential teachers, who would like to include mathematics among the subjects that they are eligible to teach at Leaving Certificate level. If you have already been exposed to a limited amount of University-level mathematics and would like to find a path into teaching or more advanced studies in the subject, then this programme provides the necessary bridge. After completing the Higher Diploma Mathematical Studies you will achieve a level of competence equivalent to that of a Mathematics major in a three-year honours degree. The programme covers the mathematics necessary to qualify the student to teach mathematics to Leaving Certificate level when combined with a Professional Master of Education (PME).

## Course Content and Structure

**60 CREDITS** Higher Diploma = **60 CREDITS** Taught Modules

### Modules and Topics (Subject to change and are not guaranteed by UCD)

#### Sample Topics

- Calculus of Several Variables
- Mathematics Pedagogy
- Algebraic Structures
- Linear Algebra
- History of Mathematics
- Introduction to Coding and/or Cryptography
- Graphs and Networks
- Financial Mathematics
- Analysis
- Geometry
- Differential Equations
- Statistics and Data Analysis

## Career Opportunities

The programme covers the mathematics necessary to qualify the student to teach mathematics to Leaving Certificate level when combined with a Professional Master of Education (PME). With further study in mathematics or a related discipline a wide range of the following careers become available: Financial engineer/quantitative analyst, Meteorologist, Computer animation, Graduate entry into banking/accountancy, Systems biologist, Internet security, software, Statistician. Prospective employers include Bell Labs, Campbell Scientific, Google, IBM, Intel, IFSC, Met Éireann, Microsoft, Nokia, Norkom, Philips, RIM and the Tyndall National Institute.

## Applicant Profile

- This programme is intended for applicants with an undergraduate degree with at least 10 credits of university level mathematics, including a course in calculus and a course in linear algebra, both aimed at Mathematics or Science students.
- Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent, such as TOEFL (iBT) score of 90 or PTE score of 63. Visit the UCD Admissions website for further details.

## Graduate Testimonial

**Cathal Dempsey**
Risk Analyst

Having completed a BComm, choosing to then study Mathematics was initially daunting and very challenging, but thankfully the design of the course and in particular the support from lecturers was excellent. The approachability of lecturers and their genuine desire to see you improve and learn was a huge help. I found the course to be so interesting and enjoyable that I decided to continue and study the UCD Higher Diploma in Mathematical Science.

## EU Enquiries

**Programme Administrator**
UCD School of Mathematics and Statistics

smspostgrads@ucd.ie
www.ucd.ie/courses/hdip-mathematical-studies

## Non-EU Enquiries

internationalenquiries@ucd.ie
www.ucd.ie/global

## Apply Now

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V1 2023

University College Dublin
Ireland's Global University

Course code:
**T020**

MATHEMATICS, ACTUARIAL SCIENCE & FINANCE

# MSc Statistics

1 Year Full Time


On completion of the MSc Statistics, you will be able to demonstrate in-depth understanding of statistical concepts, apply basic statistical reasoning, techniques and models in the analysis of real data and employ technical computing skills. This programme is aimed at students who have an undergraduate degree in Statistics or a degree in a discipline related to Statistics and with numerate skills.

Compulsory modules are intended to ensure that all students have appropriate basic statistical skills, knowledge and experience, while optional modules provide depth and exposure to the diverse range of statistical applications and methods. This latter aspect provides you with the opportunity to specialise in specific areas. The major project provides you with the chance to work extensively on either theoretical or practical problems.

## Course Content and Structure

**90 CREDITS** Taught Masters = **65 CREDITS** Taught Modules + **25 CREDITS** Research Project/Dissertation

### Modules and Topics (Subject to change and are not guaranteed by UCD)

#### Modules

- Mathematical Statistics
- Monte Carlo Inference
- Actuarial Statistics
- Survival models
- Data Mining
- Time Series
- Multivariate Analysis
- Statistical Network Analysis
- Data Programming with R
- Stochastic Models
- Data Programming with Python
- Applied Statistical Modelling
- Statistical Machine Learning
- Advanced Predictive Analytics
- Optimisation
- Data Programming with C

## Career Opportunities

Career opportunities exist in a variety of industries including pharmaceutical companies, banking, finance, government departments, risk management and the IT sector. Some past students embarked on a career in academia by proceeding to study for a PhD.

Graduates are currently working for companies such as Google, Western Union, AIB, Norbrook, Ernst & Young, O2, and SPSS. Demand for graduates continues to be strong both in Ireland and abroad.

## Applicant Profile

- This programme is intended for applicants who hold a degree in Statistics or a cognate subject area. An upper second class honours or international equivalent is required.
- Those who have been awarded an upper second class honours or higher in the Higher Diploma in Statistics are eligible for the programme.
- Alternatively students may qualify for enrolment for the four trimester MA in Statistics which brings them to the same level as the MSc in Statistics.
- Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent, such as TOEFL (iBT) score of 90 or PTE score of 63. Visit the UCD Admissions website for further details. Applicants with an IELTS score of at least 5.5 may apply for admission to the UCD Pre-Masters Pathway programme.

## Graduate Testimonial

**Valda Murphy**
Project Lead, Novartis

I am glad that I decided to take the MSc in Statistics in UCD. It had a strong theoretical foundation and gave me an education in how to apply statistics. My research project inspired me to go into the area of medical statistics after graduation. The course served as a launch pad for my career in pharmaceutical statistics where I now work as a project lead, overseeing the quantitative aspects of several drugs in development.

## EU Enquiries

**Programme Administrator**
UCD School of Mathematics and Statistics

smspostgrads@ucd.ie
www.ucd.ie/courses/msc-statistics

## Non-EU Enquiries

internationalenquiries@ucd.ie
www.ucd.ie/global

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V1 2023

University College Dublin
Ireland's Global University

Course code:
**F043**

MATHEMATICS, ACTUARIAL SCIENCE & FINANCE

# MA Statistics

16 Months Full Time

The MA in Statistics will bring students to the same level as the 1-year MSc degree in Statistics. Currently, students without sufficient statistical background knowledge can attain master's level proficiency by first completing the Higher Diploma in Statistics followed by the MSc in Statistics, which takes two years. The MA in Statistics provides an alternative pathway in 16 months and there is no comparable programme in Ireland or the UK. The MA Statistics is an EMOS (European Master in Official Statistics) labelled programme, which means that some students may choose to take modules and a project on official statistics, and potentially receive the EMOS certification of their degree.

On successful completion of the programme you will be able to demonstrate in-depth understanding of statistical concepts, apply basic statistical reasoning, techniques and models in the analysis of real data, employ technical computing skills, learn from experiences gained in different contexts, and apply knowledge across discipline boundaries to solve problems.

## Course Content and Structure

**120 CREDITS** Taught Masters = **95 CREDITS** Taught Modules + **25 CREDITS** Dissertation or Data Analytics Project

The MA in Statistics is of 16 months' duration (four trimesters) and will bring students to the same level as the MSc degree in Statistics.

### Modules and Topics (Subject to change and are not guaranteed by UCD)

Modules offered change from year to year and the list includes:

- Data Mining
- Time Series
- Multivariate Analysis
- Mathematical Statistics
- Monte Carlo Inference
- Actuarial Statistics
- Survival Models
- Stochastic Models
- Data Programming with R
- Applied Statistical Modelling
- Statistical Machine Learning
- Advanced Predictive Analytics
- Optimisation
- Data Programming with C

## Career Opportunities

Career prospects on completion of the MA in Statistics are equivalent to those of the MSc in Statistics and graduates pursue careers in the pharmaceutical industry, banking, finance and risk management. There is increased demand for statisticians from the IT sector (e.g., Google, Intel, data mining companies). In addition, many government departments employ statisticians. Former MSc and MA students are currently working for such firms as Google, Western Union, AIB, Norbrook, Ernst & Young, O2 and SPSS. Other graduates embarked on careers in academia by proceeding to study for a PhD.

## Applicant Profile

- This programme is intended for applicants with a degree in mathematics, economics, finance, certain engineering degrees or similar quantitative disciplines where statistics has formed some component of the degree. An upper second class honours or international equivalent is required.
- Applicants who do not meet these requirements but can demonstrate an interest and ability in statistics may be considered.
- Alternatively students may qualify for enrolment to the Higher Diploma Statistics from which they can gain entry to the one-year MSc in Statistics.
- Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent, such as TOEFL (iBT) score of 90 or PTE score of 63. Visit the UCD Admissions website for further details.

## Faculty Profile

**Dr Michelle Carey**
UCD School of Mathematics and Statistics

The ever-increasing rise of automated measurements allows us an unprecedented view of the world around us. Traditional statistical methodology is challenged by this more complex and high-dimensional data. My research advances statistical and numerical methods for the analysis of high-dimensional functional data in climatology, finance and medicine.

## EU Enquiries

**Programme Administrator**
UCD School of Mathematics and Statistics

smspostgrads@ucd.ie
www.ucd.ie/courses/ma-statistics

## Non-EU Enquiries

internationalenquiries@ucd.ie
www.ucd.ie/global

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V1 2023

University College Dublin
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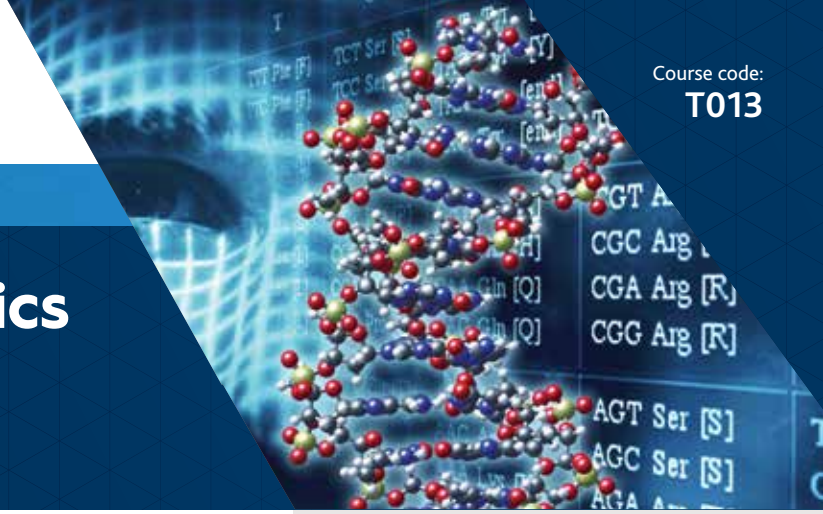
Course code:
**T013**

MATHEMATICS, ACTUARIAL SCIENCE & FINANCE

# Higher Diploma Statistics

1 Year Full Time




This programme is aimed at graduates whose level of statistical or mathematical training is high and have demonstrated numerical ability, but below that of a BSc Degree in Statistics. Students who are awarded a distinction or upper second-class honours in the Higher Diploma in Statistics are qualified to enter the MSc Statistics.

On successful completion of the programme, you will reach in one year a level of statistical knowledge equivalent to that of BSc Honours graduates. You will be able to apply basic statistical reasoning, techniques and models in the analysis of real data, understand the context in which statistical work is done, select appropriate statistical models for different applications, interpret results, and demonstrate programming skills, report writing skills and presentation skills.

## Course Content and Structure

**60 CREDITS** Higher Diploma = **60 CREDITS** Taught Modules

### Modules and Topics (Subject to change and are not guaranteed by UCD)

**Modules**

- Probability Theory
- Inferential Statistics
- Monte Carlo Inference
- Bayesian Analysis
- Stochastic Models
- Data Mining
- Predictive Analytics
- Actuarial Statistics
- Time Series
- Categorical Data Analysis
- Multivariate Analysis
- Data Programming with R

## Career Opportunities

Many students pursue careers in the pharmaceutical industry, banking, finance and risk management. There is an increase in demand for statisticians from the IT sector. Many government departments employ statisticians including the Central Statistics Office. Many students embarked on the MSc Statistics, based on achieving a second-class honours grade. Prospective employers include Vodafone, Google, Intel, Irish Life, Paddy Power, the ESRI, SPSS, Bank of Ireland, Quintiles, Accenture, Tesco, eBay and Aviva.

## Applicant Profile

- Applicants must have a minimum of an upper second class honours degree in a numerical discipline or a cognate subject area.
- Applicants who do not meet these requirements but can demonstrate an interest and ability in statistics may be considered.
- Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent, such as TOEFL (iBT) score of 90 or PTE score of 63. Visit the UCD Admissions website for further details.

## Graduate Testimonial

**James McBride**
Director of the Irish Social Science Data Archive from 2000-2012

The material covered in the core lecture courses was underpinned by an excellent tutorial system, which further enhanced my understanding of the topics. I cannot recommend this course highly enough for anyone wishing to strengthen their statistical skills, whether to pursue a career in academic research or in the broader job market.

## EU Enquiries

**Programme Administrator**
UCD School of Mathematics and Statistics
smspostgrads@ucd.ie
www.ucd.ie/courses/higher-diploma-statistics

## Non-EU Enquiries

internationalenquiries@ucd.ie
www.ucd.ie/global

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V1 2023

University College Dublin
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Course code:
**F012**

PHYSICS & NANOTECHNOLOGY

# MSc Physics

1 Year Full Time | Negotiated Learning

Physics provides us with a model of the universe, on an incredible range of scales, from inside the nucleus of the atom towards the edge of the observable universe. Advances in Physics underpin many technological developments, for example our knowledge of electron transport in semiconductors has led us to the point where computer processors and memory are almost ubiquitous.

This UCD MSc in Physics offers a negotiated learning (NL) model for students with a Physical Science or Engineering background that allows you to customise your learning path and to tailor what you learn to your own specific needs and career aspirations. It can prepare you either for further research in a PhD programme, or employment directly after graduation.

## Course Content and Structure

**90 CREDITS** Taught Masters = **30-60 CREDITS** Taught Modules OR **30-60 CREDITS** Project

### Modules and Topics (Subject to change and are not guaranteed by UCD)

#### Programme Modules

- Ultrafast Soft X-ray Photonics
- Physics Tutoring and Demonstrating
- Applied Quantum Mechanics
- Applied Optics
- Nano-optics and Biophotonics
- Nanomaterials
- Bio-inspired Technologies
- The Space Environment
- Quantum Condensed Matter
- Advanced Statistical Mechanics
- Nanomechanics

## Career Opportunities

This relatively new programme offers the possibility for graduates to go on to PhD programmes. The MSc will prepare you for employment in the semiconductor industry as a process engineer, the financial sector as a modelling and data expert, or as an engineer in the space sector. Prospective employers include Intel Ireland, Airbus, Analog Devices, Met Éireann, and companies in the Irish Financial Services Centre.

## Applicant Profile

- Entrance to this programme requires a degree in physics, chemistry, engineering, material sciences or a related discipline with a significant physics content. An upper second class honours or international equivalent is required. In special circumstances, students with a strong physics background and a lower second class honours degree may be accepted.
- Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent, such as TOEFL (iBT) score of 90 or PTE score of 63. Visit the UCD Admissions website for further details. Applicants with an IELTS score of at least 5.5 may apply for admission to the UCD Pre-Masters Pathway programme.

## Graduate Testimonial

**Oisín Maguire**
PhD Student in Plasma Spectroscopy, UCD School of Physics

I chose to study the MSc Physics (Negotiated Learning) due to its flexibility and engaging topics: from nano-mechanics and nano-optics to plasma physics. A wide variety of prospective research projects will fit practically every student, regardless of their specific background and research interests. Overall, this MSc gave me the insight I needed to progress my career and the knowledge that is required to have a successful career.

## EU Enquiries

**Associate Professor Brian Vohnsen**
UCD School of Physics
brian.vohnsen@ucd.ie
www.ucd.ie/courses/msc-physics-negotiated-learning

## Non-EU Enquiries

internationalenquiries@ucd.ie
www.ucd.ie/global

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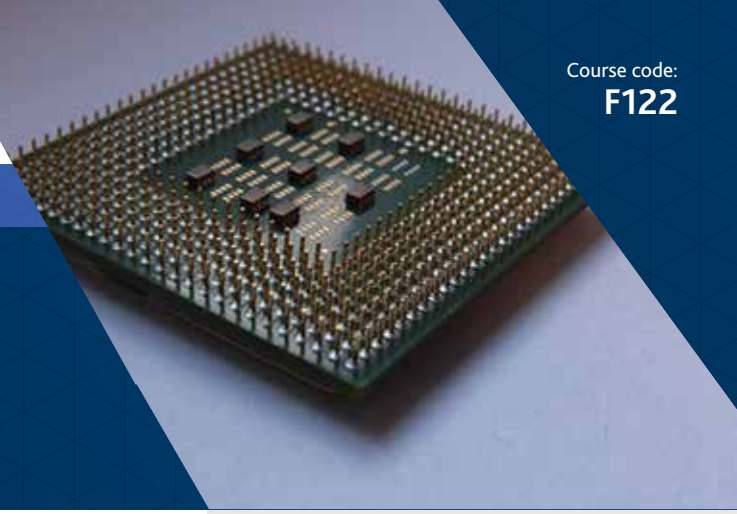
University College Dublin
Ireland's Global University

Course code:
**F122**

PHYSICS & NANOTECHNOLOGY

# MSc Nanotechnology

1 Year Full Time



Nanotechnology is an emerging sector, which covers many areas of both academic science and device design and innovation. Manipulating matter at the nanoscale has already led to new technology in many areas such as electronics, displays, sensors, and green technology. The design, fabrication and control of devices with nanoscale (billionth of a metre) dimensions, is an engine of innovation in almost every sector.

This course is suitable for graduates who wish to apply their degree expertise in the nanoscale science and related sectors. This specialisation is for students excited by the prospect of studying and researching in an interdisciplinary area, where physics, chemistry and engineering all come together.

## Course Content and Structure

**90 CREDITS** Taught Masters = **45 CREDITS** Taught Modules + **45 CREDITS** Research Project OR **60 CREDITS** Taught Modules + **30 CREDITS** Research Project

### Modules and Topics (Subject to change and are not guaranteed by UCD)

Modules will be decided upon agreement with the Programme Director.

You will gain experimental, theoretical and computational training in the following topics:

- Nano-Optics
- Physics of Nano-Materials
- Ultrafast Soft X-ray Photonics
- Nano-Mechanics
- Atomic Force Microscopy
- Biophysics at the Nanoscale
- Bio-inspired Technologies
- Innovation

## Career Opportunities

The programme prepares you for industry or further PhD research. Career opportunities include the semiconductor industry, telecommunications, diagnostic imaging, green technologies and sensor applications, both in Ireland and internationally. It is also a stepping-stone to PhD research in the areas of photonics, nanotechnology and computational physics and nanoscience.

Prospective employers include Abbott, Allergan, Andor, Asylum Research, Becton Dickinson, Boston Scientific, Carl-Zeiss Meditec, Covidien Imaging, Eblana Photonics, Intel, Intune Networks, Park Systems, Pharma-Bio Serv, Philips, and SensL.

## Applicant Profile

- Entrance to this programme requires a degree in physics, chemistry, engineering, material sciences or a related discipline with a significant physics content. An upper second class honours or international equivalent is required. In special circumstances, students with a strong physics background and lower second class honours degree may be accepted.
- Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent, such as TOEFL (iBT) score of 90 or PTE score of 63. Visit the UCD Admissions website for further details. Applicants with an IELTS score of at least 5.5 may apply for admission to the UCD Pre-Masters Pathway programme.

## Faculty Profile

**Associate Professor James Rice**
UCD School of Physics

The research projects in Associate Professor Rice's group at UCD are in the area of experimental nanoscience. His main scientific contributions are related to understanding optical processes in nanoscale materials, concentrating on semiconducting and metallic nanostructured materials. He contributed to the development of novel nanomaterial designs that possess plasmonic properties and the use of biomaterials as functional conducting nanomaterials.

## EU Enquiries

**Associate Professor James Rice**
UCD School of Physics
james.rice@ucd.ie
www.ucd.ie/courses/msc-nanotechnology

## Non-EU Enquiries

internationalenquiries@ucd.ie
www.ucd.ie/global

## Apply Now

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V1 2023

University College Dublin
Ireland's Global University

Course code:
**T149**

PHYSICS & NANOTECHNOLOGY

# MSc NanoBio Science

1 Year Full Time

This MSc programme unites the technological with the biological aspects of nanotechnology in a unique way, equipping graduates with a truly interdisciplinary perspective of the field. Manipulating matter at the nanoscale is already leading to new and improved imaging and display technologies, biomedical sensors, and solar cells for environmentally friendly energy production. The design, fabrication and control of devices with nanoscale (billionth of a metre) dimensions is an engine of innovation in almost every sector.

The MSc in NanoBio Science at the UCD School of Physics is for students excited by the prospect of studying and researching in this emerging interdisciplinary area, where physics, chemistry, engineering and life sciences all come together.

## Course Content and Structure

**90 CREDITS** Taught Masters = **45 CREDITS** Taught Modules + **45 CREDITS** Research Project

### Modules and Topics (Subject to change and are not guaranteed by UCD)

You will gain experimental and theoretical knowledge in the following topics:

- Nano-Optics and Bio-Photonics
- Physics of Nanomaterials
- Ultrafast Soft X-ray Photonics
- Nano-Mechanics
- Atomic Force Microscopy
- Computational Biophysics
- Biophysics at the Nanoscale
- Bio-inspired Technologies
- Innovation

## Career Opportunities

The programme prepares you for industry or further research. Career opportunities include the pharmaceutical industry, telecommunications, diagnostic imaging, green technologies and sensor applications, both in Ireland and internationally. It is also a stepping stone to PhD research in the areas of nanoscience, biophotonics and nanotechnology.

Prospective employers include Abbott, Alcon, Allergan, Bausch & Lomb, Becton Dickinson, Boston Scientific, Eblana Photonics, Intel, Pfizer, Pharma-Bio Serv, Philips, and SensL.

## Applicant Profile

- This programme is intended for applicants with a degree in Physics, Chemistry, Engineering, Material Science or a related discipline. An upper second class honours or international equivalent is required.
- Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent, such as TOEFL (iBT) score of 90 or PTE score of 63. Visit the UCD Admissions website for further details. Applicants with an IELTS score of at least 5.5 may apply for admission to the UCD Pre-Masters Pathway programme.

## Graduate Testimonial

**JiaJun Li**
Chinese Academy of Sciences, Shanghai

I chose to study the MSc in NanoBio Science because of its huge potential. The subjects in this course cover areas from physics to biology and the cutting-edge experiments and research will benefit you in your future career. The international aspect definitely brings new ideas and gives you a chance to get to know people in your area of study from around the world.

## EU Enquiries

**Professor Dominic Zerulla**
UCD School of Computer Science
dominic.zerulla@ucd.ie
www.ucd.ie/courses/msc-nanobio-science

## Non-EU Enquiries

internationalenquiries@ucd.ie
www.ucd.ie/global

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V1 2023

University College Dublin
Ireland's Global University

Course code:
**F060**

PHYSICS & NANOTECHNOLOGY

# MSc Space Science & Technology

1 Year Full Time

This programme is ideal for graduates of Physics, Engineering and closely related disciplines, who want to transfer their expertise to the fast-growing global space sector. Ireland is a member of the European Space Agency (ESA) and dozens of Irish companies and researchers are involved in major international space missions. UCD is building Ireland's first satellite, EIRSAT-1.

Course highlights include a hands-on CubeSat lab, payload development and satellite systems engineering of a high-altitude balloon experiment and participation in an international mission design team project. A 3-month internship provides relevant training for industry or research and can lead to employment. Students have completed internships at the European Astronaut Centre (EAC), ESA, NASA-Ames, Cosine, ENBIO, InnaLabs, Skytek, Eblana Photonics and Réaltra.

## Course Content and Structure

**90 CREDITS** Taught Masters = **60 CREDITS** Taught Modules + **30 CREDITS** Internship

### Modules and Topics (Subject to change and are not guaranteed by UCD)

#### Core Modules

- The Space Environment and Spacecraft
- Applications of Space Science
- Space Sector Professional Skills
- Space Detector Laboratory
- Satellite Subsystems Laboratory
- Space Mission Design Field Trip
- Space Sector Internship

#### Option Modules

- Planetary Geomorphology
- Remote Sensing
- Stellar Astrophysics
- Galaxies and Observational Cosmology
- Data Science in Python

## Career Opportunities

The programme is space industry focused, while also preparing graduates to pursue careers in related sectors, and in research. Satellite operator, test engineer, mission specialist, payload scientist and systems engineer are all roles that are in demand globally. Earth observation and environmental monitoring (especially to meet sustainable development goals), navigation, telecommunications and meteorology are application areas that rely heavily on graduates with satellite expertise.

The MSc can act as a stepping-stone to PhD research in areas such as atmospheric physics, space physics, aeronautics, propulsion and astrophysics, and to traineeships at European Space Agency establishments.

## Applicant Profile

- An upper second class honours degree or the international equivalent in any area of Physics or Engineering is required. Entrants should have an analytical background, and a basic level of programming skills.
- Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent, such as TOEFL (iBT) score of 90 or PTE score of 63. Visit the UCD Admissions website for further details. Applicants with an IELTS score of at least 5.5 may apply for admission to the UCD Pre-Masters Pathway programme.

## Graduate Testimonial

**Meadhbh Griffin**

The practical aspect of the Masters aided in my professional development, refining my experience of computer engineering gained in my undergraduate to better suit the specific challenges of flight control software. I learned principles of software development, project coordination and time management which I was able to rely on during my internship at ESTEC, where I developed control software for CHIMERA, a payload of RadCube, which was launched on Vega flight VV19.

## EU Enquiries

**Professor Lorraine Hanlon**
UCD School of Physics
lorraine.hanlon@ucd.ie
www.ucd.ie/courses/msc-space-science-technology

## Non-EU Enquiries

internationalenquiries@ucd.ie
www.ucd.ie/global

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University College Dublin
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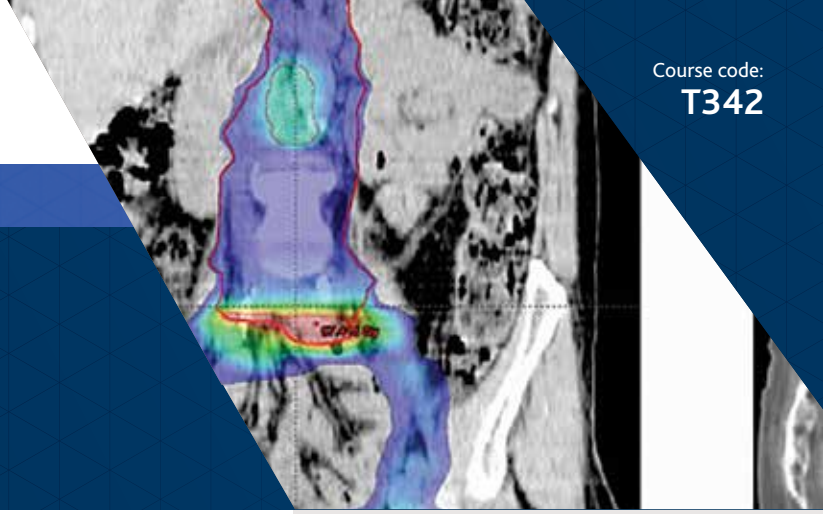
Course code:
T342

PHYSICS & NANOTECHNOLOGY

# MSc/Grad Diploma Medical Physics

1 Year Full Time/2 Years Part Time



Medical Physics is the branch of Physics that applies the concepts and principles of physics to the diagnosis and treatment of human disease. The MSc in Medical Physics is designed for students who wish to pursue a career in Medical Physics, either in a clinical environment or in research.

The programme, which is accredited by the Commission on Accreditation of Medical Physics Education Programmes (CAMPEP), provides a strong foundation in diagnostic imaging physics, nuclear medicine, radiation oncology physics and radiation protection, as well as the essential anatomy and physiology knowledge required to understand a patient's anatomical structure and physiological processes.

## Course Content and Structure

**90 CREDITS** Taught Masters = **60 CREDITS** Taught Modules + **30 CREDITS** Project Work and Dissertation

### Modules and Topics (Subject to change and are not guaranteed by UCD)

The taught modules offered as part of the MSc/Graduate Diploma programme include the following:

- Radiological Physics
- Diagnostic Imaging Physics
- Detectors and Dosimetry
- Radiation Oncology Physics
- Radiobiology and Ethics
- Radiation Protection and Safety
- Anatomy and Physiology
- Cross-sectional Imaging
- Statistics
- Data Science

## Career Opportunities

The programme provides an accepted route to enter a career in Medical Physics. It is also a stepping-stone to PhD research in areas such as diagnostic imaging, radiation oncology physics, nuclear medicine, radiation protection and radiobiology. CAMPEP accreditation allows graduates to apply for CAMPEP residency programmes in Ireland and internationally.

Prospective employers include Medical Physics Departments in hospitals and clinicals across Ireland and abroad, medical device manufactures and regulatory bodies.

## Applicant Profile

- Entrance to this programme requires a degree in physics or a related discipline with a significant physics content. An upper second class honours or international equivalent is required.
- Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent, such as TOEFL (iBT) score of 90 or PTE score of 63. Visit the UCD Admissions website for further details. Applicants with an IELTS score of at least 5.5 may apply for admission to the UCD Pre-Masters Pathway programme.

## Graduate Testimonial

**Sarah Meaney**
Medical Physicist, St Vincent's University Hospital

UCD's CAMPEP accredited MSc in Medical Physics provided me with excellent knowledge and skills to launch my career in the medical physics field. The programme is mainly taught by clinical scientists. Medical physics allows you to bring a human aspect to being a scientist. A trimester of clinical research helped me to become familiar with the clinical environment and the day-to-day requirements, complementing the knowledge gained in the classroom. I believe this course is truly a fantastic stepping stone into a rewarding career helping others through physics applications.

## EU Enquiries

**Dr Seán Cournane**
UCD School of Physics
s.cournane@ucd.ie
www.ucd.ie/courses/medical-physics

## Non-EU Enquiries

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V1 2023

University College Dublin
Ireland's Global University

Course code:
**F120**

PHYSICS & NANOTECHNOLOGY

# MSc Computational Physics

1 Year Full Time

Computational Physics is a basic specialisation that offers broad opportunities for future employment in research, development, data analytics and informatics-related industry sectors. The MSc Computational Physics is developed in close connection with the more applied NanoBio and NanoTechnology specialties, offering you both a solid training in computational methods and a direct access to laboratory-based research projects.

The programme is aimed at students with a strong background in Physics or related Natural Sciences, who wish to learn how to convert a mathematical model of a physical system into accurate and robust computer programmes that can capture quantitatively its behaviour.

## Course Content and Structure

**90 CREDITS** Taught Masters = **45 CREDITS** Taught Modules + **45 CREDITS** Research Project OR **60 CREDITS** Taught Modules + **30 CREDITS** Research Project

### Modules and Topics (Subject to change and are not guaranteed by UCD)

Modules will be decided upon agreement with the Programme Director. Indicative modules available include:

- Applied Quantum Mechanics
- Computational Biophysics and Nanoscale Simulations
- Nanofluidics and Biosimulation
- Bio-inspired Technologies
- Advanced Statistical Physics
- Numerical Weather Prediction
- Numerical Algorithms
- Stochastic Models
- Time Series Analysis

## Career Opportunities

The programme prepares you for a career in industry or for further PhD research. Career opportunities are broad, including the bio-pharmaceutical, telecommunications, data mining and analysis, IT consulting and green technologies industry sectors, both in Ireland and internationally. It is also a stepping stone to PhD research in the areas of theoretical and computational physics, biological and medical physics, nanotechnology and nanoscience.

Recent and prospective employers include Deloitte, Murex Inc., Intel, Pfizer, MSD, Philips, Tullow Oil, the University of Edinburgh, Imperial College London, and the National Institutes of Health, USA.

## Applicant Profile

- This programme is intended for applicants who have a strong background in physics, chemistry, engineering, material sciences or a related discipline with a significant physics content. An upper second class honours or international equivalent is required. In special circumstances, students with a strong physics background and lower second class honours may be accepted.
- Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent, such as TOEFL (iBT) score of 90 or PTE score of 63. Visit the UCD Admissions website for further details. Applicants with an IELTS score of at least 5.5 may apply for admission to the UCD Pre-Masters Pathway programme.

## Faculty Profile

**Associate Professor Nicolae-Viorel Buchete**
UCD School of Physics & UCD Institute for Discovery

Ongoing research projects in his group at UCD are concerned with statistical mechanics and conformational dynamics of biomolecular systems, protein folding, amyloid aggregation, structural aspects of systems biology and bioinformatics, and with multiscale modelling of biomolecules and complex fluids.

## EU Enquiries

**Associate Professor Nicolae Buchete**
UCD School of Physics
nicolae-viorel.buchete@ucd.ie
www.ucd.ie/courses/msc-computational-physics

## Non-EU Enquiries

internationalenquiries@ucd.ie
www.ucd.ie/global

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University College Dublin
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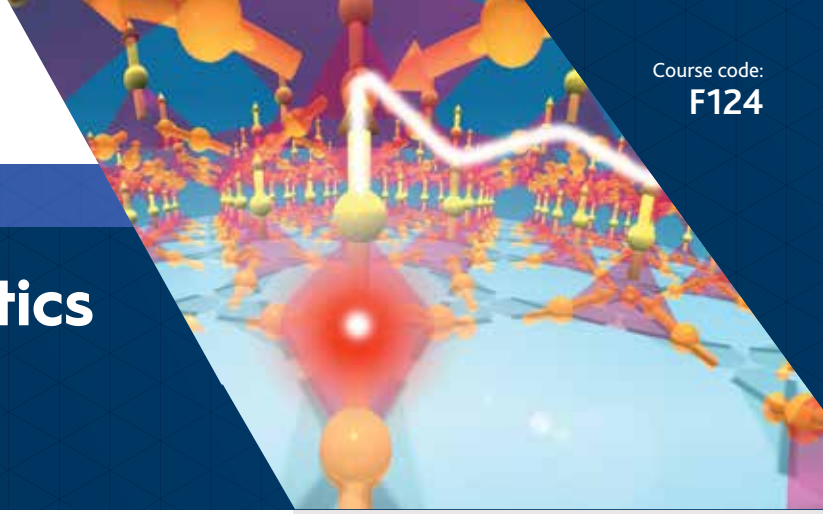
Course code:
**F124**

PHYSICS & NANOTECHNOLOGY

# MSc Applied Mathematics & Theoretical Physics

1 Year Full Time



The MSc Applied Mathematics and Theoretical Physics offers broad opportunities for future employment in research, development, predictive modelling and risk assessment, and informatics related industry sectors. At UCD, this MSc programme is developed in close connection with the Simulation Science and Computational Physics specialties, offering students both a robust training in computational methods on top of the solid theoretical and mathematical foundation.

The programme is aimed at students with a strong background in Physics, Mathematics or a related Natural Science, who wish to learn state of-the-art mathematical models and methods, applied to quantitative analysis of a broad range of physical phenomena.

## Course Content and Structure

**90 CREDITS** Taught Masters = **45 CREDITS** Taught Modules + **45 CREDITS** Research Project OR **60 CREDITS** Taught Modules + **30 CREDITS** Research Project

### Modules and Topics (Subject to change and are not guaranteed by UCD)

Modules will be decided upon agreement with the Programme Director. Indicative modules available include:

- General Relativity and Cosmology
- Quantum Theory of Condensed Matter
- Theoretical Astrophysics
- Advanced Statistical Physics
- Quantum Field Theory
- High Energy Particle Physics
- General Relativity and Black Holes
- Numerical Algorithms
- Dynamical Systems
- Electrodynamics and Gauge Theory
- Relativistic Quantum Mechanics
- Environmental Fluids
- Differential Geometry

## Career Opportunities

The programme prepares you for a career in industry or for further PhD research. Career opportunities are broad, including the financial, predictive modelling and risk assessment, telecommunications, data mining and analysis, IT consulting and green technologies industry sectors, both in Ireland and internationally. It is also a stepping stone to PhD research in the areas of theoretical and computational physics, nanotechnology and nanoscience.

Recent and prospective employers include Deloitte, Murex, Intel, Pfizer, MSD, Philips, Tullow Oil, the University of Edinburgh, Imperial College London, Los Alamos National Laboratory, and the National Institutes of Health, USA.

## Applicant Profile

- This programme is intended for applicants who have a strong background in physics, chemistry, engineering, material sciences or a related discipline with a significant physics content. An upper second class honours or international equivalent is required. In special circumstances, students with a strong physics background and lower second class honours may be accepted.
- Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent, such as TOEFL (iBT) score of 90 or PTE score of 63. Visit the UCD Admissions website for further details. Applicants with an IELTS score of at least 5.5 may apply for admission to the UCD Pre-Masters Pathway programme.

## Faculty Profiles

**Associate Professor Vladimir Lobaskin**

Associate Professor Lobaskin's main scientific contributions are related to structure and interactions in charged colloidal dispersions, colloidal dynamics, mechanics of biomolecules, and flocking of active particles.

**Professor Adrian Ottewill**

Professor Adrian Ottewill's research interests are in general relativity (gravitational entropy, detection of gravitational radiation) and quantum field theory in curved space-time (Hawking evaporation of black holes, quantum mechanical origin of structure in the universe).

## EU Enquiries

**Associate Professor Vladimir Lobaskin**
UCD School of Physics
vladimir.lobaskin@ucd.ie
www.ucd.ie/courses/msc-appliedmaths-theoreticalphysics

## Non-EU Enquiries

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www.ucd.ie/global

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V1 2023

University College Dublin
Ireland's Global University

Course code:
**T195**

COMPUTER SCIENCE

# MSc Computer Science (Conversion)

16 Months Full Time


UCD offers a skills conversion graduate programme for individuals who hold a primary degree in another discipline (e.g., Arts, Commerce, Engineering), and would like to enter an IT-related career. This programme provides a thorough foundation in modern Computer Science in a practically oriented learning environment.

On completion of the programme you will be able to demonstrate an integrated knowledge and understanding of the scientific principles of Computer Science; demonstrate competence and specialist knowledge in areas such as Programming, Data Science, Software Engineering, Web Application Development, Database Design, Cloud & Distributed Computing, Artificial Intelligence & Cognitive Science; undertake independent innovative research and development projects; and work with confidence both autonomously and as part of a team on projects related to real-world computer science applications.

A research practicum allows students to apply the skills learned in the taught modules in a more significant project and to see where these skills can play a role in industry. In the final trimester, students choose 30 credits of taught modules from the MSc Computer Science (Negotiated Learning) programme.

## Course Content and Structure

**120 CREDITS** Taught Masters = **60 CREDITS** Taught Modules + **30 CREDITS** Research Practicum + **30 CREDITS** Taught Modules

### Modules and Topics (Subject to change and are not guaranteed by UCD)

**Year 1**
(Autumn Semester)

- Python Programming
- Object Oriented Programming
- Computational Thinking
- Relational Databases and Information Systems
- Operating Systems
- Web Application Development

**Year 1**
(Spring Semester)

- Java Programming
- Data Structures and Algorithms
- Data Analytics
- Software Engineering
- Computer Architecture
- Networks and Internet Systems

**Year 1**
(Summer Trimester)

- Research Practicum

**Year 2**
(Autumn Trimester)

Choose modules such as*:

- Data Science
- Software Engineering
- Artificial Intelligence and Cognitive Science

**Note that there may be some limitations on choice due to pre-requisites and timetabling.*

## Career Opportunities

Some of the roles graduates have worked in include: Software Engineer, IT Project Analyst, Data Scientist, Python Developer, Web Applications Developer, Data Analyst, Business Analyst, Technical Analyst and Technical Consultant. Companies that have employed graduates include IBM, Dell, Accenture, SAP, Workday, Ericsson, Deloitte Ireland, First Derivatives, BearingPoint, Tableau Software, AIB, Web Summit and Zalando SE.

## Course Highlight

- This programme has been specifically designed for graduate students of disciplines other than Computer Science. No prior knowledge of programming is assumed. During the first year, students take modules with learning outcomes aimed at providing fundamental skills required by modern technology companies.

## Applicant Profile

- This programme is intended for applicants who do not have a Computer Science or ICT background. An upper second class honours degree, or the international equivalent, in another discipline is required for entry.
- Computer Science is a mathematical subject involving logical understanding and reasoning and therefore applicants must be able to demonstrate a good knowledge of mathematics.
- Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent, such as TOEFL (iBT) score of 90 or PTE score of 63. Visit the UCD Admissions website for further details.

## Graduate Testimonial

**Jack Halpin**
Software Engineer, SN Systems Ltd.

I wanted to get into web and mobile development but only had a handful of programming experience from my degree. From doing the MSc, I've learned a lot about the underlying theory of Computer Science as well as becoming proficient across a number of technologies that are relevant to today's industry. I'd highly recommend the course to anyone thinking of pursuing a career in IT or software development.

## EU Enquiries

**Programme Administrator**
UCD School of Computer Science
cs_conversion@ucd.ie
www.ucd.ie/courses/msc-computer-science-conversion

## Non-EU Enquiries

internationalenquiries@ucd.ie
www.ucd.ie/global

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V1 2023

University College Dublin
Ireland's Global University

Course code:
**T150**

COMPUTER SCIENCE

# MSc Computer Science

1 Year Full Time/2 Years Part Time

Negotiated Learning

The MSc Computer Science (Negotiated Learning) is a uniquely flexible and innovative programme. It offers a negotiated learning model for students with an ICT background that allows you to customise your learning path and to tailor what you learn to your own specific needs and career aspirations. Module choices include several programming languages, cloud computing, bioinformatics, data mining, machine learning and information visualisation.

Once you are accepted onto the programme we will guide you through a student needs assessment to establish your prior experience, personal knowledge gaps and your career plans. You have the option to select modules with a very specific thematic focus or you may select modules from one of the pre-defined themes covered by the programme.

## Course Content and Structure

**90 CREDITS** Taught Masters = **60 CREDITS** Taught Modules + **30 CREDITS** Internship/Project/Dissertation

### Modules and Topics (Subject to change and are not guaranteed by UCD)

While the programme offers some modules that are taught online, these options are limited, and it is not normally possible to complete this degree without substantial regular attendance at day-time lectures and practicals on campus in UCD.

### Sample Themes

- Artificial Intelligence and Cognitive Science
- Computer Engineering
- Data Manipulation and Visualisation
- Prediction and Learning with Data
- Data Science Programming
- Distributed Computing
- Mathematics and Statistics
- Software Engineering
- Advanced Software Engineering
- Computers and Society

## Career Opportunities

Previous graduates are in demand and among their recent career destinations are employers Google, SAP, Intel, PayPal, Deloitte, Microsoft, Symantec, HMH, Vilicom, Murex, NYSE Technologies, Realex Payments, Version 1, Salesforce, Pfizer, Ericsson, and Intune Networks.

Recent graduates have secured roles in areas including: hardware design, software engineering & QA, data programming & analysis, commercialisation of technology, teaching & training, senior management & CEO roles, security & forensics consultancy, and bioinformatics R&D.

## Course Highlights

- Currently there are approximately 100 module options offered in conjunction with other UCD Schools and Units including Business, Physics, Mathematics and Statistics, Psychology, Law and NovaUCD.

## Applicant Profile

- This programme is intended for applicants with a strong Computer Science or ICT background.
- Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent, such as TOEFL (iBT) score of 90 or PTE score of 63. Visit the UCD Admissions website for further details.

## Graduate Testimonial

**Ahmed Yawer**
Equifax Technology

The programme was a huge step forward in my career. After the completion of the programme, I secured a full-time job as a programmer at Equifax Technology. The MSc Computer Science (Negotiated Learning) course gave me the freedom to pick the modules I wanted to study, so I was able to study what I loved and what I needed.

## EU Enquiries

**Travis Grotewold**
UCD School of Computer Science
travis.grotewold@ucd.ie
www.ucd.ie/courses/msc-computer-science-negotiated-learning

## Non-EU Enquiries

internationalenquiries@ucd.ie
www.ucd.ie/global

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University College Dublin
Ireland's Global University

Course code:
**T023**

COMPUTER SCIENCE

# MSc Cognitive Science

1 Year Full Time/2 Years Part Time

The MSc Cognitive Science suits those interested in issues relating to the rich questions about the human mind from philosophical, psychological, and computational perspectives. Advanced computational skills are not a prerequisite. The course is designed as a suitable preparation for those wishing to progress to research, e.g. at PhD level.

You will have the opportunity to be familiar with the problems associated with minds, brains, and behaviour and the theoretical approaches to them, know the principal 20th Century philosophical approaches to mind, brain and body, understand the principal issues, models, and concepts used in cognitive psychology, and develop an interdisciplinary perspective that links and integrates insights from multiple specialised domains.

## Course Content and Structure

**90 CREDITS** Taught Masters = **60 CREDITS** Taught Modules + **30 CREDITS** Research Project

### Modules and Topics (Subject to change and are not guaranteed by UCD)

#### Typical Modules

- Graduate Introduction to Cognitive Science
- Philosophy of Mind
- Foundations of Cognitive Neuropsychology
- Connectionism and Dynamical Systems
- Cognitive Modelling
- Readings in Visual and Social Cognition
- The Cultural Mind
- Embodied and Enactive Approaches to Cognitive Science
- Cognitive Psychology

## Career Opportunities

This is not a vocational course. Over one year we cover a very broad range of material, thus greatly increasing the breadth of academic exposure of our students. Historically, about half of the students go on to do PhD studies, and many others look for work in research. This course will not make a psychologist out of a non-psychologist, or an IT specialist out of someone who is not an IT specialist upon entry. It will enable students to tackle research issues they might not have been able for before, and to do PhDs in areas that would not have been possible before. Many students pursue this course because of a passionate interest in our scientific understanding of what it is to be human. Please note that a cognitive science degree is not part of an accredited programme towards a clinical degree, and it has minimal neuroscientific content.

## Applicant Profile

- This programme is intended for applicants with a degree in computer science, psychology, philosophy, linguistics, neuroscience or a other related discipline. More important than the name of the primary degree is that applicants must display an awareness of the interdisciplinary challenges of cognitive science, and be prepared to engage with those challenges through earnest and open questioning. Please note that many psychology undergraduate programmes do not provide this kind of interdisciplinary sensitivity. An upper second class honours or the international equivalent is required.
- Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent, such as TOEFL (iBT) score of 90 or PTE score of 63. Visit the UCD Admissions website for further details.

## Graduate Testimonial

**Eileen Wahl**
Graduate

I felt that I really grew as a scientist by being able to critique other people's papers and to think about those issues when I am doing my own science work. I would certainly recommend this programme to international students as you get to meet people from all different countries.

## EU Enquiries

**Associate Professor Fred Cummins**
UCD School of Computer Science
**Professor Maria Baghramian**
UCD School of Philosophy
fred.cummins@ucd.ie/maria.baghremian@ucd.ie
www.ucd.ie/courses/msc-cognitive-science

## Non-EU Enquiries

internationalenquiries@ucd.ie
www.ucd.ie/global

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V1 2023

University College Dublin
Ireland's Global University

Course code:
**T380**

COMPUTER SCIENCE

# MSc Cybersecurity

2 Years Part Time | Blended Learning

This course is designed to prepare IT professionals for a managerial or technical career in cybersecurity. It will help companies, government and state institutions, defence forces and others to upskill their staff to fill new roles in cybersecurity so that they can protect their organisations, their customers and the public. It facilitates professional learners through flexible blended study options. Lectures are delivered online and complemented by occasional full-day workshops on campus, with a remote option for those who cannot attend in person. The combination of mainly distance but with some on-campus days allows flexible learning but with face-to-face interactions.

In developing the course we have collaborated with industry and law enforcement practitioners to ensure that the course meets the needs of professional learners.

## Course Content and Structure

**90 CREDITS** Taught Masters = **75 CREDITS** Taught Modules + **15 CREDITS** Case Study **OR** **60 CREDITS** Taught Modules + **30 CREDITS** Research Project

### Modules and Topics (Subject to change and are not guaranteed by UCD)

#### Core Modules

- Information Security
- Leadership In Security
- Risk Assessment and Standards
- Cybersecurity Law and Regulation
- Secure Software Engineering
- Applied Cryptography
- Network Security
- Incident Response

#### Option Modules

- Malware Analysis
- Security Research Trends
- Ethical Hacking
- Case Study
- Professional Project
- Research Project

## Career Opportunities

The course will prepare professionals for a rewarding career in cybersecurity; for example, to take a role as a security manager, security engineer, security analyst, or IT security specialist. Career development possibilities are excellent. Organisations of all sizes in all sectors, including both Irish and foreign owned companies, are looking for people with these skills.

Many global companies have a base in Ireland, including security software and cybersecurity companies with a security operations centre (SOC). There is a growing cybersecurity market globally as cybersecurity is recognised as critical for national security and the smooth functioning of society.

## Course Highlights

- Curriculum aligned with the ACM/IEEE/AIS SIGSEC/IFIP Cybersecurity Curricular Guidelines preparing students to take a variety of cyber security roles
- Modules for professionals seeking to take a managerial role in security

## Applicant Profile

- Minimum of a 2.1 honours bachelor's degree in Computer Science (or a cognate discipline) or 2:2 honours bachelor's degree in Computer Science (or a cognate discipline) and equivalent (>5 years) industrial experience in software development or software/system security.
- Each applicant will be assessed on a case-by-case basis.
- Applicants are also required to fulfill UCD's English language requirements.

## EU Enquiries

**Dr Liliana Pasquale**
UCD School of Computer Science
Liliana.pasquale@ucd.ie
www.ucd.ie/courses/msc-cybersecurity

## Non-EU Enquiries

internationalenquiries@ucd.ie
www.ucd.ie/global

## Apply Now

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V1 2023

University College Dublin
Ireland's Global University

Course code:
T146

COMPUTER SCIENCE

# MSc Forensic Computing & Cybercrime Investigation

1 Year Full Time/2 Years Part Time | Distance Learning

This is a programme for law enforcement. It aims to provide high quality forensic computing and cybercrime investigation training and formal education. It is also designed to deliver cutting-edge, up-to-date cybercrime investigation techniques, strategies and tactics that allow students to understand and tackle emerging trends in cybercrime. Over the past 10 years we have brought in specialists from around the world to review and advise on the content considering the needs of digital forensic investigators and computer crime specialists. The UCD School of Computer Science (CS) and UCD Centre for Cybersecurity and Cybercrime Investigation (CCI) are working closely with law enforcement agencies and industry practitioners in seeking solutions to technologies-related crime. CS and CCI staff also collaborate with the scientists from European Cybercrime Training and Educational Group at Europol (ECTEG).

## Course Content and Structure

**90 CREDITS** Taught Masters = **90 CREDITS** Taught Modules

OR **80 CREDITS** Taught Modules + **10 CREDITS** Case Study

OR **60 CREDITS** Taught Modules + **30 CREDITS** Research Project

### Modules and Topics (Subject to change and are not guaranteed by UCD)

Lectures are pre-recorded and provided online via a virtual online learning environment, allowing you to participate from your home or office and attend UCD only for examinations each year in Dublin, the Netherlands or the USA.

#### Core Modules

MSc candidates are encouraged to take the following modules in their first year:

- Computer Forensics
- Network Investigations
- Programming for Investigators
- Malware Investigations
- Mobile Device Investigations
- Live Data Forensics
- Linux for Investigators
- VoIP and Wireless Investigations
- Advanced Computer Forensics
- Data and Database Forensics
- Advanced Malware Analysis
- Case Study
- Research Project

#### Option Modules

- Financial Investigation Techniques – Following the Money
- OSINT Collection and Analysis
- Online Child Abuse

## Career Opportunities

For law enforcement officers, having this qualification has the additional advantage of adding credibility to their testimony as expert witnesses. Career development possibilities in this field are excellent.

Graduates include senior staff at Europol and INTERPOL, members of national and regional police forces and police training colleges, government ministries and agencies with Law Enforcement (LE) powers, defence forces, specialist cybercrime agencies, revenue, customs and border protection.

## Applicant Profile

- All applicants must be current employees of a law enforcement organisation (LE) working in an investigative role. You do not have to be a sworn officer. LE includes any organisation that has responsibility for the enforcement of national or local legislation.
- Applicants with a primary degree in Computer Science are preferred. However, applicants working in the field of digital forensic investigations in law enforcement for more than 2 years and who have successfully completed advanced training, will be considered at the discretion of the course directors on a case-by-case basis.
- Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent, such as TOEFL (iBT) score of 90 or PTE score of 63. Visit the UCD Admissions website for further details.

## Graduate Testimonial

**Michael Lenasolon**
Investigations Officer, Kenya Revenue Authority

Studying in UCD has been a lifetime experience for me. The skills in law enforcement and digital forensic that I have acquired and enhanced, will go a long way in improving my professional skills. The course has been hands-on and I am confident that I am well placed for most challenges in the future that touch on Law Enforcement, Digital Forensics Investigation and Cybercrime.

## EU and Non-EU Enquiries

**Emily Delaney**
UCD School of Computer Science
emily.delaney@ucd.ie
www.ucd.ie/courses/msc-forensic-computing-cybercrime

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RISING TO THE FUTURE
UCD Strategy 2020-2024

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