The creation of the world did not take place once and for all time, but takes place every day

Samuel Beckett (1906–1989)
Trinity College Dublin
alumnus 1923–1927

Balanced solutions for a better world
Mission

E3 aims to develop the knowledge, technologies, and aptitudes to design and actively shape the planet’s natural capital, through its unique integration of engineering, natural and computer sciences.

Vision

To strengthen the interdependence between technological innovation and our natural capital stocks, through world-leading research, education and entrepreneurship.

Values

Foresight, Innovation, Transdisciplinarity, Global Responsibility and Excellence
"Taking up the responsibility of 'Balanced Solutions for a Better World', E3 will address the challenges of our time; reconciling technological progress with a sustainable future for planet earth"

Dr. Patrick Prendergast
Provost, Trinity College Dublin
As a university we have a responsibility to work with society to address the most pressing issues of our time. Universities are centres of excellence for research and teaching. They act as focal points, working through a time and place, to inspire generations. At their best they uncover new knowledge and foster new ideas for the betterment of society and the planet on which we live.

In 2018 Trinity College Dublin launched its E3 initiative. Representing Engineering, Environment and Emerging Technologies, E3 is a radically new type of collaboration between the Schools of Computer Science and Statistics, Engineering and of Natural Science. It sets out to put the finite nature of our natural resources firmly at the forefront of Irish third-level education.

Coupled with a new capital project that provides purpose-built teaching and learning spaces, E3 will realise trans-disciplinary Undergraduate and Postgraduate programmes under the research themes of Data, Production, Well-being, Environment, Resources and Communities. These programmes will imbibe students with the skills they need to tackle the global challenges of today and tomorrow and to bring world-changing discoveries within their reach.

E3 presents a future-proofed education for new graduates via a suite of Undergraduate and Postgraduate programmes across its constituent schools. These include a variety of new and existing Undergraduate programmes, from Environmental Science and Engineering or Computer Science and Geography.

As Dean of the Faculty, I warmly invite you to consider registering for an E3 Undergraduate Taught Programme. In doing so you will be taking the bold next step, not just in furthering your education but, as a participant in this exciting new venture. With our leading research professors and staff you will become a co-creator of your future and that of generations to come. Together we will seek out ‘balanced solutions for a better world’ and enable society to live on this planet in a more sustainable and equitable way.

Professor Sylvia Draper
Dean of the Faculty of Science, Technology, Engineering and Mathematics
‘Vision is the art of seeing things invisible.’

Jonathan Swift
Trinity Alumnus
About E3

Balanced solutions for a better world

Talent emerges from opportunity. E3 will place those opportunities in front of our students and help them maximise their potential, as citizens and shapers of the future.
Trinity College Dublin is embarking on an ambitious project to expand education and research activities across three of its Schools: the Schools of Engineering, Natural Sciences, and Computer Science & Statistics. Recognising the importance for humanity in addressing the challenge of sustainable technological development, the expansion of the three Schools is being executed as a single strategic activity in the area of “Engineering, Environment, and Emerging Technologies”, or E3.

The E3 vision enables;

- the creation of a purpose built, multi-disciplinary, foundry for the delivery of innovations in research and teaching within the Schools of Engineering, Natural Science and Computer Science and Statistics.
- a future-proofed education for new graduates who will enable society to live on this planet in a way that is sustainable and equitable.
- the underpinning of the infrastructural and staffing needs of these expanded Schools to ensure that their outputs are world leading.
- An increase in the number of STEM students within Trinity by over one third in 10 years.

With E3, Trinity promotes the Vision of a society where an understanding between technological innovation and our natural capital is advanced by world-leading research, education and entrepreneurship.

E3 will position Ireland at the forefront of fields of research in Science, Technology, Engineering, and Mathematics (the STEM disciplines), that are crucial for future economic competitiveness. It will educate engineers and scientists for employment in existing and new technology sectors, equip them with the skills and attributes to lead in the creation of new businesses, and place Ireland in a leadership role globally for the quality of its graduates in the STEM disciplines.

Research in E3
As inherently curious and creative, humanity will always seek to both understand the world around us and to create tools, systems and processes that enhance our quality of life. As our understanding of our world grows, we now know better the effects, both positive and negative, that our way of living has on the world around us.

These effects lead to challenges that are inherently global, multidisciplinary and complex in nature. E3 will be among the first centres internationally to integrate Engineering, technology and scientific expertise at scale to address some of the biggest challenges facing Ireland and the world – challenges such as climate change, renewable energy, personalised data, water, connectivity, and sustainable manufacturing, among many others. The span of E3 research has been defined using six E3 Research Challenges:
About E3

Martin Naughton E3 Learning Foundry

The central theme of E3 is ‘balanced solutions for a better world’. E3 will be a crucial component in our transition to a ‘smarter’ economy, developing technological solutions that are more sustainable and more equitable in the use of the earth’s limited natural resources.

The E3 project aims to significantly increase the number of students in the E3 Schools. This will ramp up over ten years. The education of these students with a new pedagogy will be realised through the Martin Naughton E3 Learning Foundry, a state of the art 7,200 square metre facility based on the main Trinity campus, which will deliver new teaching facilities and an innovative interactive learning space for undergraduate and postgraduate students.

It will accommodate the substantial growth in the number of students and staff, and facilitate an innovative curriculum with increased emphasis on team work, design and project-based activities that will draw the teaching activities in the E3 Schools closer together. Work will commence on the space this year, with a projected completion date of 2023 on the cards.

E3 Research Institute

Building on its tradition of innovation, entrepreneurship and engagement, the expected development of the Grand Canal Innovation District (GCID) being championed by Trinity will include an opportunity to contribute to the development of Dublin as an innovation centre. At the heart of GCID, the E3 Research Institute will be a venue for large-scale research programmes, especially for those working in collaboration with industry and other stakeholders.

E3 Research Institute will tackle the fundamental issues of a liveable planet, the technological development that is needed for our economy and society.

At the core of the E3 Research Institute is a recognition that technology must evolve in symbiosis with the natural and human world. The natural world furnishes us with resources that are needed for economic activity and for society, and that economic activity in turn impacts on the natural world.
The Martin Naughton E3 Learning Foundry which is due to be completed by 2023.
An innovation district will connect indigenous and multinational companies together with researchers and venture capitalists. Such a district will produce a sum that is greater than its parts, driving inward investment, new collaborations and jobs. Its benefits will be brought to the regions through virtual connections and the sharing of research, best practice and space.

Trinity Research Centres;
Trinity Centre for Bioengineering
Trinity Centre for Biodiversity Research
Trinity Centre for Creative Technologies & Media Engineering (CHIME)
Science Foundation Ireland centers;

**CONNECT**  Ireland’s Research Centre for Future Networks and Communications.

**ADAPT**  The Global Centre of Excellence for Digital Content and Media Innovation.

**iCRAG**  (Irish Centre for Research in Applied Geosciences) - Ireland’s national geoscience research centre, located at UCD.

**Amber**  (Advanced Materials and BioEngineering Research) - Centre that provides a partnership between leading researchers in materials science and industry.

Trinity analytical and test facilities;

**iCRAG LAB@TCD**  State-of-the-art electron and laser beam equipment for the characterisation of geoscience material.

**CRANN**  Advanced Microscopy Laboratory (AML) Structures Testhalls - Civil, Structural & Environmental Engineering.

Trinity College Dublin, founded in 1592, is the oldest university in Ireland and is recognised internationally as Ireland’s No. 1 university. For over 425 years, this historic university has been a world leader in high-quality, internationally-recognised education. With a global reputation for excellence, Trinity promotes creativity and innovative thinking in students.

Trinity’s bustling 47-acre campus is an oasis in the very heart of Dublin, a vibrant and safe European capital city. The university’s city-centre location offers students a unique opportunity to blend a rigorous academic programme with an unparalleled array of cultural, social and professional experiences.

A wealth of museums, theatres, galleries, cafes, restaurants and historic tourist sites are located right on Trinity’s doorstep.

To study at Trinity is to become part of a global community of thinkers, creators, scientists, artists, inventors and entrepreneurs, from over 130 different countries.

Trinity Facts and Figures

The Times Higher Education University Impact Rankings 2020 places Trinity College in Top 5 position in the “Sustainable Cities & Communities” category and a Top 30 spot in “Affordable and Clean Energy”.

Trinity researchers attract approx €100 million annually in external funding.

Approximately 2,500 works of art displayed on campus.

Over 1 million visitors to Science Gallery since opening in 2008.

The Book of Kells in Trinity’s Old Library was written around the year 800AD.

Ranked 1st in Ireland
QS World University Rankings 2020

Top world 101 university
QS World University Ranking 2021

The Trinity Community Has Shaped Our World

Samuel Beckett
Oscar Wilde
Dr Anil Kokaram
Bram Stoker
D.B. Weiss and
David Benioff
Mary Robinson
Jonathan Swift
Ernest Walton
Edmund Burke
Trinity’s campus ranks in the top ten of Europe’s most beautiful universities\(^1\) and lies in the very centre of Dublin city. Within minutes of museums, seats of government, theatres and global corporations, Trinity is an oasis in the middle of a vibrant European capital.

For centuries, Dublin has been renowned for music and literature. Now it is also a European hub of innovation.

**Connected to the Globe**

Over 31.5 million people pass through Dublin Airport every year\(^2\). Only one hour from London and five hours from New York, Dublin is a hub for Ryanair and Aer Lingus, low cost carriers connecting to over 180 destinations\(^3\) across the world.

Dublin ranks 37th worldwide for best student cities\(^4\) and has more than 300 worldwide student exchange agreements.

Dublin is home to Europe’s largest urban park, part of the city’s 5000 acres of green space.

Ireland consistently ranks as one of the safest and friendliest countries in the world\(^5\). Our air is clean, our hilltops are the world’s greenest and our education system is world-class.

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\(^1\) Times Higher Education Ranking 2018  
\(^2\) +3 Dublin Airport Facts and Figures 2019  
\(^3\) QS Best Student Cities Ranking 2019  
\(^4\) Global Peace Index Ranking 2019
University Life

**Accommodation at Trinity**
Many undergraduate students find accommodation in shared houses or self-catering apartments. Houses and apartments vary in price, depending on size, facilities and location. The Students’ Union offers a useful Accommodation Advisory Service at www.tcdgsu.ie/accommodation. A limited number of students may be housed in University accommodation, including residences on-campus and at Kavanagh Court located just a 15 minute walk to the University, see www.tcd.ie/accommodation.

**Student Societies**
Trinity’s 120 societies attract dynamic members from all over the university. From arts, culture, politics and debating to gaming, advocacy and music, you’re sure to find your niche.

**Sports**
There are over 50 sports clubs available to Trinity students. Get fit, stay active, and meet people outside the classroom! The university is also home to a state-of-the-art sports centre. All registered Trinity College students can utilise the facilities at the Sports Centre including the 25m pool, climbing wall, fitness centre and classes.

**Socialising**
The Trinity Ball, Europe’s largest private party and a highlight of every spring term on campus.

**Learning Supports**

**IT Services**
As a student at Trinity, you are provided with access to hundreds of computers located across campus, secure WIFI, a Trinity Gmail account and e-learning resources via the Blackboard Learn system, see www.tcd.ie/itservices/students

**Library**
Trinity’s library is the largest research library in Ireland with six million printed volumes, nearly 500,000 electronic books, 80,000 electronic journals, the country’s largest collection of maps and printed music, and an extensive collection of manuscripts, see www.tcd.ie/library.
Student Services

Careers Service
Plan your future beyond your current course of study with the help of guidance software, skills workshops and personal consultations, see www.tcd.ie/careers

Trinity Health Service
Trinity’s Health Service provides GP services for students. Student consultations are free of charge with modest fees for additional services. All EU students should bring with them a European Health Insurance Card issued in their country of origin. Non-EU students are not entitled to free national health services in Ireland, and are advised to take out insurance cover for hospitalisation or to extend private health insurance before leaving their home country. Private health insurance cover is also available in Ireland and the student health service can advise you on your options, see www.tcd.ie/college_health

Day Nursery
The day nursery caters for children aged three months to four and a half years old. There is a fee for this service, see www.tcd.ie/about/services/daynursery

“An education extends beyond the classroom; it facilitates student internships and work placements with multi-national industry partners”
University Life

Disability Service
The Student Disability Service works closely with academic staff, tutors, administrators and other support services to meet the needs requirements of students with any disability, see www.tcd.ie/disability

Graduate Students Union
The Graduate Students’ Union serves to protect students’ interests and acts as a helpful meeting point. The Union organises a variety of events, receptions and trips each year, see www.tcdgsu.ie

Student Counselling Service
Student Counselling offers a confidential, professional and free of charge service. There is also a Peer Support Network which is confidential and based on student-to-student support, see www.tcd.ie/student_counselling

Employment
Students from countries within the European Union (EU) are free to take up employment under standard EU free movement of labour regulations. Combining the demands of employment and student is not easy however and it is recommended that students do not arrive from elsewhere in the EU without possessing the financial resources to complete their chosen course of study.

Non-EU nationals who have permission to undertake postgraduate study in Ireland are entitled to take up casual employment, defined as up to 20 hours part-time work per week or full-time work during vacation periods. In order to encourage talented, skilled graduates to pursue careers in Ireland, non-EU nationals are permitted to remain in Ireland for an additional period of 12-24 months after receiving the results of their final examinations as part of the Third Level Graduate Programme, see www.inis.gov.ie/en/INIS/Pages/Student%20Pathway
How to Apply and Fees

Language Requirements
All applicants whose first language is not English and who have not been educated through the medium of English must present one of the following qualifications in the English language:

- IELTS: Grade 6.5 overall
- TOEFL: 88 internet-based, 570 paper-based, 230 computer-based
- University of Cambridge: Proficiency Certificate, Grade C or better (CEFR Level C1 or C2); Advanced Certificate, Grade C or better (CEFR Level C1 or C2)
- Pearson Test of English (Academic) – PTE Academic: a minimum score of 63 to be eligible (with no section score below 59)

Full details available at: https://www.tcd.ie/study/apply/admission-requirements/undergraduate/

Visa Requirements
If you are a citizen of the European Union (EU), you do not need a visa to enter and live in Ireland. Some, but not all non-EU students require visas to enter Ireland, students from North America are among those who do not require a visa. The list of visa-required countries can be found at the INIS website: www.inis.gov.ie. It is important to note that ALL non-EU students, whether visa-required or not, must register with the Irish Naturalisation and Immigration Service (INIS) for permission to remain in the state. Students must show their offer letter at airport immigration where they will receive a temporary stamp in their passport. They must register with the INIS within the time limit specified on their temporary stamp. Visa-required non-EU students should contact their nearest Irish Embassy or Consulate for information on visa requirements. Visas can take up to 8-10 weeks to process, so please allow sufficient time. You should apply as early as possible, especially if an Irish visa is required.

For further information: www.tcd.ie/study/international/before-arrival/visa-immigrations. All non-EU fee paying students must pay their full tuition fees prior to registration.
Fees
Fee details for all courses are available at: www.tcd.ie/academicregistry/feesandpayments
Please note a non-refundable online application fee is required for all taught and research courses. An EU application is one made by a person who fulfils one or more of the following criteria: 1. who is ordinarily resident in the EU and who has received full-time further or higher education in the EU for three of the five years immediately preceding admission; or 2. who is ordinarily resident in the EU and has worked full-time in the EU for three of the five years immediately preceding admission; or 3. who holds a passport from an EU state and has received full-time further or higher education in the EU for three of the five years immediately preceding admission. All other applications are considered to be non-EU applications.

Funding & Scholarships
Tuition fees vary by course and can be found on the Academic Registry website. A range of scholarships and funding options are available. Trinity accepts student loans and works with the US federal loan programme.

Students considering E3 undergraduate programmes can apply for the E3 - Balanced Solutions for a Better World Scholarship.

Postgraduate students should be sure to check with their schools and departments for subject-specific funding. PhD students should discuss funding with their potential supervisors. Unless explicitly excluded, local scholarships and grants can be used towards Trinity fees. Please visit our website for more information on Trinity scholarship opportunities.

Find out more:
www.tcd.ie/study/international/scholarships/
www.tcd.ie/academicregistry/feesandpayments/

How to apply
All course information and online application details are available at www.tcd.ie/courses.

Contact us
Academic Registry provides central academic administrative services to assists students with all queries including course applications/admission, fees and registration.
Academic Registry, Watts Building, Trinity College Dublin, the University of Dublin, Dublin 2, Ireland E: academic.registry@tcd.ie T: +353 (0)1 896 4500

General enquiries from International students [outside of Ireland and EU/EEA] should be addressed to:
Global Relations, East Theatre, Trinity College Dublin, the University of Dublin, Dublin 2, Ireland E: international@tcd.ie T: +353 (0)1 896 4494
As inherently curious and creative, humanity will always seek to both understand the world around us and to create tools, systems and processes that enhance our quality of life. As our understanding of our world grows, we now know better the effects, both positive and negative, that our way of life has on the world around us. Challenges around health, automation, artificial intelligence, climate change, energy, water and food are inherently global, multidisciplinary and complex in nature. The role of specialists in understanding and shaping developments in these areas will continue to be as important, or more important, than it has been to date. Increasingly however, humanity will require specialists who can contextualise their knowledge in broader circles and who can efficiently and effectively work with experts from other disciplines.

E3 graduates across all its constituent disciplines will share an experience of having learnt and worked in a multidisciplinary environment, been educated by world-leading experts in areas of their specialisation and benefitted from best-in-class pedagogy. E3 graduates will be flexible, adaptable and creative individuals who bring deep disciplinary knowledge and problem-solving expertise to any problem they are presented with. They will be highly sought after by indigenous and multinational companies in Ireland and will be equipped and ready to work in an international context if that is their chosen route. During their studies, E3 students will have opportunities to follow their passions, both inside and outside their chosen disciplines, supported by a flexible and responsible academic support system that allows the abilities of each student to flourish.

E3 graduates will:

- Have strong technical competence in their chosen discipline.
- Be comfortable and experienced working in teams, including with specialists from other disciplines, on ill-defined and multidisciplinary challenges.
- Be skilled communicators across a range of platforms and to varying audiences.
- Have an ability to think at multiple levels of detail and abstraction.
- Be comfortable in both practical and theoretical contexts.
- Be able to make informed and ethical decisions that balance technical, social and environmental considerations.
- Be able to confront the limitations of their own knowledge and to address these limitations through collaboration and lifelong learning.

Open a world of possibilities with an E3 Undergraduate programme at Trinity College Dublin
# Undergraduate Taught Programmes

**Balanced solutions for a better world**

<table>
<thead>
<tr>
<th>Multidisciplinary courses in E3</th>
<th>School of Computer Science &amp; Statistics</th>
<th>School of Engineering</th>
<th>School of Natural Science</th>
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<tr>
<td><strong>B.A. (Moderatorship) Honours Bachelor Degree (NFQ Level 8)</strong> Optional: M.C.S. in Computer Science (NFQ Level 9)</td>
<td><strong>B.A. (Moderatorship) Honours Bachelor Degree in Computer Science &amp; Geography Joint Honours</strong></td>
<td><strong>M.A.I. Master’s Degree in Engineering (Common Entry Programme) (NFQ Level 9)</strong> Optional: exit after 4th year with B.A.I. Honours Bachelor Degree in Engineering (NFQ Level 8)</td>
<td><strong>B.A. (Moderatorship) Honours Bachelor Degree (NFQ Level 8) in Science</strong> (direct entry courses - Biological and Biomedical Sciences; Geography and Geoscience)</td>
</tr>
<tr>
<td>B.A. (Moderatorship) Honours Bachelor Degree in Computer Science Joint Honours (with Geography, Business or Linguistics)</td>
<td><strong>B.A. (Moderatorship) Honours Bachelor Degree in Computer Science, Linguistics and a Language</strong></td>
<td>M.A.I. Master’s Degree in Engineering with Management (NFQ Level 9) Optional: exit after 4th year with B.Sc. Honours Bachelor Degree in Engineering with Management (NFQ Level 8)</td>
<td><strong>B.A. (Moderatorship) Honours Bachelor Degree (NFQ Level 8) in Biological and Biomedical Sciences</strong> (Botany; Environmental Science; Zoology)</td>
</tr>
<tr>
<td>B.A. (Moderatorship) Honours Bachelor Degree in Management Science and Information Systems Studies</td>
<td></td>
<td></td>
<td><strong>B.A. (Moderatorship) Honours Bachelor Degree (NFQ Level 8) in Geography and Geoscience</strong> (with specialisations in Geography and Geoscience)</td>
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**To study at Trinity is to become part of a global community of thinkers, creators, scientists, artists, inventors and entrepreneurs spanning 158 countries and over 425 years**
What is Environmental Science and Engineering?
Environmental Science and Engineering is a new integrated undergraduate with postgraduate degree course that aims to train the next generation of graduates who have the competencies, knowledge and experience necessary to design and deploy solutions that protect and improve our environment and human wellbeing, and that work with rather than against the natural world to foster biodiversity, climate action and sustainable use of Earth’s finite resources. Students complete an integrated five-year course consisting of four year B.Sc. plus an additional year of study leading to either Master in Engineering (Studies) a M.A.I. (St.) or Master in Applied Environmental Science MAES.

The course for you?
The course will provide students with fundamental grounding in the Natural Sciences and Engineering, and in the applied skills required to develop sustainable solutions for major societal and environmental challenges. The unique combination of Engineering and Natural Sciences modules represents one of the first in Ireland and internationally. Strong emphasis is placed on students acquiring practical laboratory and field skills, as well as working in teams. Environmental Science and Engineering at Trinity is a new integrated degree programme is delivered through the expertise of two Schools (School of Natural Science and the School of Engineering).

The School of Natural Sciences conducts research, and delivers teaching, on all aspects of the natural world, from the formation of the earth, the behaviour of the environment, the evolution and ecology of its organisms and its interactions with human society Trinity’s School of Engineering is ranked in the top 100 engineering schools in the world and offers outstanding teaching by Engineers who are at the forefront of their field worldwide. The School of Engineering is a vibrant, intellectual community of innovative researchers, teachers and students, which combines high-quality teaching with expansive research activity.

Special Entry Requirements

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<th>Requirement</th>
<th>Requirement Details</th>
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<tr>
<td>Leaving Certificate A</td>
<td>H4 in mathematics and a H4 in one of the following subjects: physics, chemistry, biology, physics/chemistry, geology, geography, agricultural science, computer science</td>
</tr>
<tr>
<td>Advanced GCE (A Level)</td>
<td>Grade C in Mathematics Grade C in one Science subject</td>
</tr>
<tr>
<td>International Baccalaureate</td>
<td>HL Grade 5 in Mathematics HL Grade 5 in one Science subject</td>
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Graduate skills and career opportunities

Environmental Engineers and Applied Environmental Scientists who graduate from this new interdisciplinary programme will address some of the most challenging and important issues of our time in terms of sustainable development, particularly with respect to the protection of the environment. Graduates will have a strong grounding in Environmental Science in conjunction with applied Engineering skills and problem solving approaches and will therefore be at the forefront of initiatives to solve the challenges of many of the United Nations Sustainable Development Goals. Graduates from this programme will be highly skilled and employable in both industrial and governmental organisations both here in Ireland as well as overseas. Recent graduates from the Civil Engineering stream who have specialised in Environmental Engineering are working in R&D, Civil Engineering and Environmental Consultancies, Project Engineers, Environmental Regulation, Energy companies, mining companies as well as setting up new ventures and spin outs.

Our environmental engineers and scientist graduates are also working in the design and development of environmental solutions with leading Engineering consultancies such as Arup, RPS, ESB International, Shell, IBM etc. Such companies have a strong demand for high quality graduates at the Masters (and Ph.D.) level due to the high technical level of their work. Environmental Engineers and scientists also find employment in governmental regulatory organisations and other institutions such as Local Authorities, Environmental Protection Agency, Geological Survey Ireland, Teagsac as well in Humanitarian Non-Governmental Organisations (Concern, GOAL, Selfhelp Africa).
Your degree and what you’ll study
Drawing on the expertise of the School of Engineering and the School of Natural Science at Trinity, this programme focuses on delivering a research-inspired, outcome-based educational experience to students. Students complete an integrated five-year course consisting of four year B.Sc. plus an additional year of study leading to a M.A.I. (St.) or MAES. During the first three years a balanced and integrated programme of modules in Environmental Science and Engineering is provided. Following completion of the first three years of the course, students start to follow a more specialised programme in one of the following strands, although there are still many shared courses and projects between the two strands:

- **Environmental Engineering**
  This strand of the Environmental Science and Engineering course places stronger emphasis on modules and project work with an Engineering focus in years 4 and 5. Applied Environmental Science This strand of the Environmental Science and Engineering course places stronger emphasis on modules and project work in the discipline of Environmental Sciences in years 4 and 5.

- **Applied Environmental Science**
  This strand of the Environmental Science and Engineering course places stronger emphasis on modules and project work in the discipline of environmental sciences in years 4 and 5. In Year 4, students have the option to undertake an Industry Internship or International Exchange in their chosen stream. These options include Erasmus, UNITECH (as a paid industrial partnership) and CLUSTER. Alternatively, a student can stay for the full year in Trinity and undertake a Capstone Project module which aligns with their chosen stream, in addition to at least 2 optional modules associated with their chosen stream. Following completion of the fourth year of the Environmental Science and Engineering degree course it is anticipated that most eligible students would elect to complete one further year of study in their chosen strand leading to a M.A.I. (St.) or MAES degree.

Course director says

“A key strength of this course is that it offers students tremendous scope – through working with industry partners and working on their own research projects – to tailor their programmes in the areas they are most interested in.”

Professor Jennifer Mc Elwain
The School of Natural Science
Assessment
This new course will be delivered through laboratory practicals, lectures and field work which includes international trips. The course has been designed to embed a diverse array of assessment approaches across the entire 5 year programme. These include summative and formative assessment approaches, peer assessment, group assessment, self-assessment and more conventional continuous and exam assessment methods.

Study abroad and language options
Students who spend the first semester of fourth year in Trinity may then spend the second semester on an industrial placement where they complete an industry-based project. Students following this mode will have two project supervisors: a staff member of the host company, to provide day-to-day guidance whilst on placement as well as liaison with Trinity and a member of Trinity’s academic staff. Alternatively, students who have chosen the Environmental Engineering route may opt to spend the fourth year on the Cluster/Unitech programme in a partner University.

Get in touch!
- https://naturalscience.tcd.ie/undergraduate/environ-eng/
- E: Jenny McElwain (Course Director) JMCELMOWAI@tcd.ie and Laurence Gill (Course Director): LaurenceGill@tcd.ie
- T: +353 1 896 1074
**Why study Computer Science and Geography?**
Geographical knowledge and experience are more important than ever, giving us the skills to understand a dynamic and rapidly changing world. Geography is an integrative subject with an international outlook and openness to interdisciplinary collaboration. The focus in geography is on understanding spatial and temporal change on and of our planet.

Computer Science is concerned with the study of everything to do with computers and our relationship with them. Computer scientists are critical to the efficient running of modern societies, dealing with health, security, finance, transportation, and now increasingly our interaction through social networks.

Computing professionals deal with theoretical issues, solve complex problems, deal with matters of ethics and with society at large.

The combination of Computer Science and Geography allows students to combine computational skills and geographical knowledge to address important global issues. Examples of this include Geographical Information systems (GIS) which is used to underpin decision making in: urban planning; land use planning and energy distribution or Remote Sensing/Earth Observation which can be used to monitor the impact of global change.

Graduates of this programme will be well placed to develop the next generation of GIS; these may, for example, incorporate large volumes of IOT (Internet of Things), remote sensing data, integrate diverse forms of data, and present advanced visualisations. These developments would be driven by computer scientists who understand geoscience. Graduates of the programme might apply “big data” techniques to geographic data, for example to predict flooding, to model urban traffic, to explain demographic changes or monitor long-term environmental change.

Graduates with these skills will be at the heart of the design of future smart and sustainable cities and societies.
Why study Computer Science and Geography at Trinity?

This programme is a multidisciplinary programme delivered by the School of Computer Sciences and Statistics and the School of Natural Sciences.

The School of Computer Science and Statistics at Trinity is recognised for establishing computer science as an academic discipline in Ireland. The School has earned a strong international reputation and has partnerships in education, research and industry across the globe. Computer Science at Trinity is ranked number 1 in Ireland, top 25 in Europe and top 100 worldwide (QS subject rankings, 2020). The School hosts three National Research Centres and continues to evolve and lead groundbreaking research programmes. The School collaborates with leading employers and fosters innovation through its many successful start-up companies.

Professor Lucy Hederman,
Course Director

You might be interested in:

Multidisciplinary courses in E3

“Many of the developments that will make ripples across the globe in years to come will be driven by computer scientists who understand geoscience and possess the technological skills to create solutions. These skills are at the very heart of the design of future smart and sustainable cities and societies. We are excited to watch our graduates develop and see which paths they take in their learning. Some may apply big data techniques to geographic data to predict flooding or model urban traffic, while others may monitor demographic changes or monitor long-term environmental patterns before developing apps that benefit people and the planet.”

Professor Lucy Hederman,
Course Director

What our graduates say

“It might be cheesy to say that ‘geography rocks’ but it’s true! Studying Geography at Trinity has left me with more than just an education. Through the wide range of modules offered within the course I have learnt a diverse range of skills which are really relevant in today’s society. Not only that, but the chance to partake in fieldtrips both at home and abroad makes this course an excellent place for forming lasting friendships while learning lots along the way.”

Sarah McDonagh

Geography at Trinity is a place of intensive and extensive geographical scholarship in Ireland. The School carries out teaching and research across the discipline, from development theory to coastal modelling, and from climate change to the social economy, all within different contexts, from Nigeria to New Zealand. The School aims to challenge students intellectually to foster and maintain world-class research and teaching in a supportive and collegial atmosphere. Trinity is ranked in the world top 101 universities for Geography (QS World University Rankings by Subject 2020).

In recent years, third and fourth year geography students have been involved in academic staff-led fieldwork from Clare Island to Mallorca, undertaken summer research projects in Kenya, and made digital video documentaries and blogposts as part of their assessed work.
Programme overview
This is a Joint Honours Programme. Students on the programme begin studying both subjects equally, and then may specialise more in one subject than the other, and may exit with a Joint Honours Degree or a Major with Minor Degree.

Drawing on the expertise of both Schools, the programme focuses on delivering a research inspired, outcome-based educational experience to students. In first year students spend equal time on Computer Science and Geography. In the first three years of the Computer Science programme, students will develop key skills in designing and implementing computer programmes and systems, solving problems, using mathematics, statistics and data analytics and communicating both orally and in writing. Students will learn how to use a range of programming languages and how to tackle large software engineering projects. Students will also learn about computer networks and telecommunications, information management and the relationship between computers and society. The first year Geography course aims to provide a solid grounding in human, physical and environmental geography, focusing on materials that are dealt with in greater depth in later years. Second and third year geography modules cover issues relating to cultural, economic and historical geography, and to natural and human-modified environmental processes and systems. Research skills are developed further through e.g., Remote Sensing and GIS modules and modules that include fieldwork components.

For their fourth year, students undertake a capstone project or research dissertation in either Computer Science or Geography depending on their pathway. In addition students choose from Computer Science topics such as Group Programming Project, Machine Learning, Strategic Information Systems, Technology Entrepreneurship, Data Analytics, Fuzzy Logic, Formal Verification, Functional Programming, Internet Applications, Human Factors, Computer Graphics, Computer Vision; and from Geography choose from modules such as Living on the Edge (coastal Geography), Globalisation and African Development, Historical Geography, Geomorphology, GIS and Remote Sensing Applications in Geography, Environmental Governance, Remote Sensing of the Environment, Spatial Analysis Using GIS, Stormy Geomorphology, Urban Geography: Cities, Space and Culture.

The Course for you?
This new course will suit students who are interested in the world around them, in understanding the significant challenges that face our world, and would like to tackle those challenges with computer and related technologies. Computer Science is best suited to those who are comfortable applying logical thinking to situations.

No prior knowledge of Computer Science or Geography is assumed.

Learn more about the joint honours pathways on page 34
Study abroad and language options
Students may apply to spend your third year studying at a university abroad as part of an exchange programme.

Graduate Opportunities
Graduates from this new course will be highly skilled and employable in both industrial and governmental organisations both here in Ireland as well as overseas. Both geography and computer science offer a wide array of career opportunities for graduates. The combination of these disciplines train students to analyse challenges in a broad range of areas and to provide solutions to them.

Careers taken up by graduating geography students in recent years include urban and regional planning, environmental consultancy, policy, and research, and teaching as well as positions in such areas as financial services, foreign affairs, leisure and tourism and overseas development.

Graduates from computer science find employment in almost every sector from communications and entertainment to manufacturing and transportation, government, healthcare, education and many more. Positions can be found within: design, testing, manufacturing, support and implementation, information systems, research and development, operations and management. Some graduates of this course can be expected to pursue careers in research to Ph.D. and beyond; others will found their own companies.

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- T: +353 1 896 1576
School of Computer Science & Statistics

Balanced solutions for a better world
Computer Science at Trinity is ranked number 1 in Ireland, top 25 in Europe and top 100 worldwide
(QS Subject rankings 2018, 2019, 2020)

The School of Computer Science and Statistics at Trinity is recognised for establishing computer science as an academic discipline in Ireland. The School has earned a strong international reputation and has partnerships in education, research and industry across the globe. The School is actively engaged in research across virtually all areas of computer science including artificial intelligence, future networks and the Internet of Things (IoT); graphics, vision, augmented and virtual reality; smart cities; Computer Science and Statistics.

In addition, the School leads four major nationally-funded large-scale research centres; ADAPT, CONNECT, ENABLE and V-SENSE.

The School of Computer Science and Statistics has a strong track record of working with industry as research partners and via student internships in Dublin and around the world. Many of our graduates are in leadership positions in the global technology sector or are founders of startups like Iona Technologies, Havok, Kore, Swrve, Quaternion Labs, LinguaBox, WiFi Guard, CipherApps, Haunted Planet Studios, Haptica, GLANTA, Tolerant Networks, Cara Health, X Communications Ltd, EmpowerTheUser, Insight Statistical Consulting, Xcelerit, Wrpl and Emizar, SoapBox Labs, Good Travel Software, SilverCloud, Danalto, Volgrams and Data Chemist.

The School has a wide range of undergraduate taught and research programmes. It offers a variety of options for students wishing to pursue Ph.D. studies, from working individually with an expert supervisor to engaging in a rich programme of studies offered by one of the four SFI Centres for Research Training supported by the School.

Whichever programme students choose, we are preparing them with strong research skills and an ability to ask insightful and pertinent questions. Whether they choose to join Ireland’s vibrant R&D sector or to enter academia, our students are helping to ask and answer some of the most pressing questions in computer science and statistics.

Students joining us can look forward to a friendly atmosphere with world-class academic staff supported by a state-of-the-art teaching and research environment. The success of our School depends on the enthusiasm and ingenuity of our staff and students. If you join us, we will work hard to foster your creativity and, in return, we are sure you will enjoy your time with us and help contribute to our reputation as a leading centre for academic excellence.
**Computer Science (Single Honours)**

B.A. (Moderatorship) Honours Bachelor Degree (NFQ Level 8)
Optional Masters in Computer Science (NFQ Level 9)

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**What is Computer Science?**

Computer Science is concerned with the study of everything to do with computers and our relationship with them. Computer scientists are critical to the efficient running of modern societies, dealing with health, security, banking and finance, transportation, and now increasingly our interaction through social networks. Computing professionals deal with theoretical issues, solve complex problems, deal with matters of ethics and with society at large. Theoretical issues in computer science relate to the abstract notions of computation and information.

The study of these issues leads, for example, to efficient and robust algorithms and to new programming languages. Applications of computer science range from artificial intelligence to health informatics, from computer animation and graphics to information security, and from social network sites to educational and training systems.

**Computer Science: The course for you?**

Computer Science at Trinity is a challenging and exciting course with a focus on innovation and cutting-edge technology that demands the very best from our students. To get the best from the course you need to be interested in developing clear logical ideas about situations and about how to develop feasible schemes ('algorithms') for computers to deal with these situations. You need to be comfortable using mathematical techniques to solve problems. If you are knowledgeable about computers already, to the extent of building them or writing programmes for them, so much the better – but bear in mind, no prior knowledge of computer science is assumed.

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**Computer Science**

B.A. (Moderatorship) Honours Bachelor Degree (NFQ Level 8)

| Optional: M.C.S. Master’s Degree (NFQ Level 9) |
| Course Code | TR033 |
| CAO Points 2020 | 509 |
| Duration | 4 years (5 years with a master’s) |

**Special Entry Requirements**

- Leaving Certificate
  - H4 Mathematics
- Advanced GCE (A Level)
  - Grade C Mathematics

**IB Subject Requirements**

- HL Grade 5 Mathematics
Computer Science (Single Honours)

Computer Science at Trinity
Computer Science at Trinity is ranked number 1 in Ireland, top 25 in Europe and top 100 worldwide (QS subject rankings, 2020).

Computer Science at Trinity is an integrated programme: students can study for an Honours degree over four years, and also have the option to study for a fifth year leading to a master’s degree in Computer Science (M.C.S.).

The School of Computer Science and Statistics at Trinity is recognised for establishing computer science as an academic discipline in Ireland. The School has earned a strong international reputation and has partnerships in education, research and industry across the globe. The School hosts three National Research Centres and continues to evolve and lead ground breaking research programmes.

The School collaborates with leading employers and fosters innovation through its many successful start-up companies.

This course is accredited by Engineers Ireland.

Graduate skills and career opportunities
Graduates from this programme are highly sought after and can expect to find employment anywhere in the world. Each year leading employers in the sector attend a special recruitment fair held at the School of Computer Science and Statistics which affords students an opportunity to chat informally regarding their career opportunities.

Graduates find employment in almost every sector from communications and entertainment to manufacturing and transportation, government, healthcare, education and many more. Positions can be found within: design, testing, manufacturing, support and implementation, information systems, research and development, operations and management. Many graduates hold senior positions such as CTO and CIO. Others pursue careers in research to Ph.D. and beyond. The School is proud of the entrepreneurial and academic success of its graduates.
Your degree and what you’ll study

*First, second and third years*
In the first three years of the programme, you will develop key skills in designing and implementing computer programmes and systems, solving problems, using mathematics, statistics and data analytics and communicating both orally and in writing. You will learn how to use a range of programming languages and how to tackle large software engineering projects. You will also learn about computer hardware and develop a broad knowledge of other topics, including networks and telecommunications, information management and the relationship between computers and society.

Students will take two Trinity Electives in the second year, one in the first semester and one in the second semester. At the end of third year, you choose to study either for the Honours degree (B.A. Moderatorship in Computer Science) or the master’s degree in Computer Science (M.C.S.).

*Fourth year*
If you decide to study for the Honours degree in Computer Science over four years, you can choose from a range of advanced subjects to study including: Artificial Intelligence; Computer Graphics and Animation; Computer Vision; Internet Applications; Advanced Computer Networks; and many others. Topics are reviewed annually to reflect developments in the field of computing.

You will spend the second half of this fourth year working with an academic supervisor on a substantial Capstone project in an area of your choice.
If you decide to study for the master’s degree in Computer Science over five years, you also choose from the range of advanced subjects listed above.

*Internship*
Fourth-year students who opt for the master’s degree undertake an internship in industry or in a research laboratory at home or abroad. The aim is to develop your understanding of how design and theoretical aspects of computer science are applied in a commercial or research workplace.

Fifth year
In your optional 5th year, as well as continuing to study advanced subjects, you will spend the second half of the year working with an academic supervisor on a substantial research dissertation in an area of your choice.

On successful completion of the five years, both a B.A. Moderatorship and master’s degree in Computer Science are awarded.

Study abroad
You may apply to spend your third year studying at a university abroad as part of an exchange programme.

What our graduates say
What I really enjoyed about the course was the exposure to software, hardware and telecommunications which gives you the entire view of a system rather than the separate components. I found the lecturers to be knowledgeable and approachable. Being a male dominated science, I think we need more girls to think seriously about studying computer science at university. During my summers at Trinity, I undertook a number of internships both in Ireland and abroad. One of these internships resulted in a full-time graduate job offer in London.

Katharine Burton

Get in touch!

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Computer Science can be studied as a Joint Honours subject with one of the following options:

- TR240 Geography  Page 23
- TR188 Business  Page 30
- TR241 Linguistics  Page 32
Computer Science (Joint Honours)

Each of the Computer Science Joint Honours combinations offers unique opportunities where the subjects intersect. Students studying Computer Science and Geography may have a particular interest in geographic information systems, spatial data or “smart cities”. The combined study of Computer Science and Linguistics yields opportunities for graduates to specialise in computational speech and language processing or text analysis. Our long-running Computer Science and Business joint programme provides graduates with the knowledge and expertise needed to work in the technical field of Computer Science along with the business management skills required to understand the fundamentals of markets, organisations and business management.

Pathways
The pathways available are Major with Minor and Joint Honours. See Trinity prospectus for further information.

Your degree and what you’ll study
Details of the Computer Science part of the joint programmes are provided below.

First year
In first year, students spend about 25% of their time learning to design and write computer programs. They also study Mathematics, Statistics, and Computer Systems.

Second year
In the second year the study of Computer Science continues with Algorithms and Data Structures, Information Management and Software Engineering. Depending on the pathway chosen, students may also take Applied Statistics and Probability, Intermediate Programming, Algorithms and Data Structures II, and Natural Language Processing.

Third year
All students in third year take Software Engineering, Information Management, and Computer Networks. Depending on the chosen pathway, students may take additional subjects such as Compiler Design, Artificial Intelligence, Symbolic Programming, Functional Programming, Discrete Mathematics, Advanced Computer Networks.

Fourth year
In the fourth year, all students will complete a Capstone project. In addition they choose from topics such as Group Programming Project, Machine Learning, Strategic Information Systems, Technology Entrepreneurship, Data Analytics, Fuzzy Logic, Formal Verification, Functional Programming, Internet Applications, Human Factors, Computer Graphics, Computer Vision.

Assessment
Courses are examined by a combination of continuous assessment and/or end of term examination or assessment.

Study abroad
You may apply to spend your third year studying at a university abroad as part of an exchange programme.
Why study Computer Science and Business?
Computer Science and Business is a Joint Honours programme. The computer science subjects in this programme will build upon your problem solving, logical and mathematical skills and challenge you to develop a deep understanding of the science of computers. The business subjects will develop your knowledge, management ability and understanding of the operations of organisations and their critical role in society and the many roles available within organisations like marketing, organisational behaviour, human resources and finance. At the end of the course graduates will be able to apply their knowledge of computer science, business and management, along with their problem solving skills, in new and familiar environments, both within the disciplines of Computer Science and Business and in the wider context of the modern workplace.

Computer Science and Business at Trinity
Computer Science at Trinity is ranked number 1 in Ireland, top 30 in Europe and top 100 worldwide while the Business School is ranked number 1 in Ireland, 36th in Europe and in the top 100 worldwide (QS subject rankings, 2020). Over a period of more than 50 years, both the School of Computer Science and Statistics and the Trinity Business School have earned a strong international reputation. They have enduring partnerships in education, research and industry across the globe.

Computer Science and Business at Trinity
Computer Science at Trinity is ranked number 1 in Ireland, top 30 in Europe and top 100 worldwide while the Business School is ranked number 1 in Ireland, 36th in Europe and in the top 100 worldwide (QS subject rankings, 2020). Over a period of more than 50 years, both the School of Computer Science and Statistics and the Trinity Business School have earned a strong international reputation. They have enduring partnerships in education, research and industry across the globe.

Computer Science and Business: The course for you?
Computer Science and Business at Trinity is a challenging and exciting course with a focus on innovation and cutting-edge technology. To get the best from the course you need to be interested in exploring how organisations work and how they can be improved and in developing clear logical ideas about situations and about how to develop feasible solutions for computing to deal with these situations. No prior knowledge of computer science or business is assumed.
Graduate skills and career opportunities
Government and industry have identified a need for more graduates with Computer Science and Business skills. Graduates of this programme have secured employment in a variety of roles and areas. They have been hired by multinationals, both nationally and internationally, such as Google, LinkedIn, Twitter and by consultancy and accountancy firms such as Ernst & Young, Accenture, MRBI, PwC, and KPMG. Our graduates are also much sought after within the public sector and for small and medium sized businesses. Many students have set up and launched their own businesses, some of which have won entrepreneurship awards. Other students have pursued Master’s and Ph.D. studies in business and computer science disciplines.

Your degree and what you’ll study
The computer science subjects in this programme are listed on page 26.

For more information about other Joint Honours subjects, including any special entry requirements, please visit: www.tcd.ie/courses/undergraduate

What our graduates say
Computer Science and Business is a powerful combination in today’s world, where no business can compete without digitalisation. As a student, you are exposed to a great variety of disciplines, modules and learning opportunities that open up an array of careers paths. During this degree, I have had the opportunity to study software engineering, artificial intelligence, project management, accountancy, finance, organisational behaviour and more. In the final two years of Computer Science and Business, students are given a significant amount of choice when selecting their modules, allowing you to specialise in your area of interest. This degree is perfect for students with an entrepreneurial mindset, as it gives you a powerful toolkit to launch your own business. It also has seen students pursue careers in programming, project management, consulting, entrepreneurship, investment banking, teaching – to name but a few. Ultimately, a degree like Computer Science and Business allows students to develop their logic and reasoning skills, while learning how to best implement these in the working world. Computer science and business was a great choice for me and I cannot recommend it enough!

Sinead McAleer

Get in touch!

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Computer Science and Linguistics (Joint Honours)

TR241 B.A. (Moderatorship) Joint Honours Bachelor Degree in Computer Science & Linguistics (NFQ Level 8)

Why study Computer Science and Linguistics?
Linguistics is the scientific study of language. Linguistics investigate how language works; how patterns of sounds, words and sentences combine to convey meaning. Training in Linguistics promotes the critical evaluation of evidence, logical and detailed analysis, and the formulation and presentation of arguments. Studying computer science builds your problem solving, logical and mathematical skills and challenges you to develop a deep understanding of the science of computers. At the end of the course graduates will be able to apply their knowledge of computer science and linguistics, along with their problem solving skills to improve computer understanding and generation of language, to use computing to explore languages, as well as to more general issues of computing and communication.

Computer Science and Linguistics: The course for you?
If you enjoy problem solving, conceptual analysis, mathematics, languages and are interested in combining topics in creative and insightful ways, then this may be the right course for you. It appeals to students with strengths in analytical reasoning. If you are interested in how language works and in how computers can be applied both to study language and to improve communication then this is an ideal combination. No prior knowledge of computer science or linguistics is assumed.
Computer Science and Linguistics at Trinity

Computer Science at Trinity is ranked number 1 in Ireland, top 30 in Europe and top 100 worldwide (QS subject rankings, 2020). There is a decades-long tradition of Linguistics teaching and research in the Centre for Language and Communication Studies (CLCS). In both subjects, teaching is research-led: all members of the teaching team are engaged in state-of-the-art research. There is a long history of combined Computer Science and Linguistics study at Trinity.

Graduate skills and career opportunities

Graduates are qualified to work as language specialists, in the language and speech technology sector, as information technologists or software specialists in any of the IT, banking, publishing or multimedia sectors.

Your degree and what you'll study

The computer science subjects in this programme are listed on page 26.

For more information about other Joint Honors subjects, including any special entry requirements, please visit: www.tcd.ie/courses/undergraduate

Get in touch!

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What is Management Science and Information Systems Studies (MSISS)?

Students learn how to use techniques from disciplines such as business, mathematics, computer science, statistics and management science to solve real world problems. There is also a firm emphasis on interpersonal skills such as verbal communication, interviewing, teamwork and report writing.

The primary objective of the MSISS programme is to produce graduates who are both business and computer literate and who have a solid understanding of how to approach and solve practical problems using a variety of tools and techniques. The emphasis in MSISS is on building up analytical skills, flexibility and creative thinking.

One of the remarkable features of MSISS is the range of careers that graduates take up. The MSISS programme provides students with a unique blend of skills and experience. It is this mix which makes MSISS unique amongst other third-level courses in Ireland and helps contribute significantly to the success MSISS graduates have in getting jobs.

MSISS: The course for you?

This course is ideally suited to students who like solving complex problems and are interested in both technology and business, and are naturally comfortable with mathematics. The range of subjects studied is wide and will challenge your abilities on several fronts, leading to graduates who have the ability to think about issues in both technical and business terms. MSISS is a good way of keeping your options open.

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<th>B.A. (Moderatorship) Honours Bachelor Degree (NFQ Level 8)</th>
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<th>IB Subject Requirements</th>
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<tr>
<td>HL Grade 5 Mathematics</td>
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Management Science and Information Systems Studies (MSISS)

**MSISS at Trinity**
MSISS has its home in the School of Computer Science and Statistics which is ranked number 1 in Ireland, top 25 in Europe and top 100 worldwide (QS subject rankings, 2020). MSISS produces graduates who are analytical, flexible and creative. These are highly demanded skills that are applicable across a range of careers.

In MSISS the theory of subjects is covered but consideration is given to building practical skills. The teaching methods include formal lectures, laboratories, role-playing, real-life projects, many with an emphasis on group work.

**Graduate skills and career opportunities**
MSISS has one of the best graduate employment records of any undergraduate course in Ireland. One feature of MSISS is that it provides a base for following a remarkably wide range of careers within management consultancy, the financial services and the actuarial and accounting professions. Many graduates also work in information technology management, quality control, and marketing, while others pursue postgraduate study at home and abroad.

Demand for MSISS graduates has always been steady as the wide ranging skill sets developed in the course of study together with the problem-solving and team-working skills are highly sought after by employers. A high level of numeracy and fluency in the use of modern technology are a further attraction for employers.

Employers include large financial institutions, management consultants and other businesses both nationally and internationally; for example Deloitte, Ernst and Young, Accenture, McKinsey, KPMG, PwC, BearingPoint, PA Consulting, FTI Consulting, Bank of America Merrill Lynch, CitiBank, Credit Suisse, Barclays, Deutsche Bank, JP Morgan, HSBC, RBS, Bank of Ireland, Ulster Bank, AIB, Irish Life, Aviva, Mercer, Paddy Power, First Derivatives, Boylesports, Kerry Group, Betfair, Google, Colgate, Palmolive, Proctor and Gamble, United Drug.
Management Science and Information Systems Studies (MSISS)

B.A. (Moderatorship) Honours Bachelor Degree (NFQ Level 8)

Your degree and what you’ll study
MSISS is made up of four strands.

- The first is based around developing skills in quantitative techniques, such as mathematics, statistics, probability, data analytics, forecasting and management science.
- The second strand focuses on information technology and systems and ranges from basic end user tools, like spreadsheets, through programming, system design and development and databases, up to state of the art topics/techniques in areas such as strategic information systems.
- The third strand is business-based and covers important concepts in management, finance and operations management.
- The fourth strand seeks to develop a range of personal skills including teamwork, making presentations, interviewing, report writing and researching.

The four strands in MSISS are organised as three main subject areas, supported by the interpersonal skills framework. The three subject areas are: Business and Management; Quantitative Analysis and Information Systems. Interpersonal skills such as interviewing and making presentations are taught explicitly and implicitly (i.e. built into the teaching of other subjects). Third and fourth year provide the opportunity to specialise in an area of your choice.

Topics

Subjects studied under the various topics include:
- Business and Management: Introduction to Management and Organisation; Finance and Accounting; Operations Management; Economics
- Quantitative Analysis: Forecasting; Management Science (Operations Research); Data Analytics; Market Research; Mathematics; Probability; Statistics
- Information Systems: Information Systems and Technology; Programming (Java, Visual Basic, SQL and PHP); Strategic Information Systems; End User Computing;
- Personal Skills: Making Presentations; Interviewing; Report Writing; Research Methods; Team-Working; Consulting.

First and second years
During first and second year, you will get a solid introduction to a number of fields. Subjects you will study include:
- Computer Programming
- Economics
- Management Science
- End-User Computing
- Mathematics
- Organisation and Management
- Statistics
- Finance and Accounting
Third and fourth years
The third and fourth years allow you to focus on areas that are of particular interest to you. In each year there are a number of core courses (five in third year and three in fourth year) and a range of optional modules from which students select options in each of the final two years.

An integral component of the final year is a Capstone project which takes the form of a consultancy project for a real world client. In recent years, projects have been undertaken for clients such as Google Ireland, Irish Life, L&P Group, PwC, Deloitte, Electric Ireland, AIB, Bank of Ireland, McDonalds, Teagasc, HIQA, Betfair and Boyle Sports.

The choice of optional modules spans business studies, economics, computer science, statistics, mathematics and engineering. The courses currently offered include financial and management accounting, economics, human resources management, technology entrepreneurship, mathematics, investment analysis, corporate financial reporting, statistical modelling and project management.

Assessment
You will be assessed by a combination of assignments and end-of-year examination. A report on the final-year project is an important part of the assessment.

What our graduates say
MSISS students complete real world type projects and learn practical skills which are valued by employers. The course has an excellent reputation, which leads to exciting and varied employment opportunities. Every day on the job I use skills honed and developed through my study of MSISS, which include information technology skills together with other skills such as report writing and problem solving, key to building a successful career. MSISS is a dynamic course, which will appeal to students with an interest in modern business issues such as big data, data analytics and information technology.

Laura Headon, Deloitte

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Computer Science, Linguistics and a Language

TR039 B.A. (Moderatorship) Honours Bachelor Degree in Computer Science, Linguistics and a Language (NFQ Level 8)

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<th>Course Code</th>
<th>TR039</th>
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<td>CAO Points 2020</td>
<td>424</td>
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Special Entry Requirements

- Leaving Certificate Mathematics: H4
- Leaving Certificate: H3 in French or Spanish or Irish

Advanced GCE (A Level) if presenting French or Spanish: Grade C
Advanced GCE (A Level) if presenting Irish: Grade B
Advanced GCE (A Level): Grade C Mathematics

Grade C if presenting French or Spanish,
Grade B if presenting Irish

Students choose one language from French, Spanish and Irish. Students must present one of the above grades in their chosen language.

IB Subject Requirements
- HL Grade 5 Mathematics
- HL Grade 6 in French or Spanish or Irish

What is Computer Science, Linguistics and a Language?

The Computer Science, Linguistics and a Language (CSLL) degree combines computer science with the mastery of a particular language (French, Spanish or Irish) and with the study of linguistics, which is the scientific study of language in general and the associated technologies concerning language. The chosen language (French, Spanish or Irish) is studied to degree level, with emphasis on aural, oral and written fluency.

This course develops a unique combination of skills – technical, mathematical, analytical and communicative. In doing so, it provides two of the most sought after skills today: a degree-level fluency in a second language and a degree in computing, opening up hosts of future career possibilities. Many of these careers also involve the third degree level strand of the course – linguistics.

Predictive text in telephones, automatic speech recognition in directory enquiries, and machine translation are just three examples of technologies that derive from computational linguistics; Countless others are on the horizon.
Computer Science, Linguistics and Language: The course for you?
This course will appeal to students with strengths in analytical reasoning and an affinity for mastering languages, but who do not want to choose between arts and sciences. While the course involves the study of mathematics and computing, linguistics and language, students are afforded considerable flexibility in their course options. If you enjoy mathematics, languages and problem solving and are interested in combining topics in creative and insightful ways, then this may be the right course for you.

Computer Science, Linguistics and a Language at Trinity
This degree is one of the most interdisciplinary on offer, bridging both computer science and the arts. The skills acquired in the study of computing, together with the study of language and linguistics, open doors to world mobility and employability. Computer Science at Trinity is ranked number 1 in Ireland, top 25 in Europe and top 100 worldwide (QS subject rankings, 2020). Over a period of more than 50 years, the School of Computer Science and Statistics has earned a strong international reputation and has partnerships in education, research and industry across the globe.

Graduate skills and career opportunities
Since the course began in 1985, graduates have moved on to careers that reflect the range of topics within the degree. Graduates will be qualified to work as language specialists, information technologists or software specialists in any of the IT, banking, translation, publishing or multimedia sectors. A number of our graduates work as software engineers in international consulting firms. Some have embarked on careers in professional translation; others have moved into primary and secondary-level education. About 65% of graduates work in software engineering (whether in a mainly English speaking country or in a country where the language of the degree focus is the primary language); about 25% pursue research careers. A number of graduates now hold academic staff positions in Ireland and abroad. Another 10% tend towards a focus in technical translation.

Some graduates have taken up employment in government service, e.g. the European Patent Office and the Irish Diplomatic Corps.

Your degree and what you’ll study
In the first two years, you will study computer science, linguistics and your chosen language. The final year offers students the opportunity to explore in greater depth areas where computers and language meet or in the classical core of the constituent disciplines: computer science, linguistics and a language. Students complete increasingly complex projects in each year of the programme.
Computer Science, Linguistics and a Language

TR039 B.A. (Moderatorship) Honours Bachelor Degree in Computer Science, Linguistics and a Language (NFQ Level 8)

Subject areas include

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<tr>
<th>First Year</th>
<th>Second Year</th>
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<tr>
<td><strong>Computer Science</strong></td>
<td><strong>Discrete and Continuous Mathematics</strong></td>
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<td>Mathematics</td>
<td>Data Structures and Programming Techniques</td>
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<td>Introduction to Programming</td>
<td>Natural Language Processing</td>
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<td>Representations and Computation</td>
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<td><strong>Linguistics</strong></td>
<td><strong>Syntactic Theory</strong></td>
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<td>Introduction to the Study of Language (General Linguistics)</td>
<td>Introduction to Speech Science</td>
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<td>Introduction to Phonetics and Phonology</td>
<td>Formal Semantics</td>
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<td>Introduction to Syntax</td>
<td>Instrumental Phonetics</td>
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<td>Computational Morphology</td>
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<td>Statistics for Linguistics</td>
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<td><strong>Language</strong></td>
<td><strong>Written, oral and aural language fluency</strong></td>
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<td>Written, oral and aural language fluency</td>
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<td>Area Studies</td>
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Third and fourth years
Subjects that you study in the first two years of your degree will be continued in your third and fourth years either at Trinity or abroad under the Erasmus programme. In the fourth year, you will be able to take advanced modules in interdisciplinary areas such as artificial intelligence, information systems, computer processing of human language and the analysis and synthesis of the human voice. You also proceed to advanced study in your chosen language, perfecting both your oral skills and written skills in translation and essay writing.

Optional modules and a major interdisciplinary Capstone project allow you to specialise in areas you particularly enjoy and to shape the degree around your individual strengths. Examples of final-year module options include Computer Graphics, Machine Vision, Advanced Computational Linguistics (involving Speech Recognition and Machine Translation), Fuzzy Logic, and Human Second-Language Acquisition.

Assessment
Written examinations, course work and projects are all used in assessment. You will also complete a final-year dissertation as part of the degree.

Study abroad
Students who study French or Spanish will spend the third year studying at a university abroad and for students studying Irish, it is a possibility. Studying abroad gives students the opportunity to develop language skills and experience university life in another country. It also provides options for students to define their own specialist areas within the programme.

What our graduates say
The unique combination of computer science and a chosen language in this course makes for a challenging but rewarding experience at TCD. I chose CSL because I wanted to continue learning German whilst also studying the field of computer science, which I am so passionate about. The projects during the Erasmus year & final year helped me realise my interests in computer science and linguistics and ultimately pointed me in the direction of my career.

This course was the building blocks for my career and helped me realise what direction I wanted my career to go in. I graduated from CSL an experienced computer science student with a new passion for linguistics. I am a Front-End software engineer.

Luke Byrne CSL Graduate

*Computer Science and Language (CSL) was renamed Computer Science, Linguistics and a Language (CSLL)*
School of Engineering

Balanced solutions for a better world
Welcome to the School of Engineering….. we are delighted that you’re considering studying here!

The School of Engineering is a vibrant, intellectual community of innovative researchers, teachers and students, which combines high-quality teaching with expansive research activity.

Each year, the Engineering School welcomes growing numbers of visiting and full-time students from around the world who enrich our shared multicultural learning environment. The School has international students from all over Europe, North and South America, Australia, Asia and Africa.

The School strives to educate global citizens who will have a real impact on society and who will enhance Engineering throughout the world, by sharing their innovative ideas.

The School of Engineering at Trinity is ranked in the top 200 Engineering Schools in the world and offers outstanding teaching by engineers who are at the forefront of their field worldwide. It has a strong philosophy of research-led teaching and continuously benchmarks itself against the top international Engineering schools.
What is Engineering?
Engineering is about being creative in technical problem solving. Engineers make things possible by using mathematical and scientific principles together with analytical and design skills. They tackle existing problems by developing new solutions through innovative technologies.

They also expand the frontiers of society by developing advanced materials, sustainable energy systems, construction technologies, transport systems, biomedical devices and telecommunications infrastructure.

Engineering: The course for you?
We have been teaching Engineering at Trinity since 1841. There have been immense developments since that time, but the continuity of excellence in teaching and learning is a source of pride for us and our graduates. A distinctive feature of Engineering at Trinity is the two-year common programme, in which all students learn the fundamentals of Engineering science and also engage in substantial elements of project work prior to choosing a specific Engineering discipline. Trinity is the top-ranked university in Ireland, and our Engineering graduates use this to their advantage all over the world as well as in Ireland.
Engineering is a constantly evolving profession. As an engineer, you will need to be adaptable both to the rapid development of new ideas and technology and to the shifting requirements of industry and society. You will need to be a good communicator and be capable of working as part of a team. Above all, you must be a problem solver. You must be creative and able to synthesise and analyse information from different sources to arrive at efficient and practical solutions.

Engineering at Trinity
The School of Engineering at Trinity is ranked in the top 200 Engineering Schools in the world and offers outstanding teaching by engineers who are at the forefront of their field worldwide. It has a strong philosophy of research-led teaching and continuously benchmarks itself against the top international Engineering schools. The Engineering course offers the opportunity to carry out research as part of your course with the aim of producing graduates capable of participating at the highest national and international levels. There are opportunities for work placements in Ireland and abroad as well as study abroad opportunities as part of the degree programme. The Engineering programme is fully accredited by Engineers Ireland up to master’s level (M.A.I.) and offers excellent career prospects in Ireland and abroad.

Graduate skills and career opportunities
Engineering graduates from Trinity have the capacity to think independently but also to work in teams. They can use technical understanding to problem solve in a wide range of technical areas. They are able to communicate their technical and creative ideas to other professionals and to society at large. They are able to take responsibility, deal with complexity and ambiguity and successfully face open-ended challenges.

Your degree and what you’ll study
The B.A.I./M.A.I. (Engineering) degree programme is based on two years of general Engineering, providing students with a firm grounding in the principles common to all disciplines, followed by two/three years of specialisation. Graduates are professionally accredited engineers with both a broad-based understanding of the whole discipline and a detailed knowledge of their chosen specialist area. The aim is that graduates will be able to continuously train themselves, to adapt and move into related or newly emerging areas as their careers develop after graduation.
**Engineering (Common Entry Programme)**

**B.A., M.A.I. Master’s Degree (NFQ Level 9)**
Optional (exit after fourth year):
**B.A., B.A.I. Honours Bachelor Degree (NFQ Level 8)**

**Engineering Course Structure**

**Year 1 + 2**
Common to all Engineering streams

**Year 3**
Select one of:
- Civil, Structural and Environmental Engineering
- Mechanical and Manufacturing Engineering
- Electronic Engineering
- Electronic & Computer Engineering (joint programme)
- Computer Engineering
- Biomedical Engineering

**Year 4**
B.A.I. Programme
Capstone Project
Graduate with B.A., B.A.I. degrees

**Year 4**
B.A.I. Programme
Year at Trinity
OR
Semester 1 – Trinity
Semester 2 – Internship
OR
International exchange

**Year 5**
M.A.I. Programme
Capstone Project
Graduate with B.A., M.A.I. degrees

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**Your degree and what you’ll study**

**First and second years**
All students follow a common programme for the first two years. The first year comprises introductory courses in engineering science, mathematics, computer science, physics, chemistry, mechanics, electricity and magnetism, graphics and computer-aided engineering, and a group design and build project.

In the second year, students take further Engineering science modules, such as solids and structures, thermo-fluids and electronics, and complete two more group design and build projects. This allows you to explore all the possibilities open to you in advance of making your final decision about which specialism to concentrate on. You will also take a Trinity Elective module.

**What happens next?**
At the end of second year you choose one of the six specialist areas:
- Biomedical Engineering
- Civil, Structural and Environmental Engineering
- Electronic Engineering
- Electronic & Computer Engineering (joint programme)
- Computer Engineering
- Mechanical and manufacturing engineering

While every effort is made to allow students to study the course they choose, in some departments the number of places for students of any one year may be limited (this has never been necessary so far).
Third and fourth years
Courses in the third and fourth years aim to broaden and deepen your knowledge and understanding of the specialism you have chosen. You will also have the opportunity to take a Trinity Elective module and optional modules in other disciplines. Subjects are studied in much greater detail and students undertake real-life, practical projects. For example, if you choose Civil, Structural and Environmental Engineering you could end up testing the pre-cast concrete used to build the Paddington to Heathrow railway; If you choose Computer Engineering, you might find yourself building a microprocessor system.

Fifth year options with study abroad and internship opportunities
Engineering students require a master’s degree to be directly eligible for Chartered Engineer status with Engineers Ireland. Therefore the School offers several options for a fifth year leading to a master’s degree (M.A.I.).

M.A.I. (International)
Students have the option to spend their fourth year abroad as part of the Erasmus/International exchange, CLUSTER or UNITECH programmes. As part of the Erasmus/International exchange or CLUSTER programmes, students spend their fourth year abroad at a partner university and return to complete their fifth year at Trinity. Some of our Erasmus/International exchange partner universities include Institut National de Sciences Appliquées de Lyon – INSA, Universidad Politecnica de Madrid (UPM), Politecnico di Torino and University of Melbourne.

The CLUSTER programme is a consortium of 12 universities including Technical University of Catalonia, Barcelona; Technische Universität Darmstadt; Technische Universiteit Eindhoven; Institut polytechnique de Grenoble; Instituto Superior Técnico Lisbon; Katholieke Universiteit Leuven/Université Catholique de Louvain; Helsinki University of Technology; Karlsruhe Institute of Technology; École Polytechnique Fédérale de Lausanne; Politecnico di Torino; KTH Royal Institute of Technology Stockholm.
Assessment
Assessment in each of the first two years is mostly by means of written examination combined with continuous assessment of coursework during the year. Typically, examinations contribute at least 50% towards your grade in each subject. The design projects are assessed entirely by continuous assessment.

Engineering at a glance
All students follow common first and second years. At the end of the second year you will select one of six specialist streams as outlined above.

First year
- Lectures – 16 hours per week
- Tutorials – 5 hours per week
- Laboratory work – 6 hours per week

First year modules:
- Engineering Mathematics I and II
- Computer Engineering I
- Physics
- Chemistry
- Electrical Engineering
- Mechanics
- Introduction to Professional Engineering
- Engineering Design I: Graphics and Computer-Aided Engineering
- Engineering Materials and their Applications
- Experimental Methods

Find out more about our first year modules by visiting: https://www.tcd.ie/Engineering/undergraduate/bai/year-1/

What our students say
Studying Engineering at Trinity has been a roller-coaster. I believe it’s common knowledge that Engineering is a very hectic and tough course but nevertheless, the three years I have spent in the university have been fantastic. For my first two years here, I studied general Engineering which included all disciplines of Engineering. This year I chose to specialise in civil Engineering as I enjoyed those modules the most in the two years and I’m loving it even though it isn’t easy. In addition to loving my course, the people I’ve met in the university have contributed to my amazing experience here.

Samuel Ojelabi
Engineering (Common Entry Programme)

What our students say

Now in my fifth year of Mechanical and Manufacturing Engineering I have suddenly found a wonderful balance between my studies and extracurricular activities, joining societies and becoming a class rep with the Student Union. Engineering is a broad and creative degree that you will thrive in. Take every opportunity you can!

Charlotte Weever

Second year
- Lectures – 16 hours per week
- Tutorials – 5 hours per week
- Laboratory work – 4 hours per week

Second year modules:
- Engineering Mathematics III and IV
- Computational Engineering
- Computer Engineering II
- Solids and Structures
- Thermo-Fluids
- Electronics
- Engineering and the Environment
- Engineering Design III: Project
- Engineering Design IV: Project
- Trinity Elective module

Find out more about our second year modules by visiting:
https://www.tcd.ie/Engineering/undergraduate/bai/year-2/

Third and fourth years and M.A.I. Year
For contact hours, please see the individual stream pages (see below).

Common third and fourth year modules:
- Engineering Mathematics V
- Management for Engineers
- Probability and Statistics

Select one of the six specialisations below:
Biomedical Engineering, please see https://www.tcd.ie/courses/undergraduate/az/course.php?id=DUBSC-BIOE-2ENG

Civil, Structural and Environmental Engineering, please see https://www.tcd.ie/courses/undergraduate/az/course.php?id=DUBSC-CSEE-2ENG

Electronic Engineering, please see https://www.tcd.ie/courses/undergraduate/az/course.php?id=DUBSC-ELEE-2ENG

Electronic and Computer Engineering, please see https://www.tcd.ie/courses/undergraduate/az/course.php?id=DUBSC-ELEC-2ENG

Computer Engineering, please see https://www.tcd.ie/courses/undergraduate/az/course.php?id=DUBSC-CMPE-2ENG

Mechanical and Manufacturing Engineering, please see https://www.tcd.ie/courses/undergraduate/az/course.php?id=DUBSC-MEME-2ENG

Get in touch!

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- T: +353 1 896 1142
- Facebook: www.facebook.com/trinityengineering
- Twitter: @tcdengineering

53 54
Engineering with Management

B.Sc. (Ing), M.A.I. Master’s Degree (NFQ Level 9)
Optional (exit after fourth year):
B.Sc. (Ing) Honours Bachelor Degree (NFQ Level 8)

What is Engineering with Management?
Engineering with Management is an exciting and wide-ranging Engineering programme that is broad in scope and aims to develop both the technical and business aspects of Engineering. Engineers are problem solvers. In almost every human endeavour, an engineer has been involved somewhere. They have created the designs and systems to make everything from: gliders to space craft, ball-point pens to laser printers, matchbox cars to F1 racing cars, wheelchairs to artificial joints for the human body.

What is Engineering with Management?

Engineering with Management is concerned with the analysis, design, improvement, installation and management of integrated systems of people, finance, materials and equipment. Our graduates have the technical skills common to all excellent engineers, with this knowledge augmented by an understanding of the commercial and industrial environment and the ability to generate innovative solutions to the problems of the world.

Engineering with Management: The course for you?
Do you like the creative, analytical, problem-solving focus of Engineering? Do you like the diversity of Engineering? Perhaps, though, you see your professional life more involved with running a company, managing projects, or being a consultant? If any of these describes you, then you should consider this course. The diversity and flexibility of this course will give you endless possibilities in your professional life, both in what you do and how you do it. As well as providing the core competencies for employment in
research, manufacturing, production, design and Engineering consultancy, the breadth of the course equips graduates to compete favourably with general graduates for careers in the business and financial sectors.

**Engineering with Management at Trinity**
A key feature of the Engineering with Management programme is that the class size is capped at 30 students. This reflects a core belief in the value of small-group teaching and hands-on exercises, which is delivered through active learning strategies implemented by our world-class staff. The course is a professional Engineering degree, fully accredited by Engineers Ireland, that produces graduate engineers capable of working in the competitive environment of world-class manufacturing.

Students have the opportunity of studying abroad and have the chance to be chosen for a team which travels to Stanford University and the Silicon Valley area to showcase their product design projects (details below).

**Graduate skills and career opportunities**
Graduates of the programme will be suited to jobs in the high-tech sector (e.g. computer, aerospace, pharmaceutical, medical devices, electronic) as well as traditional manufacturing (e.g. design, fabrication, assembly). They often work as project managers on teams with design and test engineers, managers, financial controllers, marketing and sales people. The qualification is also well suited to those who wish to pursue careers in project management and management consultancy as well as in the broader business and financial sectors.

Past graduates are currently working in DePuySynthes, IBM, Intel, Project Management Group, JP Morgan, Davies Stockbrokers, Pfizer, Jaguar Land Rover, Denis Woods Forensic Engineers, PwC Accountancy, Accenture, and Reckitt Benckiser, and many have gone on to create tech start-up businesses.

**Your degree and what you’ll study**
The course is structured around themes that are developed over the four years. These themes are: Engineering Fundamentals, Business and Management, Design and Manufacturing Engineering. Approximately 80% of the syllabus comprises Engineering subjects such as design, automation, computer simulation/modelling, bio-engineering and materials. The remaining 20% comprises management subjects such as marketing, finance, quality systems, supply chain management and human resources management. Engineering is a busy but exciting course with typically full days in labs, workshops and lectures, as well as working on team and group projects.
Engineering with Management

B.Sc. (Ing), M.A.I. Master’s Degree (NFQ Level 9)
Optional (exit after fourth year):
B.Sc. (Ing) Honours Bachelor Degree (NFQ Level 8)

A variety of assessment techniques ranging from traditional examinations to continuous assessment, project work, design portfolios are used over the 4 or 5 years.

Throughout the course, a strong emphasis is placed on group projects, case studies and teamwork. Many of our 4th years are undertaking the 4E5 (Innovation in Product Development) module. This pairs Trinity students in teams with students from the world’s leading universities (e.g. Stanford in the US); each team consisting of 4 students from each university. The course also involves trips to Stanford and the Silicon Valley area. The teams are working with industrial sponsors, recent examples being SAP and Panasonic, with a mission to create innovative solutions to real customer needs.

At the end of year three you make a decision to pursue a bachelor’s degree (B. Sc.(Ing)) or a master’s degree (M.A.I.) depending on achieving the necessary academic standards.

Most of our fourth year students are in the first year of a two year master’s-cycle leading to the award of an M.A.I. degree (see below). Students electing to conclude their studies with a bachelor’s degree (B.Sc. (Ing)) undertake a Capstone project. Those continuing to a fifth year have a number of other options such as the innovation projects (see above), industry-based internships, or study-abroad programmes (see below). Students in fifth year (studying for an M.A.I. qualification) undertake a major individual research project and range of advanced specialist technical modules.

**Five year master’s degree in Engineering with study abroad and internship opportunities**
Students who achieve a satisfactory academic standard in their third year may proceed to a 2-year master’s degree cycle, which will lead to the award of an M.A.I. (master’s in Engineering) degree. Those students who choose to graduate after four years with the B.Sc. (Ing) degree will require additional qualifications (e.g. further/alternative postgraduate study) to be eligible for professional accreditation with Engineers Ireland.
Four principal routes are available:

- The entire fourth year is taken abroad at an approved partner university, after which students return to Trinity and complete their studies with an appropriate range of advanced level modules and a substantial research-based project.
- Semester 2 of year 4 is spent in industry on the Engineering project Internship where students carry out project work in one of Trinity’s internship partner industrial companies based in Ireland or abroad. The Engineering project internship is full time from mid-January to June. Example companies include; Nokia, DepuySynthes, Ferrari, Glanbia, Deloitte, PwC and many others.
- An extended period (approximately 6-8 months) in the fourth year is spent at either an approved partner university (e.g. KTH Stockholm, IST Lisbon, UPC Barcelona, EPFL Lausanne, KUL Belgium), or in a formal industrial placement, after which students return to Trinity and complete their studies with an appropriate range of advanced level modules and a substantial Capstone research project.
- An integrated 2-year cycle based in Trinity, comprising an approved combination of project work and lectures.

What our graduates say

From day one we were challenged with the task of becoming problem solvers, critical thinkers but with an acute focus on being able to communicate and present ideas and concepts to others. There was always a very clear connection between the work we did and real world application. This was one of the biggest winners for me. We could see where our learning could be applied in the real world. I owe the current continued success of my own company (StoneyCNC) largely to the learning and experience from studying in Trinity. I can’t recommend it enough.

Rory Stoney

Get in touch!

- www.tcd.ie/mecheng/engman
- E: nbyrne3@tcd.ie
- T: +353 1 896 1383
School of Natural Sciences

Balanced solutions for a better world
Welcome to the School of Natural Science

The School of Natural Sciences conducts research, and delivers teaching, on all aspects of the natural world, from the formation of the Earth, the behaviour of the environment, the evolution and ecology of its organisms and its interactions with human society. The School is engaged with solving some of the major challenges facing human society through our teaching, research and partnership with industry and policy development both nationally and globally.

The School comprises of the Disciplines of Botany, Geography, Geology and Zoology and two research centres, accommodate ca. 40 academic staff, 25 support staff, 40 postdoctoral research fellows and over 100 graduate research students who generate annual research income in excess of €4 million and produce an average of 150 publications per year. The School also delivers four taught masters degree programmes.
What is Science?
Science is about knowledge: the generation of knowledge through research and its acquisition through learning. Scientific investigation allows us to understand the world around us: how the physical world has evolved and changed since the Big Bang and how life has advanced into complex, diverse forms. The application of scientific knowledge has led to world changing developments such as modern medicine, the mobile phone and efficient methods of energy production. As we acquire new knowledge, our understanding of the world changes which in turn leads to new and better applications. There is still much to discover and new applications to be developed. Do you want to contribute?

Is Science the course for you?
Science at Trinity is offered through four different entry routes/streams leading to an honours degree following four years of study. We offer students opportunities to choose from four entry paths/streams: Biological and Biomedical Sciences; Geography and Geoscience. These four entry routes lead to one of 20 exit routes. The programme will offer students a detailed knowledge and thorough understanding of the scientific method. Students will learn scientific skills while developing an understanding of the role and Influence of science on society.
Science

Science at Trinity
The advantages of studying science in Trinity:

- Outstanding teaching by scientists and mathematicians who are at the forefront of their fields worldwide
- Coherent, progressive programmes in four broad streams
- Wide range of specialist moderatorship subjects
- Broad choice of additional, approved and elective modules
- All students complete a Capstone research project
- Small classes in third and fourth year
- Opportunities to study abroad before and after graduation
- Rigorous education and training in chosen field
- Excellent career prospects in Ireland and abroad
- Trinity is recognised internationally as one of the top research universities in Europe
- Research-led teaching by world leaders in their fields of study Graduate Skills and Career Opportunities Graduate skills Science Graduates develop a wide range of skills, some of which include:

Graduate Skills and Career Opportunities
Graduate skills Science Graduates develop a wide range of skills, some of which include:

- A working understanding of the scientific method and how scientific knowledge is acquired
- A broad understanding of the basic scientific disciplines
- A capability for critical thinking and evaluation of current and novel concepts and ideas
- A detailed knowledge of the specialist area of study, its core principles and an awareness of its knowledge boundaries
- Creativity, with an ability to formulate novel concepts and ideas
- The ability to collect qualitative and quantitative data with precision and organisation
- The numeracy to analyse and critically evaluate data using appropriate mathematical, statistical, computational and other relevant methods
- Ability to work both individually and within a team
- Capability to manage a project, set and achieve objectives and manage resources.
- Capability to communicate knowledge, concepts and ideas to scientific and non-scientific audiences.
- An understanding of the role and influence of scientific knowledge on society. Career opportunities: What can I do with a science degree?
- Many Trinity Science and Mathematical graduates pursue graduate courses or research leading to an M.Sc. or Ph.D. Trinity Science and Mathematics graduates pursue a wide variety of careers in a diversity of areas – for example:

Your degree and what you’ll study
Trinity Science is split into four different entry routes:

TR060 – Biological and Biomedical Sciences
(Degree options for TR060: Biochemistry, Botany, Environmental Sciences, Genetics, Human Genetics, Immunology, Microbiology, Molecular Medicine, Neurosciences, Physiology, Zoology)

TR062 – Geography and Geoscience
(Degree options: Geography; Geoscience)

For further details and to see what our current students say, check out our website: www.tcd.ie/science/prospective

Get in touch
Please contact us by email to arrange a visit if you’re thinking about studying Science at Trinity.
E science@tcd.ie | T +353 1 896 2829 / 2022
See our introduction to Science presentation on page 156 and student profiles: www.tcd.ie/science/prospective
What is Biological and Biomedical Sciences
Biology is the study of living things; we explore how life first arose: the properties that distinguish living organisms from inert matter; how the vast diversity of life forms was generated; how organisms reproduce themselves; how they interact both with each other and with the environment. Biology is fundamental to understanding the world we live in and plays a huge role in medicine.

Modern biological science is unravelling the mysteries of life; it is helping us to meet the challenge of illnesses such as dementia and cancer, to defend against new viruses and drug-resistant bacteria, and to protect ecosystems from climate change and other threats.

Structure of the Biological and Biomedical Sciences (TR060) programme
In this stream, students will study the core concepts that are fundamental to all biological systems. These will be presented in core modules during first and second year and will include: cell structure and composition, genetics and evolution, molecular biology, metabolism, anatomy and physiology of bacteria, fungi, plants and animals, ecosystems and environmental biology. In addition, students will acquire mathematical, statistical and computational skills and study the history, philosophy and ethics of science. Students have the opportunity to expand their scientific knowledge and to pursue their individual interests by choosing from a variety of approved modules by choosing from a variety of open modules including topics such as animal behaviour, genomes and disease, microbes and immunity, chemistry for biologists and geochemistry.

TR060 Biological and Biomedical Sciences
B.A. (Moderatorship) Honours Bachelor Degree (Botany; Environmental Science; Zoology) (NFQ Level 8)

- Course Code: TR060
- CAO Points 2018: 500
- Places 2019: 235
- Duration: 4 years

IB Subject Requirements
SL Grade 5 Mathematics
HL Grade 5 In two of physics, chemistry, biology, physics/chemistry, geology, geography, applied mathematics, agricultural science, computer science.

Combinations of subjects not permitted:
Physics/chemistry with physics or chemistry.
Agricultural science with biology.
Applied mathematics with mathematics
In the third year, students specialise in one of the 11 moderatorships offered in this stream: Biochemistry; Botany; Environmental Science and Zoology. The fundamental concepts of that discipline will be presented in core modules while students will also select from a variety of modules from allied disciplines that enhance understanding of their chosen discipline and encourage interdisciplinary thinking and research. Students can also experience the wide range of knowledge and investigation available throughout the university by choosing from a range of Trinity’s electives. In the fourth year students choose from a selection of modules on advanced topics within their discipline. They will also undertake a research project in Trinity or in a research laboratory in another university, research institute or hospital. Throughout this programme, students will also acquire skill in problem solving and data handling and in oral and written communication.

This science education programme is designed to foster and develop a student’s capability for independent thought and effective communication, an ability to continue their education independently and to act in a responsible manner. These attributes are preparation for a career in science and medicine (e.g. in research, biotechnology, pharmaceutical industry); for a career in related areas where a scientific education is beneficial (e.g. patent law, forensic science) and for careers in areas such as education, management, business, industry, communication and policy making.

Please see page 158 of the Trinity undergraduate prospectus for further information.

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<tr>
<th>TR060</th>
<th>Biological and Biomedical Sciences Stream</th>
<th>1st Year</th>
<th>2nd Year</th>
<th>3rd and 4th Year</th>
<th>Quota 235</th>
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<tr>
<td>TR062</td>
<td>Geography and Geroscience Stream</td>
<td>40 Core+ 20 Elective Credits</td>
<td>40 Core+ 20 Elective Credits</td>
<td>Biochemistry Botany Environmental Science Zoology</td>
<td>Quota 54</td>
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<td>Quota 235</td>
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63 64
Students who wish to study geoscience should apply to the geoscience stream and may select geoscience as their specialist area for the third and fourth years at the end of the second year.

**What is Geography & Geoscience**

Geography and Geoscience is the study of our planet and the people that live on it. This multi-disciplinary programme is designed by leading research scientists in response to critical challenges facing the Earth system and humanity in the 21st century. It integrates knowledge from the physical, chemical, biological and social sciences to develop novel insights into Earth system function and human-environment interactions. So, if you are interested in studying the dynamics of our planet, understanding environmental changes past, present and future, and learning how to manage Earth’s resources in an economic and sustainable manner, we have the degree for you.

The Geography and Geoscience degree programme is the Science entry pathway for the study of geography (human and physical geography) and geoscience (geology and physical geography) at Trinity. Our four-year programmes, culminating in the degrees of Geography or Geoscience, combine classroom lectures, seminars, laboratory-based practical classes, and outdoor field work, to develop the theoretical understanding and technical expertise needed to address applied, real-world problems such as natural resource management and sea level rise.

**Geography & Geoscience: The course for you?**

If you like science, enjoyed taking Geography and the physical sciences at secondary level, care about the earth, are fascinated by the natural world and enjoy working outdoors, then consider Geoscience. Geoscience attracts people who wish to study the dynamics of our planet, to understand environmental changes past, present and future, and to manage Earth’s resources in an economic and sustainable manner.

**Geography & Geoscience at Trinity**

Trinity is continually ranked in the world top 100 universities for geography and is a hub of intensive and extensive geographical scholarship in Ireland (QS World University Rankings by Subject 2020). We teach and research across the subject, from coastal modelling and environmental change to development theory and urbanisation. Trinity geographers provide expert advice to governments and non-government institutions alike, on issues such as climate change, the economy, social inequality, health and wellbeing.

**Graduate skills and career opportunities**

Geography and geoscience graduates are in demand to work on many of society’s most important challenges, and can pursue lucrative and personally rewarding careers in industry, academia, research and government. Careers leading directly from the programme include work in: environmental, Engineering and geological consultancies; mineral exploration companies; the hydrocarbon industry; environmental planning; overseas development;
Geography and Geoscience with specialisations in Geography and Geoscience

research. Geography and geoscience graduates are also highly valued in more generalised fields of employment due to their rounded educational experience and many transferable skills, their adaptability, and their experience of dealing with complex spatial or multivariate data sets.

Your degree and what you’ll study
In first and second year you will acquire a broad grounding in geography and geoscience with an emphasis on physical geography, geology and human-environment interactions. You will learn about topical issues such as climate change, natural hazards (e.g. volcanoes, earthquakes, landslides), energy, sustainability and natural resources. These foundation years cover a diverse range of material including: the origins and development of our planet; earth structure and composition; circulation in the atmosphere and oceans; the evolution of life on Earth; Earth surface processes and environments (e.g. glaciers, rivers and deserts). In addition to learning about the physical, chemical and biological processes responsible for creating and shaping the Earth, students will also consider the unique role that humans play in the Earth system, including their impacts on the land, air and water, and the grand challenges linked to environmental governance, policy and management.

In third and fourth year, you will deepen your knowledge in specialist areas, while further developing a portfolio of practical and technical skills (e.g. geochemical analysis, geographical information systems). Our flexible programme structure provides for module choice while retaining coherent curriculum design, thereby ensuring graduates are well prepared for entry to the constantly changing job market. Specialist options span the breadth of Geography and Geoscience, allowing you to tailor the course to suit your interests. In this way, you may focus on topics traditionally associated with geography (e.g. geomorphology, globalisation, sustainability) or geology (e.g. volcanology, palaeontology, earth resources), or you may choose to retain a broader, multi-disciplinary perspective that spans the critical interface between science and society.

Please see page 194 of the Trinity undergraduate prospectus for further information.

Career opportunities
Geography and geoscience graduates are highly valued for their cross-disciplinary expertise, adaptability and experience of dealing with complex spatial or multivariate data sets. They are in demand to work on many of society’s most important challenges, and can pursue lucrative and personally rewarding careers in industry, academia, research and government. Careers leading directly from the programme include work in: environmental, Engineering and geological consultancies; mineral exploration companies; the hydrocarbon industry; environmental planning; overseas development; government geological surveys; teaching and research.

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