Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

School of Natural Sciences and School of Engineering

Environmental Science and Engineering

Junior Freshman

TR064 Handbook

2026-27

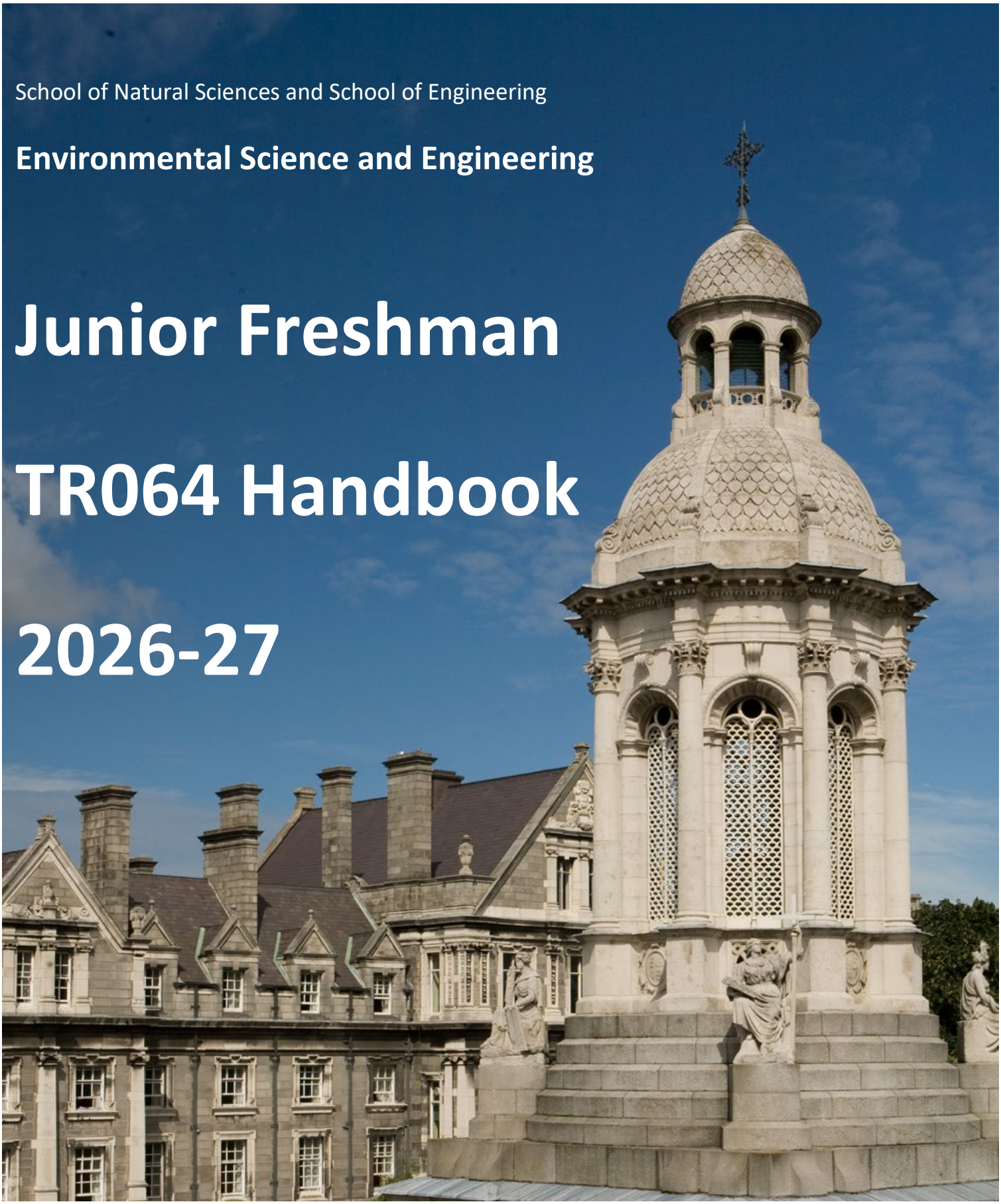


Table of Contents

Welcome

You are very welcome to the TCD Schools of Engineering and Natural Sciences on this flagship course for the university, TR064 Environmental Science and Engineering. Environmental Engineers and Applied Environmental Scientists who graduate from this interdisciplinary programme will be uniquely positioned to address some of the most challenging and important questions of our time in terms of sustainable development, particularly with respect to the protection of the environment. With the mounting global challenges of climate change, biodiversity loss, water resources depletion and contamination, urbanization and agricultural intensification driven by the demands of a growing global population, increasing numbers of Environmental Engineers and Applied Environmental Scientists are needed with the requisite knowledge and skills to tackle such challenges. These challenges have been succinctly captured within the United Nations Sustainable Development Goals.

All students follow a common programme for the first two 'fresh' years followed by two 'sophister' years of increasing specialisation in either Applied Environmental Science or Environmental Engineering. Admission to the Master's level is subject to performance in the Junior Sophister and Senior Sophister years. While there is a strong focus on scientific and technical content and problem solving in the syllabus, personal skills such as communication and teamwork are an integral part of your education. These skills are crucial in promoting an approach to lifelong learning, particularly important in today's dynamic world. The curriculum is revised on an ongoing basis, and we hope that you will find it stimulating and intellectually rewarding. You will be given the opportunity to provide us with considered feedback of your experience during each year of your studies.

The College has a great deal to offer besides the formal academic programme, including the cultural, recreational and sporting activities of the many student clubs and societies. You are strongly encouraged to participate in the breadth of College life in a balanced way. There are opportunities to study abroad in Year 3 of this course, and your first-year grades will be used to rank your application, so we encourage to start exploring ERASMUS, UNITECH and international study options and plan early.

Finally, be aware that College offers a wide range of support services. If you are experiencing problems or need to seek advice (personal, financial, health, career or academic), there are a number of sources of help available: these are listed towards the end of this booklet. Do not hesitate to call on these services should the need arise. Each of you has been allocated a tutor, and he/she is an excellent resource to help you with identifying relevant support services. We wish you a successful and enjoyable first year at University.

Professor Silvia Caldararu

School of Natural Sciences

Professor Laurence Gill

School of Engineering

Introduction

Environmental Science and Engineering is an 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. 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.

Although the information in this handbook is correct at the time of production, the precise content of the course is subject to change. While every effort will be made to give due notice of major changes, the School Office reserves the right to suspend, alter or initiate courses, timetables, examinations and regulations at any time.

*****NOTE*** Students should expect to pay fees for mandatory field courses, which can take place in the 1st week of Semester 1 as well as reading week and final week of Semester 2. Fees can range from €500 to €1000 for any given field course. Details will be confirmed in advance by the Module Coordinator.*****

Overall Course Objectives/ Learning Outcomes

On completion of the *single honours integrated programme* in **Environmental Engineering** students should be able to:

LO1: Demonstrate knowledge and understanding of the mathematics, sciences, engineering sciences and technologies underpinning environmental system;

LO2: Demonstrate an interdisciplinary knowledge and appreciation of the importance and finite nature of Earth's resources and natural capital;

LO3: Demonstrate deep knowledge and understanding of local to global environmental challenges facing society;

LO4: Work effectively as an individual, in teams and in multi-disciplinary settings, together with the capacity to undertake lifelong learning;

LO5: Communicate effectively on engineering activities with the engineering community and with society at large;

LO6: Identify, formulate, analyse and solve engineering problem;

LO7: Perform the detailed design of a novel system, component or process using the analysis and interpretation of relevant data;

LO8: Design and conduct experiments and to apply a range of standard research tools and techniques of enquiry;

LO9: Display high ethical standards in the practice of engineering, including the responsibilities of the engineering profession towards people and the environment.

On completion of *year 5 of the integrated Environmental Science and Engineering programme*, **Environmental Engineering** students should be able to meet the following Course Leaning Outcomes:

CLO1. Demonstrate advanced knowledge of the mathematics, sciences, engineering sciences and technologies underpinning Environmental engineering.

CLO2. Identify, formulate, analyse and solve complex engineering problems.

CLO3. Perform independently a detailed design of a novel system, component or process by analysing and interpreting relevant data.

CLO4. Design and conduct experiments and to apply a range of standard and specialised research (or equivalent) tools and techniques of enquiry.

CLO5: Display high ethical standards in the practice of engineering, including the responsibilities of the engineering profession towards people and the environment as well as demonstrating a wide perception of societal needs and dynamics.

CLO6: Work effectively as an individual, in teams and in multi-disciplinary settings.

CLO7: Communicate effectively on complex engineering activities with the engineering and environmental science community and with society at large.

CLO8. Engage in lifelong professional development

CLO9. Demonstrate advanced knowledge of specialized areas within environmental engineering.

On completion of the *single honours integrated programme* in **Applied Environmental Science,** students should be able to:

LO1. Demonstrate knowledge and understanding of the mathematics, sciences, engineering sciences and technologies underpinning environmental systems;

LO2.Demonstrate an interdisciplinary knowledge and appreciation of the importance and finite nature of Earth's resources and natural capital;

LO3.Demonstrate deep knowledge and understanding of local to global environmental challenges facing society;

LO4.Work effectively as an individual, in teams and in multi-disciplinary settings, together with the capacity to undertake lifelong learning;

LO5.Communicate effectively on environmental science activities with the environmental science (and engineering) community and with society at large;

LO6.Display advanced knowledge and skill in design, experimentation, data analysis and interpretation to develop and implement real-world solutions for local to global environmental issue;

LO7.Show a deep appreciation of the ethical, political and human rights principles underpinning sustainable development;

LO8.Demonstrate strong theoretical and technical competence in Environmental Science.

On completion of *year 5 of the integrated Environmental Science and Engineering programme*, **Applied Environmental Science** students should be able to:

CLO1. Demonstrate advanced knowledge and understanding of local to global environmental challenges facing society.

CLO2. Demonstrate advanced interdisciplinary knowledge and appreciation of the importance and finite nature of Earth's resources and natural capital.

CLO3. Make informed and ethical decisions that balance technical, social and environmental considerations.

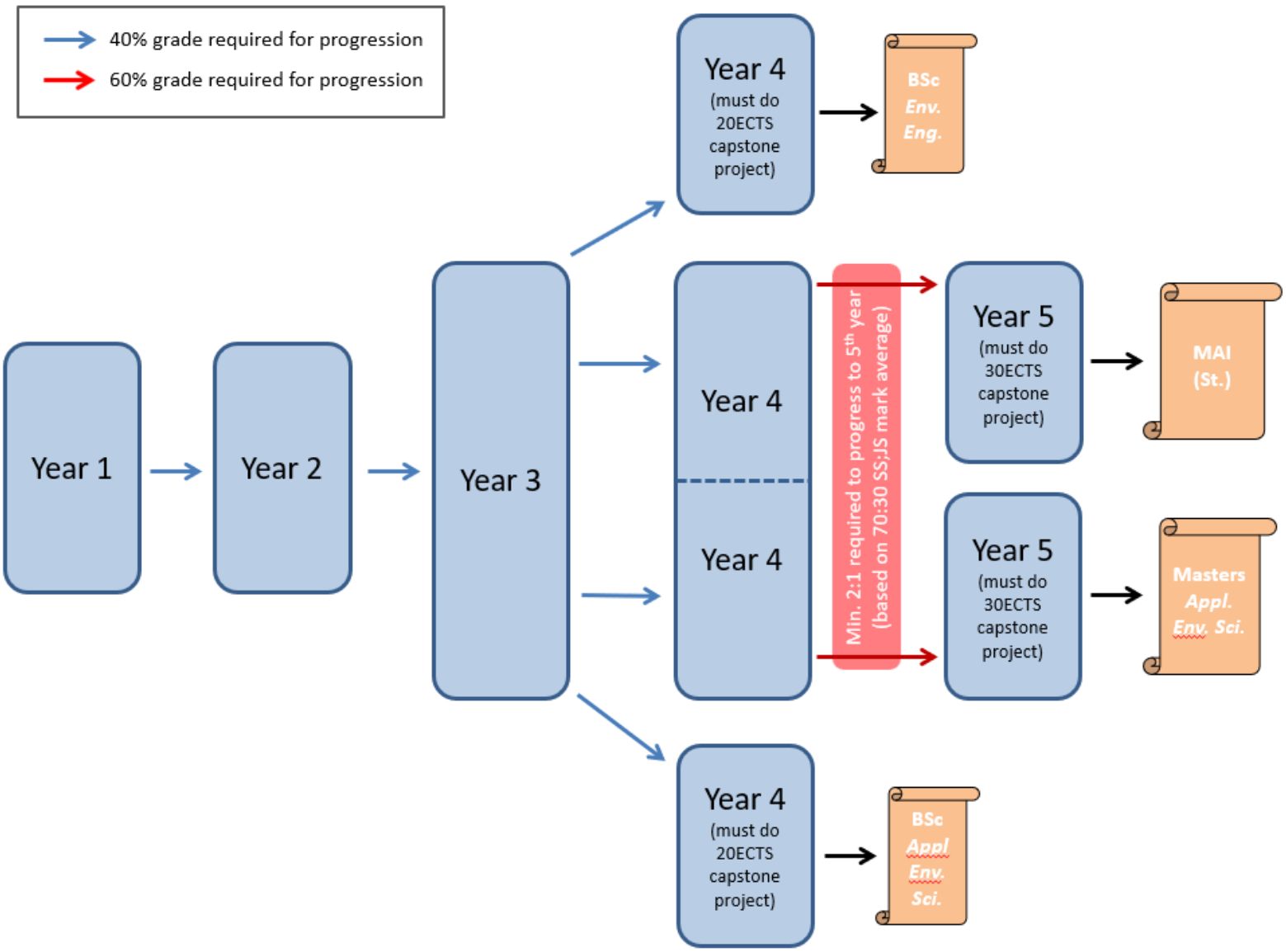
CLO4. Work effectively as an individual, in teams and in multi-disciplinary settings.

CLO5. Communicate effectively on environmental science activities with the environmental science and environmental engineering community and with society at large.

CLO6. Use advanced knowledge and skill in design, experimentation, data analysis and interpretation to develop and implement real-world solutions for local to global environmental issues and challenges.

CLO7. Demonstrate advanced theoretical and technical competence in Environmental Science through an independent research project.

Academic Progress and Streaming Process (Specific to Environmental Science and Engineering)



Progression

Year 1-4:

Progression regulations Year 1 to Year 4 are standard (grade of 40 per cent or more to progress). However, in order to be eligible to undertake an industry internship or international exchange in Year 4, students must achieve a threshold grade of 60 per cent at the end of Year 3. Students who don't achieve 60 per cent in Year 3 may still progress to Year 4 with a grade of 40 per cent or above but they must take a capstone module in Year 4 and spend the full year in Trinity.

Year 5:

Progression will be an annual basis. Progression from Year 4 to Year 5 will require a minimum overall mark of 60% for the combined Junior Sophister and Senior Sophister years (on a 30:70 basis) at the annual assessment session of the B.Sc. degree year.

In year 5, students will be able to carry failed modules from semester to semester. Progression through year 5 leading to the final awards of M.A.I. (St.) and Master in Applied Environmental Science depending on the route chosen, requires a 50% pass grade for award of pass degree on the results of students' continuous assessment and examinations. The award of distinction degree shall require at least 70 per cent in both examinations and the dissertation and at least 70 per cent in the final credit weighted average.

Streaming Rules

The rules for streaming into Environmental Engineering or Applied Environmental Science:

In Year 3 – **one out of the three** optional modules available must be modules associated with the student's chosen stream.

In Year 4 – if taking 30 ECTS Industry Internship or Erasmus/International Exchange, this should preferably be in the chosen stream (and also take at least **one 5ECTS module** in the first semester affiliated with the chosen stream).

If spending the full year in Trinity, students must take the Capstone Project module which aligns with their chosen stream, in addition to at least **two optional modules** associated with their chosen stream.

In Year 5 - students must take the Independent Research Capstone Project module which aligns with their chosen in addition to at least **three optional modules** associated with their chosen stream.

The European Credit Transfer Accumulation System (ECTS)

The European Credit Transfer and Accumulation System (ECTS) is an academic credit system based on the estimated student workload required to achieve the objectives of a module or programme of study. It is designed to enable academic recognition for periods of study, to facilitate student mobility and credit

accumulation and transfer. The ECTS is the recommended credit system for higher education in Ireland and across the European Higher Education Area.

The ECTS weighting for a module is a **measure of the student input or workload** required for that

module, based on factors such as the number of contact hours, the number and length of written or verbally presented assessment exercises, class preparation and private study time, laboratory classes, examinations, clinical attendance, professional training placements, and so on as appropriate. There is no intrinsic relationship between the credit volume of a module and its level of difficulty.

The European **norm for full-time study over one academic year is 60 credits**. 1 credit represents 20-25 hours estimated student input, so a 10-credit module will be designed to require 200-250 hours of student input including class contact time, assessments, and examinations.

ECTS credits are awarded to a student only upon successful completion of the course year. Progression from one year to the next is determined by the course regulations. Students who fail a year of their course will not obtain credit for that year even if they have passed certain component courses. Exceptions to this rule are one-year and part-year visiting students, who are awarded credit for individual modules successfully completed.

https://ec.europa.eu/education/resources-and-tools/european-credit-transfer-and-accumulation-system-ects_en

Important Information for TR064 Students

Trinity Electives

The Trinity Electives are a unique feature of your Trinity Education. They are stand alone, College-wide 5 credit modules. They cover a broad range of topics in the arts, humanities, sciences, health and social science, and technology. They are designed to allow students to study topics outside of their core discipline and thus provide breadth in their education. Environmental Sciences and Engineering students will take one two Trinity Electives in the course of their studies: one in Semester 2 of Year 2 (Senior Freshman) and one in Semester 1 of Year 3 (Junior Sophister).

Choosing your Trinity Elective

The choice of Trinity Elective is student driven. Almost all Trinity Electives are open to all students. However, students of some moderatorships may be precluded from taking certain Trinity Electives (e.g. the module 'From Planets to the Cosmos' is not available to TR063 Physical Sciences students, as this topic is part of their core discipline,). The list of exemptions is outlined in the Trinity Electives webpage: https://www.tcd.ie/trinity-electives/

Selection of Trinity Electives will be made through online enrolment which will open in July, after publication of examination results and allocation of moderatorship places. You will be asked to list your choice(s) of Trinity Elective on a first come first served basis via Online Module Enrolment.

The Trinity Electives website provides full details of each of the Trinity Electives. A list of the Trinity Electives can be found at https://www.tcd.ie/trinity-electives/

Internships and Placements

In Year 4 (Senior Sophister), Semester 2, only students who are planning to progress to Year 5 and are not participating in an Erasmus or International Exchange will undertake a full-semester industry internship. This internship, worth 30 ECTS, must be in the student's chosen stream (Applied Environmental Sciences or Environmental Engineering) and offers valuable hands-on experience in a professional environment. Students who intend to exit with a BSc in Applied Environmental Science or Environmental Engineering at the end of Year 4 will not be eligible for the internship and will instead complete a research project in Semester 2. In order to be eligible to undertake an industry internship or international exchange in Year 4, students must achieve a threshold grade of 60 per cent at the end of Year 3 (Junior Sophister). More detailed information will be provided at the start of Year 4.

For more information you can contact the Global and Industry Engagement Officer for the School of Natural Sciences at SNSGlobal@tcd.ie

Erasmus and International Exchange

Students have the opportunity to go on Erasmus or International Exchange during the Semester 2 of Year 4 (Senior Sophister). The application process takes place in Semester 1 of Year 3 (Junior Sophister) and is competitive, based on academic results from the first two years of study. Offers are issued in Semester 2 of Year 3 (Junior Sophister). An information session outlining the process and options will be held at the start of Year 3. International Exchange is coordinated through a College-Wide procedure, while Erasmus places are managed within the School of Natural Sciences, with offers issued by the School's Global Officer.

More information on Studying Abroad here:

Where can I go - Trinity Global | Trinity College Dublin

How can I go - Trinity Global | Trinity College Dublin

Frequently Asked Questions - Engineering | Trinity College Dublin

For more information you can contact the Global and Industry Engagement Officer for the School of Natural Sciences at SNSGlobal@tcd.ie

Unitech

Environmental Science and Engineering students can apply for UNITECH. UNITECH is a prestigious year long programme that students can take in Year 4 (Senior Sophister). Semester 1 will be spent in a host university, and students will undertake an internship in Semester 2. There will be an information session organised at the start of Year 3.

More information here:

UNITECH - Engineering | Trinity College Dublin

For more information, you can contact the Global Officer for the School of Engineering at CHLOE.OCONNOR@tcd.ie.

Capstone Project

The Capstone project is a significant level of independent research that you will carry out that will result in significant piece of original work in your final year. It will provide you with the opportunity to showcase the skills and knowledge which you have developed across a range of subject areas and across your years of study. The B.Sc. capstone project is taken in 4th year by those students on the 'B.Sc. Environmental Engineering' or 'B.Sc. Applied Environmental Science' streams, while the Master's project is taken in 5th year by those on the 'MAI Environmental Engineering' or 'Master's in Applied Environmental Sciences' streams. Please note that the internship project will NOT in any circumstances be deemed equivalent to a capstone project. College regulations require that all students must complete a capstone project to be eligible to graduate. The type of research that you will do will depend on your programme of study.

The Capstone project — though defined differently by different subjects — is the common element across all degree exit routes. It requires a significant level of independent research by the student.

The Capstone should:

- be an integrative exercise that allows students to showcase skills and knowledge which they have developed across a range of subject areas and across the four years of study
- result in the production of a significant piece of original work by the student
- provide students with the opportunity to demonstrate their attainment of the four graduate attributes: to think independently, to communicate effectively, to develop continuously and to act responsibly.

Students should refer to School and College policies and procedures with regards to research guidelines and ethical practices.

Prizes, Medals, and Other Scholarships

Foundation Scholarship

Foundation Scholarship is a College institution with a long history and high prestige. The objective of the Foundation Scholarship examination is to identify students who, at a level of evaluation appropriate to the Senior Freshman year, can consistently demonstrate exceptional knowledge and understanding of their subjects. The questions that are asked in the engineering scholarship exams are very challenging. They test a student's ability to think laterally, to solve unfamiliar problems and to tackle problems from first principles. Although the syllabi for the scholarship exams and the end of year exams are the same, the nature of the questions in the scholarship exams is more challenging. A good scholarship question will require a creative leap or a deep insight of the fundamental principles. The most important skill that is developed in an engineering education is problem solving. The most difficult problems to solve are those that are unfamiliar, that require a fundamental understanding of the basic principles and that require the student to make a creative or innovative leap.

TR064 Programme Prizes

Environmental Science and Engineering annual prizes

Four prizes are awarded annually to the student achieving the highest overall mark in the Junior Fresh, Senior Fresh, Junior Sophister and Senior Sophister years of the Environmental Science and Engineering course respectively. Value of each prize, €200.

Simon Perry prize in Environmental Science and Engineering

This prize will be awarded annually to the student achieving the highest overall mark in the fifth year of the Environmental Science and Engineering course. Value, €300.

E3 prize in Environmental Science and Engineering

This prize will be awarded annually to the student in the fifth year of the Environmental Science and Engineering course achieving the highest mark in their research project dissertation. Value, €300.

Book Prizes

A prize of a book token to the value of €13 is awarded to candidates who obtain a standard equivalent to an overall first class honours grade (70% and above) at the first attempt of the semester 1 and semester 2 assessment. Book Prizes will be available for collection in November of the following academic year from the Academic Registry. These prizes are issued in the form of book tokens and can be redeemed at Hodges Figgis and Co. Ltd.

Academic Year Structure

Find the full academic year structure 2026-27 here: academic-year-structure.pdf

Key Dates

Event(s)	Date(s)
Semester one starts	**UG continuing years / PG all years:** Classes start 14-Sept-26 **UG new first years:** - Orientation (JF UG) 14-Sept-26 - Classes start 21-Sept-26
Semester one ends	Week 15 - 07-Dec-26 - Revision / Assessment* * Semester 1 assessment session: December 11 to 22, 2026 inclusive (No assessment after Dec 22)
Semester one assessment session	Week 15 to Week 17 – 11-Dec-26 to 22-Dec-26
Semester two starts	Week 21 - 18-Jan-27
Semester two ends	Week 33 - 12-Apr-27 - Revision
Semester two assessments session	Week 34 and Week 35 - 19-Apr-27 to 30-Apr-27
Publication of results	End of May 2027 after the Court of Examiners
Reassessment Examinations	Week 52 - 23-Aug-27
Publication of Reassessment results	After Reassessment Court of Examiners early Sept 2027

Assessment Regulations

All students must fulfil the course requirements of the school or department, as appropriate, with regard to attendance and course work. Where specific requirements are not stated, students may be deemed non-satisfactory if they miss more than a third of their course of study or fail to submit a third of the required course work in any term.

Further details of procedures for reporting a student as non-satisfactory are given on the College website at https://www.tcd.ie/academicregistry/student-cases/

Transcripts

Transcripts requests should be made to the TR064 course administrator: envscieng@tcd.ie

The School of Engineering and the Science Course Office are not responsible for issuing Environmental Science and Engineering transcripts.

Module List

Module Selection – Junior Freshman (Year 1)

Semester 1	Semester 2
ESU11001 – Team Design – Global Environmental Challenges (5 ECTS)	EEU11E21 – Probability, Statistics and Data Centric Engineering (5 ECTS)
MAU11E01 – Engineering Mathematics I (5 ECTS)	CEU11E13 – Biology for Environmental Engineering (5 ECTS)
MEU11E16 – Materials Science (5 ECTS)	MAU11E02 – Engineering Mathematics II (5 ECTS)
CHU11E05 – Chemistry for Engineers (5 ECTS)	PYU11E04 – Physics (5 ECTS)
GSU11001 – Spaceship Earth: Introduction to Earth System Science (10 ECTS)	GSU11005 – Introduction to Geology: A beginner's guide to Planet Earth (10 ECTS)

Year Module Structure

Brief breakdown: Overview of core, approved, open, assessment modes and TEs modules for the year.

Michaelmas Term

Module code	Module title	ECTS	Term
	Module Coordinator	ICA/CW/FE	
ESU11001	Team Design – Global Environmental Challenges	5	Michaelmas
	Laurence Gill & Kamila Kwasniewska	100% CW	
MAU11E01	Engineering Mathematics I	5	Michaelmas
	Nicholas Aidoo	80% FE 20% CW	
MEU11E16	Materials Science	5	Michaelmas
	Amir Pakdel	80% FE 20% CW	
CHU11E05	Chemistry for Engineers	5	Michaelmas
	Chris Batchelor-McAuley	80% FE 20% CW	
GSU11001	Spaceship Earth: Introduction to Earth System Science	10	Michaelmas
	Robin Edwards	50% FE 50% CW	

Total		30	

ICA = In course Assessment – Formal Assessment in exam conditions

CW = Coursework

FE = Formal Examination in Annual Examination Period

Hilary Term

Module code	Module title Module Coordinator	ECTS ICA/CW/FE	Term
EEU11E21	Probability, Statistics and Data Centric Engineering Arman Farhang	5 70% FE 30% CW	Hilary
CEU11E13	Biology for Environmental Engineering Muhammad Ali	5 50% FE 50% CW	Hilary
MAU11E02	Engineering Mathematics II Patrick Fritzsch	5 80% FE 20% CW	Hilary
PYU11E04	Physics Stefan Hutzler	5 60% FE 40% CW	Hilary
GSU11005	Introduction to Geology: A beginner's guide to Planet Earth Christopher Nicholas	10 60% FE 40% CW	Hilary
Total		30	

ICA = In course Assessment – Formal Assessment in exam conditions

CW = Coursework

FE = Formal Examination in Annual Examination Period

Module Descriptions

Semester 1 – Core

Module Code	CHU11E05
Module Name	Chemistry for Engineers
ECTS Weighting[1]	5 ECTS
Semester taught	Semester 1
Module Coordinator/s	Dr. Chris Batchelor-McAuley
Module Learning Outcomes with reference to the Graduate Attributes and how they are developed in discipline	On successful completion of this module, students should be able to: LO1. Explain chemical equations, balance them, and make calculations based on them relating to stoichiometry and molarity; LO2. Relate trends in the periodic table (in both elements and their compounds) with the underlying trends in electronic and atomic structure; LO3. Perform calculations on the rates of reaction and to relate reaction kinetics to the details of the reaction mechanism; LO4. Perform calculations on chemical equilibria of different nature (acid-base, complexation, gas reactions, solubility, etc.); LO5. Be able to read and interpret basic phase diagrams of pure substances and binary mixtures; LO6. Explain the properties of ideal and near-ideal solutions and carry out calculations using colligative properties; LO7. Perform calculations of electrochemical potentials and relate them to thermodynamic quantities; LO8. Explain chemical reactivity (thermodynamic and kinetic) in terms of valency, electronegativity and electronic structure; LO9. Relate some of the macroscopic properties of materials to the nature of the electronic structure and bonding at the molecular/atomic level; LO10. Carry out basic experimental procedures on aspects of chemical reactions and to appreciate the need for safety and safety procedures in the laboratory. **Graduate Attributes: levels of attainment** To act responsibly - Introduced To think independently - Introduced To develop continuously - Introduced

[1] TEP Glossary

	To communicate effectively - Introduced
Module Content	**Introduction and General Chemistry** • Chemical change; elements, compounds and mixtures; atomic theory; stoichiometry and chemical equations; atomic structure; electronic structure and the periodic table; bonding; elementary structural chemistry; polymers; metals, semiconductors and insulators. **Physical Chemistry I** • Thermodynamics: First law, internal energy, enthalpy; introduction to entropy, 2nd and 3rd Laws; criterion for chemical change; Gibbs free energy. **Physical Chemistry II** • States of matter: Gibbs phase rule, ideal solutions, colligative properties • Chemical Equilibrium: Law of mass action; equilibrium constant for a chemical reaction; factors that influence the position of equilibrium. Ionic equilibria: ionic equilibria in aqueous solutions; strong and weak acids and bases; buffer solutions and indicators; • Electrochemistry; molar conductivity and electrolyte solutions; electrode potentials; cells; electrolysis; emf and chemical equilibrium; and introduction to analytical chemistry; • Chemical Kinetics: rates of reactions; order and molecularity; activation energy; kinetics and mechanisms; catalysis.
Teaching and Learning Methods	This module is taught using a combination of lectures, tutorials and laboratory-based experiments.
Assessment Details[2]	

[2] TEP Guidelines on Workload and Assessment

Please include the following:

- **Assessment Component**
- **Assessment description**
- **Learning Outcome(s) addressed**
- **% of total**
- **Assessment due date**

Assessment Component	Assessment Description	LO Addressed	% of total	Week due
End of semester examination	Written/Multiple Choice Examination	1-9 above	80	20
Laboratory sessions	Students attend 3 laboratory practicals (1 experiment online/at home, 2 experiments on site in laboratory setting, 3 hours per experiment). Lab reports are assessed.	1-10 above	20	Reports due **1 week** after each scheduled in-person experiment, **2 weeks** after each scheduled online/at home experiment

Reassessment Requirements

Contact Hours and Indicative Student Workload[2]

Contact hours: 48 hours
Independent Study (preparation for course and review of materials): 40 hours (approximately 30 hours reviewing lecture material and references to textbook, 10 hours answering tutorial questions)
Independent Study (preparation for assessment, incl. completion of assessment): 26 hours (6 hours preparing for labs and completing lab reports, 20 hours preparation for final exam)

Recommended Reading List

Main text for the course:

The recommended text for this module is:

Chemistry – The Molecular Nature of Matter and Change, Silberberg and Amateis, 9th edition, McGraw-Hill

The material is also covered in: Chemistry, Chang and Overby, 13th edition, McGraw-Hill; Chemistry: Molecules, Matter and Change, Atkins and Jones, 4th edition, Freeman; Chemistry for Engineering Students, Brown and Holme, 1st edition, Thompson,

	There is also a more detailed and advanced text by Atkins and Jones: Chemical Principles – the Quest for Insight, Freeman, 2nd edition. This will also cover the material presented in lectures and may suit students who already have a strong background in Chemistry. Some students who have not studied Chemistry previously may find that they benefit from access to a text that starts at a more elementary level. Two such texts that JF Engineering students have found valuable in recent years are: Chemistry, R Lewis and W Evans, MacMillan Foundations; Fundamentals of Chemistry, DE Goldberg, McGraw-Hill A valuable online resource is available via openstax at the following link. https://openstax.org/details/books/chemistry-2e/
Module Pre-requisite	N/A
Module Co-requisite	N/A
Module Website	Year One - Engineering | Trinity College Dublin
Are other Schools/Departments involved in the delivery of this module? If yes, please provide details.	School of Chemistry School of Engineering **Admin contact:** Caroline Clabby – TR064 Course Administrator Anne Marie Farrell - Administrative Officer, School of Chemistry
Academic Start Year	September 2026
Academic Year of Date	2026-2027

Module Code	MEU11E16
Module Name	Materials Science
ECTS Weighting[3]	5 ECTS
Semester taught	Semester 1

[3] TEP Glossary

Module Coordinator/s	Dr. Amir Pakdel
Module Learning Outcomes with reference to the Graduate Attributes and how they are developed in discipline	Upon completion of this module, students will be able to: LO1. Identify the classes of materials, including metals, ceramics, polymers, composites, and semiconductors, and explain how their properties can be determined and exploited. LO2. Comprehend the correlation between the atomic/molecular structure of materials and their physical properties. LO3. Apply fundamental concepts of materials behaviour (such as deformation, failure mechanisms, and phase transformations) to solve basic engineering problems. LO4. Work in teams to conduct basic experimental procedures for measuring key material properties and interpreting the results. This will help develop a deeper understanding of materials behaviour, as well as enhance communication and collaboration skills. **Graduate Attributes: levels of attainment** To act responsibly - Introduced To think independently - Introduced To develop continuously - Introduced To communicate effectively - Introduced
Module Content	This introductory module provides a broad foundation in materials science and engineering, focusing on the fundamental principles that govern the structure, properties, and performance of materials. The topics covered include: • Introduction to materials science and engineering: classification of materials (*metals, ceramics, polymers, composites, semiconductors, nanomaterials, natural materials*). • Materials design and selection for different applications (e.g., *mechanical, biomedical, structural, and electronic applications*). • Atomic bonding, binding energy, crystal structures, microstructures. • Relationship between structure and materials properties. • Atom movements in materials (*diffusion*). • Defects in materials (e.g. *point defects, grain boundaries, dislocations*) and their effects on material properties. • Principles of mechanical behaviour of materials, including concepts such as: stress and strain (*under tension, compression, shear, bending, isostatic*

	pressure), deformation (*elastic, plastic*), and failure (*ductile fracture, brittle fracture, creep, fatigue, wear*). • Mechanical properties including strength, stiffness, ductility, hardness, toughness, and fracture toughness. • Strengthening mechanisms, such as: solid solution strengthening, precipitation hardening, strain hardening, compositing, and heat treatment. • Cold and hot deformation processes and microstructural changes. • Introduction to phase diagrams. • Steel types and iron-carbon phase diagram. • Hands-on experiments to measure materials properties.
Teaching and Learning Methods	The module includes a taught component delivered through podium lectures. Regular tutorial sessions are also held to provide practice in solving problems. An experimental component is included, where students work in teams to test the properties of materials and structures. A briefing session will be conducted beforehand to explain the required experimental procedures. The module will require an active participation of the students. Attendance at lectures, tutorials, and lab sessions is mandatory, as is the submission of all work subject to continuous assessment. Unexcused absences will be penalised. The module will be assessed at the end of the semester.

Assessment Details[4] Please include the following:

- **Assessment Component**
- **Assessment description**
- **Learning Outcome(s) addressed**
- **% of total**
- **Assessment due date**

Assessment Component	Assessment Description	LO Addressed	% of total	Week due
Examination		1, 2, 3	80	Examination Week
Continuous Assessment	Quizzes, reports on laboratory experiments and design challenges.	4	20	Various occasions

[4] TEP Guidelines on Workload and Assessment

Reassessment Requirements	Students must pass the examination element of the module to avoid the possibility of reassessment. Reassessment will be by examination only.
Contact Hours and Indicative Student Workload[2]	Contact hours (lectures, analytical sessions, labratory sessions): **44 hours** Independent Study (preparation for course and review of materials, teamwork and group discussions): **50 hours** Independent Study (preparation for assessment, incl. completion of assessment): **50 hours**
Recommended Reading List	*The Science and Engineering of Materials*, Askeland, Fulay, Wright *Materials Science and Engineering*, William D Callister *Engineering Materials 1&2: An Introduction to Properties, Applications and Design*, Ashby and Jones *Any other textbook covering fundamentals of "materials science & engineering"*
Module Pre-requisite	N/A
Module Co-requisite	N/A
Module Website	Blackboard
Are other Schools/Departments involved in the delivery of this module?	School of Engineering **Admin contact:** Caroline Clabby – TR064 Course Administrator Juana Martí Hernández - Executive Officer, School of Engineering
Academic Start Year	September 2026
Academic Year of Date	2026-2027

Module Code	ESU11001
Module Name	Team Design – Global Environmental Challenges

ECTS Weighting[5]	5 ECTS
Semester taught	Semester 1
Module Coordinator/s	Prof. Laurence Gill Dr. Kamila Kwasniewska
Module Learning Outcomes with reference to the Graduate Attributes and how they are developed in discipline	On successful completion of this module, students should be able to: 1. Discuss broadly Trinity's E3 initiative, the UN Sustainability Goals, the concepts of Natural Capital, Environmental Engineering and Environmental Sciences 2. Explain key global environmental challenges 3. Engage with the processes and practices involved in independent desk research on an environmental topic of global importance 4. Work as part of a team 5. Self-reflect on learning and Knowledge acquisition through a learning journal 6. Communicate effectively to peers 7. Use analytical and discursive skills
Module Content	Team Design will introduce students to big picture global environmental challenges facing society through their own team-based research under the mentorship of a Professor in Environmental Science or Environmental Engineering. The concepts of sustainable development, Natural Capital and Trinity's role through research and education will also be communicated through tutorial discussions. Students will conduct a desk study in small teams on an environmental topic of their choice in weekly tutorials culminating in a 5000-word group report and 15-minute group presentation to student peers and tutorial supervisors. Through weekly tutorials students will learn how to source, analyse and appraise published scientific and engineering literature on the environmental topic of their choice. Tutors will guide students through the research process covering plagiarism, research ethics, citations and appropriate attribution, critical thinking, independent research, teamwork, project planning and how to draw project conclusions and communicate them to an audience of their peers.

[5] TEP Glossary

Teaching and Learning Methods	Associated laboratory/project/tutorial programme

Assessment Details[6] **Please include the following:**

- **Assessment Component**
- **Assessment description**
- **Learning Outcome(s) addressed**
- **% of total**
- **Assessment due date**

Assessment Component	**Assessment Description**	**LO Addressed**	**% of total**	**Week due**
Continuous Assessment 1	Contribution / involvement in Tutorial/Learning Journal	LO1 to LO6	25%	Weeks 5 - 16
Continuous Assessment 2	Writing a scientific abstract	LO3, LO6, LO7	15%	Week 11
Continuous Assessment 3	5000-word group project report	LO1 to LO7	40%	Week 15
Continuous Assessment 4	8 minutes group formal presentation + 2 min questions 2-5 minutes alternative presentation	LO4 to LO8	20%	Week 16

Reassessment Requirements	Submission of 5000-word individual report on new subject (defined by Module Coordinators)

Contact Hours and Indicative Student Workload[2]

Contact hours:
Independent Study (preparation for course and review of materials):
Independent Study (preparation for assessment, incl. completion of written assessment):

[6] TEP Guidelines on Workload and Assessment

Recommended Reading List	*https://www.ipcc.ch/* *https://sustainabledevelopment.un.org/?menu=1300* *https://www.tcd.ie/e3/* Peer reviewed literature on student chosen topic Blackboard resources
Module Pre-requisite	N/A
Module Co-requisite	N/A
Module Website	Blackboard Ultra
Are other Schools/Departments involved in the delivery of this module? If yes, please provide details.	School of Natural Sciences School of Engineering **Admin contact:** Caroline Clabby – TR064 Course Administrator
Academic Start Year	September 2026
Academic Year of Date	2026-2027

Module Code	GSU11001
Module Name	Spaceship Earth: An introduction to Earth System Science
ECTS Weighting[7]	10 ECTS
Semester taught	Semester 1
Module Coordinator/s	Dr. Robin Edwards
Module Learning Outcomes with reference to the Graduate Attributes and how they are developed in discipline	**Learning Outcomes:** On successful completion of this module students will be able to: • Outline the fundamental concepts of Earth Systems Science with reference to its major subsystems: Geosphere, Biosphere, Atmosphere, Hydrosphere and Anthroposphere • Illustrate how material and energy are cycled through the Earth system

[7] TEP Glossary

	• Describe the links between biotic and abiotic systems and their role in maintaining a habitable planet • Apply an Earth Systems approach to describe the phenomena of environmental and climate change • Discriminate between 'weather' and 'climate' and situate concerns about current climate change in a longer-term (geological) context • Identify how human activities modify Earth System function • Apply core concepts in geography and geoscience to real-world examples
Module Content	More than 8 billion people now inhabit the Earth, and no corner of the planet is unaffected by human activity. The rise of our species has been fuelled by our ability to access planetary storehouses of energy and employ this to manipulate the environments around us. The global-scale of human impacts has led some to suggest we are entering a new era of Earth history - the Anthropocene. Dealing with the effects of environmental and climate change is one of the most significant challenges that our species faces in the 21st century. This module provides a foundation for understanding global environmental issues by considering the Earth as an interconnected system in which matter and energy are exchanged between the Geosphere, Biosphere, Atmosphere, Hydrosphere and Anthroposphere. It considers the life-support systems of 'Spaceship Earth' and aims to provide a theoretical basis for evaluating the role of humans as agents of climate and environmental change.
Teaching and Learning Methods	
Assessment Details[8] Please include the following: • **Assessment Component** • **Assessment description** • **Learning Outcome(s) addressed** • **% of total** • **Assessment due date**	

Assessment Component	**Assessment Description**	**LO Addressed**	**% of total**	**Week due**
Examination	2-hour MCQ type examination		50%	End of semester
Continuous Assessment	Coursework – in-course activities and MCQ quizzes		50%	

[8] TEP Guidelines on Workload and Assessment

Reassessment Requirements	
Contact Hours and Indicative Student Workload[2]	**Contact hours:** **Independent Study (preparation for course and review of materials):** **Independent Study (preparation for assessment, incl. completion of written assessment):**
Recommended Reading List	Holden, J. (2019) An Introduction to Physical Geography and the Environment. 4th Edition. Pearson: Harlow, UK. 876 pages. Skinner, B.J., Murck, B. (2011) The Blue Planet: An Introduction to Earth System Science. 3rd Edition. J. Wiley & Sons: Hoboken, USA. 656 pages.
Module Pre-requisite	N/A
Module Co-requisite	N/A
Module Website	Blackboard Ultra
Are other Schools/Departments involved in the delivery of this module? If yes, please provide details.	School of Natural Sciences – Geology Department **Admin contact:** Caroline Clabby – TR064 Course Administrator TBC – Executive Officer, Geology
Academic Start Year	September 2026
Academic Year of Date	2026-2027

Module Code	MAU11E01
Module Name	Engineering mathematics I
ECTS Weighting[9]	5 ECTS
Semester taught	Semester 1
Module Coordinator/s	Dr. Nicholas Aidoo

[9] TEP Glossary

Module Learning Outcomes with reference to the Graduate Attributes and how they are developed in discipline

On successful completion of this module, students will be able to

1. Recognise mathematical structures in practical problems, translate these problems into mathematical language, and then analyse them using methods from single-variable calculus.
2. Use derivatives to find the minimum and maximum values of a function of one real variable.
3. Compute definite integrals using a variety of methods of integration.
4. Use integrals to compute various physical quantities such as volume, area and length.

Module Content

- **Functions:** domain and range, operations with functions, inverse function, algebraic function, rational and trigonometric functions.
- **Limits and continuity:** limits and one-sided limits, limits at infinity, asymptotes, continuity, intermediate value property.
- **Differentiation:** definition of derivative, rules of differentiation, implicit differentiation, linear approximation.
- **Applications of derivatives:** graphs of functions, optimisation problems, related rates, Newton-Raphson method.
- **Integration:** definite integral, Riemann sums, antiderivatives, integration by substitution, fundamental theorem of calculus.
- **Applications of integrals:** area between two curves, volumes and areas of solids of revolution, length of a plane curve.

Teaching and Learning Methods

Assessment Details[10] Please include the following:

- **Assessment Component**
- **Assessment description**

Assessment Component	Assessment Description	LO Addressed	% of total	Week due
Continuous Assessment	Coursework		20%	

[10] TEP Guidelines on Workload and Assessment

• **Learning Outcome(s) addressed** • **% of total** • **Assessment due date**	Examination	2 hours written exam		80%	End of semester 1

Reassessment Requirements	Re-assessment, if needed, consists of 100% exam.
Contact Hours and Indicative Student Workload[2]	**Contact hours:** 11 weeks of teaching with 3 lectures and 1 tutorial per week. **Independent Study (preparation for course and review of materials):** **Independent Study (preparation for assessment, incl. completion of written assessment):**
Recommended Reading List	*Calculus: Late transcendentals* by Anton, Bivens and Davis.
Module Pre-requisite	N/A
Module Co-requisite	N/A
Module Website	Blackboard Ultra
Are other Schools/Departments involved in the delivery of this module? If yes, please provide details.	School of Mathematics School of Engineering **Admin Contact:** Caroline Clabby – TR064 Course Administrator Emma Clancy - Administrative Officer, School of Mathematics
Academic Start Year	September 2026
Academic Year of Date	2026-2027

Semester 2 – Core

Module Code	EEU11E21
Module Name	Probability, Statistics and Data Centric Engineering
ECTS Weighting[11]	5 ECTS
Semester taught	Semester 2
Module Coordinator/s	Dr. Arman Farhang Additional lecturer(s): Prof. Nicola Marchetti
Module Learning Outcomes with reference to the Graduate Attributes and how they are developed in discipline	On successful completion of this module, students should be able to: • LO1. Develop detailed understanding of data types, visualisation, data summarisation and exploratory data analyses • LO2. Compute probabilities for a variety of random variable applicable especially to engineering problems • LO3. Construct and apply mathematical descriptions of discrete and continuous probability distributions • LO4. Assess the results of statistical tests applying the concepts of hypothesis testing • LO5. Performing correlation and regression analysis • LO6. Model trends in a set of data using a least squares straight line fit both manually • LO7. Utilise software for carrying out data analyses **Graduate Attributes: levels of attainment** To act responsibly - Enhanced To think independently - Enhanced To develop continuously - Enhanced To communicate effectively – Introduced

[11] TEP Glossary

Module Content	This module will provide basic knowledge of mathematical probability theory and the techniques of statistical inference that are used for analysing data. Indicative syllabus: *Data description:* Data Visualisation, Histogram, Measures of Central Tendency, Measures of Variation, Range, IQR and Finding Outliers, Graphs and Exploratory Data Analysis *Probability and probability distributions:* Basic theory of probability, Discrete probability distributions (Bernoulli and Binomial Experiments, Multinomial Experiments, Geometric, Hypergeometric, Negative Binomial and Negative Multinomial, Poisson Distribution), Continuous probability distributions (Density Curves, Moments, Normal Distribution, Exponential Distribution, Chi-squared Distribution) *Sampling Theory:* Sampling distributions of means, proportions, differences of means, differences of proportions, variances and ratios of variances. The Central Limit Theorem. Concept of standard error. *Statistical Inference:* Estimation, point estimates and confidence intervals, Significance tests: null and alternative hypotheses, test statistic, level of significance, p-value. Z-tests, t-tests, F-tests, chi-square tests, paired comparisons. *Regression and Correlation:* Simple linear regression, method of least squares, coefficient of determination, confidence intervals and prediction intervals, correlations coefficient, significance tests in regression and correlation, time-series analyses
Teaching and Learning Methods	Lectures: The teaching strategy follows a set of well-established textbooks provided in the reference. This subject has been well developed for teaching at this level, so student accessibility and consistency of notation is easily established. Tutorials: The tutorials are designed to support students in the preparation of weekly homework assignments with example questions and possible solutions. Ten weekly homework assignments are comprised of two parts: 1. Randomised practise tests (unmarked) & 2. Randomised Real Tests (marked).
Assessment Details[12]	

[12] TEP Guidelines on Workload and Assessment

Please include the following:

- **Assessment Component**
- **Assessment description**
- **Learning Outcome(s) addressed**
- **% of total**
- **Assessment due date**

Assessment Component	Assessment Description	LO Addressed	% of total	Week due
End of semester exam	Written examination	LO1-6	70%	End of semester
Continuous Assessment	Tutorials - weekly homework assignments	LO1-6	20% (2% per week)	Wk 2-12
Continuous Assessment	Group assignment	LO1-7	10% (2 projects)	Wk 5 and 11

Reassessment Requirements

Examination (2 hours, 100%)

Contact Hours and Indicative Student Workload[2]

Contact hours: 44hrs (33 lectures, 10 tutorials)
Independent Study (preparation for course and review of materials): 51hrs
Independent Study (preparation for assessment, incl. completion of written assessment): 30hrs

Recommended Reading List

Applied Statistics and Probability for Engineers
by Douglas C. Montgomery and George C. Runger

Fundamentals of Statistics: Informed Decisions Using Data, Global Edition
by Michael Sullivan III

Statistics for Engineers and Scientists (5th Edition)
by William Navidi

Introduction to Probability and Statistics for Engineers and Scientists (6th Edition)
by Sheldon M. Ross

Mathematical Statistics with Applications, New International Edition
by John E. Freund

Probability and Statistics for Engineering the Sciences (9th Edition)
by Jay L. Devore

Module Pre-requisite	MAU11E01
Module Co-requisite	MAU11E02
Module Website	Blackboard Ultra
Are other Schools/Departments involved in the delivery of this module? If yes, please provide details.	School of Engineering, Electronic and Electrical Engineering **Admin contact:** Caroline Clabby – TR064 course administrator Juana Martí Hernández - Executive Officer, School of Engineering
Academic Start Year	January 2027
Academic Year of Date	2026-2027

Module Code	CEU11E13
Module Name	Biology for Environmental Engineering
ECTS Weighting[13]	5 ECTS
Semester taught	Semester 2
Module Coordinator/s	Dr. Muhammad Ali
Module Learning Outcomes with reference to the Graduate Attributes and how they are developed in discipline	LO1. Provide an account of the cellular basis of life: from its origins in the abiotic world, to the evolution of unicellular and multicellular organisms. LO2. Describe the diversity of life forms: including viruses, Prokaryotes (bacteria), Archaea, and Eukaryotes (unicellular organisms, animals and plants). LO3. Differentiate microorganisms according to their metabolism (e.g., electron acceptors, electron donors and carbon source). LO4. Employ a range of laboratory techniques, demonstrating the development of practical scientific skills, knowledge of experimental design and the interpretation of results.

[13] TEP Glossary

	LO5. Apply the scientific method as a fundamental approach to experiment- based investigations, critical analysis of data, and problem solving. LO6. Outline the diversity of life on earth and describe how it evolved over geological time scales. LO6. Describe the ecological relationships between microbial communities and ecosystems. LO7. Explain how microorganism can positively and negatively influence other living organisms and their environment and understand the value of microorganisms for humans. LO8. Collate, synthesise, organise and present information in written reports.
Module Content	This module aims to provide an introduction to microbiology with relevance to both the natural and engineered systems. It starts with a description of the possible origin of life, from the abiotic world to single-celled and multicellular organisms, and the ultrastructure of the prokaryotic and eukaryotic cells will be covered in detail. The diversity of life forms, from viruses to prokaryotic and eukaryotic microorganisms will be described. This course will serve as an introduction to the topic of environmental microbiology. Information about basic microbiology and biochemistry, and microbial ecology will be incorporated, providing the student with both an understanding of basic microbiology and of the potential of microorganisms to influence our environment. The topics addressed in the course include: - **Introduction to microbiology** Microbiology & Microorganisms; Hallmarks of cellular life; Cell structure; Microorganisms and the Biosphere; The Impact of Microorganisms on Human; Microscopy and the Origins of Microbiology - **Classification of microorganisms** Classification based on: Cell Morphology, Nutrients requirement; Environmental requirements; Phylogeny; Metabolic Diversity - **Microbial cell structure and function** Size of Microbes; The Cytoplasmic Membrane; Transporting Nutrients into the Cell; Cell Motility; Chemotaxis and Other Taxes - **Microbial metabolism** Feeding the Microbe: Cell Nutrition; Culture Media; Principles of Bioenergetics; Electron Donors and Acceptors - **Microbial growth and its control** Binary Fission, Budding, and Biofilms; Quantitative Aspects of Microbial Growth; The Microbial Growth Cycle; Kinetics of growth (Monod equation); Bacterial growth in continuous culture; Culturing Microbes and Measuring

Their Growth; Environmental Effects on Growth; Controlling Microbial Growth

- **Metabolic Diversity of Microorganisms**
  Photosynthesis; Anoxygenic Photosynthesis; Oxygenic Photosynthesis; Autotrophic Pathways; Nitrogen Fixation; Respiratory Processes Defined by Electron Donor; Respiratory Processes Defined by Electron Acceptor
- **Microbial Ecosystems & Nutrient Cycles**
  Carbon, Nitrogen, and Sulfur Cycles; Other Nutrient Cycles; Humans and Nutrient Cycling
- **Microbiology of the Built Environment**
  Public Health and Water Quality; Wastewater and Drinking Water Treatment; Indoor Microbiology and Microbially Influenced Corrosion

Teaching and Learning Methods

Assessment Details[14]
Please include the following:

- **Assessment Component**
- **Assessment description**
- **Learning Outcome(s) addressed**
- **% of total**
- **Assessment due date**

Assessment Component	Assessment Description	LO Addressed	% of total	Week due
Continuous Assessment 1	Multiple Choice Tests and Assessments		30%	
Continuous Assessment 2	Laboratory		20%	
Examination	Written Examination		50%	End of semester

Reassessment Requirements

Re-assessment, if needed, consists of 100% Written Examination

[14] TEP Guidelines on Workload and Assessment

Contact Hours and Indicative Student Workload[2]	**Contact hours:** **Independent Study (preparation for course and review of materials):** **Independent Study (preparation for assessment, incl. completion of written assessment):**
Recommended Reading List	Brock's Biology of Microorganisms, 15th Edition – Madigan et al. [Pearson]. Environmental Biotechnology: Principles and Applications, Second Edition - Bruce Rittmann, Perry McCarty
Module Pre-requisite	N/A
Module Co-requisite	N/A
Module Website	Blackboard Ultra
Are other Schools/Departments involved in the delivery of this module? If yes, please provide details.	School of Natural Sciences School of Engineering **Admin contact:** Caroline Clabby – Course Administrator TR064 Liam McCarthy - Executive Officer, Civil Struct & Env. Eng.
Academic Start Year	January 2027
Academic Year of Date	2026-2027

Module Code	GSU11005
Module Name	Introduction to Geology: A beginners Guide to Planet Earth
ECTS Weighting[15]	10 ECTS
Semester taught	Semester 2
Module Coordinator/s	Dr. Christopher Nicholas

[15] TEP Glossary

Module Learning Outcomes with reference to the Graduate Attributes and how they are developed in discipline	On successful completion of this module students will be able to: • Outline the origin and evolution of planet Earth • Describe and illustrate the dynamic nature of planet Earth with reference to specific geological processes • Describe the origins of life on Earth and list the major evolutionary episodes evident in the fossil record • Explain the links between the evolution of life and environmental conditions on planet Earth • Outline the geological history of the island of Ireland • Make basic geological observations, measurements and interpretations in the field and laboratory To develop the following skills & graduate attributes • Written and digital / analytical skills • Critical thinking • Make connections between a student's core subject areas and the science of Geology
Module Content	From the vastness of space to the microscopic crystal structure of minerals; from events which take billions of years, like galaxy formation, to volcanic eruptions which may last only minutes or seconds. Geology, or Earth Science, is the all-encompassing study of Planet Earth. Geology sets out to investigate the origin and development of the planet, the natural principles that govern it, the processes that act in it, on it, and around it, and finally the life that has evolved with it. Many sciences are conducted in the laboratory, but to a geologist, the Earth itself is the laboratory. The module is organised into two main themes. Firstly, we will look at 'Earth in Space'. We live on a dynamic and ever-changing planet, where the surface is constantly being destroyed and renewed. This theme looks at the origin of the Earth, what it's made of and the processes at work, inside and out, which drive this change. The second theme, 'Earth in Time', then focuses on the evolution of the planet over time, and the life that has evolved with it. Earth has been around for just over 4,500 000 000 years, and remarkably, we have evidence that life has existed for at least 3,800 000 000 of those years. There are times in Earth's history when geological events have changed the course of biological evolution. And, perhaps more intriguingly, there are times when life has changed the way the planet operates. So, this theme of Earth and Life evolving together through geological time is illustrated by looking at eight key episodes in Earth's history, without which, we simply wouldn't be here.

Teaching and Learning Methods	
Assessment Details[16] Please include the following: • **Assessment Component** • **Assessment description** • **Learning Outcome(s) addressed** • **% of total** • **Assessment due date**	

Assessment Component	**Assessment Description**	**LO Addressed**	**% of total**	**Week due**
Continuous Assessment	Coursework		40%	
Examination	Written Examination, 3 hours		60%	End of semester

Reassessment Requirements	
Contact Hours and Indicative Student Workload[2]	**Contact hours:** 22 hours **Independent Study (preparation for course and review of materials):** **Independent Study (preparation for assessment, incl. completion of written assessment):**
Recommended Reading List	Nicholas, C. J., 2019. A Beginner's Guide to Planet Earth: Introductory Lectures in Geology. C.J. Nicholas (ISBN 978-1-911180-33-3)
Module Pre-requisite	N/A

[16] TEP Guidelines on Workload and Assessment

Module Co-requisite	N/A
Module Website	Blackboard Ultra
Are other Schools/Departments involved in the delivery of this module? If yes, please provide details.	School of Natural Sciences **Admin contact:** Caroline Clabby – TR064 Course Administrator TBC – Executive Officer, Geology
Academic Start Year	January 2027
Academic Year of Date	2026-2027

Module Code	MAU11E02
Module Name	Engineering Mathematics II
ECTS Weighting[17]	5 ECTS
Semester taught	Semester 2
Module Coordinator/s	Dr. Patrick Fritzsch
Module Learning Outcomes with reference to the Graduate Attributes and how they are developed in discipline	On successful completion of this module, students will be able to • Use standard techniques to integrate trigonometric and rational functions. • Use integrals to compute volumes, areas and lengths. • Evaluate improper integrals. • Formulate and solve first-order differential equations. • Determine whether a given sequence converges or not. • Test a given series for convergence. • Use polynomials to approximate a given function. • Use vectors to solve geometrical problems in R^3. • Solve systems of linear equations and find the inverse of a matrix.

[17] TEP Glossary

Module Content

- Techniques of integration.
- Sequences and series including simple convergence tests, Taylor and Maclaurin series.
- Vectors, lines and planes in R3, scalar and cross products.
- Matrix algebra, Gaussian elimination, inverse matrix, determinants.

Teaching and Learning Methods

Assessment Details[18] Please include the following:

- **Assessment Component**
- **Assessment description**
- **Learning Outcome(s) addressed**
- **% of total**
- **Assessment due date**

Assessment Component	Assessment Description	LO Addressed	% of total	Week due
Continuous Assessment	Coursework		20%	
Examination	2-hour examination		80%	End of Semester 2

Reassessment Requirements

Re-assessment, if needed, consists of 100% exam

Contact Hours and Indicative Student Workload[2]

Contact hours: 11 weeks of teaching with 3 lectures and 1 tutorial per week.
Independent Study (preparation for course and review of materials):
Independent Study (preparation for assessment, incl. completion of written assessment):

[18] TEP Guidelines on Workload and Assessment

Recommended Reading List	• *Single variable calculus: Early transcendentals* by James Stewart. • *Linear algebra and its applications* by David Lay.
Module Pre-requisite	N/A
Module Co-requisite	N/A
Module Website	Blackboard Ultra
Are other Schools/Departments involved in the delivery of this module? If yes, please provide details.	School of Mathematics, School of Engineering **Admin contact:** Caroline Clabby – TR064 Course Administrator Emma Clancy - Administrative Officer, School of Mathematics
Academic Start Year	January 2027
Academic Year of Date	2026-2027

Module Code	PYU11E04
Module Name	Physics
ECTS Weighting[19]	5 ECTS
Semester taught	Semester 2
Module Coordinator/s	Dr. Stefan Hutzler
Module Learning Outcomes with reference to the Graduate Attributes and how they are developed in discipline	LO1. To introduce the student to the basic physical laws describing oscillations and waves (including light and sound), thermodynamic processes, heat and heat-transfer, electricity and magnetism LO2. To demonstrate the application of these laws and enable the student to apply them to basic, technologically relevant examples LO3. To introduce the student to measurement principles and their application to investigate physical phenomena LO4. To establish good laboratory practice and clearly written laboratory reports **Graduate Attributes: levels of attainment**

[19] TEP Glossary

	To act responsibly - Introduced To think independently - Introduced To develop continuously - Introduced To communicate effectively - Introduced
Module Content	**Oscillations and Waves** Simple harmonic oscillator (+resonance and damping), properties of waves, wave-equation, travelling and stationary waves, superposition-principle, Huygens principle, diffraction, interference, and polarisation, electromagnetic and sound waves. (Applications of electromagnetic waves in different frequency ranges). Sound waves, decibel scale. **Geometrical Optics** Mirrors, lenses and prisms, reflection, refraction, polarisation, interference/diffraction, image formation, simple optical systems. **Thermal Physics** Temperature (including kinetic gas theory), temperature scales, thermometers, thermal expansion, laws of thermodynamics, ideal and real gases, isochoric and isobaric heat capacity, thermodynamic cycles, Carnot cycle; heat transfer, conduction, convection, radiation. (Fridges, heat pumps, combustion engines) **Electricity and Magnetism** Introduction to electrostatics, magnetostatics and electromagnetism: electric charge, Coulomb's law, electric currents, Ohm's law, concepts of electrical field and potential, energy, Biot-Savart Law, Ampere's Law, magnetic fields, Lorenz Force, electromagnetic induction and Faraday's Law, summary of Maxwell equations.
Teaching and Learning Methods	The module is taught using a combination of lectures, laboratories and tutorials. Most module materials (lecture notes, tutorials) are provided in electronic form. Students work in tutorial and laboratory groups, thereby encouraging teamwork and cooperation. Laboratory reports are individual.
Assessment Details[20]	

[20] TEP Guidelines on Workload and Assessment

<table>
<tr><td>Please include the following:
Assessment Component
Assessment description
Learning Outcome(s) addressed
% of total
Assessment due date</td><td colspan="5"><table>
<tr><th>Assessment Component</th><th>Assessment Description</th><th>LO Addressed</th><th>% of total</th><th>Week due</th></tr>
<tr><td>Examination</td><td>End of semester exam</td><td>1,2</td><td>60%</td><td>End of semester</td></tr>
<tr><td>Continuous Assessment</td><td>Laboratory experiments and write-ups</td><td>3,4</td><td>40%</td><td>Every other week</td></tr>
</table></td></tr>
<tr><td>Reassessment Requirements</td><td colspan="5">Re-assessment, if needed, consists of 100% exam</td></tr>
<tr><td>Contact Hours and Indicative Student Workload[2]</td><td colspan="5"><table>
<tr><td>Contact hours: ~40 (lectures and laboratory work)</td></tr>
<tr><td>Independent Study (preparation for course and review of materials): Total ~40 (30 hours for lecture revision, 10 hours for tutorial preparation/revision)</td></tr>
<tr><td>Independent Study (preparation for assessment, incl. completion of written assessment): Total ~40
(~ 10 hours for writing of lab reports, ~ 30 hours for preparation for annual exam)</td></tr>
</table></td></tr>
<tr><td>Recommended Reading List</td><td colspan="5">University Physics, Young and Freedman, 12th edition</td></tr>
<tr><td>Module Pre-requisite</td><td colspan="5">N/A</td></tr>
<tr><td>Module Co-requisite</td><td colspan="5">N/A</td></tr>
<tr><td>Module Website</td><td colspan="5">Blackboard Ultra</td></tr>
<tr><td>Are other Schools/Departments involved in the delivery of this module? If yes, please provide details.</td><td colspan="5">School of Physics

Admin contact:
Caroline Clabby – TR064 course administrator
Úna Dowling – Administrative Officer, School of Physics</td></tr>
<tr><td>Academic Start Year</td><td colspan="5">January 2027</td></tr>
<tr><td>Academic Year of Date</td><td colspan="5">2026-2027</td></tr>
</table>

School Policies and Procedures

Health and Safety

Health

Please inform either the Programme Director of medical conditions or other problems that may require special attention from staff. In case of illness, students may attend the Student Health Centre (House 47).

Accidents

All accidents must be reported to the Safety Officer (Alison Boyce ext: 3506) as soon as possible after they occur. Victims should be escorted to the Student Health Centre for treatment if necessary. An ambulance should be called in the event of a serious accident (9-999 on phones with outside lines and inform the security office). Victims should not be taken to hospital in a private car or taxi.

Fire Safety

Fire extinguishers and copies of the College General Fire Notice are displayed at various locations in the campus. These are normally located in hallways. Fire extinguishers provided are water, powder, carbon dioxide or a fire blanket.

Help to prevent fires from starting or spreading by the following:

- Do not store flammable materials in corridors and other open-access areas.
- Exercise caution when using flammable materials and electrical equipment.
- Do not place smouldering items in bins
- Keep filing cabinets and presses closed when not in use
- Turn off and switch off at the socket (or unplug) electrical equipment that is not in use.

The college buildings are equipped with fire alarms. On hearing the alarm, leave the building quickly and in an orderly manner, and assemble at the designated meeting point for that building.

Bomb Alerts

Watch out for suspicious packages at all times and, if one is observed, alert a staff member immediately. If there is a bomb alert, follow the same procedures as for a fire alert.

Risk Assessment

A risk assessment must be carried out for research activities such as field work. Risk assessment forms are available from the Safety Officer and will also be available on Blackboard. Detailed safety guidelines on fieldwork are available from the department's Safety Officer and should be consulted before fieldwork is undertaken. A risk assessment should be completed BEFORE conducting fieldwork.

IMPORTANT NOTE: Failure to complete the relevant forms may prevent you from undertaking fieldwork or participating in field trips and can result in you forfeiting marks for associated.

Labs and Field Courses

Certain modules have laboratory experiments attached to them. Students are expected to keep a logbook recording the details of every experiment performed and to write a technical report about each experiment. Each student is required to submit her/his report neatly presented and by the date specified to avoid penalty. Guidelines as to the required length and format of each report will be specified by the lecturer concerned.

Laboratory groups and timetable for Engineering modules will be published at the beginning of the semester. Please note that you must attend the particular laboratory sessions to which you have been assigned. Students cannot swap sessions because of the complexity of the timetable, the large numbers in the year and the limited accommodation available.

A no show at a lab results in a zero mark even if a report is submitted. No report submitted means a zero mark even if the lab was attended. Labs cannot be taken in the summer/autumn periods if missed during the year.

Laboratory timetables for Engineering modules will be forwarded to students via email and posted on the School of Engineering website.

My TCD

Year One - Engineering | Trinity College Dublin

Year Two - Engineering | Trinity College Dublin

Year Three - Engineering | Trinity College Dublin

Year Four - Engineering | Trinity College Dublin

Attendance

All students should enter residence in or near Dublin and must begin attendance at the College not later than the first day of teaching term and may not go out of residence before the last day of teaching term unless **they have previously obtained permission from the Senior Lecturer through their tutor.**

Students must attend College during the teaching term. They must take part fully in the academic work of their class throughout the period of their course. Lecture timetables are published through my.tcd.ie, and on school or discipline noticeboards or in Blackboard before the beginning of Michaelmas teaching term. The onus lies on students to inform themselves of the dates, times and venues of their lectures and other forms of teaching by consulting these timetables.

The requirements for attendance at lectures and tutorials vary between the different faculties, schools, and disciplines. The school, discipline, or course office, whichever is relevant, publishes its requirements for attendance at lectures and tutorials on noticeboards, and/or in handbooks and elsewhere, as appropriate.

Marking

Guidelines on Grades for Essays and Examination Answers

	Criteria
90-100	EXCEPTIONAL ANSWER; This answer will show original thought and a sophisticated insight into the subject, and mastery of the available information on the subject. It should make compelling arguments for any case it is putting forward, and show a rounded view of all sides of the argument. In exam questions, important examples will be important examples will be supported by attribution to relevant authors, and while not necessarily giving the exact date, should show an awareness of the approximate period. In essays, the referencing will be comprehensive and accurate, supported by attribution to relevant authors, and while not necessarily giving the exact date, should show an awareness of the approximate period. In essays, the referencing will be comprehensive and accurate.
80-89	OUTSTANDING ANSWER; This answer will show frequent originality of thought and make new connections between pieces of evidence beyond those presented in lectures. There will be evidence of awareness of the background behind the subject area discussed, with evidence of deep understanding of more than one view on any debatable points. It will be written clearly in a style which is easy to follow. In exams, authors of important examples may be provided. In essays all important examples will be referenced accurately.
70-79	INSIGHTFUL ANSWER; showing a grasp of the full relevance of all module material discussed and will include one or two examples from wider reading to extend the arguments presented. It should show some original connections of concepts. There will be only minor errors in examples given. All arguments will be entirely logical, and well written. Referencing in exams will be sporadic but referencing should be present and accurate in essays
65-69	VERY COMPREHENSIVE ANSWER; good understanding of concepts supported by broad knowledge of subject. Notable for synthesis of information rather than originality. Evidence of relevant reading outside lecture notes and module work. Mostly accurate and logical with appropriate examples. Occasionally a lapse in detail.
60-64	LESS COMPREHENSIVE ANSWER; mostly confined to good recall of module work. Some synthesis of information or ideas. Accurate and logical within a limited scope. Some lapses in detail tolerated. Evidence of reading assigned module literature

55-59	SOUND BUT INCOMPLETE ANSWER; based on module work alone but suffers from a significant omission, error or misunderstanding. Usually lacks synthesis of information or ideas. Mainly logical and accurate within its limited scope and with lapses in detail.
50-54	INCOMPLETE ANSWER; suffers from significant omissions, errors and misunderstandings, but still with understanding of main concepts and showing sound knowledge. Several lapses in detail.
45-49	WEAK ANSWER; limited understanding and knowledge of subject. Serious omissions, errors and misunderstandings, so that answer is no more than adequate.
40-44	VERY WEAK ANSWER; a poor answer, lacking substance but giving some relevant information. Information given may not be in context or well explained, but will contain passages and words, which indicate a marginally adequate understanding.
30-39	MARGINAL FAIL; inadequate answer, with no substance or understanding, but with a vague knowledge relevant to the question.
0-29	UTTER FAILURE; with little hint of knowledge. Errors serious and absurd. Could also be a trivial response to the misinterpretation of a question.

Guidelines on Marking Projects/Dissertation Assessment

Mark Range	**Criteria**
90 - 100%	Exceptional project report showing broad understanding of the project area and exceptional knowledge of the relevant literature. Exemplary presentation and analysis of results, logical organisation and ability to critically evaluate and discuss results coupled with insight and novelty/originality. Overall, an exemplary project report of publishable quality (e.g. peer reviewed scientific journal/patent application).
80 - 89%	An excellent project report clearly showing evidence of wide reading far above that of an average student, with excellent presentation and in-depth analysis of results. Clearly demonstrates an ability to critically evaluate and discuss research findings in the context of relevant literature. Obvious demonstration of insight and novelty/originality. An excellently executed report overall of publishable quality (e.g. short peer reviewed conference paper such as IEEE) with very minor shortcomings in some aspects.
70 - 79%	A very good project report showing evidence of wide reading, with clear presentation and thorough analysis of results and an ability to critically evaluate and discuss research findings in the context of relevant literature. Clear indication of some insight and novelty/originality. A very competent and well-presented report overall but falling

	short of excellence in some aspects. Sufficient quality and breadth of work similar to the requirements for an abstract at an international scientific conference.
60 - 69%	A good project report which shows a reasonably good understanding of the problem and some knowledge of the relevant literature. Mostly sound presentation and analysis of results but with occasional lapses. Some relevant interpretation and critical evaluation of results, though somewhat limited in scope. General standard of presentation and organization.
50 - 59%	A moderately good project report which shows some understanding of the problem but limited knowledge and appreciation of the relevant literature. Presentation, analysis and interpretation of the results at a basic level and showing little or no novelty/originality or critical evaluation.
40 - 49%	A weak project report showing only limited understanding of the problem and superficial knowledge of the relevant literature. Results presented in a confused or inappropriate manner and incomplete or erroneous analysis. Discussion and interpretation of result severely limited, including some basic misapprehensions, and lacking any novelty/originality or critical evaluation. General standard of presentation poor.
20 - 39%	An unsatisfactory project containing substantial errors and omissions. Very limited understanding, or in some cases misunderstanding of the problem and very restricted and superficial appreciation of the relevant literature. Very poor, confused and, in some cases, incomplete presentation of the results and limited analysis of the results including some serious errors. Severely limited discussion and interpretation of the results revealing little or no ability to relate experimental results to the existing literature. Very poor overall standard of presentation.
0 - 19%	A very poor project report containing every conceivable error and fault. Showing virtually no understanding or appreciation of the problem and of the literature pertaining to it. Chaotic presentation of results, and in some cases incompletely presented and virtually non-existent or inappropriate or plainly wrong analysis. Discussion and interpretation seriously confused or wholly erroneous revealing basic misapprehensions.

Assessment: Procedures for the non-submission of coursework and absence from examinations

All students must fulfil the course requirements of the school or discipline, as appropriate, with regard to attendance and course work. Where specific requirements are not stated, students may be deemed non-satisfactory if they miss more than a third of their course of study or fail to submit a third of the required course work in any term.

TR064 Follows the same examination regulations as in the School of Engineering. Full regulations on examination can be found via the following:

B.A.I., Engineering with Management and M.A.I. (St.)

At the end of the teaching term, students who have not satisfied the school or department requirements may be reported as non-satisfactory for that term. Students reported as non-satisfactory for the Michaelmas and Hilary terms of a given year may be refused permission to take their semester two assessment/examinations and may be required by the Senior Lecturer to repeat their year.

8.3.1 Submission guidelines

Please pay attention to the guidelines for submission. These may vary from module to module. Ensure that you submit on time and, where appropriate, that your submission has been logged. It is good practice to keep a digital copy of your submissions.

The work you submit must be your own. College has very strict guidelines concerning plagiarism. Please ensure you read Section 13.3 of this handbook.

8.3.2 Policy on late submission

Coursework and assessment is an essential part of a student's learning to reinforce aspects of module content. You are enrolled on an accredited professional programme and are expected to submit work on time. Submitting work late is a habit you should avoid. It is never too early in your career to start to plan your work so you meet your deadlines. Late submissions delay feedback and in group work you risk incurring a penalty on the other members of your group.

Late submissions may be penalized or not accepted. Submission dates may be extended in exceptional and extenuating circumstances. In such circumstances, students must apply directly (via email) to the module coordinator requesting an extension and provide an explanation and/or evidence for such (e.g. medical cert). Please note that the module coordinator reserves the right to refuse granting of an extension.

8.3.3 Policy on participation in continuous assessment-based modules

Students who are absent from a third of their lectures, tutorials, or labs of a continuous assessment-based module or who fail to submit a third of the required coursework will be deemed non-satisfactory.

Students reported as non-satisfactory for both semesters of a given year may be refused permission to take their examinations and may be required by the Senior Lecturer to repeat the year.

Further details of procedures for reporting a student as non-satisfactory are given on the College website at https://www.tcd.ie/academicregistry/student-cases/

Further details on the conduct of examinations and submission of assessed work in the College Calendar, Part II, pages 35-37, 39 General Regulations and Information.

Access to Scripts and Other Assessed Work

All students have a right to discuss their examination and assessment performance with the appropriate members of staff. This right is basic to the educational process. Students are entitled to view their scripts and other assessments when discussing their performance. For work completed during semester one students should note that all results are provisional until moderated by the court of examiners in Trinity term. In Trinity term, students' performance cannot be discussed with them until after the publication of the end-year results.

Written assessment components and assessment components which are recorded by various means (e.g. video, audio) are retained by schools and departments for thirteen months from the date of the meeting of the court of examiners which moderates the results in question and may not be available for consultation after this time period.

Re-check/Re-mark of Examination Scripts and Other Assessed Work

Having received information about their final results at the court of examiners in Trinity term and having discussed these and their performance with the Director of Teaching and Learning (Undergraduate) or the head of discipline and/or the appropriate staff, students may ask that their results be reconsidered if they have reason to believe:

(a) that the grade is incorrect because of an error in calculation of results;

(b) that the examination paper or other assessment specific to the student's course contained questions on subjects which were not part of the course prescribed for the examination or other assessment; or

(c) that bias was shown by an examiner in marking.

In the case of (a) above, the request should be made through the student's tutor to the Director of Teaching and Learning (Undergraduate) or course director as appropriate.

In the case of (b) and/or (c) above, the request should be made through the student's tutor to the Senior Lecturer. In submitting such a case for reconsideration of results, students should state under which of (b) and/or (c) the request is being made.

Requests for re-check or re-mark should be made as soon as possible after discussion of results and performance and no later than twelve months from the date of the meeting of the court of examiners which moderated the marks in question.

Once a result has been formally published following the court of examiners it cannot be amended without the permission of the Senior Lecturer.

Any student who makes a request for re-check or re-mark that could have implications for their degree result is advised not to proceed with degree conferral until the outcome of the request has been confirmed.

Plagiarism

To ensure that you have a clear understanding of what plagiarism is, how Trinity deals with cases of plagiarism and how to avoid it, you will find a repository of information at https://libguides.tcd.ie/academic-integrity

We ask you to take the following steps:

Visit the online resources to inform yourself about how Trinity deals with plagiarism and how you can avoid it at https://libguides.tcd.ie/academic-integrity. You should also familiarize yourself with the 2023/24 Calendar entry on plagiarism located on this website and the sanctions which are applied.

Complete the 'Ready, Steady, Write' online tutorial on plagiarism at https://libguides.tcd.ie/academic-integrity/ready-steady-write. Completing the tutorial is compulsory for all students.

Familiarise yourself with the declaration that you will be asked to sign when submitting course work at https://libguides.tcd.ie/academic-integrity/declaration.

Contact your College Tutor, your Course Director, or your Lecturer if you are unsure about any aspect of plagiarism.

Guidance on the Use of AI and Generative-AI in College

The advent of commonly available artificial intelligence tools is disruptive in both positive and negative ways. Before using them in your studies it is important that you familiarise yourself with College policies on its use. Unless otherwise instructed for particular modules or assessments, **the default expectation would be that you do not submit AI generated content as an attempt at an assessment.**

Below is some basic overview of the College policy on AI and GenAI. This has been taken from the more detailed policy which is informative and wide ranging. You are expected to have read and familiarised yourself with this policy.

https://www.tcd.ie/academicpractice/resources/generative_ai/

Artificial Intelligence (AI)

Artificial intelligence is generally understood to be a set of technologies that enable computers to perform a variety of functions usually perceived as requiring human intelligence – for example, understanding speech, recognising objects in images, composing written answers and problem reasoning. A more formal definition of an AI system from the European Union AI Act (2024) is:

...a machine-based system designed to operate with varying levels of autonomy and that may exhibit adaptiveness after deployment and that, for explicit or implicit objectives, infers, from the input it

receives, how to generate outputs such as predictions, content, recommendations, or decisions that can influence physical or virtual environments[.] (EU AI Act 2024)

Generative Artificial Intelligence (GenAI)

Generative AI is the sub-area of AI, involving AI systems which generate content — for example, human dialogue, speech, images and video. GenAI systems are capable of generating such content based on a user's request or instruction. More formally, GenAI is defined by UNESCO as **"an artificial intelligence (AI) technology that automatically generates content in response to prompts written in natural-language conversational interfaces" (UNESCO 2023).**

AI and GenAI in Trinity

As Ireland's leading university and as a world leader in AI research, Trinity recognises that AI and GenAI offer new opportunities for teaching, learning, assessment and research. We also recognise that these technologies present challenges and risks, including to academic integrity, ethics, privacy, impartiality, intellectual property and sustainability.

Acknowledging these opportunities and challenges, Trinity commits to supporting the opportunity for students and staff to become AI literate and fluent, thereby helping them to navigate and respond to the challenges and risks of AI and GenAI in order to harness the potential of (Gen)AI to enhance teaching, learning, assessment and research – and to be prepared for future challenges as these technologies evolve. We also commit to providing ongoing resources and guidance to support students and staff to use AI and GenAI in ways that are appropriate, responsible and ethical – and to ensure that academic integrity is maintained in its usage.

College aspires to develop best practice guidelines in this area. In addition to the resources and supports that College provides and recognising that appropriate uses of AI and GenAI tools vary across academic disciplines, Schools will have some flexibility to customise their own discipline-specific practices in line with this institutional statement, other institutional policies as they develop, and national and international regulation. The College goal is to enable overall consistency in the regulation of GenAI usage, while also respecting where disciplines or degree programmes require specific restrictions in GenAI usage in assessment preparation and execution.

Thus, where disciplines or degree programmes wish to refine specific regulations on student use of GenAI for learning, general as well as programme-specific regulations should be communicated in the relevant discipline/degree programme handbook.

Such regulation could range from how student GenAI usage is acknowledged or cited within student assessment submissions, to prohibition of GenAI usage in the production of student assessment submissions.

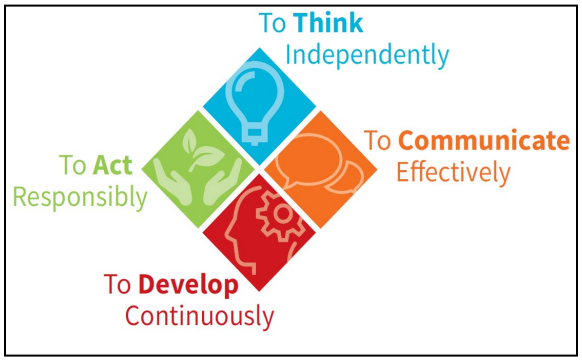
IMPORTANT NOTE: If any additional restrictions on the use of Generative Artificial Intelligence (GenAI) apply to a particular module, these will be stated in the module description on Blackboard or communicated to students by module coordinators.

Graduate Attributes

The Trinity Graduate Attributes represent the qualities, skills, and behaviours that you will have the opportunity to develop as a Trinity student over your entire university experience, in other words, not only in the classroom, but also through engagement in co- and extra-curricular activities (such as summer work placements, internships, or volunteering).

The four Trinity Graduate Attributes are:

- To Think Independently
- To Act Responsibly
- To Develop Continuously
- To Communicate Effectively



Why are the Graduate Attributes important?

The Trinity Graduate Attributes will enhance your personal, professional, and intellectual development. They will also help to prepare you for lifelong learning and for the challenges of living and working in an increasingly complex and changing world.

The Graduate Attributes will enhance your employability. Whilst your degree remains fundamental, also being able to demonstrate these Graduate Attributes will help you to differentiate yourself as they encapsulate the kinds of transversal skills and abilities, which employers are looking for.

How will I develop these Graduate Attributes?

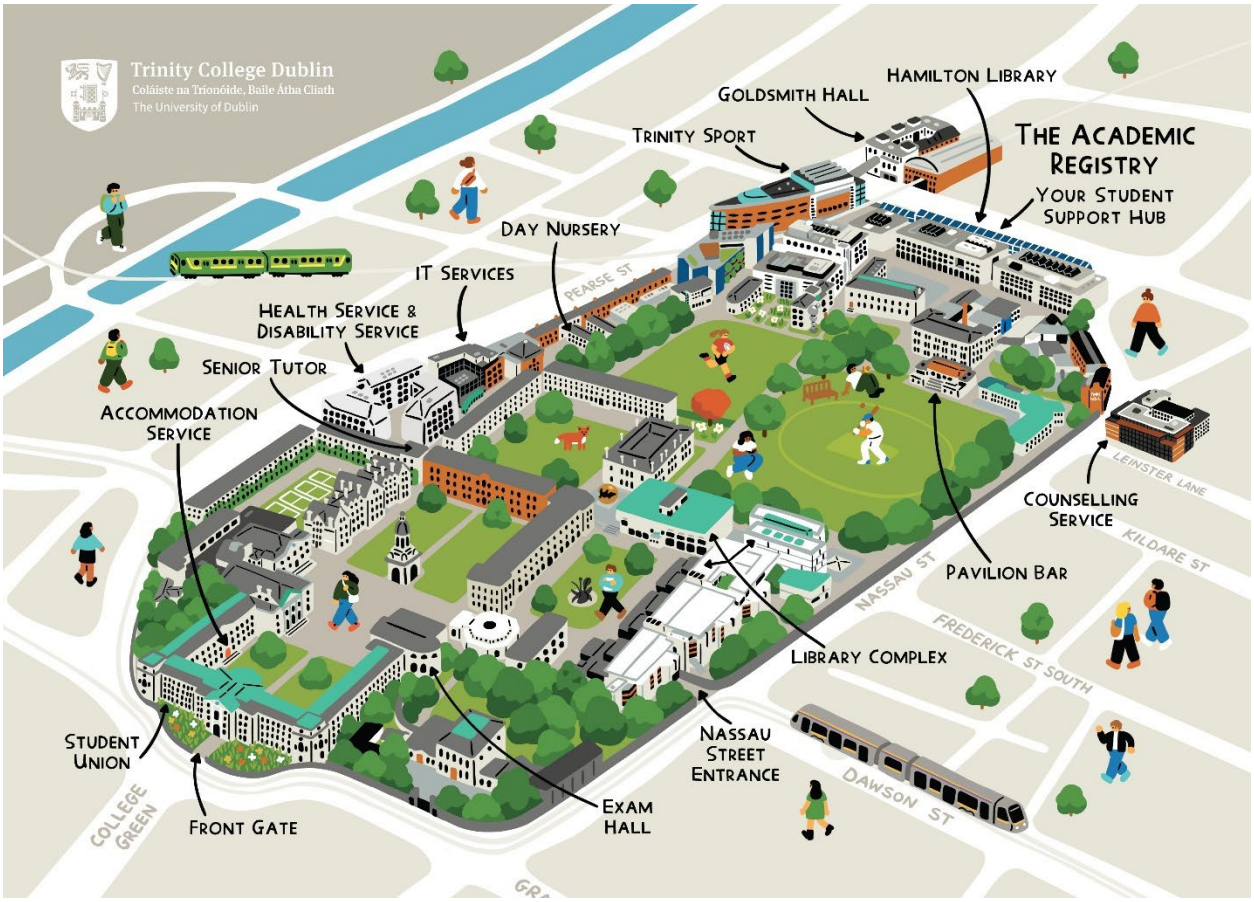
Many of the Graduate Attributes are 'slow learned', in other words, you will develop them over the four or five years of your programme of study.

They are embedded in the curriculum and in assessments, for example, through undertaking independent research for your final year project, giving presentations and engaging in group work.

You will also develop them through the co-curricular and extra-curricular activities. If you help to run a club or society you will be improving your leadership skills, or if you play a sport, you are building your communication and team-work skills.

Important Information

Student Services



For general information on the Supports and Services available to Trinity Students please visit: https://www.tcd.ie/students/supports-services/

This is a comprehensive site which breaks down the different categories of support and services available to students is an intuitive manner.

Follow on to the next page for a breakdown of some of our key supports and services.

Trinity Tutorial Service (Undergraduate Students)

The Tutorial Service is unique, confidential, and available to all undergraduate students offering student support in all aspects of College life. The Tutorial Service is supported and coordinated by the Senior Tutor's Office which is located on the ground floor in House 27.

Opening Hours and Appointments

The Senior Tutor's Office is open for student appointments between 10.30am - 12.30pm and 2.30pm - 4.00pm Monday to Friday ONLY (email stosec@tcd.ie to arrange an appointment).

What is a Tutor?

A Tutor is a member of the academic staff who is appointed to look after the general welfare and development of the students in his/her care. Whilst the Tutor may be one of your lecturers, this is not always the case as the role of the College Tutor is quite separate from the teaching role.

When should I go to see my Tutor?

You should visit your Tutor whenever you are worried or concerned about any aspect of College life or indeed your personal life, especially if it is affecting your academic work. The conversation with your Tutor takes place in strictest confidence. Unless you give him/her permission to do so, s/he will not divulge information given to them to anybody, whether a member of College or to anyone outside College (to your parents/family for example). Your Tutor can only help you if s/he knows you are facing difficulties, so if you are worried about anything go and see your Tutor before things get out of hand.

Further information on the Senior Tutors Office and College Tutors may be found via the following webpage: **Senior Tutor Services-** https://www.tcd.ie/seniortutor/students/undergraduate/

DisAbility Services

The DisAbility Service aims to provide appropriate advice, support and information to help students and staff with disabilities. The DisAbility Service has in place a range of supports to ensure that students with disabilities have full access to the same facilities for study and recreation as their peers. Most students registering with the DisAbility Service request access to a range of supports that help the student reach their full potential while studying. Most students' needs are accommodated through these supports. The student decides what level of support they require.

For contact information or to make an appointment please contact the DisAbility Services – contact details are available via the following webpage: https://www.tcd.ie/disability/contact/

Student Learning Development

Student Learning Development offers support in a variety of study and learning skills including essay writing, exam preparation, study skills, self and time-management and note taking. Mechanisms of support are workshops, individual appointments and drop-in clinics.

For new students: https://www.tcd.ie/sld/your-student-journey/new-to-trinity/

For Undergraduate Students: https://www.tcd.ie/sld/your-student-journey/undergraduate-students/

For Postgraduate Students: https://www.tcd.ie/sld/your-student-journey/postgraduate-students/

For general information on all resources and supports available visit: https://www.tcd.ie/sld/

Student Health and Wellbeing

College Health Service

Trinity Health Services have GP services available for the following Opening Hours: Please contact us on 01 8961556 or 01 8961591 between 9am and 1pm and from 2-4:30pm

You can email collegehealth@tcd.ie , but please note that this email is NOT FOR ANY MEDICAL/CLINICAL enquiries and is not manned to manage clinical/medical enquiries, strictly only admin.

The Physiotherapist operates daily between 09.00 and 13.00 and also Monday/Tuesday afternoons during term time.

For further information visit: https://www.tcd.ie/collegehealth/

Student Counselling

The Student Counselling Service is here to help you to manage any difficulties you are experiencing so you can enjoy and fully participate in your time here at College.

If you wish to make an appointment with the Student Counselling Service, please consider one of the options below. If you have any other queries you can call into reception on the 3rd floor of 7-9 South Leinster Street or contact us on:

Phone: (01) 896 1407

Email: student-counselling@tcd.ie

For further information visit the following webpage: https://www.tcd.ie/StudentCounselling/

Student Life

Student life offers information on Supports and Services, Clubs and Societies, Student Unions etc., https://www.tcd.ie/students/

Academic Registry

The Academic Registry is responsible for services that support the complete student lifecycle of Trinity College Dublin – from application to graduation.

For information on Registration, Fees, Grants, ID Cards etc. visit the Academic Registry (AR). AR is located in the Watts Building, on the first floor, or visit the AR website: https://www.tcd.ie/academicregistry/

Queries can be emailed to academic.registry@tcd.ie, or you can telephone 01 896 4500 during office hours.

Student Accommodation

CAMPUS: The Accommodation Office is open Monday to Friday from 8.30am to 1pm and 2pm-5pm each day. Queries can be emailed to residences@tcd.ie, or you can telephone 01 896 1177 during office hours.

After hours you can contact Front Gate at 01 896 3978 in case of difficulties or key problems. In Goldsmith Hall attendants are on duty in the residential area at weekends and overnight and they will assist with local problems.

In the event of a serious emergency, particularly where you require the attendance of ambulance, fire or police services please telephone College Security at 01 896 1999 (internal 1999). To ensure a co-ordinated response please do not call these services directly. We recommend that you programme these numbers into your mobile phone using the prefix "01" before the number. https://www.tcd.ie/accommodation/

Contacts

Module Coordinators

Staff	Email
Course Director Dr. Silvia Caldararu - Botany	caldaras@tcd.ie
Course Director Professor Laurence Gill – Civil Engineering	laurence.gill@tcd.ie
ESU11001 Dr. Kamila Kwasniewska – Botany	kkwasnie@tcd.ie laurence.gill@tcd.ie

Professor Laurence Gill – Civil Engineering	
MAU11E01 Dr. Nicholas Aidoo - Pure & Applied Mathematics	naidoo@tcd.ie
MEU11E16 Dr. Amir Pakdel - Mechanical, Manuf & Biomedical Eng.	pakdela@tcd.ie
CHU11E05 Dr. Chris Batchelor-McAuley – Chemistry	chris.mcauley@tcd.ie
GSU11001 Dr. Robin Edwards – Geography, Geology	Robin.Edwards@tcd.ie
EEU11E21 Dr. Arman Farhang – Electronic & Elect. Engineering	arman.farhang@tcd.ie
CEU11E13 Dr. Muhammad Ali – Civil Struct & Env. Eng.	muhammad.ali@tcd.ie
MAU11E02 Dr. Patrick Fritzsch – Mathematics	fritzscp@tcd.ie
PYU11E04 Dr. Stefan Hutzler – Physics	stefan.hutzler@tcd.ie
GSU11005 Dr. Christopher Nicholas – Geology	nicholyj@tcd.ie

Discipline Staff and Admins

Administrative staff	**School**	**Email**
Caroline Clabby **TR064 Course Administrator**	School of Natural Sciences	envscieng@tcd.ie
James Higgins **School Manager**	School of Natural Sciences	schoolofnaturalsciences@tcd.ie
Patricia Hughes **School Manager**	School of Engineering	engineering@tcd.ie
Fiona Moloney **Undergraduate Administrative Coordinator**	School of Natural Sciences	FIMOLONY@tcd.ie
Zara Cassidy-Coss **Administrative Officer, School Office**	School of Engineering	ZCASSIDY@tcd.ie
Liam McCarthy **Executive Officer, Civil Structural and Environmental Engineering**	School of Engineering	lmccart4@tcd.ie
TBC **Executive Officer, Botany**	School of Natural Sciences	ZOBOES@tcd.ie

TBC **Executive Officer, Geology**	School of Natural Sciences	EARTH@tcd.ie
TBC **Executive Officer, Geography**	School of Natural Sciences	Geography@tcd.ie
Celine Egan **Executive Officer, Zoology**	School of Natural Sciences	ZOBOES@tcd.ie
Julie Boustie **Global and Industry Engagement Officer**	School of Natural Sciences	SNSGlobal@tcd.ie
Chloe O'Connor **Global Officer (UNITECH)**	School of Engineering	CHLOE.OCONNOR@tcd.ie

School Website: https://www.tcd.ie/naturalsciences/

Link to School course page:

Undergraduate - School of Natural Sciences | Trinity College Dublin

Postgraduate - School of Natural Sciences | Trinity College Dublin

Environmental Science and Engineering - Courses | Trinity College Dublin

Environmental Science and Engineering (TR064) - School of Natural Sciences | Trinity College Dublin

Appendix 1

Item	Reference/Source
Statement on General Regulations	Calendar, Part II, General Regulations and Information,Section II, Item 12 Calendar, Part III, GeneralRegulations, Section I
Student Supports Co-curricular activities TCDSU, GSU & student representationstructures	Student Supports
Emergency Procedures	**Standard Text:** In the event of anemergency, **dial Security Serviceson extension 1999** Security Services provide a 24-hour service to the college community, 365 days a year. They are the liaison to the Fire, Garda and Ambulance services and all staff and students are advised to alwaystelephone extension 1999 (+353 1 896 1999) in case of an emergency. Should you require any emergency or rescue services on campus, you must contact Security Services. This includes chemical spills,personal injury or first aid assistance. It is recommended that all studentssave at least one emergency contact in their phone under ICE (In Case of Emergency).
Data Protection	Data Protection for StudentData
Research Ethics	Policy on Good ResearchPractice

Key Locations for students: Include Programme Offices, Laboratories, Online Learning Environments, Libraries, Academic Registry, Places of Faith/Prayer Rooms, Photocopiers and any relevant introductory information on these locations	Blackboard Academic Registry

Item	**Reference/Source**
Plagiarism &Referencing Guidance	Calendar, Part B, General Regulations and Information Calendar, Part III, General Regulations & Information,Section I 'Plagiarism' Plagiarism Policy
Health and Safety Statements	Faculty of Science Engineering, Mathematics and Science website - https://www.tcd.ie/stem/undergraduate/health-safety.php
Foundation Scholarships	Calendar, Part II, Foundation and Non-FoundationScholarships
Absence fromExaminations	Calendar, Part B, General Regulations and Information Calendar, Part III, Section III,'Examinations, Assessment and Progression' Academic Policies
Reference to Relevant University Regulations	Academic Policies Student ComplaintsProcedure Dignity and Respect Policy - Equality, Diversity and Inclusion | Trinity College Dublin (tcd.ie)
May include Programme Offices, Laboratories, Online Learning Environments, Libraries, AcademicRegistry, Places of Faith/Prayer Rooms, Photocopiers and any relevant introductory information on these locations	Blackboard Academic Registry

Timetable for students	My TCD
Internships/ Placements forCredit	Internship and PlacementPolicy.
Programme Architecture	Trinity Education ProgrammeArchitecture and Pathways
Item	**Reference/Source**
Marking Scale	Calendar, Part B, General Regulations and Information
Progression Regulations	Calendar, Part II, General Regulations & Information Calendar, Part II, Part C Calendar, Part III, Section III 'Examinations, Assessment and Progression' and 'Assessment and ProgressionRegulations'
Awards	National Framework forQualifications Trinity PathwaysTrinity Courses
Professional and Statutory Body Accreditation	Provided by School/Discipline Handbooks where applicable
Careers Information &events	https://www.tcd.ie/Science/careers/
External Examiner	Procedure for the transfer ofstudents assessed work to external examiners
Capstone (UG Programmes)	Capstone website Policy on Good ResearchPractice
Attendance Requirements	Calendar, Part B, General Regulations and Information Calendar, Part III, General Regulations and Information,Section I 'Attendance and Off-Books'; Section II 'Attendance'; Section III 'Attendance, Registration, Extensions'; Section IV 'Attendance and Examinations'
Feedback andEvaluation	Student Evaluation andFeedback Student Partnership Policy Procedure for the conduct ofFocus Groups