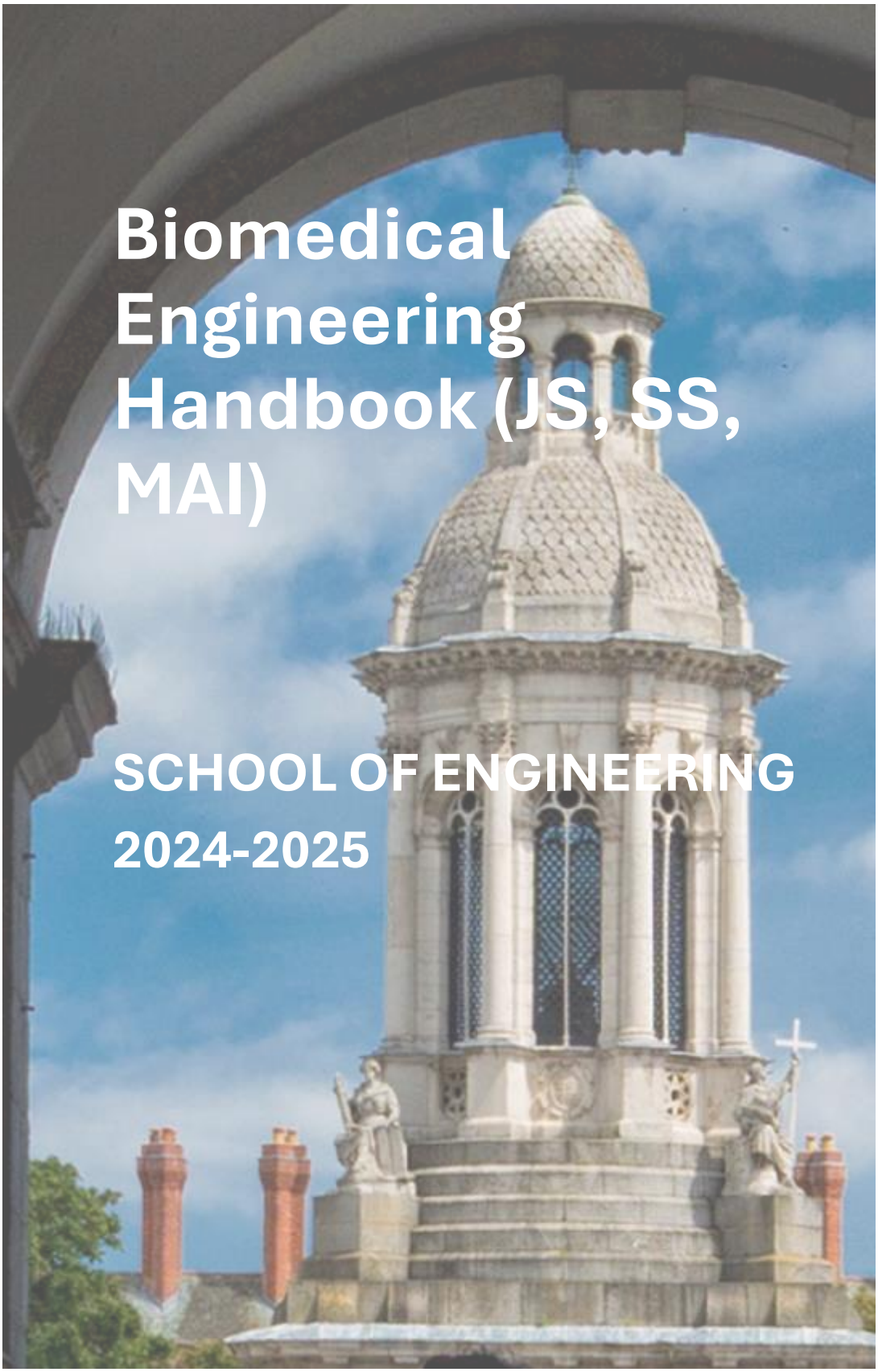
Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin



Biomedical Engineering Handbook (JS, SS, MAI)

SCHOOL OF ENGINEERING

2024-2025

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Note

Alternative formats of the handbook can be made available on request.
All students are encouraged to fully familiarise themselves with college rules and general regulations which can be found in the TCD Calendar, available on TCD's website.

In the event of any conflict or inconsistency between the General Regulations published in the University Calendar and information contained in programme or local handbooks, the provisions of the General Regulations in the Calendar will prevail.

Introduction

As students of the Biomedical Engineering stream within the School of Engineering, you are among the select few who have joined the biomedical engineering community at Trinity College Dublin for an education that will enable you to become the next leaders in this ever expanding and evolving field.

Some of the most exciting work in engineering today takes place at the intersection of disciplines. Research in biomedical engineering is an example of where the biological, physical, and digital worlds intersect and where you can have a profound impact on society.

Engineering is not just about crunching numbers or solving problems; it is seeing how problems affect society and how society changes because of the solutions you provide. You have an opportunity here as students in biomedical engineering to become involved in that community, so that, as you move into your professional life, you will become a leader who has an impact on the human condition.

You are part of a discipline that offers great opportunities for learning and advancement within Ireland's premier university. You are now part of the Trinity Centre for Biomedical Engineering (TCBE). The Centre brings together over 30 academics from the Schools of Engineering, Natural Sciences, Dental Sciences and Medicine in Trinity and colleagues from the Royal College of Surgeons in Ireland, Dublin City University and University College Dublin. There are also over 100 postdoctoral, PhD and MSc researchers working in the Centre. All these researchers are involved in exciting new developments in biomedical engineering ranging from developing new materials for use in cardiac care, analysing minute electrical signal changes in the brain for neurological diagnosis, to artificially growing new tissue for organ transplantation. The Trinity Centre for Biomedical Engineering has extensive clinical research in all the five teaching hospitals in Dublin (St James's Hospital, Tallaght Hospital, St Vincent's University Hospital, The Mater Misericordiae Hospital and Beaumont Hospital). As a member of this biomedical community, use the opportunity to learn from activities in the Trinity Centre for Biomedical Engineering, so that you can relate your course material to the real clinical challenges that are being researched and the solutions that are being generated.

The Trinity Centre for Biomedical Engineering is based in the Trinity Biomedical Sciences Institute and many of its laboratories are located here. You will be sent emails of seminars, news, and other developments. Keep up to date with these and your studies will become more fruitful and relevant.

This handbook contains information regarding the course including modules, assessment, course regulations, faculty members and important contact details.

On behalf of all the lecturers and staff, I would like to wish you every success. We look forward to you becoming part of the Trinity College Biomedical Engineering family as you embark on making your mark on society at large.

If you have any questions or comments, please do not hesitate to contact us.

Bruce Murphy

Professor Bruce Murphy
Director, Discipline of Biomedical Engineering

Brooke Tornifoglio

Assistant Professor Brooke Tornifoglio
Junior Sophister Coordinator, Biomedical Engineering

David Hoey

Professor David Hoey
Senior Sophister Coordinator, Discipline of Biomedical Engineering

Daniel Kelly

Professor Daniel Kelly
MAI Coordinator, Discipline of Biomedical Engineering

Contacts

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Professor David Hoey	dahoey@tcd.ie	SS coordinator	Parsons Building
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Ms. Tania Panero Garcia	panerogt@tcd.ie	Administrator	Reception Office, Parsons Building

Academic Year Calendar

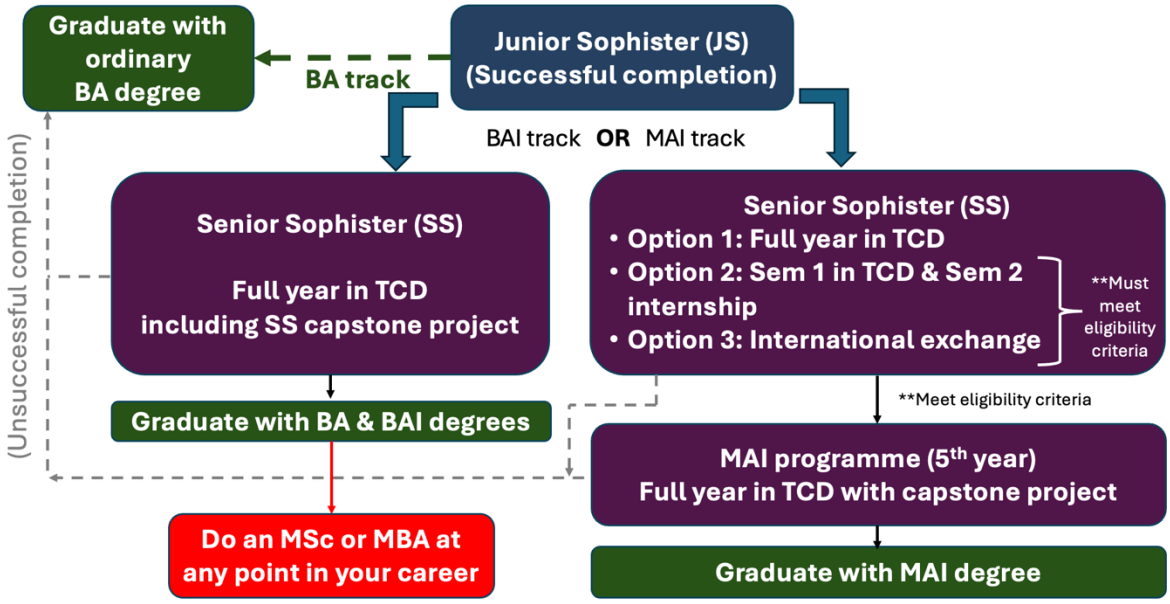
This can be found on TCD's main website, it contains details of term dates and examination periods.

Timetables

See the School of Engineering website, under the current student's section. Timetables are at the bottom of each year's page.

Programme Overview

Engineering Course Overview



The integrated BAI/MAI degree programme is professionally accredited by Engineers Ireland and meets the educational requirements for corporate membership of this professional institution and registration as a chartered engineer. Further information can be found at: http://www.engineersireland.ie/Membership.aspx.

Award Routes

Students who complete the third year by examination and who choose not to proceed to or fail to complete satisfactorily the fourth year of the Engineering or Engineering with Management course may elect to be conferred with the ordinary degree of B.A. (this is NOT a B.A. in Mathematics).

Those Engineering students who exit the course having obtained credit for years one to four of the course are entitled to the degrees of B.A. and B.A.I. The B.A.I. degree award is based on an overall average mark calculated by combining the average mark achieved in the Junior Sophister examinations (30% towards overall average) and the Senior

Sophister examinations (70% towards overall average). Students exciting must complete a capstone project in order to be eligible for a BAI degree.

Students who have obtained credit for all five years of the course are entitled to the degrees of B.A. and M.A.I. (St.).

All degrees referred to above must be conferred at the same Commencements. Students are not permitted by College regulations to have their B.A.I. or B.Sc. (Ing.) conferred and then to return to College at a later time to complete the fifth year of their course.

BA

Students who complete the third year by examination and who choose not to proceed to, or fail to complete satisfactorily, the fourth year of the Engineering course may elect to be conferred with the ordinary degree of BA (this is not a BA in Mathematics).

BA and BAI

Awarded to those Engineering students who exit the course by fulfilling all 3 criteria below:

1. obtained the required credit for years 1 to 4 of the course.
2. successfully completed a Senior Sophister capstone project.
3. spent their final semester in the University of Dublin, Trinity College an dcomplete a capstone project.

The BAI mark combines the average mark achieved in the Junior Sophister year (30% towards overall average) and the Senior Sophister year (70% towards overall average).

Eligibility for MAI/International Exchange/Internship

See the School of Engineering Website for eligibility requirements for MAI/Internship and international exchange.

Examination Regulations

These can be found on the School of Engineering Website.

External Examiner

The external examiner for Biomedical Engineering is Prof. Keita Ito, from Eindhoven University of Technology (Prof. Keita Ito - TU/e).

Programme Learning Outcomes

Upon successful completion of the degree programme, our biomedical engineering graduates are capable of dealing with complex multi-disciplinary problems in medicine, physiology and biological systems but also with ill-defined problems. They can design to professional codes of practice within the regulatory standards of medical devices and can deal with new problems from first principles relying on their knowledge of engineering science. In the broadest sense applying to the biomedical stream, on

successful completion of the programme biomedical engineering graduates will be first and foremost engineers and be able to:

- Explain the basic anatomy, physiology, and function of the human body
- Analyse medical or clinical problems from an engineering perspective
- Model the behaviour of medical, physiological, and biological systems
- Provide engineering solutions to clinical and biological problems
- Engage in research within medical and healthcare sectors
- Design devices and instrumentation for use in medical and clinical applications
- Understand and explain the operation of a range of medical equipment
- Interpret and apply standards and specifications in the medical realm
- Interact and communicate with non-engineering but scientific professionals

Modules and module descriptors

The most up to date information on modules on offer can be found on the School of Engineering website in the current students section. The School reserves the right to amend the list of available modules and, in particular, to withdraw and add modules. Timetabling may restrict the availability of modules to individual students.

In your studies you should aim to work a minimum of 50 hours per week. With a timetabled schedule of about 25 hours per week, this means you should be planning independent study of at least 25 hours per week. This includes reading course material prior to lectures – you should not expect to be given all the module material in the lectures and tutorials. The table below details the modules, credit value and coordinator

3rd (JS) year

Course Code	Module Title	ECTS	Semester	Coordinator
MAU33E01	Engineering Mathematics V	5	S1	Prof. Tristan McLoughlin (tristan@maths.tcd.ie)
MEU33B10	3D CAD & 3D Printing	5	S1	Prof. Daniel Trimble (dtrimble@tcd.ie)
MEU33B04	Mechanical Engineering Materials	5	S1	Prof. Kevin O'Kelly (kevin.okelly@tcd.ie)
EEU33BM1	Anatomy & Physiology	5	S1	Prof. Roisin McMackin (mcmackro@tcd.ie)

EEU33C01	Signals and Systems	5	S1	Prof. Nicola Marchetti (marchetn@tcd.ie)
MEU33B05	Mechanics of Machines	5	S2	Prof. Ciaran Simms (csimms@tcd.ie)
EEU33E03	Probability and Statistics	5	S2	Prof. Bidisha Ghosh (bghosh@tcd.ie)
MEU33B07	Manufacturing Technology and Systems	5	S2	Prof. Daniel Trimble (dtrimble@tcd.ie)
MEU33BM3	Quantitative Physiology	5	S2	Prof. Richard Reilly (reillyri@tcd.ie)
MEU33B03	Mechanics of Solids	5	S2	Prof. Mark Ahearne (ahearnm@tcd.ie)
MEU33BM2	Biomedical Design Project	5	S2	Prof. Tríona Lally (lallyca@tcd.ie)

4th (SS) Year

Course Code	Module Title	ECTS	Semester	Coordinator
CEU44E01	Management for Engineers	5	S1	Prof. John Gallagher (j.gallagher@tcd.ie)
MEU44BM4	Experimental and Research Methods	5	S1	Prof. David Hoey (dahoey@tcd.ie)
MEU44BM5	Biomechanics	5	S1	Prof. David Hoey (dahoey@tcd.ie)
MEU44BM6	Biomaterials	5	S1	Prof. Conor Buckley (cbuckle@tcd.ie)
EEU44C05	Digital Signal Processing	5	S1	Prof. N Harte (nharte@tcd.ie)
MEU44B17	Multibody Dynamics	5	S1	Prof. Ciaran Simms (csimms@tcd.ie)
MEU44B15	Fundamentals of Medical Device design	5	S1	Prof. Bruce Murphy (murphb17@tcd.ie)
MEU44B01	Mechanics of Solids	5	S2	Prof. Mark Ahearne (ahearnm@tcd.ie)
MEU44B02	Forensic Materials Engineering	5	S2	Prof. David Taylor (dtaylor@tcd.ie)

MEU44B05	Laser Processing and Additive Manufacturing	5	S2	Dr. Moyin Otubela (otubelmv@tcd.ie) Prof. Garret O'Donnell (odonnege@tcd.ie) Prof. Rocco Lupoi (lupoir@tcd.ie)
MEU44B06	Manufacturing Systems and Project Management	5	S2	Dr. Shuo Yin (yins@tcd.ie) Dr. Garret O'Donnell (odonnege@tcd.ie)
MEU44B09	Control Engineering I	5	S2	Prof. Henry Rice (hrice@tcd.ie)
EEU44C08	Digital Image and Video Processing	5	S2	Prof. François Pitié (pitief@tcd.ie)
MEU44E02	Project	15	S2	
MEU44E04	Internship Project	30	S2	Prof. Mark Ahearne (ahearnm@tcd.ie)

5th (MAI) Year

Course Code	Module Title	ECTS	Semester	Coordinator
MEP55E02	Engineering Research Project	30	1+2	Prof Garret O'Donnell
ME5MM3	Supply chain management	5	1	Prof. Garret O'Donnell (Garret.ODonnell@tcd.ie)
ME5MM7	Risk management and safety assessment systems	5	1	Prof. Garret O'Donnell (Garret.ODonnell@tcd.ie) Prof. Kevin O'Kelly (kevin.okelly@tcd.ie) Dr. Chiara Leva (levac@tcd.ie)
ME5BIO3	Tissue Engineering	5	1	Prof. Daniel Kelly (kellyd9@tcd.ie)
MEP55B10	Finite element analysis	5	1	Prof. Triona Lally (lallyca@tcd.ie)
EE55C04	Speech technology	5	1	Prof. Naomi Harte (nharte@tcd.ie)

EEU44C16	Deep Learning & its Applications	10	1	Prof. François Pitié (pitief@tcd.ie)
MEP55B21	Neural Signal Analysis	10	1	Prof. Alejandro Lopez Valdes (alopezva@tcd.ie)
MEP55B17	Cell & Molecular Biology	5	1	Prof. Sarah Doyle (hayesj2@tcd.ie)
MEP56BM1	Medical Device Design Innovation Project	10	1 + 2	Prof. Bruce Murphy (murphb17@tcd.ie)
ME5BIO7	Advanced Medical Imaging	5	2	Prof. Brooke Tornifoglio (btornifo@tcd.ie)
MEP55BM8	Active Implanted Devices and Systems	10	2	Prof. Alejandro Lopez Valdes (alopezva@tcd.ie)
EE5C01	Motion Picture Engineering	5	2	Prof. Anil Kokaram (anil.kokaram@tcd.ie)
ME5MM1	Advanced Manufacturing II	5	2	Prof. Amir Pakdel (pakdela@tcd.ie)

*The deadline for changing module choices is the end of week 1 of each semester.

Laboratories

If applicable, 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 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: Laboratory timetables will be forwarded to students via blackboard/email.

Project Safety Documents

Before undertaking any research within the department as part of your BAI/MAI project, a Project Safety Statement should be completed. This document should include an overview of your project and the lab you are working in, emergency procedures, standard operating procedures and risk assessments.

If your research introduces a new hazard (e.g. compressed gas, chemical, cryogenics) to the research lab, you should complete a New Hazard Safety Document. This document should include an overview of the new hazard, risk assessment, safety information and documentation.

Risk assessments for the above documents should be completed using the 5x5 risk rating method. All risk assessments must be signed by both you and your supervisor.
Completed safety documents should be emailed to the MMBE Safety Officer, Gordon.obrien@tcd.ie and uploaded to the Completed Risk Assessments folder of the Projects SharePoint.

The Safety Statement can be found on the Department of Mechanical, Manufacturing and Biomedical Engineering's Website.

Coursework Requirements

Policy on late submission

Coursework and assessment is an essential part of a student's learning to reinforce aspects of module content. For all years (JS/SS/MAI/MSc) and **ALL** modules within the Discipline of Biomedical Engineering the following applies:
Individual Coursework

1. Coursework received within two weeks of the due date will be graded, but a penalty will be applied
    - Up to 1 week late = minus 15%
    - From 1 week to 2 weeks late = minus 25%
2. Any submissions received two weeks after the due date will not be accepted and will receive a zero grade**.**
3. Submission dates may be extended in exceptional and extenuating 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.

Group work

1. The same penalties for late submissions will apply to group coursework as outlined for "Individual Coursework".

2. In addition, certain modules may also adopt an additional grading scheme whereby group projects/assignments will be graded as a function of lecture attendance. Please consult module coordinator.

Policy on participation in continuous assessment

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.

General Regulations

Attendance Requirements

Please note that attendance at lectures, tutorials and laboratory sessions is mandatory as is the submission of all work subject to continuous assessment. Regarding online teaching, attendance is mandatory at live lectures, tutorial and labs. Pre-recorded lectures should be viewed at the allocated slot on the timetable. Students who prove lacking in any of these elements may be issued with a non-satisfactory form and asked for an explanation for their poor attendance or performance. Students who do not provide a satisfactory explanation can be prevented from sitting the annual examinations. Please refer to College Calendar (18-25) outlining the College policy on attendance and related issues.

Absence from examinations

Please refer for the College Calendar.

Plagiarism

In the academic world, the principal currency is *ideas*. As a consequence, you can see that *plagiarism* – i.e. passing off other people's ideas as your own– *is tantamount to theft*. It is important to be aware that plagiarism can occur knowingly or unknowingly, and the offence is in the action not the intent.

Plagiarism is a serious offence within College and the College's policy on plagiarism is set out in a central online repository hosted by the Library. This repository contains information on what plagiarism is and how to avoid it, the College Calendar entry on plagiarism, and a matrix explaining the different levels of plagiarism outlined in the Calendar entry and the sanctions applied.

Undergraduate and postgraduate new entrants and existing students, are required to complete the online tutorial ***'Ready, Steady, Write'***. Linked to this requirement, all cover sheets which students must complete when submitting assessed work, must contain the following declaration:

I have read and I understand the plagiarism provisions in the General Regulations of the University Calendar for the current year.

I have also completed the Online Tutorial on avoiding plagiarism 'Ready, Steady, Write', located at https://libguides.tcd.ie/academic-integrity/ready-steady-write.

Plagiarism detection software such as "Turnitin" and Blackboard's "SafeAssign" may be used to assist in automatic plagiarism detection. Students are encouraged to assess their own work for plagiarism prior to submission using this or other software.

University regulations, policies and procedures

- Academic Policies - https://www.tcd.ie/teaching-learning/academic-policies/
- Student Complaints Procedure can be found in the complainst procedure policy in the policy section of TCD's main website.
- Dignity and Respect Policy - https://www.tcd.ie/media/tcd/about/policies/pdfs/hr/dignity-and-respect.pdf

Data Protection

A short guide on how College handles student data is available here: https://www.tcd.ie/info_compliance/data-protection/student-data/

Prizes and scholarships

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.

Collen Prize in Arts

This prize was founded in 1963 by a gift from L.D.G. Collen, M.A., M.A.I. The prize is awarded annually to the third-year engineering student who gives the best performance in the module 'management for engineers'. Value, €120.

Stanford-Smith Prizes

These prizes were founded in 1994 by a bequest from Raymond Thomas Kennedy in memory of his grandfather, Francis Stanford-Smith. They are awarded annually in the third year of the Bachelor in Engineering course based on the annual examinations in that year. The prize is awarded in six equal parts; each part is awarded to the student achieving the best examination results in the following engineering streams: (i) Biomedical Engineering, (ii) Civil, Structural and Environmental Engineering, (iii) Computer Engineering, (iv) Electronic and Electrical Engineering, (v) Electronic/Computer Engineering, (vi) Mechanical and Manufacturing Engineering. The value of each part is €350.

Depuy Synthes Prize

This prize was founded by Depuy Synthes in 2020 to recognise engineering scholarship and to support outstanding academic achievement among fourth year biomedical engineering students. The prize is awarded to the fourth-year engineering student with the highest marks in biomedical engineering. Value: €500.

Maurice F. Fitzgerald Prize

T his prize was instituted in 1961 by a bequest from Anna Maria FitzGerald. It is awarded annually, where sufficient merit is shown, by the nomination of trustees on the result of the examination for the degree of B.A.I. Candidates must have achieved distinction during the engineering course and have made or be making satisfactory arrangements for the advancement of their knowledge of engineering and progress in the profession of engineer. The value of the prize is approximately €2,500 and is currently administered through the Charities Regulatory Authority.

Wright Prize

This prize was founded in 1988 by subscription in appreciation of the work of William Wright, Professor of Engineering and Head of the School of Engineering 1957-85. The prize is awarded annually, provided sufficient merit is shown, to the student in the area designated who obtains the highest aggregate of marks at the examination for the degree of B.A.I.

The designated areas reflect the six Engineering streams currently offered and may be varied at the discretion of the School of Engineering Curriculum Committee. Value, €1,500.

Professor John Fitzpatrick Prize

This prize was established in 2013 by a bequest from the Department of Mechanical and Manufacturing Engineering in memory of the late Professor John Fitzpatrick, former Head of the School of Engineering and Chair of Mechanical Engineering. The prize is awarded annually to the best student in the M.A.I. (St.) degree as determined by the court of examiners. Value, not less than €400.

MAI Stream Engineering Prizes

These prizes were established in 2015 in order to recognise the best M.A.I. student in each of the engineering streams and are awarded annually to the student(s) obtaining the highest aggregate of marks at the annual M.A.I. examination. They are funded by the three departments in the School of Engineering and by the School of Computer Science and Statistics. Value, €30.

Ranalow Scholarship

These scholarships were founded in 2019 by Mr Brian Ranalow and H&K International Limited and will run for five years until the scheme closes in 2024. Three Ranalow Scholars are awarded annually, from all Engineering study streams, where sufficient merit is shown, by the nomination of trustees on the result of the examination for the degree of B.A.I. for students entering the M.A.I. year. There is a limit of one award per stream. Candidates must have achieved distinction during the engineering course and

personal achievements will be considered. The value of each prize is €6,500 (three prizes) to cover expenses in the M.A.I. year of study.

Health and Safety

We operate a 'safe working environment' policy and we take all practical precautions to ensure that hazards or accidents do not occur. We maintain safety whilst giving you the student very open access to facilities. Thus safety is also your personal responsibility and it is your duty to work in a safe manner. By adopting safe practices you ensure both your own safety and the safety of others.

Please familiarise yourself with the safety section of the MMBE website for all safety documents and information including the MMBE Safety Statement. You must read the MMBE Safety Statement and complete the online acknowledgement form if conducting any experimental or practical project work in MMBE.

If you are working in Trinity Centre for Biomedical Engineering Laboratories in Trinity Biomedical Sciences Institute, please contact Mr Simon Carroll, Senior Technical Officer at scarrol6@tcd.ie, to complete necessary Health and Safety paperwork prior to completing any laboratory work.

Please ensure you comply with the instructions given in these important documents. Failure to behave in a safe manner may result in you being refused the use of departmental facilities.

General Information

Feedback and evaluation

The Staff/Student Liaison Committee meets once a semester to discuss matters of interest and concern to students and staff. It comprises class representatives from each year. A programme level survey is issued online to students towards the end of semester 2.

European Credit Transfer 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 effort 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 effort, so a 5- credit module will be designed to require 100-125 hours of student effort including class contact time, assessments and examinations. ECTS credits are awarded to a student only upon successful completion of the programme year. Progression from one year to the next is determined by the programme regulations. Students who fail a year of their programme will not obtain credit for that year even if they have passed certain components. Exceptions to this rule are one-year and part-year visiting students, who are awarded credit for individual modules successfully completed.

Guidelines on Grades

The following Descriptors are given as a guide to the qualities that assessors are seeking in relation to the grades usually awarded. A grade is the anticipated degree class based on consistent performance at the level indicated by an individual answer. In addition to the criteria listed examiners will also give credit for evidence of critical discussion of facts or evidence.

Guidelines on Grades for Essays and Examination Answers:

Mark Range	Criteria
90-100	IDEAL ANSWER; showing insight and originality and wide knowledge. Logical, accurate and concise presentation. Evidence of reading and thought beyond course content. Contains particularly apt examples. Links materials from lectures, practicals and seminars where appropriate.
80-89	OUTSTANDING ANSWER; falls short of the 'ideal' answer either on aspects of presentation or on evidence of reading and thought beyond the course. Examples, layout and details are all sound.
70-79	MAINLY OUTSTANDING ANSWER; falls short on presentation and reading or thought beyond the course but retains insight and originality typical of first class work.
65-69	VERY COMPREHENSIVE ANSWER; good understanding of concepts supported by broad knowledge of subject. Notable for synthesis of information rather than originality. Sometimes with evidence of outside reading. Mostly accurate and logical with appropriate examples. Occasionally a lapse in detail.
60-64	LESS COMPREHENSIVE ANSWER; mostly confined to good recall of coursework. Some synthesis of information or ideas. Accurate and logical within a limited scope. Some lapses in detail tolerated.

55-59	SOUND BUT INCOMPLETE ANSWER; based on coursework 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.
35-39	MARGINAL FAIL; inadequate answer, with no substance or understanding, but with a vague knowledge relevant to the question.
30-34	CLEAR FAILURE; some attempt made to write something relevant to the question. Errors serious but not absurd. Could also be a sound answer to the misinterpretation of a 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 in-progress).

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 in-progress) 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 organisation adequate to good.
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. Insufficient attention to organisation and presentation of the report.
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.

Student Supports

Trinity College provides a wide range of personal and academic supports for its students.

Tutors

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 or her care. Whilst your tutor may be one of your lecturers, the role of tutor is quite separate from the teaching role. Tutors are a first point of contact and a source of support, both on arrival in college and at any time during your time in college. They provide confidential help and advice on personal as well as academic issues or on anything that has an impact on your life. They will also, if necessary, support and defend your point of view in your relations with the college. If you cannot find your own tutor, you can contact the Senior Tutor.

Student Counselling Services

The Student Counselling Service, 3rd Floor, 7-9 South Leinster Street, College. Opening hours: 9:15 am to 5:10 pm Monday to Friday during lecture term.

- Tel: 01 896 1407
- Email: student-counselling@tcd.ie
- Web: http://www.tcd.ie/Student_Counselling.

College Health Service

The Health Centre is situated on Trinity Campus in House 47, a residential block adjacent to the rugby pitch.

- Opening hours: 09.00 - 16.40 with emergency clinics from 09.00 - 10.00.
- Tel: 01 896 1591 or 01 896 1556
- Web: https://www.tcd.ie/collegehealth/

Chaplaincy

The Chaplains are representatives of the main Christian Churches in Ireland who work together as a team, sharing both the college chapel and the chaplaincy in House 27 for their work and worship.

- Steve Brunn (Anglican Chaplain): brunns@tcd.ie; tel: 01 896 1402
- Alan O'Sullivan (Catholic Chaplain): aeosulli@tcd.ie; tel: 01 896 1260
- Peter Sexton (Catholic Chaplain): sextonpe@tcd.ie; tel: 01 896 1260
- Web: https://www.tcd.ie/Chaplaincy/

Trinity Disability Service

Declan Treanor, Disability Services Coordinator Room 3055, Arts Building

- Email: mdtreanor@tcd.ie
- Tel: 01 896 3475
- Web: https://www.tcd.ie/disability/

Niteline

A confidential student support line run by students for students which is open every night of term from 9pm to 2.30am.

- Tel: 1800 793 793
- Web: https://niteline.ie/

Student's Union Welfare Officer

House 6, College

- Email: welfare@tcdsu.org
- Web: https://www.tcdsu.org/welfare-equality

Maths Help Room

The Maths Help Room offers free assistance to students who are having difficulty with Mathematics, Statistics or related courses. It runs every week of term and at certain times out of term. The Maths help-room is a drop in centre, where you can bring in a maths or stats question and get some help.

The Help Room is located in the New Seminar Room in House 20 in the School of Mathematics in the Hamilton Building.

Undergraduate Programming Centre

The Programming Centre is available to all Computer Engineering students free of charge. The centre operates as a drop-in service where you can get help with any problems you might have with programming in your courses. For further information, please visit http://www.scss.tcd.ie/ugpc/.

Student Learning Development

Student Learning Development provides learning support to help students reach their academic potential. They run workshops, have extensive online resources and provide

individual consultations. To find out more, visit their website at https://student-learning.tcd.ie/.

Student 2 Student (S2S)

S2S offers trained Peer Supporters for any student in the College who would like to talk confidentially with another student, or just to meet a friendly face for a chat. This service is free and available to everyone.

- To contact a Peer Supporter you can email: student2student@tcd.ie
- Web: https://student2student.tcd.ie/peer-support/

Trinity Careers Service

As a Trinity College Dublin student you have access to information, support and guidance from the professional team of expert Careers Consultants throughout your time at Trinity.

The support offered includes 'next step' career guidance appointments, CV and LinkedIn profile clinics and practice interviews. The Trinity Careers Service and the School of Engineering also hold an annual Careers Fair in October which gives students the opportunity to find out about career prospects in over fifty companies.

- Web: https://www.tcd.ie/Careers/.

Co-Curricular Activities

Trinity College has a significant number of diverse student societies which are governed by the Central Societies Committee. They provide information on the societies including how to get involved and even how to start your own society. See http://trinitysocieties.ie/ for more details. Students are encouraged to get involved.

Trinity College also has a huge range of sports clubs which are governed by the Dublin University Athletic Club (DUCAC). See https://www.tcd.ie/sport/student-sport/sport-clubs/ for more details.

Trinity College Student's Union

The Trinity College Students' Union (TCDSU) is run for students by students. TCDSU represent students at college level, fight for students' rights, look after students' needs, and are here for students to have a shoulder to cry on or as a friend to chat with over a cup of tea. Students of Trinity College are automatically members of TCDSU. It has information on accommodation, jobs, campaigns, as well as information pertaining to education and welfare. For more information see https://www.tcdsu.org/.

Emergency procedure

In the event of an emergency, **dial Security Services on 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 always telephone 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 students save at least one emergency contact in their phone under ICE (in Case of Emergency).

Cyberbullying

Cyberbullying refers to bullying which is carried out using the internet, mobile phone or other technological devices and platforms. In general, cyberbullying is psychological rather than physical but is often part of a wider pattern of 'traditional' bullying (Reference-Union of students in Ireland cyberbullying-policy: https://usi.ie/policy/usi-cyberbullying-policy/).

We ask students to familiarise themselves with the college Dignity and Respect policy which supports a respectful work and study environment free from bullying and harassment.