Introduction

This is the course handbook of the Computer Science degree programme offered by the School of Computer Science and Statistics in Trinity College Dublin. The integrated Computer Science degree programme leads to a **BA Moderatorship in Computer Science degree** after four years and a **Master in Computer Science (MCS) degree** after five. This handbook contains information and regulations for all Computer Science degree programme students. It provides a guide to what is expected of you on this programme, and the academic and personal support available to you. Please retain it for future reference.

We are confident that you will find this programme challenging and demanding, and we hope that you will find your studies at Trinity College Dublin both stimulating and rewarding. Our courses have been designed to offer students a dynamic, structured and coherent learning experience. Our programme has several features which we believe will contribute to your studies being an effective and enjoyable period of personal and academic development.

If you are a new student to university, we invite you to read *First Year in University*, on page 8, which may help you understand what you need to do to have an enjoyable and productive time at college. You are also very strongly recommended to meet your tutor (see page 5) as he or she is your advocate in College and can also provide you with support should you have any difficulties.

We wish you every success in the coming year.


Notes:

Information provided in this handbook is believed to be accurate at the time of preparation except where noted. Any necessary revisions will be notified by college email. Please note that, in the event of any conflict or inconsistency between the General Regulations published in the University Calendar and information contained in course handbooks, the provisions of the General Regulations will prevail. The University Calendar is available at [http://www.tcd.ie/calendar/](http://www.tcd.ie/calendar/).

This handbook is available from the School of Computer Science and Statistics website. A hard copy of this document is available from the School Reception office on request.
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Recent Changes

- September 2019: New version released for academic year 2019-20 including change of modules in year 1, details of the new programme for JF students in Appendix A, “Broad Curriculum” to “Trinity Elective” in year 2, a specific requirement to finalise option choices within 2 weeks of the start of any semester, that the undergraduate regulations in the Calendar apply to year 5 of this programme, change of the external examiner, and a change of module codes for most modules.

- December 2019: Minor update with an updated link for the Gold Medal information provided by Academic Registry, details of the new External Examiner, and an updated version of the Progression to the Masters Programme regulations (which is now the same as that shown in the Calendar).
1 General Information

1.1 Trinity College Dublin

Trinity College Dublin (TCD)—the College of the Holy and Undivided Trinity of Queen Elizabeth near Dublin—was founded in 1592 by Queen Elizabeth I. Trinity is sometimes referred to as the University of Dublin or Dublin University. Today, Trinity has nearly 800 academics catering for more than 16,500 students (of whom over 25% are postgraduates). TCD is recognized internationally as Ireland’s premier university and ranks very highly among European and world universities.

1.2 Student Supports

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

1.2.1 Personal or Academic Concerns: 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, any other tutor will help as will the Senior Tutor (phone 8962551).

1.2.2 Personal Concerns: Other sources of Assistance

- 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. Phone: 8961407. Email: student-counselling@tcd.ie. Web: http://www.tcd.ie/Student_Counselling.

- Niteline (Thursday to Tuesday during term time only, 9 pm–2.30 am) Phone: 1800 793 793. Web: http://www.niteline.ie/.

- The College Health Service, House 47, College. Medical Director: Dr David McGrath. Phone: 8961591 or 8961556.

- The Welfare Officer, Students’ Union, House 6, College. Email: welfare@tcdsu.org;

  - Peter Sexton SJ (Catholic) 8961260
  - Steve Brunn (Church of Ireland) 8961402
  - Julian Hamilton (Methodist) 8961901

Web: http://www.tcd.ie/chaplaincy

- Any student, member of staff or other person with whom you feel able to discuss your concerns;
• Disability Services Coordinator, Mr Declan Treanor, Room 3055, Arts Building, phone: 8963475, email: dtreanor@tcd.ie

1.2.3 Academic Concerns: Programming Centre

The Programming Centre is available to all Computer Science 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/.

1.2.4 Academic Concerns: 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. The service is offered by the College’s Student Counselling Service. To find out more, visit their website at http://www.tcd.ie/Student_Counselling/student-learning/.

1.2.5 Academic Concerns: 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 helproom is a drop in centre, where you can bring in a maths or stats question and get some help. It is run by the School of Mathematics and further information is available at http://www.maths.tcd.ie/~mathshelp/.

1.2.6 Academic Concerns: Other sources of Assistance

• Other students in the class.

• The course lecturer.

• Your class representatives.

• Your tutor (or any other tutor if you cannot find yours), or the Senior Tutor.

• The Course Director or the Course Coordinator.

• The Students’ Union Education Officer, email education@tcdsu.org), web http://www.tcdsu.org.

• Peer Mentors. Junior Freshmen are introduced to their Peer Mentors during Freshers’ Week. The Student to Student Service runs also provides peer mentoring for the other years. For information about all Student to Student services, please email student2student@tcd.ie or phone 8962438. See Figure 1.

NOTE: IF YOU HAVE A CONCERN OF ANY SORT, PLEASE TALK TO SOMEONE STRAIGHT AWAY
Figure 1: Student to Student services
1.3 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 http://www.tcd.ie/Sport/student-sport/ducac/?nodeId=94&title=Sports_Clubs for more details.

1.4 Student organisations

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/.

The Trinity Graduate Students’ Union (TCD GSU) is the main representative body for postgraduate students in Trinity College. For more information see https://www.tcdgsu.ie/.

1.5 Emergency Procedure

In the event of an emergency, dial Security Services on extension 1999 (+353-1-8961999 from a mobile phone or an external landline). 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).

1.6 Data Protection

Trinity College Dublin uses personal data relating to students for a variety of purposes. We are careful to comply with our obligations under data protection laws and we have prepared a short guide (available at https://www.tcd.ie/info_compliance/data-protection/student-data/) to ensure you understand how we obtain, use and disclose student data in the course of performing University functions and services.

1.7 First Year in University

Everybody says college is different from school. Of course, in lots of obvious ways it is different, and no doubt you’ll enjoy finding out just what those differences are. In
not-so-obvious ways though, college is very different from school, and in this section we concentrate on how the academic side of university life is different and what you need to do about it.

1. You are not at school. We want you to do more than simply reproduce what you are told in a lecture. You need to get a good command of the material. In computing-related disciplines, the best way to do this—and the best way to know that you have really learned something—is to apply your new knowledge to solving new problems; not just the examples done in class, but to similar problems you’ll find in textbooks or elsewhere (later on, as a professional computer scientist, you will have to apply your knowledge to problems you have never seen before—now is the time to start).

2. Expect the material to be covered much faster than at school. Lecture time is at a premium, so it must be used efficiently. You cannot be taught everything in lectures and tutorials. It is your responsibility to learn the material. Most of this learning will take place outside the classroom, and you must be willing to put in the study time necessary to ensure that this learning takes place. If you do fall behind in a course—that is, if you can’t continue to understand the lectures as they are given—then you really need to make the effort to catch up right away. Don’t be tempted to think that you can somehow catch up at the end of the year—it’s almost impossible.

3. A lecturer’s job is primarily to provide you with a framework, with some of the particulars, to guide you in doing your learning of the concepts and methods that comprise the material of the course. It is not to ‘programme’ you with isolated facts and problem types or to monitor your progress. Your job is to fill out that framework with a thorough understanding of the material.

4. You are expected to read the textbook for comprehension. It gives the detailed account of the material of the course. It also contains many examples of problems worked out, and these should be used to supplement those you see in the lecture. The textbook is not a novel; you cannot simply skim through it from start to finish. Reading the textbook must often be slow-going and careful; frequently you’ll need to use pencil and paper to work through the material, but you can work at your own pace.

5. As for when to read the textbook, it’s a good idea to read the appropriate section ahead of the lecture. This way, although you may not understand it fully, you’ll be prepared for the lecture, and you’ll have a good idea what areas to ask questions about. If you haven’t looked at the book beforehand, pick up what you can from the lecture (absorb the general idea and/or take thorough notes) and count on sorting it out later while studying the book and transcribing your notes.

6. Laboratories and tutorials are far more important than the marks you might get for them, because they give you a chance to develop your understanding of the subject. They are also a good ‘reality check’ for you to see just how much you really do understand. Use them wisely.
7. In examinations, the examiners set out to probe your mastery of the material in the course. Primarily, they'll be looking for your command of the material, as noted above. You'll probably have to solve problems you've never seen before. (To be sure, you'll have encountered similar problems, but they won't be the same.) Hence, preparing for examinations simply by remembering lots of answers without understanding them simply won't work; examinations test your understanding of the material as well.

This section is adapted from Teaching at the University Level by Steven Zucker in Notices of the AMS August 1996.
2 General Programme Information

The Computer Science degree programme is a five-year course leading to

- (after four years) an honors degree in Computer Science. Honors\(^1\) degrees are traditionally called *Moderatorships* in Trinity, thus the formal title of the degree is *B.A. (Mod.) in Computer Science*.

- and (after five years) the degree of *Master in Computer Science*.

This programme, established in 1979, is the longest established computer science programme in Ireland. The aim of the programme is to bring you to a thorough understanding of the principles and practice of computer science and to prepare you to contribute fully and effectively as a member of the professional computer science community, in industry or the academic world.

On successful completion of the programme, you should be able to:

- Develop and apply computer systems from a broad base of knowledge in mathematics, computer science, computer technology and human factors.

- Identify and formulate advanced technical challenges and demonstrate judgement to design appropriate computer science solutions.

- Design systems, components or processes to meet specified functional objectives and to measure and analyse performance against these objectives.

- Understand and express the role of computer science in the community including the need for high standards of ethical behaviour and professional responsibility.

- Work effectively, independently and within multidisciplinary teams, and act as a mentor in team settings and engage in lifelong learning.

- Communicate effectively both professionally with other computing professionals and with the wider community.

- Participate in contemporary research activity as appropriate and demonstrate the knowledge and skills needed to undertake independent research.

2.1 Contact Details

The *School of Computer Science and Statistics* (SCSS) was formed in 2005 by the amalgamation of the Department of Computer Science and the Department of Statistics. The School has more than 60 academic staff and more then 200 full-time postgraduate students and support staff. It comprises five academic disciplines: (i) Software and Systems, (ii) Artificial Intelligence, (iii) Networks and Distributed Systems, (iv) Graphics & Vision and (v) Statistics & Information Systems.

Reception beside Room G.8 in the O’Reilly Institute.

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\(^{1}\)This is the correct spelling of the word when applied to degrees awarded in TCD.
Opening hours during lecture terms are 9:15 am to 11:00 am, 11:30 am to 1:00 pm and 2:00 pm to 4:30 pm.

Tel (01) 896 1765

Fax (01) 677 2204

Email enquiries@scss.tcd.ie

Web http://www.scss.tcd.ie/

Address School of Computer Science and Statistics, O’Reilly Institute, Trinity College Dublin, Dublin 2. Ireland.

2.2 Academic and Administrative Staff

Dr Kenneth Dawson-Howe Course Director
Dr Jonathan Dukes Director of Undergraduate Teaching and Learning
Prof Carol O’Sullivan Head of School
Ms. Hannah Archbold Administration Officer, Teaching Support Unit

The Course Director is Dr Kenneth Dawson-Howe who can be contacted by email at kenneth.dawson-howe@scss.tcd.ie. Please note that, in the first instance, all enquiries regarding modules, assignments, feedback and supervision should be directed to the administrative staff in the Teaching Support Unit who will then, where appropriate, inform the director and coordinator. The Teaching Support Unit can be contacted by emailing teaching-unit@scss.tcd.ie.

2.3 Key Dates

The key dates of the Academic Year are specified by the College at https://www.tcd.ie/calendar/academic-year-structure/. All students must attend College during all Teaching and Learning weeks and during all Assessment weeks (including Saturdays). It should be noted that examinations can be scheduled during Trinity week and might even be scheduled towards the end of the Revision weeks.
Submission deadlines for coursework are specified by the individual modules.

2.4 Timetables

Timetables are provided through https://my.tcd.ie/ but are also made available at https://scss.tcd.ie/undergraduate/timetables.php.
2.5 Key Locations and means of communication

The School of Computer Science and Statistics is based in the O’Reilly Institute as are some of the laboratories and small meeting rooms. Most of the lectures/tutorials take place in the Hamilton building, the Lloyd building or in Goldsmith Hall although they can be scheduled anywhere within the University. A searchable online campus map is provided at https://www.tcd.ie/Maps/map.php.

Communications from many College services will be sent to you via your online portal at https://my.tcd.ie, which will give you access to an ‘in tray’ of your messages. You can view your timetables online, both for your teaching and for your examinations. Fee invoices and payments, student levies and commencement fees will be issued online and all payments will be carried out online. You can view your personal details in the new system—some sections of which you may edit yourself.

The ‘TCD Blackboard’ online learning system is accessible via http://mymodule.tcd.ie.
Examination results are published online by the Examinations Office via https://my.tcd.ie.

Lecturers, tutors and support staff may contact you using your College email address, which you can access through http://myzone.tcd.ie. It is expected that you will check your College email regularly. The use of other email addresses for official communication is discouraged.

The Academic Registry (see https://www.tcd.ie/academicregistry/about/) provides central academic administrative services in support of Undergraduate and Postgraduate Admissions, Fees & Payments, Annual Student Registration, Lecture Timetables, Erasmus & Study Abroad, Examinations, Assessment & Progression and Commencements & Graduation.

2.6 Internships/Placements for Credit

It is possible for students to spend the third year of the programme studying abroad. Details are provided in Section 3.5.

An industry/research lab placement is an integral part the fourth year of the five year MCS programme. For more information about internships, please visit https://www.scss.tcd.ie/internships/.

2.7 Health and Safety

Figure 2 (p.16) shows the five-year composition of the programme. Students typically enter Year 1 from secondary school via the Central Applications Office (CAO) system.

Students normally exit the programme at the end of Year 4, with a B.A. (Mod.) in Computer Science degree, or at the end of Year 5, with a Master in Computer Science degree in addition to the B.A. (Mod.) in Computer Science degree. Provision is made for students to exit the programme with an ordinary B.A. degree at the end of Year 3.

The terms Junior Fresh, Senior Fresh, Junior Sophister and Senior Sophister are widely used in Trinity to refer to a first-year, second-year, third-year and fourth-year student respectively; thus, for example, Junior Fresh year, (or JF year), refers to Year 1.

In the first three years, instruction is given in the theoretical underpinnings of computer science along with courses in hardware and software. In the later years, students may select a number of options in addition to core courses. Students participating in the MCS course are required to engage in a one-semester internship in industry or in a university research laboratory in Year 4 (and to be allowed engage in this internship students must get 60% or more in their first attempt at the Year 3 examinations; If a student repeats Year 3, it is the mark from their first attempt at the repeat Year 3 examinations which is considered). In Year 5, students undertake a significant project with a substantial element of independent research leading to a dissertation.

The teaching year is divided into two twelve-week semesters. The first semester is the Michaelmas Term, the second is the Hilary Term. The seventh week of each semester is

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2The names come from traditional Christian feast days: Michaelmas Day is September 29 and St Hi-
a reading week, during which no lectures are held.

Subjects are taught in modules. Modules may be taught for one or two semesters, and consist of lectures, tutorials, seminars, and laboratory sessions. All students on the programme take the same modules in Year 1, Year 2 and Year 3. From Year 4 onwards, students take some compulsory modules and a selection of elective modules. Each module is assigned an European Credit Transfer System (ECTS) rating. Modules in the first three years are each assigned 5 or 10 ECTS credits (where typically full year modules are assigned 10 ECTS credits and one semester modules are assigned 5 ECTS credits). Projects, dissertations and internships in Year 4 and Year 5 are assigned more credits.

3.2 Plagiarism

It is important to highlight that all work submitted must be your own, and not taken directly from the internet or other sources. The College takes plagiarism seriously (See the College plagiarism policy at http://www.tcd.ie/teaching-learning/assets/pdf/PlagPolicy02-06-2016.pdf). The College regulations governing plagiarism are available in the college calendar and are copied in Appendix B. You are expected to be familiar with these rules and to understand what is considered plagiarism. Before beginning your first assignment, you must complete the online tutorial on avoiding plagiarism Ready, Steady, Write, located at http://tcd-ie.libguides.com/plagiarism/ready-steady-write.

Please note that our School may use tools such as TurnItIn to identify plagiarism.

You are also encouraged to use the College Library’s repository of resources on plagiarism and its avoidance at http://tcd-ie.libguides.com/plagiarism In the case of group work, groups should establish some mechanism to ensure that no member engages in plagiarism. Do not sign the Group Assignment Declaration if you have not assured yourself that the whole assignment is original.

3.3 European Credit Transfer System

The European Credit Transfer System (ECTS) is an academic credit transfer and accumulation system representing the student workload required to achieve the specified objectives of a study programme.

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.

In College, one ECTS unit is defined as 20–25 hours of student input so a five-credit module will be designed to require 100–125 hours of student input including class contact time and independent or group work. Each year of the programme is composed of modules worth a total of 60 credits. Where there is the option to choose from a range of modules, it is the responsibility of the student to ensure that they successfully complete modules worth 60 credits.

lary’s Day is January 13.
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. Exceptions to this rule are one-year and one-semester visiting students, who are awarded credit for individual modules successfully completed.

3.4 Programme Structure & Workload

3.4.1 Year 1 – Junior Fresh Year

In Year 1 (referred to as the Junior Fresh (JF) year in Trinity), students take the following full year and half year modules:

<table>
<thead>
<tr>
<th>Michaelmas Term</th>
<th>Hilary Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSU11001 Mathematics I</td>
<td>CSU11002 Mathematics II</td>
</tr>
<tr>
<td>CSU11010 Introduction to Programming</td>
<td>CSU11022 Introduction to Computing II</td>
</tr>
<tr>
<td>CSU11026 Digital Logic Design</td>
<td>CSU11013 Programming Project I</td>
</tr>
<tr>
<td>CSU11031 Electrotechnology and Information Technology</td>
<td>STU11002 Statistical Analysis I</td>
</tr>
<tr>
<td>CSU11081 Computers and Society</td>
<td></td>
</tr>
</tbody>
</table>

Brief descriptions of the modules are provided on the course website (See https://www.cs.tcd.ie/undergraduate/computer-science/jf/). Full details, including learning outcomes, book recommendations and important evaluation and assessment criteria are available at http://my.tcd.ie.

3.4.2 Year 2 – Senior Fresh Year

For students in JF in 2019-20 onwards the senior freshman year is somewhat different. Please see Appendix A for details.

In Year 2 (referred to as the Senior Fresh (SF) year in Trinity), students take the following full year and half year modules:

<table>
<thead>
<tr>
<th>Michaelmas Term</th>
<th>Hilary Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSU22010 Algorithms &amp; Data Structures</td>
<td>CSU22016 Concurrent Systems and Operating Systems</td>
</tr>
<tr>
<td>CSU22014 Systems Programming</td>
<td>CSU22021 Microprocessor Systems</td>
</tr>
<tr>
<td>CSU23031 Telecommunications II</td>
<td>CSU23022 Computer Architecture I</td>
</tr>
<tr>
<td>CSU22041 Information Management I</td>
<td>MAU22C00 Discrete Mathematics</td>
</tr>
<tr>
<td>Trinity Elective*+</td>
<td>CSU22013 Software Engineering Project I</td>
</tr>
</tbody>
</table>

*All Trinity Elective modules have an ECTS weighting of 5 credits. +See https://www.tcd.ie/trinity-electives/

Brief descriptions of the modules are provided on the course website (See https://www.cs.tcd.ie/undergraduate/computer-science/sf/). Full details, including learning outcomes, book recommendations and important evaluation and assessment criteria are available at http://my.tcd.ie.
3.4.3 Year 3 – Junior Sophister Year

For students in JF in 2019-20 onwards the junior sophister year is somewhat different. Please see Appendix A for details.

In Year 3 (referred to as the Junior Sophister (JS) year in Trinity), students take the following half year modules:

<table>
<thead>
<tr>
<th>Michaelmas Term</th>
<th>Hilary Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSU34011 Symbolic Programming</td>
<td>CSU33081 Computational Mathematics</td>
</tr>
<tr>
<td>CSU33012 Software Engineering</td>
<td>CSU33013 Software Engineering Project II</td>
</tr>
<tr>
<td>CSU34021 Computer Architecture II</td>
<td>CSU33014 Concurrent Systems I</td>
</tr>
<tr>
<td>CSU33071 Compiler Design I</td>
<td>STU33009 Statistical Methods for Computer Science</td>
</tr>
<tr>
<td>CSU34016 Introduction to Functional Programming</td>
<td>CSU34031 Advanced Telecommunications</td>
</tr>
<tr>
<td>CSU34041 Information Management II</td>
<td>CSU33061 Artificial Intelligence I</td>
</tr>
</tbody>
</table>

All modules have an ECTS weighting of 5 credits.

Brief descriptions of the modules are provided on the course website (See https://www.cs.tcd.ie/undergraduate/computer-science/js/). Full details, including learning outcomes, book recommendations and important evaluation and assessment criteria are available at http://my.tcd.ie.
3.4.4 Year 4 – Senior Sophister Year

For students in JF in 2019-20 onwards the senior sophister year is very slightly different. Please see Appendix A for details.

During the first few weeks of Year 4 (referred to as the Senior Sophister (SS) year in Trinity), students have to decide whether they are going to take the 5 year Masters (MCS) programme or the 4 year Bachelors (BA (Mod.)) programme. As a result there are two possible versions of Year 4:

<table>
<thead>
<tr>
<th>Michaelmas Term</th>
<th>Hilary Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSU44051 Human Factors (5 credits)</td>
<td>CS7091 Industrial / Research Lab Internship (30 credits) * + 5 year MCS programme</td>
</tr>
<tr>
<td>All students</td>
<td></td>
</tr>
<tr>
<td>CSU44081 Entrepreneurship and High Tech Venture Creation (5 credits)</td>
<td>CSU44098 Group Design Project (10 credits) 4 year B.A.(Mod) programme</td>
</tr>
<tr>
<td>All students</td>
<td></td>
</tr>
<tr>
<td>Final Year Options (4*5 credits) ++</td>
<td>CSU44099 Final Year Project (20 credits) ** 4 year B.A.(Mod) programme</td>
</tr>
<tr>
<td>All students</td>
<td></td>
</tr>
</tbody>
</table>

* For more information about internships, please visit https://www.scss.tcd.ie/internships/
+ To take the internship students must get 60% or more in their first attempt at the Year 3 examinations.
++ Students must select four options from the Year 4 Options in the Options Table below.
** For more information about final year projects, please visit https://www.scss.tcd.ie/StudentProjects/.

The Year 4 options, all of which count for 5 ECTS credits, are as follows.

<table>
<thead>
<tr>
<th>Year 4 Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSU44000 Scalable Computing</td>
</tr>
<tr>
<td>CSU44001 Fuzzy Logic</td>
</tr>
<tr>
<td>CSU44004 Formal Verification Techniques</td>
</tr>
<tr>
<td>CSU44012 Topics in Functional Programming</td>
</tr>
<tr>
<td>CSU44021 Advanced Computer Architecture</td>
</tr>
<tr>
<td>CSU44031 Next Generation Networks</td>
</tr>
<tr>
<td>CSU44052 Computer Graphics</td>
</tr>
<tr>
<td>CSU44053 Computer Vision</td>
</tr>
<tr>
<td>CSU44061 Machine Learning</td>
</tr>
<tr>
<td>CSU44062 Advanced Computational Linguistics</td>
</tr>
</tbody>
</table>

An Options presentation will be held during Hilary Term for Year 3 students and students select their options by submitting a (provided) form by a deadline typically in the middle of April. Please note that not all options may run in a given year depending on demand and availability of appropriate staff to teach the options. Students may change options by informing the teaching unit up to the end of the second week of Michaelmas Term. Late changes will not be accepted.

Brief descriptions of the modules are provided on the course website (See https://www.cs.tcd.ie/undergraduate/computer-science/ss/). Full details, including learning outcomes, book recommendations and important evaluation and assessment criteria are available at http://my.tcd.ie.
3.4.5 Year 5 – MCS Year

In Year 5, in addition to one compulsory course, students select five options and a major dissertation topic:

<table>
<thead>
<tr>
<th>Michaelmas Term</th>
<th>Hilary Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS7CS1 Research Methods (5 credits)</td>
<td>CS7092 MCS Dissertation (30 credits) *</td>
</tr>
<tr>
<td>Year 5 Options (25 credits) +</td>
<td></td>
</tr>
</tbody>
</table>

* For more information, see https://www.scss.tcd.ie/StudentProjects/.
+ Students must select options totalling 25 credits from the Year 5 Options below.

The Year 5 options, which all count for 5 ECTS credits, are as follows. (Please note that not all options may run in a given year and some options have prerequisites.) Students should be aware that they should not take modules with significant overlap with modules which they took in year 4 (e.g. students who took CS4032 should not take CS7NS6). Students may change options by informing the teaching unit up to the end of the second week of the semester in which the options are run. Late changes will not be accepted.

<table>
<thead>
<tr>
<th>Year 5 Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS7CS2: Innovation</td>
</tr>
<tr>
<td>CS7CS4: Machine Learning</td>
</tr>
<tr>
<td>CS7DS2: Optimisation Algorithms for Data Analysis</td>
</tr>
<tr>
<td>CS7DS3: Applied Statistical Modelling</td>
</tr>
<tr>
<td>CS7DS4: Data Visualisation</td>
</tr>
<tr>
<td>CS7GV1: Computer Vision</td>
</tr>
<tr>
<td>CS7GV2: Mathematics of Light and Sound</td>
</tr>
<tr>
<td>CS7GV3: Real-time Rendering</td>
</tr>
<tr>
<td>CS7GV4: Augmented Reality</td>
</tr>
<tr>
<td>CS7GV5: Real-time Animation</td>
</tr>
<tr>
<td>CS7GV6: Computer Graphics</td>
</tr>
<tr>
<td>CS7IS1: Knowledge and Data Engineering</td>
</tr>
<tr>
<td>CS7IS2: Artificial Intelligence</td>
</tr>
<tr>
<td>CS7IS3: Information Retrieval and Web Search</td>
</tr>
<tr>
<td>CS7IS4: Text Analytics</td>
</tr>
<tr>
<td>CS7IS5: Adaptive Applications</td>
</tr>
<tr>
<td>CS7NS1: Scalable Computing</td>
</tr>
<tr>
<td>CS7NS2: Internet of Things</td>
</tr>
<tr>
<td>CS7NS3: Next Generation Networks</td>
</tr>
<tr>
<td>CS7NS4: Urban Computing</td>
</tr>
<tr>
<td>CS7NS5: Security and Privacy</td>
</tr>
<tr>
<td>CS7NS6: Distributed System</td>
</tr>
<tr>
<td>EE5C1: Digital Media Studies</td>
</tr>
</tbody>
</table>

Brief descriptions of the modules are provided on the course website (See https://www.cs.tcd.ie/undergraduate/computer-science/y5/). Full details, including learning outcomes, book recommendations and important evaluation and assessment criteria are available at http://my.tcd.ie.
3.5 Study Abroad

Students on the ICS programme can spend their third year abroad as long as they achieve an overall II.1 in their annual examinations in Junior Fresh. There are two schemes: (1) Erasmus which has a limited number of places and which is coordinated by Dr. Carl Vogel (email: Carl.Vogel@scss.tcd.ie), and (2) Trinity College Dublin also has some exchanges with universities in North America (which are not conducted with Erasmus support). Information about those exchanges may be obtained through the Academic Registry. Interested students should contact Dr. Vogel and/or the Academic Registry during the summer after they obtain the Junior Fresh results.

3.6 Coursework Requirements

Coursework is an integral part of Computer Science and it is essential that every student participates fully in the coursework associated with each module. If a student does not make a serious attempt at the coursework in a module this is considered in the same way as if a student does not make a serious attempt at an examination. Any student who submits less than two thirds of their coursework in a module is considered as not making a serious attempt. In such circumstances, if the student fails the module overall, they may be excluded from the degree programme at the discretion of the Examination Board.

Timely submission of coursework is particularly important as this is a vital professional skill. The penalties for late submission of coursework may be specified by the individual module lecturers, but in the absence of any such specification the following penalties will apply:

- In the case of fourth and fifth year dissertations and internship reports, late submissions are penalised by 5% per ‘day’, and a mark of 0% is awarded if the submission is more than 2 weeks after the deadline.

- In fourth and fifth year late submissions of coursework other than dissertations and internship reports are penalised by 10% per ‘day’ and a mark of 0% is awarded if the submission is more than 2 weeks after the deadline for submission.

- In all other years late submissions are penalised by 20% per ‘day’ and a mark of 0% is awarded if the submission is more than 1 week after the deadline for submission.

In the case of electronic submission, a ‘day’ is taken to be a 24 hour period (or any part thereof). In the case where physical submission is required a ‘day’ is taken to be a working day or any part thereof. For coursework which must be submitted in both electronic and physical form the larger of the two penalties will be applied. In all cases a week is a calendar week.

If there are extenuating circumstances warranting late submission students must request extensions through their tutors in advance of the deadline for submission. Extenuating circumstances include only serious circumstances such as certified medical conditions and bereavements.

Coursework marks are normally computed and returned as numerical values (e.g. as percentages). Guidelines for the presentation and submission of work are provided separately for each module.

It is the responsibility of each student to retain a copy of any coursework that they submit.
3.6.1 Grade Descriptors

The requirements of each piece of coursework differ depending on the year of study as well as the nature of the problem. To give an idea of what each grade equates to in a qualitative fashion, the following is an indication of the standard expected of dissertations/projects which are done in year 4:

I+ (80 - 100 Marks) An upper first project is one which is exceptionally good for an undergraduate and which displays:

- thorough understanding of the project area
- excellent knowledge of the relevant literature
- comprehensive development of the technical theme including an element of originality
- exemplary presentation and analysis of results
- sound critical evaluation
- well organised and excellently presented report

I (70 - 79 Marks) A standard first class project is one which rates as very good for an undergraduate and which displays:

- good understanding of the project area
- sound knowledge of the relevant literature
- complete development of the technical theme with at least some novel thinking
- comprehensive presentation and full analysis of the results
- clear evidence of an ability to critically evaluate
- logically organised and very well presented report

II.1 (60 - 69 Marks) An upper second class project is one which clearly rates as a good project and which displays:

- reasonably good understanding of the project area
- some knowledge of the relevant literature
- sound development of the technical theme
- clear presentation and relevant analysis of results
- some critical evaluation, perhaps limited in scope
- well organised and well presented report

II.2 (50 - 59 Marks) A lower second class project is one which rates as moderately good and which displays:

- some understanding of the project area
- limited knowledge and appreciation of the relevant literature
- limited development of the technical theme
basic presentation and analysis of results
– no originality or critical evaluation
– insufficient attention to organisation and presentation of report

III (40 - 49 Marks) A third class project is one which generally rates as weak and displays:
– very limited understanding of the project area
– scant knowledge and appreciation of the relevant literature
– sparse development of the technical theme
– confused presentation and incomplete analysis of results
– weak level of technical discussion
– poorly organised and presented report

Fail (0 - 39 Marks) A project graded as a fail represents an unsatisfactory project containing significant errors or omissions:
– flawed understanding of the project area
– very superficial knowledge and appreciation of the relevant literature
– lack of development in the technical theme
– poor or incomplete presentation of results; inadequate or flawed analysis
– discussion confused or erroneous
– very poor overall presentation

3.7 Marking Scale
Grades for individual subjects and overall grades in years 1-5 are awarded based on the (rounded) percentage achieved as follows:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Year 1-4</th>
<th>Mark</th>
<th>Year 5</th>
<th>Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td></td>
<td>70%–100%</td>
<td></td>
<td>70%–100%</td>
</tr>
<tr>
<td>II.1</td>
<td></td>
<td>60%–69%</td>
<td></td>
<td>50%–69%</td>
</tr>
<tr>
<td>II.2</td>
<td></td>
<td>50%–59%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>III</td>
<td></td>
<td>40%–49%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3.8 Progression Regulations
For one semester modules students are examined at the end of the semester and for one year modules they are examined at the end of the second semester.

To complete an academic year (and hence progress to the next year of the programme or exit with a degree award), students must be successful at the Annual or Supplemental Examinations.

In order to be successful in the Annual or Supplemental Examinations, students must pass all modules. The pass mark in years 1-4 is 40%, and in year 5 is 50%. Alternatively, students may pass by compensation if they (i) achieve an overall weighted average pass
mark and (ii) pass modules totalling 50 credits, and (iii) get a ‘Qualified Pass’ mark (35% in years 1-4 and 45% in year 5) in the failed module(s) (either one 10-credit module or one/two 5-credit modules).

If a student is successful in the Annual Examinations his/her overall mark will be calculated as the average of each module’s mark weighted by its ECTS rating and an overall grade awarded (according to the scale above).

If a student is unsuccessful in the Annual Examinations, he/she is required to take a supplemental examination or assessment in all modules in which they have not achieved a pass mark, as indicated in the examination results. Permission to take supplemental examinations will not normally be granted to students whom the court of examiners considers not to have made a serious attempt at the annual examinations and coursework in each module unless an adequate explanation is furnished. The method of assessment of modules varies between annual and supplemental examinations (See Section 3.8.2).

Supplemental examinations are held in Michaelmas term each year (i.e. towards the end of the summer break). If a student is successful in the Supplemental Examinations his/her overall mark will be calculated as the average of each module’s mark (weighted by its ECTS rating) and an overall grade awarded (according to the scale above). This average is based on the marks achieved in the supplemental examinations together with the marks achieved in the annual examinations for the modules in which supplemental examinations/assessments were not required.

A student who does not feel their returned mark is correct should first ask to view their script with the examiners, and may (through their tutor) if they still believe that something is incorrect request a recheck, remark (of the full class) or lodge an appeal (See Section 3.8.3).

A student who does not pass in either the Annuals or the Supplementals is required to repeat the year in full (See Section 3.8.4).

### 3.8.1 Progression to the Masters Programme

Students who pass the fourth year of the five year masters course, achieve an average of at least 60 per cent at the first attempt of their fourth year examinations (the taught component) and 60 per cent overall, and satisfy the requirements for the award of Moderatorship in Computer Science may progress to the fifth year or exit the course with a B.A. (Moderatorship) degree. Students who fail the fourth year of the master’s course may repeat the fourth year as provided by the General Regulations but may only do so to exit the course with the B.A. (Moderatorship) degree, taking the modules required for students intending to exit after four years in place of the internship.

### 3.8.2 Module Assessment

The form of assessment at annual and supplemental examination stages varies between modules and may include a combination of coursework, written examination or other forms of assessment. The method of assessment and criteria for passing each module is set out the module descriptor, which may be found on the Student Information System (http://my.tcd.ie).
3.8.3 Viewing examination scripts and appealing results

Once the results are published students can discuss their examination/assessment performance with the examiners to understand why a specific mark was awarded. This is their right and, if they wish to do so, the student should contact the Teaching Unit (by emailing teaching-unit@scss.tcd.ie) who will instruct them on how to arrange a meeting with the examiner. Please note that these consultation should be individual meetings where the topic is confined to the students performance in the examination. They are not an opportunity to negotiate an increase of marks. Lecturers cannot independently change any marks once they have been approved by the Court of Examiners.

Students are entitled to view their script when discussing their examination or assessment.

If a student is still unhappy with their result and has reason to believe that:

1. The grade is incorrect because of an error in calculation of results,

2. The examination paper contained questions on subjects which were not part of the course prescribed for the examination, or

3. Bias was shown by the examiner in marking the script,

they should contact their Tutor to discuss the situation. Their Tutor can request a re-check (a) or a re-mark (b) or (c) can appeal the result.

Appeals are first presented to the Court of First Appeal for your Faculty. If unsuccessful, your case may be taken to the Academic Appeals Committee. If your Tutor is unwilling to act on your behalf you can contact the Senior Tutor in House 27.

There are 3 grounds on which you can take an appeal:

1. Your case/situation is not adequately covered by College regulations

2. The regulations were not properly applied

3. Ad misericordiam grounds, such as illness, bereavement, serious personal crisis, etc.

Please note that an Appeal cannot change exam results or marks but can change the effect of the results.

3.8.4 Repeating a year

When a student must repeat a year, they must do so in full (i.e. repeating all modules and all assessment elements of those modules). Students may repeat years 1-4 of the programme but may only repeat a particular year once and may only repeat two years within the programme.

Students may not repeat year 5, and (as per the General Regulations in the College Calendar) may only repeat a year if they have failed that year. They may not repeat a year, which they have already passed, to improve their performance.

In exceptional circumstances some students are permitted to repeat off-books (taking only examinations in the subjects which they failed). This is applied for through the tutor.
3.9 Awards

3.9.1 Ordinary BA Degree (exit only)

Students who have passed their Year 3 examinations may have an ordinary BA degree conferred if they do not choose, or are not allowed, to proceed to Year 4 of the programme or if they fail to complete satisfactorily Year 4 of the course. Except by permission of the University Council, on the recommendation of the Executive Committee of the School of Computer Science and Statistics, an ordinary BA degree may be conferred only on candidates who have spent at least two years in the University.

3.9.2 Moderatorship Degree

The BA (Moderatorship) degree result is awarded, if a student has successfully completed Years 3 and 4, based on a combined mark from the Year 3 examinations (which count for 20% of the moderatorship result) and Year 4 examinations (which count for 80% of the moderatorship result).

Where students are awarded an honors degree, the class of degree awarded is based on the weighted average mark achieved as follows: First Class Honors: 70%–100%, Second Class Honors, First Division: 60%–69%, Second Class Honours, Second Division: 50%–59%, Third Class Honors: 40%–49%.

Students who have been successful in their Year 4 examinations may have the BA (Mod) degree conferred if they do not choose, or are not allowed, to proceed to the fifth year of the programme.

3.9.3 Master in Computer Science Degree

Successful candidates at the Year 5 examinations will be awarded a classified BA (Moderatorship) based on their results in Years 3 and 4, as set out above, and a Master in Computer Science or a Master in Computer Science with Distinction. A distinction shall require at least 70 per cent in the dissertation and at least 70 per cent in the final credit-weighted average mark.

3.10 Professional Body Accreditation

The degree programme is professionally accredited by Engineers Ireland (See http://www.engineersireland.ie/Services/Accredited-Courses.aspx).

3.11 Careers Information & events

College provide a Careers Advisory Service (See https://tcd.ie/careers and https://mycareerconnect.tcd.ie). See Figure 3.

3.12 External Examiner

The external examiner for 2019-2022 is Prof. Simon Dobson, from the School of Computer Science at the University of St Andrews. He will be involved in ensuring that the examinations in (third), fourth and fifth year are run properly (in terms of how the exam papers are set and marked, and how the results are moderated).
3.13 Learning Outcomes

Our programme’s outcomes conform to those required by Engineers Ireland to satisfy the education standard for the professional title of Chartered Engineer.

For BA(Mod) graduates those outcomes are:

1. Advanced knowledge and understanding of the mathematics, sciences, engineering sciences and technologies underpinning their branch of engineering;

2. The ability to identify, formulate, analyse and solve complex engineering problems;

3. The ability to perform the detailed design of a novel system, component process using the analysis and interpretation of relevant data;

4. The ability to design and conduct experiments and to apply a range of standard and specialised research (or equivalent) tools and techniques of enquiry;

5. An understanding of the need for high ethical standards in the practice of engineering, including the responsibilities of the engineering profession towards people and the environment;

6. The ability to work effectively as an individual, in teams and in multi-disciplinary settings together with the capacity to undertake lifelong learning;
7. The ability to communicate effectively on complex engineering activities with the engineering community and with society at large.

For ordinary BA graduates we expect similar outcomes but obviously as a lesser level, and significantly not including the development of a novel system on an individual basis. Our MCS graduates achieve all of these programme outcomes. By the time our graduates finish they are capable of dealing with complex multi-disciplinary problems and with problems that are ill-defined. They can design to professional codes of practice and can deal with novel problems, where they must proceed working cautiously from first principles relying on their knowledge of engineering science. The aim of the programme is to equip its graduates with the knowledge, skills and experience to be able to:

1. Develop and apply computer systems from a broad base of knowledge in mathematics, computer science, computer technology and human factors.

2. Identify and formulate advanced technical challenges and demonstrate judgement to design appropriate computer science solutions.

3. Design systems, components or processes to meet specified functional objectives and to measure and analyse performance against these objectives.

4. Understand and express the role of computer science in the community including the need for high standards of ethical behaviour and professional responsibility.

5. Work effectively, independently and within multidisciplinary teams, and act as a mentor in team settings and engage in lifelong learning.

6. Communicate effectively both professionally with other computing professionals and with the wider community.

7. Participate in contemporary research activity as appropriate and demonstrate the knowledge and skills needed to undertake independent research.

3.14 Graduate Attributes

Throughout their time at Trinity, our students will be provided with opportunities to develop and evidence achievement of a range of graduate attributes that support their academic growth. Graduate attributes can be achieved in academic and co- and extra-curricular activities.
3.15 Module Descriptors

Links to the module descriptors are provided on the course webpages (See https://scss.tcd.ie/undergraduate/computer-science/). 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.

3.16 Attendance requirements

Students are required to attend all lectures, laboratory and tutorial sessions associated with their programme of study and to participate fully in the academic work of their class. Note that the use of laptops (and other devices) is at the lecturer’s discretion in lectures, laboratory and tutorial sessions. Students must notify the lecturer concerned or their tutor as early as possible if they are unable to attend lectures, laboratories or tutorials or to submit coursework for any reason. Students who are absent for medical reasons should notify their tutor and will usually be required to provide a medical certificate to their tutor.

3.17 Non-Satisfactory Attendance or Performance

At the end of Michaelmas term and during the study week of Hilary term, students whose attendance or performance in coursework has not been satisfactory may be reported to the Senior Lecturer’s Office as non-satisfactory for that term (see https://www.tcd.ie/undergraduate-studies/academic-progress/attendance-course-work.php). Normally, where students are non-satisfactory in a course for two terms in the year they may be refused permission to take their annual examinations and may be required to repeat the year. Unless otherwise specified for an
individual module, a student’s attendance and participation will be deemed to be non-satisfactory if they do not attend at least two thirds of the scheduled lectures, laboratories or tutorials or if they do not make a serious attempt to complete at least two thirds of the coursework for any individual module.

3.18 Absence from Examinations

Students must attend all examinations. An unexplained absence from any examination and/or not making a serious attempt at an examination results in an automatic exclusion from the degree programme.

3.19 Relevant University Regulations

College regulations are set out in the University Calendar, which may be consulted in any College Library, the Enquiries Office, any academic or administrative office or online at http://www.tcd.ie/calendar/. The two most relevant extracts of the Calendar, entitled General Regulations and Information and Faculty of Engineering, Mathematics and Science, are handed out at registration at the beginning of the year. You are expected to be aware of the various regulations. Ignorance of the regulations is not a valid reason for failure to comply. Please note that the Undergraduate Regulations in the Calendar apply equally to Year 5 (as it is part of the Integrated Programme).

3.20 Feedback and Evaluation

The School will conduct student surveys of modules on a regular basis (at least once every three years) typically around the middle of the semester, and will provide feedback on the results of these surveys as soon as practical. It will also facilitate student fora with the class representatives towards the end of each semester.
4 Research Ethics

Any research project that involves human participation conducted through this course (for example, a questionnaire or survey, or system user-evaluation, etc.) must have independent review by a Research Ethics Committee before its commencement.

A basic principle is that prospective participants should be fully informed about the research and its implications for them as participants, with time to reflect on the possibility for participation prior to being asked to sign an informed consent form.

The online system, with further information and guidelines, can be found here: http://www.scss.tcd.ie/undergraduate/ethics/

It takes time to prepare an application for research ethics approval, to have the application considered, and to respond to feedback on the application where issues are raised. You should plan in your work for the time it takes to obtain research ethics approval.

Retrospective approval will not be granted.

Please also note, research conducted in the School of Computer Science and Statistics should be undertaken with cognisance of the TCD Guidelines for Good Research Practice; see http://www.tcd.ie/about/policies/assets/pdf/TCDGoodResearchPractice.pdf.
5 Scholarships and Prizes

Various studentships, scholarships, exhibitions, and other prizes are awarded to students on the results of honor and other examinations, provided that sufficient merit is shown. Monetary awards are sent direct to prize-winners unless otherwise stated under the regulations for the prize. For details please refer to the University Calendar.

<table>
<thead>
<tr>
<th>Year</th>
<th>Possible Prizes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (JF)</td>
<td>Book Prize, Victor W. Graham Prize</td>
</tr>
<tr>
<td>2 (SF)</td>
<td>Book Prize, Scholarship</td>
</tr>
<tr>
<td>3 (JS)</td>
<td>Book Prize, Lucy Gwynn Prize</td>
</tr>
<tr>
<td>4 (SS)</td>
<td>Gold Medal, Ludgate Prize, William Nurock Prize</td>
</tr>
<tr>
<td>5</td>
<td>Professor John G. Byrne Prize</td>
</tr>
</tbody>
</table>

5.1 General examinations prizes

5.1.1 Book Prize

At the annual examinations, a book prize (under review) is awarded to each candidate obtaining an overall first class honors grade in Years 1, 2 and 3 of an honor or professional course. These prizes, which are issued in the form of vouchers, can be exchanged by the student at designated booksellers. Book prizes are issued by the Examinations Office and are posted to recipient students at their home address (See https://www.tcd.ie/academicregistry/exams/prizes/).

5.1.2 Lucy Gwynn Prize

This prize was founded in 1948 by subscription in memory of Lucy Gwynn, first Lady Registrar. It is awarded annually in Michaelmas term to a Junior Sophister woman student for distinction in her College course. Professional as well as arts studies are taken into account. The award is made by two women on the University staff nominated by the Board, and one of the female tutors. The value of the prize is €1,207. Students must apply typically around the middle of November during their Junior Sophister year (See https://www.tcd.ie/academicregistry/exams/prizes/ for full details and the deadline).

5.1.3 Gold medal

Gold medals are awarded by the Board to candidates of the first class who have shown exceptional merit (in our case that means achieving 80% or above) at the annual degree examination in honor or professional courses (i.e. in Year 4 of our programme). See https://www.tcd.ie/academicregistry/exams/assets/local/gold-medal-criteria.pdf.

5.2 Scholarship

Foundation scholarship—("Schol")—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 Year 2, can consistently demonstrate
exceptional knowledge and understanding of their subjects.

The examination requires candidates to demonstrate skill in synthesising and
integrating knowledge across the full range of the set examination materials; to
demonstrate rigorous and informed critical thought; and, in appropriate disciplines, to
demonstrate a highly-developed ability to solve problems and apply knowledge.

Attempting the scholarship examination is highly recommended.

For more information, please visit
https://www.tcd.ie/academicregistry/exams/scholarship/ and
https://www.scss.tcd.ie/undergraduate/computer-science/sf/
FoundationScholarshipforICS.pdf.

5.3 Prizes specific to the Computer Science Programme

The following prizes are listed in the University Calendar for the Computer Science
programme.

5.3.1 The Professor John G. Byrne Prize

This prize was established in 2014 with funds provided by Alumni of the School in
honour of Professor John G. Byrne, Chair of Computer Science 1973–2003, and Head of
the Department of Computer Science from its founding in 1969 to 1987 and from 1990
to 2001. In celebration of excellence, the prize is awarded annually to the student who
achieves the highest overall result in the Masters Year of the Computer Science course
provided the result is at Distinction level. Value, €1,024.

5.3.2 The Victor W. Graham Prize

This prize, founded in 1986 from funds subscribed by friends and pupils to mark Mr
V. W. Graham’s retirement, is awarded to the Year 1 student in the moderatorship in
computer science course who obtains the highest mark in the summer examination in
pure mathematics. Value, €750.

5.3.3 The Ludgate Prize

This prize was instituted in 1991 in memory of Percy E. Ludgate, an Irish designer of an
analytical engine. It is awarded to the student who submits the best project in Year 4 of
the moderatorship in computer science. Value, €127.

5.3.4 The William Nurock Prize

This prize was founded in 1938 by a bequest from William Nurock. The conditions for
the award of the prize were changed in 1984. It is now awarded annually to the best
student in the final year examinations of the moderatorship in computer science,
providing that such student also attains gold medal standard. Value, €1,000.
6 Glossary

B.A. An ordinary degree which can be awarded to students who complete three years but fail to complete the fourth year of the programme. See Section 3.9.1.

B.A.(Mod) The degree awarded after successfully completing the 4 year programme. Note that a Moderatorship degree is one of the highest primary degree awarded by Trinity College. See Section 3.9.2.

Calendar The College Calendar (See http://www.tcd.ie/calendar/) is the formal set of regulations/guidelines which apply to students while studying in Trinity College Dublin.

DUCAC Dublin University Central Athletics Committee. See Section 1.3.

ECTS European Credit Transfer System. Each taught module is typically worth either 5 or 10 ECTS. See Section 3.3.

Engineers Ireland The body which accredits the Computer Science degree programme. See Section 3.10.

External Examiner The academic from another institution who reviews our examining procedures on an annual basis. See Section 3.12.

Internship An industry/research lab placement in the fourth year of the five year MCS programme. For more information about internships, please visit https://www.scss.tcd.ie/internships/.

Handbook This document which is intend to ring together information relevant to students studying a particular programme. In the case of inconsistencies between the Handbook and the Calendar, the Calendar prevails.

JF Junior Fresh, a term used to describe a Year 1 student.

JS Junior Sophister, a term used to describe a Year 3 student.

MCS Masters in Computer Science. The degree awarded after successfully completing the 5 year programme. See Section 3.9.3.

Module An individual taught subject or project or internship.

NS Non-satisfactory.

Plagiarism Copying in an unethical fashion. See Section 3.2

S2S Student to Student peer mentoring. See Figure 1.

Scholarship A significant award from the University which is awarded to students whose performance in the Scholarship examinations is exceptional. For more information see Section 5.2.

SCSS School of Computer Science and Statistics.
SF  Senior Fresh, a term used to describe a Year 2 student.

SS  Senior Sophister, a term used to describe a Year 4 student.

TCDSU  Trinity College Dublin Students Union.

Tutor  A member of staff who acts as an individual advisor and representative for students. See Section 1.2.1.
Appendix A: New Curriculum

Students in JF in 2019-20 are following a revised curriculum. In years 2-4 the expected curriculum is as follows:

Year 2 – Senior Fresh Year

In Year 2 (referred to as the Senior Fresh (SF) year in Trinity), students take the following full year and half year modules:

<table>
<thead>
<tr>
<th>Michaelmas Term</th>
<th>Hilary Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAU22C00 Discrete Mathematics</td>
<td>CSU22010 Algorithms &amp; Data Structures</td>
</tr>
<tr>
<td>CSU22041 Information Management I</td>
<td>CSU22013 Software Engineering Project I</td>
</tr>
<tr>
<td>CSU22014 Systems Programming</td>
<td>CSU23016 Concurrent Systems and Operating Systems</td>
</tr>
<tr>
<td>CSU22022 Computer Architecture I</td>
<td>CSU23021 Microprocessor Systems</td>
</tr>
<tr>
<td>Approved module in Statistics</td>
<td>Approved module in Statistics or other approved module</td>
</tr>
</tbody>
</table>

Year 3 – Junior Sophister Year

In Year 3 (referred to as the Junior Sophister (JS) year in Trinity), students take the following half year modules:

<table>
<thead>
<tr>
<th>Michaelmas Term</th>
<th>Hilary Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSU33012 Software Engineering</td>
<td>CSU33013 Software Engineering Project II</td>
</tr>
<tr>
<td>CSU34011 Symbolic Programming</td>
<td>CSU33061 Artificial Intelligence I</td>
</tr>
<tr>
<td>Telecommunication I</td>
<td>CSU34041 Information Management II</td>
</tr>
<tr>
<td>JS Computer Science Option</td>
<td>JS Computer Science Option</td>
</tr>
<tr>
<td>JS Computer Science Option or Approved Module in Statistics</td>
<td>JS Computer Science Option or Approved Module in Statistics</td>
</tr>
<tr>
<td>Trinity Elective*+</td>
<td>Trinity Elective*+</td>
</tr>
</tbody>
</table>

All modules have an ECTS weighting of 5 credits.

*All Trinity Elective modules have an ECTS weighting of 5 credits.

+See https://www.tcd.ie/trinity-electives/

JS Computer Science options are:

<table>
<thead>
<tr>
<th>CSU33081 Computational Mathematics</th>
<th>CSU34021 Computer Architecture II</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSU33071 Compiler Design I</td>
<td>CSU33014 Concurrent Systems I</td>
</tr>
<tr>
<td>CSU34016 Introduction to Functional Programming</td>
<td>CSU34031 Advanced Telecommunications</td>
</tr>
</tbody>
</table>

Year 4 – Senior Sophister Year

The new programme in the Senior Sophister year is almost the same as the existing programme. The only changes are that

1. Rather than taking the mandatory module CSU44081 (Entrepreneurship and High Tech Venture Creation), students will be allowed to choose between a module in Technology Entrepreneurship or an approved module in Business.
2. Rather than taking four computer science options, students will take three computer science options and a module in ethics.
Appendix B: College regulations governing plagiarism

The following regulations are copied from the College Calendar:

82 General
It is clearly understood that all members of the academic community use and build on the work and ideas of others. It is commonly accepted also, however, that we build on the work and ideas of others in an open and explicit manner, and with due acknowledgement. Plagiarism is the act of presenting the work or ideas of others as one’s own, without due acknowledgement. Plagiarism can arise from deliberate actions and also through careless thinking and/or methodology. The offence lies not in the attitude or intention of the perpetrator, but in the action and in its consequences.

It is the responsibility of the author of any work to ensure that he/she does not commit plagiarism. Plagiarism is considered to be academically fraudulent, and an offence against academic integrity that is subject to the disciplinary procedures of the University.

83 Examples of Plagiarism
Plagiarism can arise from actions such as:

(a) copying another student’s work;

(b) enlisting another person or persons to complete an assignment on the student’s behalf;

(c) procuring, whether with payment or otherwise, the work or ideas of another;

(d) quoting directly, without acknowledgement, from books, articles or other sources, either in printed, recorded or electronic format, including websites and social media;

(e) paraphrasing, without acknowledgement, the writings of other authors.

Examples (d) and (e) in particular can arise through careless thinking and/or methodology where students:

(i) fail to distinguish between their own ideas and those of others;

(ii) fail to take proper notes during preliminary research and therefore lose track of the sources from which the notes were drawn;

(iii) fail to distinguish between information which needs no acknowledgement because it is firmly in the public domain, and information which might be widely known, but which nevertheless requires some sort of acknowledgement;

(iv) come across a distinctive methodology or idea and fail to record its source.

All the above serve only as examples and are not exhaustive.
84 Plagiarism in the context of group work
Students should normally submit work done in co-operation with other students only when it is done with the full knowledge and permission of the lecturer concerned. Without this, submitting work which is the product of collusion with other students may be considered to be plagiarism. When work is submitted as the result of a group project, it is the responsibility of all students in the group to ensure, so far as is possible, that no work submitted by the group is plagiarised.

85 Self plagiarism
No work can normally be submitted for more than one assessment for credit. Resubmitting the same work for more than one assessment for credit is normally considered self-plagiarism.

86 Avoiding plagiarism
Students should ensure the integrity of their work by seeking advice from their lecturers, tutor or supervisor on avoiding plagiarism. All schools and departments must include, in their handbooks or other literature given to students, guidelines on the appropriate methodology for the kind of work that students will be expected to undertake. In addition, a general set of guidelines for students on avoiding plagiarism is available on http://tcd-ie.libguides.com/plagiarism.

87 If plagiarism as referred to in §82 above is suspected, in the first instance, the Director of Teaching and Learning (Undergraduate), or their designate, will write to the student, and the student’s tutor advising them of the concerns raised. The student and tutor (as an alternative to the tutor, students may nominate a representative from the Students’ Union) will be invited to attend an informal meeting with the Director of Teaching and Learning (Undergraduate), or their designate, and the lecturer concerned, in order to put their suspicions to the student and give the student the opportunity to respond. The student will be requested to respond in writing stating his/her agreement to attend such a meeting and confirming on which of the suggested dates and times it will be possible for them to attend. If the student does not in this manner agree to attend such a meeting, the Director of Teaching and Learning (Undergraduate), or designate, may refer the case directly to the Junior Dean, who will interview the student and may implement the procedures as referred to under CONDUCT AND COLLEGE REGULATIONS §2.

88 If the Director of Teaching and Learning (Undergraduate), or designate, forms the view that plagiarism has taken place, he/she must decide if the offence can be dealt with under the summary procedure set out below. In order for this summary procedure to be followed, all parties attending the informal meeting as noted in §87 above must state their agreement in writing to the Director of Teaching and Learning (Undergraduate), or designate. If the facts of the case are in dispute, or if the Director of Teaching and Learning (Undergraduate), or designate, feels that the penalties provided for under the summary procedure below are inappropriate given the circumstances of the case, he/she will refer the case directly to the Junior Dean, who will interview the student and may implement the procedures as referred to under CONDUCT AND COLLEGE REGULATIONS §2.
If the offence can be dealt with under the summary procedure, the Director of Teaching and Learning (Undergraduate), or designate, will recommend one of the following penalties:

(a) Level 1: Student receives an informal verbal warning. The piece of work in question is inadmissible. The student is required to rephrase and correctly reference all plagiarised elements. Other content should not be altered. The resubmitted work will be assessed and marked without penalty;

(b) Level 2: Student receives a formal written warning. The piece of work in question is inadmissible. The student is required to rephrase and correctly reference all plagiarised elements. Other content should not be altered. The resubmitted work will receive a reduced or capped mark depending on the seriousness/extent of plagiarism;

(c) Level 3: Student receives a formal written warning. The piece of work in question is inadmissible. There is no opportunity for resubmission.

Provided that the appropriate procedure has been followed and all parties in §87 above are in agreement with the proposed penalty, the Director of Teaching and Learning (Undergraduate) should in the case of a Level 1 offence, inform the course director and where appropriate the course office. In the case of a Level 2 or Level 3 offence, the Senior Lecturer must be notified and requested to approve the recommended penalty. The Senior Lecturer will inform the Junior Dean accordingly. The Junior Dean may nevertheless implement the procedures as referred to under CONDUCT AND COLLEGE REGULATIONS §2.

If the case cannot normally be dealt with under the summary procedures, it is deemed to be a Level 4 offence and will be referred directly to the Junior Dean. Nothing provided for under the summary procedure diminishes or prejudices the disciplinary powers of the Junior Dean under the 2010 Consolidated Statutes.