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 28, 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 33) 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.

Kenneth Dawson-Howe, Mike Brady & Jeremy Jones.

Notes:

Information provided in this handbook is 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 19th, 2016: New version released for academic year 2016-17.
- November 1st, 2016: Rules for progression to Year 4 of the Masters programme updated.
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 is ranked in the top 100 world universities and amongst the top 50 European universities.

1.2 The School of Computer Science and Statistics

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 than 200 full-time postgraduate students and support staff. It comprises five academic disciplines:

- **Computer Systems** undertakes systems research at the hardware/software interface and has a particular research focus on telecommunications and networked computer systems.

- **Information Systems** studies the impact of Information and Communication Technology on society and business with a particular focus on the impact of technology on learning.

- **Intelligent Systems** has a research focus is on computational issues related to perception, cognition, decision and interaction by and between systems and their human users.

- **Software Systems** has significant strength in programming language and software technologies and the formal foundations that underlie them.

- **Statistics** provides the School’s research strength in statistical learning techniques and in modelling uncertainty.

1.3 School Contact Details

The School Reception office is located beside Room G.8 in the O’Reilly Institute. 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.
1.4 Academic and Administrative Staff

- Dr Kenneth Dawson-Howe: Director of the Computer Science Programme
- Dr Mike Brady: Director of Undergraduate Teaching and Learning
- Dr Lucy Hederman: Director of Postgraduate Teaching and Learning
- Dr Jeremy Jones: Head of School
- Ms. Kaukab Fatima Naqvi: Administration Officer for years 4 & 5, Teaching Support Unit
- Ms. Hannah Archbold: Administration Officer for years 1-3, Teaching Support Unit

The Course Director is Dr Kenneth Dawson-Howe who can be contacted by telephone at (01) 896 1535, or 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 undergraduate@scss.tcd.ie.

1.5 Student Contact

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 'inray' 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 on the noticeboard in the O'Reilly Institute and 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.
2 The Degree Programme

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.

2.1 Aims and Objectives

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.

Developing this into a set of objectives, 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.

\(^1\)This is the correct spelling of the word when applied to degrees awarded in TCD.
2.2 Structure of the Programme

Figure 1 (p.9) shows the five-year composition of the programme. Students typically enter Year 1 from secondary school via the Central Applications Office (CAO) system. Suitably qualified students may also join the programme in Year 3 or Year 4.

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 Freshman, Senior Freshman, 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 Freshman 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. 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*\(^2\). The seventh week of each semester is 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 five or ten 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.

### 2.2.1 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.

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

\(^2\)The names come from traditional Christian feast days: Michaelmas Day is September 29 and St Hilary’s Day is January 13.
2.3 Year 1 – Junior Freshman Year

In Year 1 (referred to as the Junior Freshman (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>CS1003 Mathematics</td>
<td></td>
</tr>
<tr>
<td>CS1010 Introduction to Programming</td>
<td></td>
</tr>
<tr>
<td>CS1021 Introduction to Computing I</td>
<td>CS1022 Introduction to Computing II</td>
</tr>
<tr>
<td>CS1026 Digital Logic Design</td>
<td></td>
</tr>
<tr>
<td>CS1025 Electrotechnology</td>
<td>CS1031 Telecommunications I</td>
</tr>
<tr>
<td>CS1081 Computers and Society</td>
<td>CS1013 Programming Project I</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.

2.4 Year 2 – Senior Freshman Year

In Year 2 (referred to as the Senior Freshman (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>CS2010 Algorithms &amp; Data Structures</td>
<td></td>
</tr>
<tr>
<td>CS2014 Systems Programming</td>
<td>CS2016 Concurrent Systems and Operating Systems</td>
</tr>
<tr>
<td>CS2031 Telecommunications II</td>
<td>CS2021 Microprocessor Systems</td>
</tr>
<tr>
<td>CS2041 Information Management I</td>
<td>CS2022 Computer Architecture I</td>
</tr>
<tr>
<td>MA2C03 Discrete Mathematics</td>
<td></td>
</tr>
<tr>
<td>CS2081 Broad Curriculum—Michaelmas Term or Hilary Term*+</td>
<td>CS2013 Programming Project II</td>
</tr>
</tbody>
</table>

*All Broad Curriculum modules have an ECTS weighting of 5 credits.
+See http://www.tcd.ie/Broad_Curriculum/

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.
2.5 Year 3 – Junior Sophister Year

In Year 2 (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>CS3011 Symbolic Programming</td>
<td>CS3081 Computational Mathematics</td>
</tr>
<tr>
<td>CS3012 Software Engineering</td>
<td>CS3013 Software Engineering Group Project</td>
</tr>
<tr>
<td>CS3021 Computer Architecture II *</td>
<td>CS3014 Concurrent Systems I</td>
</tr>
<tr>
<td>CS3071 Compiler Design I</td>
<td>ST3009 Statistical Methods for Computer Science</td>
</tr>
<tr>
<td>CS3016 Introduction to Functional Programing</td>
<td>CS3031 Advanced Telecommunications</td>
</tr>
<tr>
<td>CS3041 Information Management II *</td>
<td>CS3061 Artificial Intelligence</td>
</tr>
</tbody>
</table>

*Some modules are examined just prior to Hilary term (i.e. during January). 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.
### 2.6 Year 4 – Senior Sophister Year

Before starting 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>CS4051 Human Factors (5 credits)</td>
<td>CS7091 Industrial / Research Lab Internship (30 credits) *</td>
</tr>
<tr>
<td><strong>All students</strong></td>
<td><strong>5 year MCS programme</strong></td>
</tr>
<tr>
<td>CS4081 Technology Entrepreneurship (5 credits)</td>
<td>CS4098 Group Computer Science Project (10 credits)</td>
</tr>
<tr>
<td><strong>All students</strong></td>
<td><strong>4 year B.A.(Mod) programme</strong></td>
</tr>
<tr>
<td>Final Year Options (4*5 credits) +</td>
<td>CS4099 Final Year Project (20 credits) **</td>
</tr>
<tr>
<td><strong>All students</strong></td>
<td><strong>4 year B.A.(Mod) programme</strong></td>
</tr>
</tbody>
</table>

* For more information about internships, please visit [https://www.scss.tcd.ie/internships/](https://www.scss.tcd.ie/internships/).

** For more information about final year projects, please visit [https://www.scs.tcd.ie/StudentProjects/](https://www.scs.tcd.ie/StudentProjects/).

+ Students must select four options from the Year 4 Options in the Options Table below.

The Year 4 options, all of which count for 5 ECTS credits, are as follows. Please note that not all options may run in a given year.

<table>
<thead>
<tr>
<th>Year 4 Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS4001 Fuzzy Logic</td>
</tr>
<tr>
<td>CS4004 Formal Verification Techniques</td>
</tr>
<tr>
<td>CS4012 Topics in Functional Programming</td>
</tr>
<tr>
<td>CS4021 Advanced Computer Architecture</td>
</tr>
<tr>
<td>CS4031 Mobile Communications</td>
</tr>
<tr>
<td>CS4032 Distributed Systems</td>
</tr>
<tr>
<td>CS4052 Computer Graphics</td>
</tr>
<tr>
<td>CS4053 Computer Vision</td>
</tr>
<tr>
<td>CS4061 Artificial Intelligence II</td>
</tr>
<tr>
<td>CS4071 Compiler Design II</td>
</tr>
<tr>
<td>CS4LL5 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.

Brief descriptions of the modules are provided on the course website (See [https://www.cs.tcd.ie/undergraduate/computer-science/ss/](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](http://my.tcd.ie).
2.7 Year 5 (MCS)

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>CS7064 Research Methods (5 credits)</td>
<td>CS7092 MCS Dissertation (30 credits) *</td>
</tr>
<tr>
<td>Year 5 Options (5*5 credits) +</td>
<td></td>
</tr>
</tbody>
</table>

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

The Year 5 options, all of which count for 5 ECTS credits, are as follows. (Please note that not all options may run in a given year and some options have prequisites.)

<table>
<thead>
<tr>
<th>Year 5 Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS7003 Middleware for Distributed Systems</td>
</tr>
<tr>
<td>CS7004 Embedded Systems</td>
</tr>
<tr>
<td>CS7008 Vision Systems</td>
</tr>
<tr>
<td>CS7009 Networked Applications I</td>
</tr>
<tr>
<td>CS7012 Management of Networks and Distributed Systems</td>
</tr>
<tr>
<td>CS7030 Numerical Methods and Advanced Mathematical Modelling I</td>
</tr>
<tr>
<td>CS7031 Graphics and Console Hardware</td>
</tr>
<tr>
<td>CS7032 Artificial Intelligence</td>
</tr>
<tr>
<td>CS7033 Real-time Animation</td>
</tr>
<tr>
<td>CS7034 Augmented Reality</td>
</tr>
<tr>
<td>CS7048 Data Communications and Wireless Networking</td>
</tr>
<tr>
<td>CS7052 Sustainable Computing</td>
</tr>
<tr>
<td>CS7053 Security of Networks and Distributed Systems</td>
</tr>
<tr>
<td>CS7055 Real-time Rendering</td>
</tr>
<tr>
<td>CS7056 Autonomous Agents</td>
</tr>
<tr>
<td>CS7057 Real-time Physics</td>
</tr>
<tr>
<td>CS7058 Numerical Methods and Advanced Mathematical Modelling II</td>
</tr>
<tr>
<td>CS7069 Behavioural Finance for CS</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 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>

3.1 General examinations prizes

3.1.1 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/](https://www.tcd.ie/academicregistry/exams/prizes/)).

3.1.2 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/](https://www.tcd.ie/academicregistry/exams/prizes/) for full details and the deadline).

3.1.3 Gold medal

Gold medals are awarded by the Board to candidates of the first class who have shown exceptional merit at the annual degree examination in honor or professional courses (i.e. in Year 4 of our programme). See [http://www.tcd.ie/vpcao/administration/examinations/criteria-for-gold-medal.php](http://www.tcd.ie/vpcao/administration/examinations/criteria-for-gold-medal.php).
3.2 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.

3.3 Prizes specific to the Computer Science Programme

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

3.3.1 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.

3.3.2 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.

3.3.3 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.
3.3.4 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.
4 Regulations

4.1 College 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.

4.2 Attendance and Participation

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.

4.3 Non-Satisfactory Attendance or Performance

At the end of each teaching 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 University Calendar, General Regulations and Information). 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 fail to attend more than one third of the scheduled lectures, laboratories or tutorials or make a serious attempt to complete more than one third of the coursework for any individual module.

4.4 Retaining Coursework

It is the responsibility of each student to retain a copy of any coursework that they submit.
4.5 Plagiarism

Individual Work and 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. The College regulations governing plagiarism are available in the college calendar and are copied in the sections numbered 82 to 91 below. 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 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.

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 inprinted, 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.
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.

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.

90 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.

91 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.

4.6 Examinations, Assessment and Progression

Students are examined in the work of each year at the annual examinations. Note that in Years 3, 4 and 5 some of the annual examinations are held in January. Students must submit satisfactory course work in each year. Students who fail to do so, or whose attendance is unsatisfactory, may be refused permission to take all or part of the examinations for the year.

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.

Students who have not passed in its entirety any examination within eighteen months from the date on which they first became eligible for it, will be reported to the University Council as unsatisfactory with a recommendation for their exclusion from the course (i.e. you may only repeat a particular year once).

Grades for individual subjects and overall grades are awarded based on the (rounded) percentage achieved as follows:

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<tr>
<th>Grade</th>
<th>Mark</th>
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<tbody>
<tr>
<td>I</td>
<td>70%–100%</td>
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<tr>
<td>II.1</td>
<td>60%–69%</td>
</tr>
<tr>
<td>II.2</td>
<td>50%–59%</td>
</tr>
<tr>
<td>III</td>
<td>40%–49%</td>
</tr>
</tbody>
</table>
4.6.1 Years 1, 2 & 3

To progress to the next year of the programme, 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. Alternatively, students may pass by compensation if they achieve an overall result of at least 40% and either:

- pass modules totalling 55 credits, and get a minimum mark of 30% in the failed module, or

- pass modules totalling 50 credits, and get a minimum mark of 35% in the failed module(s) – either one 10-credit module or two 5-credit modules.

If a student is successful in the Annual Examinations their 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 satisfied the examiners, as specified 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 unless an adequate explanation is furnished. The method of assessment of modules varies between annual and supplemental examinations.

Supplemental examinations are held in Michaelmas term each year (i.e. towards the end of the summer). If a student is successful in the Supplemental Examinations his/her overall grade will be recorded as “Clear”.

A student who does not pass by either of the methods above is required to repeat the year in full (See Section 4.6.6).

4.6.2 Progression to Year 4 of the Masters Programme

In order to progress to Year 4 of the Masters programme, students must achieve an overall mark of 50% or better in their Year 3 examinations. Students may take supplemental examinations in those modules in which they obtained less than 50% in the annual examinations, or may repeat Year 3 in its entirety to achieve the required standard.

From academic year 2017-18 onwards the regulations will be this threshold will be increased to 60%.
4.6.3 Year 4

To pass the fourth year of the course students must achieve a credit-weighted average mark of at least 40% and accumulate 60 credits by (a) passing all modules outright or (b) passing by compensation or aggregation. Whether passing by compensation or aggregation students must pass outright modules totalling at least 50 credits in addition to achieving a 40 per cent (grade III) credit-weighted average, or higher, for the year. There are no supplemental examinations in the fourth year.

4.6.4 Progression to Year 5 of the Masters Programme

In order to progress to Year 5 of the Masters programme, students must be on Year 4 of the Masters programme, must qualify for the award of BA (Mod.) in Computer Science and must achieve an overall mark of 60% or better in their Year 4 examinations. Students who pass Year 4 but do not achieve an overall mark of 60% or better may repeat Year 4 in its entirety to achieve the required overall mark of 60% or better. There are no supplemental examinations in Year 4.

4.6.5 Year 5

To pass the fifth year of the course students must (i) achieve a pass mark of at least 50% in the credit-weighted average mark for modules, and (ii) for modules amounting to not less than 50 credits achieve a mark of at least 50% in each individual module, and for modules amounting to not more than 10 credits achieve a mark of at least 40% in each individual module. There are no supplemental examinations in the fifth year, and this year may not be repeated.

4.6.6 Repeating a year

When a student must repeat a year, this must be completed in full. This includes completing all assessment elements of all modules (e.g. all continuous assessment requirements and laboratory experiments).

Students may only repeat a particular year once and may only repeat two years within the programme.

In the Annual Examinations as part of a repeat year a student’s overall mark will be calculated using the marks achieved in the most recent examination.

4.6.7 Notes

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 in the module descriptor, which may be found on the Student Information System (http://my.tcd.ie).

**Non-compensatable modules**

A module or modules may be identified as “non-compensatable” – i.e. a student must pass the module, and may not fail it and pass by compensation. In addition, a module or modules may be identified as “non-supplementable” – i.e. supplemental evaluation will not be available, requiring the student to repeat the year if the module is failed. Non-compensatable modules and non-supplementable modules are so identified in the College calendar and on the Student Information System (http://my.tcd.ie).

**4.7 Awards**

**4.7.1 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.

**4.7.2 Moderatorship Degree**

The BA (Moderatorship) degree result is awarded based on a combined mark from the annual sitting of the Year 3 examinations (which count for 20% of the moderatorship result) and Year 4 examinations (which count for 80% of the moderatorship result).

An honors degree is awarded to candidates who achieve a weighted average mark of 40% or more and, if one or more Year 4 modules has been failed, those modules account for not more than 10 ECTS credits. 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%. If the weighted average mark is below 40% or if modules accounting for more than 10 ECTS credits are failed, then students may be awarded an ordinary BA degree if they are clear of Year 3.

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. Students exiting the programme after Year 4 obtain a moderatorship based on their results at their first attempt at the Year 4 examinations.

4.7.3 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.
5 Academic Year Structure, Timetables, Map

The academic year structure gives an overview of the academic terms, examination and vacation periods. It is published on at https://www.tcd.ie/academicregistry/exams/timetables-dates/.

Timetables are online at http://www.scss.tcd.ie/undergraduate/timetables.php.

A searchable online campus map is provided at https://www.tcd.ie/Maps/map.php
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.*
7 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.
8 Student Supports

8.1 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/misc/psc/.

8.2 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/.

8.3 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/.

8.4 Academic Concerns: 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.
8.5 Personal Concerns: Sources of Assistance

- Your tutor (or any other tutor if you cannot find yours), or the Senior Tutor, phone 8962251.

- 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;

- The Chaplains, House 27, College.  
Paddy Gleeson and Peter Sexton SJ (Catholic) 8961260  
Darren McCallig (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

NOTE: IF YOU HAVE A CONCERN OF ANY SORT, PLEASE TALK TO SOMEONE STRAIGHT AWAY

8.6 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.
9 Health and Safety

The College Emergency Number, for safety or personal security concerns, is extension 1999 on the internal College telephone system, +353-1-8961999 from a mobile phone or an external landline.

10 Submission Cover Sheets

School of Computer Science and Statistics

Assessment Submission Form

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<td>Module Title</td>
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<td>Lecturer(s)</td>
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<td>Assessment Title</td>
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<td>Date Submitted</td>
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<td>Word Count</td>
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I have read and I understand the plagiarism provisions in the General Regulations of the University Calendar for the current year, found at: [http://www.tcd.ie/calendar](http://www.tcd.ie/calendar)

I have also completed the Online Tutorial on avoiding plagiarism ‘Ready, Steady, Write’, located at [http://tcd-ie.libguides.com/plagiarism/ready-steady-write](http://tcd-ie.libguides.com/plagiarism/ready-steady-write)

I declare that the assignment being submitted represents my own work and has not been taken from the work of others save where appropriately referenced in the body of the assignment.

Signed .......................... Date ..........................
Author Declaration for Group Assignments

Assignment Number: ______
Module Number: ______
Title of Assignment:

Word Count: ______

<table>
<thead>
<tr>
<th>Student Number</th>
<th>Student Name</th>
<th>Nature of Contribution</th>
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We have also completed the Online Tutorial on avoiding plagiarism ‘Ready, Steady, Write’, located at http://tcd-ie.libguides.com/plagiarism/ready-steady-write

We declare that this assignment, together with any supporting artefact is offered for assessment as our original and unaided work, except in so far as any advice and/or

2016-11-01