FACULTY OF ENGINEERING, MATHEMATICS & SCIENCE

Science

Junior Freshman Programme

2017/2018

Science Course Office
www.tcd.ie/science
This handbook applies to all students taking TRO71 Science. It provides a guide to what is expected of you on this programme, and the academic and personal support available to you. Please retain for future reference.

The information provided in this handbook is accurate at time of preparation. Any necessary revisions will be notified to students via email and the Science Course Office website (http://www.tcd.ie/Science). 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.
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</tbody>
</table>
Welcome to Science at Trinity College!

Encapsulated in the one short word 'Science' is the whole spectrum and sum of human knowledge about the natural world. So where do you begin? The starting point is to choose the subjects you wish to study in your first year, which to some extent will determine your future direction. It may be that you have already decided which subjects you want to pursue, or it may be that you are not at all sure of what is on offer or where your real interests lie. Further information is available on the science course website: http://www.tcd.ie/Science and in this handbook.

Do not be put off by the prospect of studying subjects you have not encountered at school - in the long run you are more likely to do well in a subject that you enjoy and in which you have a genuine interest than in one you choose only because you have studied it at school, or for 'career' reasons. You will find many new doors opening for you at University so keep an open mind and consider all your options! The Science degree course at Trinity is structured so as to equip you with knowledge of the fundamental sciences in the first two years before you come to decide upon the area in which you will specialise in the final two years.

During Freshers' Week – 18th to 22nd September 2017 - you will have an opportunity to discuss your subject choices on an individual basis with a member of staff. Meanwhile, if you have queries, please do not hesitate to call into the Science Course Office (located in East End – Panoz Institute opposite the Biology Laboratories).

We look forward to meeting you then!

ANY QUESTIONS? Call into the Science Course Office.
Science Course Office Contact Details:

Associate Dean of Undergraduate Science Education: Prof Kevin Mitchell

Administrative Officer: Ms Anne O’Reilly
Tel: 01-896 2023
E-mail science@tcd.ie

Senior Executive Officer: Ms Ann Marie Brady
Tel: 01-896 2829
E-mail: sfSCO@tcd.ie

Executive Officer: Ms Lucy Martin
Tel: 01-896 1970
E-Mail: jfsco@tcd.ie

Address: Science Course Office
Panoz Institute/Hamilton Building
Trinity College
Dublin 2

Website Address: http://www.tcd.ie/Science/

ANY QUESTIONS? Call into the Science Course Office.
TR071 Science Overview

The Science course is a common entry two-year Freshman programme from which students have a choice of specialising in the Sophister (third and fourth) years across a wide variety of scientific topics. At the end of four years students will obtain an honours degree in one of the specialised moderatorship subjects. Further information about the course is available on the Science Course website: http://www.tcd.ie/Science/.

You are always welcome to call into the Science Course Office (SCO) for information before or after the subject/module registration on Monday 18th September 2017. (https://www.tcd.ie/Maps/assets/pdf/tcd-campus.pdf)

TR071 Science Module Registration

Students entering TR071 Science must attend the orientation and module registration session on Monday 18th September before they can complete College registration.

The Associate Dean of Undergraduate Science Education will address the TR071 Science new entrants in the MAC NEIL lecture theatre, Hamilton Building at 10.00 am on Monday 18th September 2017. This session will be followed by the TR071 module registration in the Student Concourse outside the Science Course Office (Surname A-L 11.00-12.30 and M-Z 14.00-16.00) when you will discuss your course choice with a member of the academic staff who is there to offer help and advice and together you will choose the right combination for you.

On the day of the Science Course module registration you will follow these procedures:

- You will be given a Junior Freshman (First Year) module choice form
- On completion of the Junior Freshman choice of module form, please queue to see an academic adviser to discuss your module choices.
- Go to the Science Course Office desk and hand in your completed Junior Freshman choice of module form.
- Further information regarding College Orientation is available at: http://www.tcd.ie/orientation/.

You will register online via the website my.tcd.ie. Registration will open from August on a course by course basis. A communication will be sent to the e-mail address you gave during the application process inviting you to log in to the website to register.

All information regarding College orientation and registration is available at the following links:
https://www.tcd.ie/students/orientation/undergraduates/index.php
http://www.tcd.ie/academicregistry/registration/
**Junior Freshman Subjects/Modules**

Students choose modules in the subject area from the following to a total of 60 credits (30 from each semester) as appropriate:

<table>
<thead>
<tr>
<th>Subject</th>
<th>Module Codes</th>
<th>Module Titles</th>
<th>Semester</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology</td>
<td>BY1101</td>
<td>Molecular and Cellular Biology</td>
<td>1</td>
<td>10</td>
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<tr>
<td></td>
<td>BY1102</td>
<td>Evolution, Biodiversity &amp; the Environment</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Chemistry</td>
<td>CH1101</td>
<td>General &amp; Physical Chemistry</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>CH1102</td>
<td>Introduction to Systematic, Inorganic and Organic Chemistry</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Geography</td>
<td>GG1021</td>
<td>Introduction to Geography I: Physical Geography</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>GG1022</td>
<td>Introduction to Geography II: Environmental Geography</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Geology</td>
<td>GL1101</td>
<td>Geology</td>
<td>2</td>
<td>10</td>
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<td>Mathematics</td>
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<td>Mathematics</td>
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<tr>
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<td>MA1S12</td>
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<td>10</td>
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<tr>
<td></td>
<td>MA1M01</td>
<td>Mathematical Methods</td>
<td>1</td>
<td>10</td>
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<tr>
<td>Physics</td>
<td>PY1P10</td>
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<td>PY1P20</td>
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<tr>
<td></td>
<td>PY1F01</td>
<td>Foundation Physics for Earth and Life Sciences</td>
<td>2</td>
<td>10</td>
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<table>
<thead>
<tr>
<th>Michaelmas Term (Semester 1) (25/09/17 – 15/12/17)</th>
<th>Hilary Term (Semester 2) (15/01/18 – 06/04/18)</th>
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<tbody>
<tr>
<td>BY1101 (10 credits)</td>
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<td>PY1F01 (10 credits)</td>
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<tr>
<td></td>
<td>PY1P20 (10 credits)</td>
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</table>
Faculty of Engineering Mathematics and Science

SCIENCE TR071

Junior Freshman Module Choice Form – September 2017

Please complete Sections A and B on this form, then take it to one of the Subject Choice Advisers who will complete Section C. After your subject/module choice has been approved, please take this form to the Science Course Office desk.

SECTION A: BLOCK CAPITALS PLEASE

Name: ___________________________ CAO No: ___________________________

Date: ___________________________ Student No: ___________________________

SECTION B: Leaving Certificate/ A Level Specific subject requirements

- A mathematics requirement of grade 4 on the ordinary or grade 6 on the higher Leaving Certificate paper or grade B at GCSE level.
- Two higher level grade 4s (Grade Cs at A Level) from the following subjects: physics, chemistry, biology, physics/chemistry, mathematics, geology, geography, applied mathematics, agricultural science. Physics/chemistry may not be presented with physics or chemistry. Agricultural science may not be presented with biology. Applied mathematics may not be presented with mathematics.

Please enter below the grades obtained for subjects taken

<table>
<thead>
<tr>
<th>SUBJECT</th>
<th>LC (H)</th>
<th>LC (O)</th>
<th>A Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Chemistry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physics/Chemistry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Applied Maths</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geography</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Geology</td>
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<td></td>
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</tr>
<tr>
<td>Agricultural Sc.</td>
<td></td>
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</table>
**SECTION C: JUNIOR FRESHMAN MODULES FOR 2017/18**  
(To be completed with help of Adviser)  
Please tick appropriate box

<table>
<thead>
<tr>
<th>Module Code</th>
<th>Module Title</th>
<th>Semester</th>
<th>Credits</th>
<th>Tick Box</th>
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</thead>
<tbody>
<tr>
<td>BY1101</td>
<td>Molecular &amp; Cellular Biology</td>
<td>1</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>BY1102</td>
<td>Evolution, Biodiversity &amp; the Environment</td>
<td>2</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>CH1101</td>
<td>General &amp; Physical Chemistry</td>
<td>1</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>CH1102</td>
<td>Introduction to Systematic Inorganic and Organic Chemistry</td>
<td>2</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>GG1024</td>
<td>Introduction to Geography I: Physical Geography</td>
<td>1</td>
<td>10</td>
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<tr>
<td>GG1025</td>
<td>Introduction to Geography II: Environmental Geography</td>
<td>2</td>
<td>10</td>
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<tr>
<td>GL1101</td>
<td>Geology</td>
<td>2</td>
<td>10</td>
<td></td>
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<tr>
<td>MA1S11</td>
<td>Mathematics</td>
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<td>MA1M01</td>
<td>Mathematical Methods</td>
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<td>10</td>
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<td>PY1P10</td>
<td>Physics</td>
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<td>10</td>
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<td>PY1P20</td>
<td>Physics</td>
<td>2</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>PY1F01</td>
<td>Foundation Physics for the Life and Earth Sciences</td>
<td>2</td>
<td>10</td>
<td></td>
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<tr>
<td><strong>Total Credits</strong></td>
<td>(Students must sign up for 30 credits each semester to a total of 60 credits for the year)</td>
<td></td>
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<td>60</td>
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**Signature of Subject Course Advisor/Tutor:** ____________________________

**Date:** ____________________________
### Table of Prerequisites for Moderatorship 2017-2018

<table>
<thead>
<tr>
<th>Moderatorship</th>
<th>Senior Freshman</th>
<th>Junior Freshman</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biochemistry¹</td>
<td>BY2201, BY2203, BY2205, BY2208</td>
<td>CH1101, CH1102, &amp; MA1S11 or MA1M01</td>
</tr>
<tr>
<td>Chemistry</td>
<td>CH2201, CH2202</td>
<td>CH1101, CH1102, &amp; MA1S11 or MA1M01</td>
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<tr>
<td>Environmental Sciences</td>
<td>4 of the following: BY2201, BY2202, BY2203, BY2204, BY2205, BY2206, BY2207, BY2208, BY2209, BY2210</td>
<td>BY1101, BY1102</td>
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<tr>
<td>Genetics</td>
<td>BY2201, BY2203, BY2205, BY2208</td>
<td>BY1101, CH1101, CH1102, &amp; MA1S11 or MA1M01</td>
</tr>
<tr>
<td>Geography</td>
<td>GG2024, GG2025</td>
<td>GG1021 or GG1022</td>
</tr>
<tr>
<td>Geology</td>
<td>GL2205, GL2206</td>
<td>GL1101</td>
</tr>
<tr>
<td>Immunology¹</td>
<td>BY2201, BY2203, BY2205, BY2208</td>
<td>CH1101, CH1102, &amp; MA1S11 or MA1M01</td>
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<tr>
<td>Microbiology</td>
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<td>BY1101, CH1101, CH1102, &amp; MA1S11 or MA1M01</td>
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<tr>
<td>Molecular Medicine¹</td>
<td>BY2201, BY2203, BY2205, BY2208</td>
<td>CH1101, CH1102, &amp; MA1S11 or MA1M01</td>
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<tr>
<td>Neuroscience¹</td>
<td>BY2201, BY2202, BY2203, BY2208</td>
<td>CH1101, CH1102, &amp; MA1S11 or MA1M01</td>
</tr>
<tr>
<td>Physics</td>
<td>PY2P10, PY2P20, MA22S1, MA22S2, MA22S3, MA22S4</td>
<td>PY1P10, PY1P20, MA1S11, MA1S12</td>
</tr>
<tr>
<td>Physics and Astrophysics</td>
<td>PY2P10, PY2P20, MA22S1, MA22S2, MA22S3, MA22S4</td>
<td>PY1P10, PY1P20, MA1S11, MA1S12</td>
</tr>
<tr>
<td>Physiology²</td>
<td>BY2201, BY2202, BY2203, BY2208</td>
<td>MA1S11 or MA1M01</td>
</tr>
<tr>
<td>Plant Sciences</td>
<td>4 of the following: BY2201, BY2202, BY2203, BY2204, BY2205, BY2206, BY2207, BY2208, BY2209, BY2210</td>
<td>BY1101 or BY1102</td>
</tr>
<tr>
<td>Zoology</td>
<td>BY2201, BY2202, BY2203, BY2208</td>
<td>BY1101, BY1102, &amp; MA1S11 or MA1M01</td>
</tr>
</tbody>
</table>

¹Junior Freshman Biology 1101 is advisable ²Junior Freshman Biology 1101 and 1102 are advisable
BIOLOGY

Biology is the Study of Life - a broad and fascinating study that covers topics as diverse as population ecology, the control of metabolism, mechanisms of evolution and biological diversity. It deals with all living organisms from microbes to man. At Trinity College there is no single School of Biology; rather the subject is divided up into a number of overlapping disciplines or areas, dealt with by the Schools of Biochemistry and Immunology, Genetics and Microbiology, Natural Sciences (Botany and Zoology) and Medicine (Physiology), all of whom come together, through the Biology Teaching Centre, to provide an integrated Biology programme for first and second year students.

Many of you will have studied Biology at school - perhaps even taking Higher Level Biology at the Leaving Cert - and many of you will take Biology as one of the first year modules, even if your ultimate goal is not in the biological area. In first year there are two, ten-credit Biology modules available, both building on the Leaving Certificate curriculum but with a strong emphasis on critical thinking and the development of practical skills.

BY1101: Molecular and Cellular Biology (Semester 1 - 10 Credits)

This module is an introduction to molecular and cellular biology, including biochemistry, genetics, developmental biology and microbiology. The levels of understanding in biology are covered, from ecosystems to molecules. A description of the possible origin of life, from the abiotic world to multicellular organisms will be given, and the ultrastucture of the eukaryotic cell will be covered in detail. The major properties and functions of each class of biochemicals (carbohydrates, lipids, proteins and nucleic acids) will be described. Students will then be introduced to some basic concepts in genetics, considering the experimental evidence on which they are based and gaining insights into the central place of genetics in the biological sciences. Developmental biology deals with how a complex organism is established from a single cell – the fertilized egg cell – and has relevance to our understanding of stem cells and how normal cells are regulated. Finally, Microbiology deals with prokaryotic and eukaryotic microorganisms, and viruses. Students study cell and virus structure, cell growth and viral replication, infectious diseases and host immunity.

Learning Outcomes:

On successful completion of the module, students will be able to:

- define fundamental principles of biology and provide an account of the origin of life, from the abiotic world to multicellular organisms (including an account of endosymbiosis)
- describe the properties and functions of the major groups of biologically important molecules, and the structure and functions of the plasma membrane and the major organelles that occur in eukaryotic cells.
- provide an overview of developments in the field of genetics and heredity – from Mendel to genetic engineering
- outline the major steps involved in how a complex animal is formed and relate the morphological changes that occur to the molecular and cellular changes that underlie and drive embryo development.
• describe the structure and properties of prokaryotic and eukaryotic microorganisms and the structure and replication of viruses.
• explain the mechanisms of action of and resistance to antibiotics, how pathogens cause infection, and host innate and induced immunity.
• use general texts, reference books and a range of other resources to further develop knowledge of biological issues through continued independent learning
• apply the scientific method as a fundamental mechanisms for critical analysis and problem solving
• employ a range of laboratory techniques, demonstrating the development of practical scientific skills and the interpretation of results.

BY1102: Evolution, Biodiversity and the Environment (Semester 2 - 10 Credits)
This module will introduce students to the biology of individuals, species, populations and communities, and how humans affect, are effected by, and benefit from, other living organisms. We will cover evolutionary (past) and ecological (present) responses to their environment, using examples from the multicellular Animal and Plant Kingdoms. Topics covered in this module will incorporate the diversity of life, interactions between organisms and between organisms and the environment, the biological context of climate change, human impacts on the environment, and the value and conservation of biodiversity.

Learning Outcomes:
On successful completion of this course, the student will be able to:
• Recognise the diversity of life on earth and define the evolutionary relationships of major plant and animal groups and
• Describe the ecological relationships between individuals, populations, communities and ecosystems, and between organisms and their environment
• Explain how humans can positively and negatively influence other living organisms and their environment
• Demonstrate practical, numerical and analytical skills
• Collate, synthesise, organise and present information in written reports

In the second year, students, whether or not they intend to specialise in a biological discipline may select one or more of the advanced, five-credit modules covering topics such as Behaviour, Cell Structure and Function, Ecosystem Biology and Global Change, Evolution, Genetics, Infection and Immunity, Metabolism, Microbiology, Agriculture, Environment and Biotechnology, and Vertebrate Form and Function.

After four years in College, each biology graduate will have had the benefit of a broad and versatile course, resulting in a unique qualification to pursue his/her chosen career.
Contact Details:

**Director of the Biology Teaching Centre:** Professor John Rochford
Tel: 01-896 2237
E-mail: rchfordj@tcd.ie

**Address:**
Biology Teaching Centre
28 Westland Row
Trinity College
Dublin 2.

**Executive Officer:** Ms Diane Touzel
Tel: 01-896 1117
Email: BTC/Administrator@tcd.ie

**Address:**
Science Course Office
27 Westland Row
Trinity College
Dublin 2.

**Web Address:** [http://www.tcd.ie/Biology_Teaching_Centre/](http://www.tcd.ie/Biology_Teaching_Centre/)
CHEMISTRY

CH1101 General and Physical Chemistry (Semester 1 – 10 credits)
CH1102 Introduction to Systematic Inorganic and Organic Chemistry (Semester 2 – 10 credits)

Chemistry is a fundamental science that has an influence throughout the other sciences and is dominant in modern life. If a material is needed, chemists can make it, be it polythene for a washing bowl, the detergent to put in it, the different silicon-based materials for contact lenses, or the computer chips or liquid crystals used in electronic displays. Knowledge of chemistry lies behind the production of fertilisers that assist in the growth of the food we need, as well as the drugs and antiseptics that have transformed medicine. Behind these obvious contributions to our daily lives, there is a substantial body of chemical ideas.

The JF Chemistry course provides a general introduction to the fundamentals of modern chemistry and forms the basis for further studies, both in chemistry and in other sciences. It consists of two modules, Chemistry 1101, General and Physical Chemistry (10 Credits) and Chemistry 1102, Introduction to Systematic Inorganic and Organic Chemistry (10 Credits). Chemistry 1101 is a prerequisite for Chemistry 1102.

Chemistry 1101 (CH1101)
General and Physical Chemistry is a one-semester module taken by Junior Freshman Science, Chemistry with Molecular Modelling, Medicinal Chemistry, Nanoscience, Physics and Chemistry of Advanced Materials, Human Genetics and Earth Sciences students. It covers a general introduction to chemistry and physical chemistry, and equips the student with the knowledge necessary to understand the basic concepts in chemistry, such as the building principles of matter, chemical bonding and molecular structure, an introduction to thermodynamics, kinetics, electrochemistry, acid/base reactions and to the chemistry of liquids, solids and solutions.

Learning Outcomes
On successful completion of this module, students will be able to:
1. Explain, using appropriate terminology and physical units, basic concepts in chemistry, including precipitation and redox reactions.
2. Analyse bonding and molecular structure, and identify the main types of intermolecular forces.
3. Identify and explain the principal features of the phase diagrams of pure compounds, including pressure dependence of melting and boiling points, triple point and critical point, and variation of vapour pressure with temperature.
4. Calculate chemical equilibria and illustrate the key concepts, including variation of components with concentration, temperature and pressure.
5. Discuss simple acid/base chemistry and apply to solution equilibria.
6. Illustrate the basic concepts of an electrochemical cell, including half-cell reactions, cell potential and reaction free energy and be able to determine these properties as well as concentration dependence.
7. Describe the main classes of the solid-state structure; cubic- and hexagonal close packing; body-centred and face-centred cubic structures: NaCl and CsCl. Octahedral and tetrahedral holes, coordination numbers, the Born-Haber cycle, lattice energy.

8. Identify, describe and analyse the factors affecting the solubility of liquids.

9. Define and explain colligative properties, including Raoult’s Law and the calculation of molecular weights.

10. Understand and apply the concepts underlying the First and Second Laws of Thermodynamics to numerical problems.

Chemistry 1102 (CH1102)
Introduction to Systematic Inorganic and Organic Chemistry is a one-semester module taken by Junior Freshman Science; Chemistry with Molecular Modelling; Medicinal Chemistry; Nanoscience, Physics and Chemistry of Advanced Materials, and Human Genetics students. The first part of this module deals with the structure, bonding and reactivity of simple functional groups in organic chemistry. The emphasis is on understanding reaction mechanisms, in terms of the inherent reactivity and polarisation of the two reaction components, which allows the mechanism to be understood, and also facilitates the student to spot patterns and similarities between different reaction mechanisms, which makes learning easier. The second part of this module covers inorganic chemistry, with emphasis on understanding and explaining the similarities and differences that arise in the properties of elements in the periodic table.

Learning Outcomes
On successful completion of this module, students will be able to:
1. Identify and explain bonding, hybridisation and mechanisms.
2. Describe and explain the chemistry of functional groups (alkanes, alkenes and alkynes, aromatics, alkylhalides, alcohol, aldehydes, ketones and amines) and their applications.
3. Analyse and discriminate between mechanisms in terms of the inherent reactivity/polarisation etc. of the two reaction components.
4. Identify and classify chiral centres in organic molecules.
5. Describe the chemical and physical properties of elements as a function of their position in the periodic table.
6. Determine and explain the origin of the trends within groups and across periods of the properties of elements in the periodic table.
7. Describe the typical structures of some common compounds of the main group elements.
8. Classify elements as metallic/metalloid/non-metallic and contrast their characteristic properties.
9. Explain the practical and industrial uses of key elements and compounds, and relate these to their properties.
We hope that you will find the Freshman years of Chemistry sufficiently interesting and stimulating to convince you to take an honours degree in the subject. In the third and fourth (sophister) years, in addition to intensive course work, you will also have the opportunity, through a short research project in the final year, to do some novel chemistry yourself.

The School has many links with other Universities in Europe and North America and many students elect to do this project work at a University outside Ireland.

Contact Details:

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Dublin 2

Web address: www.tcd.ie/Chemistry
GEOGRAPHY

GG1024 Introduction to Geography I: Physical Geography and Earth System Science (Semester 1 - 10 Credits)
GG1025 Introduction to Geography II: Environmental Geography (Semester 2 - 10 Credits)

Geography is one of the most intellectually challenging and relevant disciplines for understanding the nature of the world today and the processes of change that are affecting landscapes and societies. It is concerned with the distribution of physical and human features over the earth’s surface, with the interrelationships between people and their environments and with the nature of landscapes and places. Thus, Geography has a unique integrating role in linking the natural and social sciences. In addition to the inherent interest of its subject matter, Geography has practical and educational value in that it deals with many aspects of the real world, it encourages the development of broad and balanced perspectives and it involves the acquisition of useful skills. Because of these attributes, modern Geography is increasingly being recognised as a desirable training by a wide range of employers throughout the private and public sectors.

In the first year there are two Geography modules available for students following the Science programme. The first module is GG1024 Introduction to Geography I: Physical Geography and Earth System Science (10 Credits). More than 7 billion people now inhabit the Earth and no corner of the planet is unaffected by human activity. The rise of our species has been fuelled by our ability to access planetary storehouses of energy and employ this to manipulate the environments around us. The global-scale of human impacts has led some to suggest we are entering a new era of Earth history - the Anthropocene. Dealing with the effects of environmental and climate change is one of the most significant challenges that our species faces in the 21st century. This module provides a foundation for understanding global environmental issues by considering the Earth as an interconnected system in which matter and energy are exchanged between the Geosphere, Biosphere, Atmosphere, Hydrosphere and the Anthroposphere. It considers the life-support systems of ‘spaceship Earth’ and aims to provide a theoretical basis for evaluating the role of humans as agents of climate and environmental change.

GG1024:
Learning Outcomes:
On successful completion of this module students will be able to:

• Outline the fundamental concepts of Earth Systems Science with reference to its major subsystems: Geosphere, Biosphere, Atmosphere, Hydrosphere and Anthroposphere;
• Illustrate how material and energy are cycled through the Earth system;
• Apply an Earth Systems approach to describe the phenomena of environmental and climate change;
• Identify how human activities modify Earth System function.

The second module, GG1025 Introduction to Geography II: Environmental Geography (10 Credits), introduces key concepts relating to nature, society and the environment as well as examining interactions between humans and their environment using case
studies from the fields of resource exploitation, environmental degradation and natural hazards.

**GG1025: Learning Outcomes:**
On successful completion of this module students will be able to:
- Define environmental geography and describe foundational concepts and issues relating to the human-environment interface
- Describe and analyse select cases of environmental degradation derived from human-environment interactions
- Identify and evaluate human-environmental relations within select cases of environmental hazards
- Identify and evaluate a range of sources and materials for analysing human-environment relations

In terms of transferable skills, students will be expected to have:
- Developed their writing skills in terms of researching and writing both essays and a weekly environmental issues journal
- Developed their abilities to synthesise and evaluate material presented during the module

Students taking either or both of these modules will be able to take Geography in their second year.

In the second year (Senior Freshman) students who wish to take Geography as their Sophister specialization must take two 10 Credit modules which build on the knowledge and understanding gained in the first year, whilst introducing new material that can lead to further study at Sophister level. The module Physical Geography: Changing Environments is designed to explain and analyse environmental change during the last 2.6 million years (the Quaternary period). The module will take a number of key elements of contemporary environmental change and analyse modern process, past records and archives of environmental change.

This is complemented by a second module, Human Geography: Changing Worlds, which introduces students to a number of key issues within contemporary human geography and exposes them to a range of methodological approaches and research techniques. The overarching theme of the module is the way in which historical, cultural, environmental, political and economic geographies are changing under the force of globalisation.

In the Sophister years, students can select from a range of modules to supplement their core curriculum. Topics covered currently include: practical physical geography; deserts of our solar system; human origins; environmental change; environmental governance; globalisation; historical geography; urban geography; sustainable cities; geomorphology and Quaternary oceans & climate, among others. As part of the core curriculum, all students undertake fieldwork in their third year, and a research dissertation in their final year. Further opportunities for field study are associated with some of the optional modules.

www.tcd.ie/Science/
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GEOLOGY
GL1101 (Semester 2 - 10 Credits)

The science of geology sets out to investigate the origin and development of planet Earth, the natural principles that govern it, the processes that act in, on and around it, and the life that has evolved with it. In essence, this module provides a beginner's guide to Planet Earth.

No previous knowledge of geology is assumed and the course is suitable for science students from all backgrounds. The geology lecture course investigates a wide range of fundamental topics, including; the origin of the Universe and our Solar System, how Earth first formed, its composition and structure, how Earth’s internal dynamism constantly changes the landscape upon which we live, causing earthquakes and triggering volcanic eruptions, and the evolution of life on Earth. The accompanying, practically-based tutorial course deals with minerals, rocks and fossils and with some aspects of geology relevant to all such as earthquakes. This part of the course is done via small group teaching. Two short field excursions are held during the year to illustrate the geology of the Dublin area.

Junior Freshman Geology is a requirement for reading Geology as a Senior Freshman subject. Senior Freshmen can study geology in combination with a wide range of other subjects. Geology may be read as a single subject in the Junior Sophister and Senior Sophister years, leading to the degree of B.A. (Mod.) in Geology. Within the geology moderatorship students study both academic and applied aspects of the subject. There is a strong field programme in the Sophister years.

There is a global deficit of quality geoscientists that is predicted to last for several decades at least. Geologists find employment worldwide in the hydrocarbons and mining industries and also in environmental and hydrogeological companies and consultancies. Many are also employed in government surveys, civil engineering firms, third level educational institutions and the teaching profession. Geology graduates are also highly valued in the general graduate market, especially for their problem solving and team working skills developed during the field programme.

Learning outcomes:

On successful completion of this module students should be able to explain the basics of the origin of planet Earth and outline its basic dynamics. They should be able to outline the major phases of the evolution of life and review the relationship between Earth resources, natural processes and humans.
Contact Details:

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Web Address: http://www.tcd.ie/Geology
MATHEMATICS
MA1S11 & MA1S12 (Semester 1 & 2 - 20 Credits)

The aim of the JF Mathematics subject is to give all students a good working knowledge of basic mathematics, including an introduction to computing. Although you may find that you have already met some parts of the syllabus at school, you will find the approach at University level somewhat different. There is an emphasis on understanding and reasoning which is not only important in helping you to use mathematics in your chosen science, but promotes logical thinking which will be of use to you whatever your final career. This is one subject where you should not have to do a lot of learning-by-heart!

For administrative reasons, the subject is divided in two modules MA1S11 (in the Michaelmas term) and MA1S12 (in the Hilary term). Apart from a significant contribution of continuous assessment, the modules are examined in Trinity term (at the end of the academic year). The principal topics are related to calculus and linear algebra, including their applicability to science, but there are several other topics which take a shorter part of the time.

Module MA1S11
Co-ordinator: Prof. Stefan Sint

Learning Outcomes
On successful completion of this module students will be able to:

- Manipulate vectors to perform algebraic operations on them such as dot products and orthogonal projections and apply vector concepts to manipulate lines and planes in space \( \mathbb{R}^3 \) or in \( \mathbb{R}^n \) with \( n \geq 4 \).
- Use Gaussian elimination techniques to solve systems of linear equations, find inverses of matrices and solve problems which can be reduced to such systems of linear equations.
- Manipulate matrices algebraically and use concepts related to matrices such as invertibility, symmetry, triangularity, nilpotence.
- Manipulate numbers in different bases and explain the usefulness of the ideas in computing.
- Use computer algebra and spreadsheets for elementary applications.
- Explain basic ideas relating to functions of a single variable and their graphs such as limits, continuity, invertibility, even/odd, differentiability and solve basic problems involving these concepts.
- Give basic properties and compute with a range of rational and standard transcendental functions, for instance to find derivatives, antiderivatives, critical points and to identify key features of their graphs.
- Use a range of basic techniques of integration to find definite and indefinite integrals.
- Apply techniques from calculus to a variety of applied problems.
Module MA1S12
Co-ordinator: Professor Stefan Sint

Learning Outcomes – Calculus
On successful completion of this module students will be able to:

- Apply definite integrals to various geometric problems.
- Apply various methods of integration.
- Use the concept of differential equations and methods of their solution.
- Use the concept of infinite series and their convergence; Taylor series.
- Use the concepts of parametric curves and polar coordinates.

Learning Outcomes – linear algebra and probability
On successful completion of this module students will be able to:

- Define and calculate determinants by cofactor expansion and through upper triangular form.
- Use Cramer's Rule to solve linear equations.
- Use the Adjoint Matrix to invert matrices.
- Construct bases for row space, column space, and nullspace of a matrix.
  Construct orthonormal bases in three dimensions.
- Calculate the matrices of various linear maps.
- Compute linear and quadratic curves matching data through least squared error criterion.
- Calculate eigenvalues and eigenvectors for 2x2 matrices, with applications to differential equations.
- Derive probability distributions in simple cases.
- Apply the Binomial Distribution.
- Compute the conditional probability $P(A_i \mid D)$ given $P(D \mid A_i)$.
- Apply the Poisson distribution to traffic-light queuing problems.
- Apply continuous distributions, Normal, chi-squared, Student’s t-distribution.
- Obtain confidence intervals for mean and standard deviation.
- Apply the Central Limit Theorem to approximate the binomial distribution for large $n$.
- Perform basic hypothesis testing.
MATHEMATICAL METHODS
MA1M01 (Semester 1 - 10 Credits)
Co-ordinator: Professor Stefan Sint

Mathematical Methods is a short foundation in mathematics and computing for Junior Freshman students who are not taking mathematics as a full subject. In brief, the mathematical methods course is a refresher course and more.

The module runs in the Michaelmas term and includes continuous assessment and practical work, while the examination is in Trinity term.

Learning Outcomes
On successful completion of this module students will be able to;
- Use graphs of functions in the context of derivatives and integrals.
- Compute derivatives and equations of tangent lines for graphs of standard functions including rational functions, roots, trigonometric, exponential and logs and compositions of them.
- Find indefinite and definite integrals including the use of substitution and integration by parts.
- Solve simple maximization/minimization problems using the first derivative test and other applications including problems based on population dynamics and radioactive decay.
- Select the correct method from those covered in the module to solve wordy calculus problems, including problems based on population dynamics and radioactive decay.
- Algebraically manipulate matrices by addition and multiplication and use Leslie matrices to determine population growth.
- Solve systems of linear equations by Gauss-Jordan elimination.
- Calculate the determinant of a matrix and understand its connection to the existence of a matrix inverse; use Gauss-Jordan elimination to determine a matrix inverse.
- Determine the eigenvalues and eigenvectors of a matrix and link these quantities to population dynamics.
- State and apply the laws of probability.
- Determine the results of binomial experiments with discrete random variables.
- Calculate probabilities using probability density functions for continuous random variables.
Contact Details

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PHYSICS
PY1P10 & PY1P20 (Semesters 1 & 2 – 20 Credits)

Physics is the study of the fundamental nature of our universe in all its diversity, from particles to planets, from crystals to chaos, from quanta to quasars and from semiconductors to superstrings. In addition, a modern physics degree offers a way into technologies, such as advanced materials, energy and telecommunications. The School of Physics is an extremely active research centre, where exciting developments are being made in the physics of electronic and magnetic materials, foams, non-linear optics and lasers, and in computational physics, astrophysics, and nanoscience, including nanobiotechnology.

The School offers Moderatorships in Science (honours degree) in the areas of Physics, and Physics and Astrophysics. The School also offers Moderatorships in Theoretical Physics (jointly with the School of Mathematics) and in Nanoscience, Physics and Chemistry of Advanced Materials (jointly with the School of Chemistry). Science students may apply to transfer to the Nanoscience, Physics and Chemistry of Advanced Materials course and vice versa at any time up to the end of the Senior Freshman year provided that their chosen subjects in both Freshman years are: Physics, Chemistry and Mathematics.

Junior Freshman Physics provides a balanced experimental and theoretical training in core subjects. It includes lectures on what physics is, the physics of motion, hearing and seeing, the material world, electromagnetic interactions, modern physics and the universe. Students also attend weekly laboratory classes, small group tutorials and solve online physics problems. Those intending to specialise in physics in their Sophister years must take Physics (20 credits) and the full Mathematics for Science (20 credits) course in both of their Freshman years.

Each of these physics degrees is a general preparation for a wide range of careers in high technology companies, industrial research and development, telecommunications, management, financial services and other careers such as meteorology and teaching. Physics graduates are highly sought after since they are versatile, flexible, numerate and capable of applying themselves to very diverse fields.

Note: students taking the Junior Freshman Mathematical Methods (10 credits) module cannot proceed to any of the Physics Moderatorships. Such students should consult the Junior and Senior Freshman prerequisites for their intended Moderatorship.
Learning Outcomes PY1P10:

On successful completion of this module, students should be able to:

- Express in mathematical language the motion of a body under the action of forces
- Describe wave motion and relate it to basic phenomena in light and sound
- Understand sources of errors in measurements and calculate their propagation
- Prepare a brief report, including error analysis, of a simple physical experiment

Learning Outcomes PY1P20:

On successful completion of this module, students should be able to:

- Describe key experimental observations underpinning electricity and magnetism
- Describe how physics of matter and radiation is underpinned by quantum physics
- Interpret the data obtained in a simple physical experiment by applying a numerical data analysis
- Describe observational insights into the structure and evolution of the Universe
FOUNDATION PHYSICS

PY1F01 Foundation Physics for the Life and Earth Sciences
(Semester 2 - 10 Credits)

Foundation Physics for the Life and Earth Sciences is a foundation module (10 credits) in physics for Junior Freshman students and is available to those who are taking Mathematical Methods (10 credits).

Physics is a fundamental science and physical principles underlie practically all of the processes that occur in biological and geological/environmental systems. Life and earth scientists need therefore to understand and appreciate some basic physics. This foundation module covers some basic topics in physics and their applications in biology, medicine and earth sciences.

This foundation module comprises lectures, practical work and tutorials in topics such as: physics of motion, biomechanics, physics of hearing and seeing, electricity, magnetism and bioelectricity, radioactivity, nuclear physics and related medical applications, heat, pressure, as well as fluids and their biological, geological and medical applications.

Note: students who intend to specialise in Physics in their sophister years should not take this course but must take Physics (20 credits) and the full Mathematics (20 Credits) course in both of their Freshman years.

Learning Outcomes PY1F01:

On successful completion of this module, students should be able to:

- Demonstrate the application of Classical Physics within the biomedical and earth sciences
- Connect the study of wave phenomena and electromagnetism with ultrasound diagnostics and vision
- Relate basic knowledge of atomic and nuclear physics to radiation diagnostics and therapy and to geological applications
- Prepare a brief report, including error analysis, of a simple physical experiment
- Identify the appropriate concepts, principles, and relations that apply in solving foundation physics problems
Contact Details:

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**Web address:**  
http://www.physics.tcd.ie

**School E-mail:**  
physics@tcd.ie
Dates to Note:

**Freshman Orientation Week:** 18th September – 22nd September 2017
**TR071 Module Registration:** Monday 18th September 2017

**Surname:**
- A – L 11:00 – 12:30
- M – Z 14:00 – 16:00

**TR071 Module Re-registration:** Monday 27th November 2017

**Closing Dates for Course Transfer**

If you decide to transfer out of Science altogether, you must submit an application for transfer of course to the Academic Registry, following discussion with your tutor. Decisions are based on a) the availability of places, and b) the entry qualifications of the transfer applicant. It may not be possible to permit transfers to subjects which already have a full complement of students. Further details are available on the following link [http://www.tcd.ie/Admissions/undergraduate/apply/transferred/within-trinity/](http://www.tcd.ie/Admissions/undergraduate/apply/transferred/within-trinity/)

Students may not register or attend a course until their application to transfer has been formally approved by the Senior Lecturer.

**Teaching Terms 2017-2018**

**Semester 1 -** (Michaelmas Term)
Monday 25th September – Friday 15th December 2017

**Semester 2 -** (Hilary Term)
Monday 15th January 2018 – Friday 6th April 2018

Please note that lectures start on these dates so you are required to be in attendance.

**CHANGE OF MODULES**

If, after a couple of weeks, you feel that you have perhaps made the wrong choice of module, please seek advice immediately. It may be possible for you to change from one module to another within Science, subject to permission from the Associate Dean of Undergraduate Science Education. If you do decide to change modules, then do so quickly - it can be difficult to try to catch up with work in a new module if you have missed more than two or three weeks of lectures. You should call into the Science Course Office if you wish to change modules.

**ANY QUESTIONS? Call into the Science Course Office.**
## Academic Year Structure 2017/2018

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<th>Cal. Wk</th>
<th>Dates 2017/18 (week beginning)</th>
<th>Outline Structure of Academic Year 2017/18</th>
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<td>28-Aug-17</td>
<td>Supplemental Examinations</td>
<td>Statutory Term (Michaelmas) begins</td>
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<td>2</td>
<td>04-Sep-17</td>
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<td>3</td>
<td>11-Sep-17</td>
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<td>4</td>
<td>18-Sep-17</td>
<td>Freshers' Week / Undergraduate Orientation Week</td>
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<td>5</td>
<td>25-Sep-17</td>
<td>Teaching Week 1</td>
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<td>02-Oct-17</td>
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<td>09-Oct-17</td>
<td>Teaching Week 3</td>
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<td>16-Oct-17</td>
<td>Teaching Week 4</td>
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<td>9</td>
<td>23-Oct-17</td>
<td>Teaching Week 5</td>
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<td>10</td>
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<td>Teaching Week 6 (Monday, Public Holiday)</td>
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<td>Teaching Week 7 - Study Week</td>
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<td>Teaching Week 10</td>
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<td>Teaching Week 11</td>
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<tr>
<td>16</td>
<td>11-Dec-17</td>
<td>Teaching Week 12</td>
<td>- Michaelmas Term ends Sunday 17 December 2017</td>
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<td>17</td>
<td>18-Dec-17</td>
<td>Christmas Period (College closed)</td>
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<td>18</td>
<td>25-Dec-17</td>
<td>22 December 2017 to 1 January 2018, inclusive</td>
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<tr>
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<td>01-Jan-18</td>
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<tr>
<td>20</td>
<td>08-Jan-18</td>
<td>Foundation Scholarship Examinations</td>
<td>Note: It may be necessary to hold some exams in the preceding week.</td>
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<tr>
<td>21</td>
<td>15-Jan-18</td>
<td>Teaching Week 1</td>
<td>Hilary Term begins</td>
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<td>Teaching Week 3</td>
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<td>24</td>
<td>05-Feb-18</td>
<td>Teaching Week 4</td>
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<td>25</td>
<td>12-Feb-18</td>
<td>Teaching Week 5</td>
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<td>26</td>
<td>19-Feb-18</td>
<td>Teaching Week 6</td>
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<td>27</td>
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<td>Teaching Week 7 - Study Week</td>
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<td>05-Mar-18</td>
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<td>Teaching Week 10 (Monday, Public Holiday)</td>
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<td>09-Apr-18</td>
<td>Revision Trinity Week (Monday, Trinity Monday)</td>
<td>Trinity Term begins</td>
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<td>16-Apr-18</td>
<td>Revision</td>
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<td>35</td>
<td>23-Apr-18</td>
<td>Revision</td>
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<td>36</td>
<td>30-Apr-18</td>
<td>Annual Examinations 1</td>
<td>Annual Examination period: Four weeks followed by five weeks for marking, examiners’ meetings, publication of results, Courts of First Appeal and Academic Appeals.</td>
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<td>37</td>
<td>07-May-18</td>
<td>Annual Examinations 2 (Monday, Public Holiday)</td>
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<td>14-May-18</td>
<td>Annual Examinations 3</td>
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<td>21-May-18</td>
<td>Annual Examinations 4</td>
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<td>40</td>
<td>28-May-18</td>
<td>Marking/Courts of Examiners/Results</td>
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<td>41</td>
<td>04-Jun-18</td>
<td>Marking/Courts of Examiners/Results (Monday, Public Holiday)</td>
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<tr>
<td>42</td>
<td>11-Jun-18</td>
<td>Marking/Courts of Examiners/Results</td>
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<td>43</td>
<td>18-Jun-18</td>
<td>Marking/Courts of Examiners/Results/Courts of First Appeal</td>
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<tr>
<td>44</td>
<td>25-Jun-18</td>
<td>Courts of First Appeal/Academic Appeals</td>
<td>- Statutory (Trinity) Term ends Sunday 1 July 2018</td>
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<tr>
<td>45 to 52</td>
<td>02 Jul 2018 - 26 Aug 2018</td>
<td>Postgraduate dissertations/theses/Research 1-8</td>
<td>Eight weeks between end of statutory (Trinity) term and commencement of statutory (Michaelmas) term. This period is also used for writing up Masters dissertations and research theses due for submission in September. - Ends Sunday 26 August 2018</td>
</tr>
</tbody>
</table>
Important information

Attendance

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

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

2 The requirements for attendance at lectures and tutorials vary between the different faculties, schools and departments. Attendance is compulsory for Junior Freshmen in all subjects. The school, department or course office, whichever is relevant, publishes its requirements for attendance at lectures and tutorials on notice-boards, and/or in handbooks and elsewhere, as appropriate.

3 In special circumstances exemption from attendance at lectures for one or more terms may be granted by the Senior Lecturer; application for such exemption must be made in advance through the tutor. Students granted exemption from attendance at lectures are liable for the same annual fee as they would pay if attending lectures. Students thus exempted must perform such exercises as the Senior Lecturer may require. If these exercises are specially provided, an additional fee is usually charged.

4 Students who in any term have been unable, through illness or other unavoidable cause, to attend the prescribed lectures satisfactorily, may be granted credit for the term by the Senior Lecturer and must perform such supplementary exercises as the Senior Lecturer may require. The onus for informing the Senior Lecturer of illness rests with individual students who should make themselves familiar with the general and more detailed school or course regulations regarding absence from lectures or examinations through illness. In addition, issues with students may arise from time to time, which in the opinion of the Senior Lecturer affect a student’s ability or suitability to participate in his or her course. If required by the Senior Lecturer, students (other than those subject to §28 below) are obliged to undergo a medical examination or assessment by a doctor or specialist nominated by the Senior Lecturer at the expense of the College for the purpose of obtaining an opinion as to the student’s medical fitness to continue with his/her studies or as to his/her ability or suitability to participate in his/her course to the standards required by the College. Students found to be unfit following such a medical examination or assessment may be required to withdraw until such time as they are deemed fit to resume their studies. Students who fail to attend such a medical examination or assessment within a reasonable period may be required by the Senior Lecturer to withdraw until such time as they attend the aforementioned medical examination or assessment and are deemed fit to resume their studies.
Non-satisfactory attendance and course work

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

Further details of procedures for reporting a student as non-satisfactory are given on the College website at https://www.tcd.ie/undergraduate-studies/ academic-progress/attendance-course-work.php

Plagiarism
https://www.tcd.ie/undergraduate-studies/general-regulations/plagiarism.php

Throughout your studies in Trinity College Dublin you will develop and write assignments that require research. Your ideas will be expressed through words, images, diagrams and other multi-media forms. As you research you will be expected to understand and build upon the work of others. This requires acknowledging correctly and fully the contributions of others to your own scholarship. Regardless of what discipline you enter in Trinity, the cornerstone of its scholarship is academic honesty. So no matter what form your scholarly writing takes, you are expected at all times to take responsibility for the integrity of your work as you advance knowledge in your field of study.

The word plagiarism is derived from the Latin words meaning ‘kidnapper’. In its simplest sense, plagiarism can be seen as stealing someone else’s words or ideas and passing them off as your own, although plagiarism comes in many forms. In some educational systems, rules for avoiding plagiarism may not be clearly defined. Some of you may be studying in Ireland for the first time and may have different culturally-based understandings of plagiarism. However, whether unintentional or intentional, plagiarism is your responsibility and you need to know exactly what it is in order to avoid it.

It is important to emphasise that all students, i.e., undergraduate, postgraduate, new entrants and existing students, will be required to complete the online tutorial ‘Ready, Steady, Write’. Students must ensure that the cover sheets they complete when submitting assessed work, contain the following declaration:

I have read and I understand the plagiarism provisions in the General Regulations of the University Calendar for the current year, found at: https://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.
Students should read the items listed below to ensure that they understand plagiarism.

2. The College Calendar entry on plagiarism; https://www.tcd.ie/Science/current/PDF/plagiarism/Plagiarism.pdf.
3. Guidelines on the appropriate methodology for the kind of work that students will be expected to undertake. Providing discipline specific examples of good academic practice for referencing is very helpful for students. We would like to draw your attention to the Calendar entry on plagiarism which states that “[a]ll 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”;
4. A statement informing all students that they must complete the online tutorial on avoiding plagiarism ‘Ready, Steady, Write’, located at http://tcd-ie.libguides.com/plagiarism/ready-steady-write
5. The template of the coversheet/s which students must complete and attach to work submitted in hard or soft copy or via Blackboard. NB: coversheet must include the declaration noted above.


Request for Academic Transcript:
A request for a transcript may be made by calling to the Science Course Office, or via the web http://www.science.tcd.ie/request-academic-transcript/.

Due to the large volume of requests for transcripts, you are advised that transcripts take a minimum of ten working days to complete and during busy periods it may take up to three weeks.

Course timetables 2017-18:
Copies of course timetables for all Junior Freshman Students will be available from the Science Course Office. Draft timetables are available at the back of this booklet.

Once you have registered, you can access your timetable via the web through the following link: my.tcd.ie

Laboratories:
Multiple laboratory sessions are associated with a number of modules such as Biology BY1101, Chemistry CH1101, etc. Students taking these modules WILL BE ASSIGNED to specific sessions by the SCIENCE COURSE OFFICE (SCO), based on their other timetable commitments, availability of places, etc. Students MUST attend the sessions to which they have been assigned.
In very exceptional circumstances it may be possible to reassign a student to a different session. Students requesting to change their laboratory sessions should call to the Science Course Office as early as possible in the term, providing valid reasons and provide supporting documentation e.g. letter from employer, medical certificate to justify their request.
Absence from College/Med Certs
All Freshman Science Students – TR071 Science; Chemistry with Molecular Modelling; Earth Sciences; Human Genetics; Medicinal Chemistry; Nanoscience, Physics and Chemistry of Advanced Materials:

Students must attend College during the teaching term. They must take part fully in the academic work of their class throughout the period of their course. Lecture timetables are published on the science web page and copies are available in the Science Course office before the beginning of teaching term. The onus lies on students to inform themselves of the dates, times and venues of their lectures and other forms of teaching by consulting these timetables. Students are advised NOT to take a screenshot of timetables on my.tcd.ie as this will not reflect the most up-to-date information. Timetables should be viewed regularly in real time.

Medical Certificates
Where a student misses an assigned laboratory practical class through illness, they should (a) submit a Medical Certificate to the Science Course office on the day of their return to College and (b) inform the laboratory practical supervisor of their absence at the next session.

- Science Medical Certificate Form (use with med cert from doctor) – Available from Science Course Office

For periods of illness of three days or less (but no more than seven days in any year) a student may ‘self-certify’ their illness on the forms supplied, again to the Science Course Office on the day of their return to College.

- Science Medical Self Certification Form (use for 3 days med not covered by doctor) – Available from the Science Course Office

Other Absences
Students who require to be absent from a laboratory practical classes (with or without an associated assessment) for any other reason, such as a sporting or social event, should inform the appropriate module coordinator well in advance of the event (preferably a week beforehand).

- Science Absence from College Form (other reasons Sport etc.,) – Available from the Science Course Office

Where possible they will be assigned to an alternative laboratory practical session, but if that is not possible, and the justification for the absence is considered legitimate, they may be treated in the same manner as students submitting medical certificates (i.e. assigned an alternative assessment for one missed or awarded a pro-rata/pass mark). Excuses for absence, presented after the event, will not be entertained. Students who anticipate that their sporting commitments may necessitate more than the occasional absence from College (e.g. Sport Scholars, etc) should discuss their situation with their tutor and the Associate Dean of Undergraduate Science Education (ADUSE).

Any questions? Call into the Science Course Office.
Anonymous marking
All undergraduate students, including visiting students, will have their annual and supplemental examinations anonymously marked.

Science TR071 Grading Schedule:

<table>
<thead>
<tr>
<th>Schedule of Grades</th>
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</thead>
<tbody>
<tr>
<td>I</td>
<td>69.5%+</td>
</tr>
<tr>
<td>II-1</td>
<td>59.5-69.49%</td>
</tr>
<tr>
<td>II-2</td>
<td>49.5-59.49%</td>
</tr>
<tr>
<td>III</td>
<td>39.5-49.49%</td>
</tr>
<tr>
<td>F-1</td>
<td>29.5-39.49%</td>
</tr>
<tr>
<td>F-2</td>
<td>0-29%</td>
</tr>
<tr>
<td>U.G.</td>
<td>Ungraded</td>
</tr>
</tbody>
</table>

Examinations
All information pertaining to examinations is available on the Examinations office website, including examination regulations and timetables: https://www.tcd.ie/academicregistry/exams/

Junior Freshman examination regulations can be accessed at: http://www.science.tcd.ie/current/PDF/ExaminationRegulations/JFScienceExamregs.

Information Systems (IS) Services Guide to Services for undergraduate students:
This is a guide to all services provided by IS services and is well worth a look. Further information can be found at: https://www.tcd.ie/itservices/getting-started/index.php.

ANY QUESTIONS? Call into the Science Course Office.
Trinity Tutorial Service

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

For a list of all current Tutors and their contact details via the following the Senior tutors website: https://www.tcd.ie/Senior_Tutor/

Appointments
If you require specific advice or would like a confidential meeting with the Senior Tutor, you can make an appointment by telephoning +353 1 896 2551 or by emailing stosec@tcd.ie.

1. How do I contact my Tutor?
You can contact your Tutor by email, phone or by visiting his/her office. Go to https://www.tcd.ie/Senior_Tutor/ to find the email address, college address and extension number of your Tutor.

If you do not know who your Tutor is then go to https://my.tcd.ie/urd/sits.urd/run/siw_lgn which is on the TCD Local Homepage and enter your student number and details as requested.

2. When should I go to see my Tutor?
Whenever you are worried or concerned about any aspect of College life or your personal life, in particular if it is affecting your academic work. Everything you say to your Tutor is in strict confidence. Unless you give him/her permission to do so, s/he will not give any information to anybody else, whether inside College or outside (to your parents/family for example). Your Tutor can only help you if s/he knows you are facing difficulties, so if you are worried about anything go and see your Tutor before things get out of hand.

ANY QUESTIONS? Call into the Science Course Office.
Disability Services

The Disability Service aims to provide appropriate advice, support and information to help students and staff with disabilities.

Contact Us

- The Disability Service [https://www.tcd.ie/disability/](https://www.tcd.ie/disability/). Reception is located in Room 2054, beside the Lecky Library, in the Arts Building, Trinity College Dublin. To find us see map [http://www.tcd.ie/Maps/map.php](http://www.tcd.ie/Maps/map.php)

Making an Appointment

For queries, you can contact us as follows:

- By Phone: (01) 896 3111
- By Text / SMS (for Deaf Students): 086 3442322
- By Email: disab@tcd.ie

Student Counselling

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

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

- Phone: (01) 8961407
- Fax: (01) 8963464
- Email: student-counselling@tcd.ie

Brief Consultation

Students who have never used the service before are advised to avail of a Brief Consultation slot. Brief Consultation is a drop-in service reserved for new clients who have not already made an appointment with us and it runs during term time (October to May) from Monday to Friday through lunch (1.00pm-2.00pm).

Each day there are two half-hour slots available. Brief Consultation cannot be booked in advance and Students are seen on a first come first served basis, so just call in person to reception on the 3rd floor of 7-9 South Leinster Street.

NOTE:
While every effort will be made to give due notice of major changes, the Science Course Office reserves the right to suspend, alter or initiate courses, timetables, examinations and regulations at any time.
Faculty of Engineering, Mathematics and Science

EXAMINATION REGULATIONS
JUNIOR FRESHMAN STUDENTS:
  SCIENCE (TR071),
  HUMAN GENETICS (TR073),
  CHEMISTRY WITH MOLECULAR MODELLING (TR074),
  MEDICINAL CHEMISTRY (TR075)
  NANOSCIENCE, PHYSICS AND CHEMISTRY OF ADVANCED MATERIALS (TR076)
  EARTH SCIENCES (TR077)

1. GENERAL COLLEGE REGULATIONS
General College regulations with regard to examinations shall apply to all examinations in Science as set out in of the University Calendar 2017-18

2. EXAMINATION REGULATIONS – JUNIOR FRESHMAN

2.1 Timetables for all Freshman examinations are published in advance of the dates of the examinations, and available on-line on the College website. The onus lies on each student to find out the dates of examinations by consulting these timetables. No timetables or reminders will be sent to any individual student.

2.2 Junior Freshman students must, in the first instance, sit the annual examination for their course.

Students obtaining 40% or higher in each of their modules, or passing by compensation (see below) are qualified to rise to the Senior Freshman year. To gain a pass in the Junior Freshman examination, students must either pass in each module or compensate for marks of 35-39% in module/s not exceeding a total of 10 credits by their level of performance in the other modules.

2.3 To compensate at the Annual/Supplemental examinations, students must
   (i) obtain an overall mark of 40% or higher AND
   (ii) obtain individual marks of 40% or higher in modules to the value of 50 credits AND
   (iii) obtain marks of 35% or higher in each of the remaining modules.

2.4 Students who are unsuccessful in the annual examinations may re-sit examinations in the failed modules at the supplemental examination. (There is no fee for the Supplemental Examination).

www.tcd.ie/Science/
2.5 Students who are not qualified to rise to the Senior Freshman year, but whose overall mark is 35% or higher in either the annual or supplemental examination, may be permitted to repeat the Junior Freshman year in order to improve their performance.

2.6 Students whose overall mark is 34% or lower in the annual examinations and supplemental examinations are not permitted to repeat their year and must withdraw from the course.

Students failing to take the Annual Examination are not permitted to take the Supplemental Examination or repeat the year, except with the permission of the Senior Lecturer. Students permitted to defer their first sitting until the Supplemental Examination will be permitted to compensate as in 2.3 above.

2.7 If a student’s examination result indicates the remark ‘See tutor’, the student must contact their tutor immediately. If appropriate, an appeal can be lodged by the tutor to the Court of First Appeal.

A student may not repeat the Junior Freshman year more than once, except by special permission of the University Council.

Science Course Office
# Science Key to Lecture Theatres and Laboratories

<table>
<thead>
<tr>
<th>Lecture Room Name</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Macneil3</td>
<td>Hamilton Building</td>
</tr>
<tr>
<td>Joly 4</td>
<td>Hamilton Building</td>
</tr>
<tr>
<td>Maxwell5</td>
<td>Hamilton Building</td>
</tr>
<tr>
<td>Salmon Theatre</td>
<td>Hamilton Building</td>
</tr>
<tr>
<td>Synge Theatre</td>
<td>Hamilton Building</td>
</tr>
<tr>
<td>LTEE1</td>
<td>Lecture Theatre 1, EE4/5 Science Building</td>
</tr>
<tr>
<td>LTEE2</td>
<td>Lecture Theatre 2, EE4/5 Science Building</td>
</tr>
<tr>
<td>LTEE3</td>
<td>Lecture Theatre 3, EE4/5 Science Building</td>
</tr>
<tr>
<td>EE.Mac Lab</td>
<td>East End Science Building</td>
</tr>
<tr>
<td>EE.PC1</td>
<td>East End Science Building</td>
</tr>
<tr>
<td>EE.PC2</td>
<td>East End Science Building</td>
</tr>
<tr>
<td>EE.PC3</td>
<td>East End Science Building</td>
</tr>
<tr>
<td>Biology Laboratory</td>
<td>East End Science Building</td>
</tr>
<tr>
<td>Chemistry Laboratory</td>
<td>East End Science Building</td>
</tr>
<tr>
<td>CHLLT</td>
<td>Chemistry Large Lecture Theatre, Chemistry Building</td>
</tr>
<tr>
<td>CHSCLT</td>
<td>Chemistry Science Lecture Theatre, Chemistry Building</td>
</tr>
<tr>
<td>LB11</td>
<td>Lloyd Building</td>
</tr>
<tr>
<td>MOYNLT</td>
<td>Moyne Lecture Theatre, Moyne Institute Building</td>
</tr>
<tr>
<td>Moyne Seminar Room</td>
<td>Moyne Seminar Room, Moyne Institute Building</td>
</tr>
<tr>
<td>Goldsmith Hall</td>
<td>Goldsmith Building, Pearse Street</td>
</tr>
<tr>
<td>Room 1A</td>
<td>Goldsmith Building, Pearse Street</td>
</tr>
<tr>
<td>Room 2A</td>
<td>Goldsmith Building, Pearse Street</td>
</tr>
<tr>
<td>PHYLLT</td>
<td>Physics Large Lecture Theatre, Physics Building</td>
</tr>
<tr>
<td>Physics Labs</td>
<td>Physics Building</td>
</tr>
<tr>
<td>SNIAMS</td>
<td>Sami Nasr Institute of Materials Science Building</td>
</tr>
<tr>
<td>SNIAM LT</td>
<td>SNIAM Lecture Theatre, SNIAM Building</td>
</tr>
<tr>
<td>SNIAM LR</td>
<td>SNIAM Lecture Room, SNIAM Building</td>
</tr>
<tr>
<td>SNIAM CR</td>
<td>SNIAM Conference Room, SNIAM Building</td>
</tr>
<tr>
<td>SNIAM CPL</td>
<td>SNIAM Computational Physics Laboratory, SNIAM Building</td>
</tr>
<tr>
<td>SNIAM LAB 4</td>
<td>JS Advanced Material Laboratory, SNIAM Building</td>
</tr>
<tr>
<td>SNIAM LAB 1</td>
<td>JF Physics Laboratory, SNIAM Building</td>
</tr>
<tr>
<td>SNIAM LAB 2</td>
<td>SF Physics Laboratory, SNIAM Building</td>
</tr>
<tr>
<td>SNIAM LAB 3</td>
<td>JS Physics Laboratory, SNIAM Building</td>
</tr>
<tr>
<td>Name</td>
<td>Location</td>
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<tr>
<td>--------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Main Lab</td>
<td>Geology Department, Museum Building</td>
</tr>
<tr>
<td>Pal Lab</td>
<td>Geology Department, Museum Building</td>
</tr>
<tr>
<td>Pet Lab</td>
<td>Geology Department, Museum Building</td>
</tr>
<tr>
<td>M4</td>
<td>Geology Department, Museum Building</td>
</tr>
<tr>
<td>GLT</td>
<td>Geography Lecture Theatre, Museum Building</td>
</tr>
<tr>
<td>GG.SEM A</td>
<td>Geography Seminar Room A, Ground Floor, Museum Bldg</td>
</tr>
<tr>
<td>GG.SEM B</td>
<td>Geography Seminar Room B, G</td>
</tr>
<tr>
<td>TIME</td>
<td>MON</td>
</tr>
<tr>
<td>------</td>
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</tr>
<tr>
<td>09:00</td>
<td>G01204 (Geography) JOLY 4 Weeks 5-10, 12-16</td>
</tr>
<tr>
<td>10:00</td>
<td>BY1101 (Biology) GOLDHALL Weeks 5-10, 12-16</td>
</tr>
<tr>
<td>11:00</td>
<td>G01204 (Geography) JOLY 4 Weeks 5-10, 12-16</td>
</tr>
<tr>
<td>12:00</td>
<td>BY1101 (Biology) GOLDHALL Weeks 5-10, 12-16</td>
</tr>
<tr>
<td>13:00</td>
<td>MA1511 (Maths) G01204 (Geography) MACNiEL 3 CH101 (Chemistry) TUTORIAL T3 CH101 (Chemistry) GOLDHALL Weeks 5-10, 12-16</td>
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<td>14:00</td>
<td>MA1511 (Maths) G01204 (Geography) MACNiEL 3 CH101 (Chemistry) TUTORIAL T3 CH101 (Chemistry) GOLDHALL Weeks 5-10, 12-16</td>
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<td>15:00</td>
<td>MA1511 (Maths) G01204 (Geography) MACNiEL 3 CH101 (Chemistry) TUTORIAL T3 CH101 (Chemistry) GOLDHALL Weeks 5-10, 12-16</td>
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<td>16:00</td>
<td>MA1511 (Maths) G01204 (Geography) MACNiEL 3 CH101 (Chemistry) TUTORIAL T3 CH101 (Chemistry) GOLDHALL Weeks 5-10, 12-16</td>
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<tr>
<td>17:00</td>
<td>MA1511 (Maths) G01204 (Geography) MACNiEL 3 CH101 (Chemistry) TUTORIAL T3 CH101 (Chemistry) GOLDHALL Weeks 5-10, 12-16</td>
</tr>
</tbody>
</table>

NOTE: Please consult your timetable via en.tcd.ie to ensure you have the correct timetable information. SCREENSHOTS ARE NOT ADVISED - timetables are subject to change.

Science TN071

06/07/2017