Science
Junior Freshman Programme

2016/2017

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.

Produced by: The Science Course Office
Trinity College
Dublin 2
Tel: +353 1 896 1970/896 2022
Web Address: http://www.tcd.ie/Science/

Edited by: Anne O'Reilly, Ann Marie Brady and Mary Pat O'Sullivan
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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 – 19th to 23rd September 2016 - 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 Officers: Ms Agnes Gogan
Tel: 01-896 2022
E-mail gogana@tcd.ie

Ms Ann Marie Brady
Tel: 01-896 2829
E-mail: ennisa@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 honors’ 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 19th September 2016. (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 19th 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 19th September 2016. This session will be followed by the TR071 module registration in the Student Concourse outside the Science Course Office (Surnames 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. Please check your tcd e-mail address regularly.

All information regarding College registration is available at the following link: http://www.tcd.ie/academicregistry/registration/

Please Note: Students who have already accessed the my.tcd.ie website should continue to access it using your current username and password as this has not changed. For those who have not previously logged on, a username and password has been created to give you immediate access.

Username: Shown on the top right corner of both the email and letter you received.
Password: This is your date of birth in the format DDMONYYYY, e.g. 03FEB1977

www.tcd.ie/Science/
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>
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<tr>
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<td>BY1101</td>
<td>Molecular and Cellular Biology</td>
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<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>
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<tr>
<td>Geology</td>
<td>GL1101</td>
<td>Geology</td>
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<td>10</td>
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<td>Mathematics</td>
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<tr>
<td></td>
<td>MA1S12</td>
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<td>10</td>
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<tr>
<td></td>
<td>MA1M01</td>
<td>Mathematical Methods</td>
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<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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<td>10</td>
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<td></td>
<td>PY1F01</td>
<td>Foundation Physics for Earth and Life Sciences</td>
<td>2</td>
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<tr>
<th>Michaelmas Term (Semester 1) (26/09/16 – 12/12/16)</th>
<th>Hilary Term (Semester 2) (16/01/17 – 07/04/17)</th>
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<tr>
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<td>PY1F01 (10 credits)</td>
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<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 2016

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

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>
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<tr>
<td>Biology</td>
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<td>Chemistry</td>
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<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>
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</tr>
<tr>
<td>Mathematics</td>
<td></td>
<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>
</tr>
<tr>
<td>Geology</td>
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<td></td>
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</tr>
<tr>
<td>Agricultural Sc.</td>
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PTO
SECTION C: JUNIOR FRESHMAN MODULES FOR 2016/17
(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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<td>Molecular &amp; Cellular Biology</td>
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<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>
<td></td>
</tr>
<tr>
<td>GG1025</td>
<td>Introduction to Geography II: Environmental Geography</td>
<td>2</td>
<td>10</td>
<td></td>
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<tr>
<td>GL1101</td>
<td>Geology</td>
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<td>MA1S11</td>
<td>Mathematics</td>
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<td>MA1S12</td>
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</tr>
<tr>
<td>MA1M01</td>
<td>Mathematical Methods</td>
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<td>10</td>
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<td>Physics</td>
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<td>10</td>
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<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><strong>(Students must sign up for 30 credits each semester to a total of 60 credits for the year)</strong></td>
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<td></td>
<td>60</td>
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</table>

Signature of Subject Course Advisor/ Tutor: ________________________________

Date: __________________________
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<tr>
<th>Moderatorship</th>
<th>Senior Freshman</th>
<th>Junior Freshman</th>
</tr>
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<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>
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<tr>
<td>Comparative Biology</td>
<td>BY2201, BY2202, BY2203, BY2208</td>
<td>BY1101, BY1102, &amp; MA1S11 or MA1M01</td>
</tr>
<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>
<td>BY2201, BY2203, BY2205, BY2208</td>
<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>
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<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>
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<td>BY1101 or BY1102</td>
</tr>
<tr>
<td>Zoology</td>
<td>BY2201, BY2202, BY2203, BY2208</td>
<td>BY1101, BY1102, &amp; MA1S11 or MA1M01</td>
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</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: DIANET@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.

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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:

**Director of Teaching and Learning (UG):** Professor Paula Colavita & Professor Michael Bridge  
Tel: 01-896 3562/1264  
E-mail: udtlchem@tcd.ie

**Co-ordinator of Freshman Chemistry:** Dr Noelle Scully  
Teaching  
Tel: 01-896 1972/01-896 2040

**School Email:** jfchem@tcd.ie

**Address:** School of Chemistry  
Chemistry Building  
Trinity College  
Dublin 2

**Web address:** [www.tcd.ie/Chemistry](http://www.tcd.ie/Chemistry)
GEOGRAPHY

GG1024 Introduction to Physical Geography (Semester 1 - 10 Credits)
GG1025 Introduction to 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 to relating to the complex interactions between nature and society, exemplified by cases related to environmental hazards.

www.tcd.ie/Science/
The module aims to introduce students to foundational concepts and issues relating to the human-environment interface and exposes students to a range of sources and materials for analysing human environment relations.

**GG1025:**

**Learning Outcomes:**

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

- Define environmental geography and describe key areas of concern for environmental geographers;
- Describe different kinds of environmental degradation as the outcome of unsustainable social interactions with the environment;
- Identify and evaluate human-environmental relations within select cases of environmental hazards.

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

In the second year 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 Changing Environments (past, present, future) is designed to explain and analyse environmental change during the Quaternary period by examining modern processes, past records and archives of environmental change in different geographical settings, both physical and biological.

This is complemented by a second module, Changing Worlds: Human Geography, which focuses on the praxis of geographical research, introducing a range of techniques used in the acquisition and analysis of geographical data in a human geography context. In a mixture of lectures and practicals, students are introduced to research approaches and design, the collection and analysis of qualitative, quantitative and digital data, GIS and remote sensing as well as the presentation of geographical information.

In the sophister years, students can select from a range of modules to supplement their core curriculum. Topics covered include: coastal processes and management; economy, the state and spatial development; environmental change; environmental governance; environmental history and culture; globalisation; historical geography; and Quaternary geomorphology. 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.
Contact Details:  
Freshman Coordinator  
Professor Martin Sokol  
Tel: 01-896 2355  
E-mail: sokolm@tcd.ie

Head of Discipline:  
Professor Padraig Carmody  
Tel: 01-896 1713  
E-mail: carmodyp@tcd.ie

School Email:  
geog@tcd.ie  
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Address:  
Geography  
Museum Building  
Trinity College  
Dublin 2

Web address:  
http://www.tcd.ie/Geography
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:

Head of Discipline: Professor Patrick Wyse Jackson

Course Coordinator: Dr David Chew
Tel: 01-896 3481
E-mail: chewd@tcd.ie

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Address: Geology
Museum Building
Trinity College
Dublin 2

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.
• The concept of differential equations and methods of their solution.
• The concept of infinite series and their convergence; Taylor series.
• The concepts of parametric curves and polar coordinates.

Module Content – Discrete Mathematics
• Linear Algebra
• Determinants, Evaluation by Row Operations and Laplace Expansion, Properties, Vector Cross Products, Eigenvalues and Eigenvectors
• Introduction to vector spaces and linear transformations. Least squares fit via linear algebra.
• Differential equations, system of first order linear equations, linear second order equations.
• Selected application in different branches of science

Module Content - Probability
• Basic concepts of probability, sample means.
• Expectation and standard deviation for discrete random variables; Continuous random variables.
• Examples of common probability distributions (binomial, Poisson, normal).
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

Director of Teaching and Learning (UG): Professor Paschalis Karageorgis
E-mail: pete@maths.tcd.ie

Administrative Officer: Ms. Karen O’Doherty
Tel: 01-896 1889
E-mail: kod@maths.tcd.ie
Fax: 01 896 2282

Address: School of Mathematics
18 Westland Row
Trinity College
Dublin 2.

Web address: http://www.maths.tcd.ie

Departmental E-mail: mathdep@maths.tcd.ie
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
- Sketch how astronomy provides a basic description of the universe
- 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
- Demonstrate how the properties of matter can be described in terms of state variables, such as pressure and temperature
- Describe the important paradigm shifts that occurred within physics at the end of the 19th century and that still carry on through to 21st-century physics
- Interpret the data obtained in a simple physical experiment by applying a numerical data analysis
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
• Employ web-based research techniques within a small group project
Contact Details:

Director of Teaching and Learning (UG): Professor Charles Patterson
2.48 Lloyd Building
Tel: 01-896 1468

School Administrator: Dr. Colm Stephens
Tel: 01-896 2024
E-mail: colm.stephens@tcd.ie

Address: School of Physics
Trinity College
Dublin 2.
Fax No: 01-671 1759

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

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

**Freshman Orientation Week:** 19th September – 23rd September 2016
**TR071 Module Registration:** Monday 19th September 2016
**Surname:**
- A – L 11:00 – 12:30
- M – Z 14:00 – 16:00
**TR071 Module Re-registration:** Monday 26th November 2016

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/.

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

Teaching Terms 2016-2017

**Semester 1 -** (Michaelmas Term)
Monday 26th September – Friday 16th December 2016

**Semester 2 -** (Hilary Term)
Monday 16th January 2017 – Friday 7th April 2017

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 Science Course Director. 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 2016/2017

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<tbody>
<tr>
<td>1</td>
<td>29-Aug-16</td>
<td>Supplemental Examinations</td>
<td>Statutory Term (Michaelmas) begins</td>
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<tr>
<td>2</td>
<td>05-Sep-16</td>
<td>Teaching Week 1</td>
<td>Michaelmas Lecture term begins</td>
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<td>12-Sep-16</td>
<td>Teaching Week 2</td>
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<td>4</td>
<td>19-Sep-16</td>
<td>Freshers’ Week / Undergraduate Orientation Week</td>
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<td>5</td>
<td>26-Sep-16</td>
<td>Teaching Week 3</td>
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<td>03-Oct-16</td>
<td>Teaching Week 4</td>
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<td>7</td>
<td>10-Oct-16</td>
<td>Teaching Week 5</td>
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<td>8</td>
<td>17-Oct-16</td>
<td>Teaching Week 6 (Monday, Public Holiday) Teaching Week 7 - Study Week</td>
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<td>9</td>
<td>24-Oct-16</td>
<td>Teaching Week 8</td>
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<td>21-Nov-16</td>
<td>Teaching Week 12</td>
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<td>14</td>
<td>28-Nov-16</td>
<td>Christmas Period (College closed 24 December 2016 to 1 January 2017, inclusive)</td>
<td>←Michaelmas term ends Sunday 18 Dec</td>
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<tr>
<td>15</td>
<td>05-Dec-16</td>
<td>Foundation Scholarship Examinations</td>
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<td>16</td>
<td>12-Dec-16</td>
<td>Note: It may be necessary to hold some exams in the preceding week.</td>
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<td>19-Dec-16</td>
<td>Hilary Term begins</td>
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<td>18</td>
<td>26-Dec-16</td>
<td>Revision Trinity Week (Monday, Trinity Monday)</td>
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<td>02-Jan-17</td>
<td>Revision</td>
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<td>09-Jan-17</td>
<td>Hilary Term ends Sunday 9 April 2017</td>
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<td>01-May-17</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>08-May-17</td>
<td>Annual Examinations 2 (Monday, Public Holiday) Annual Examinations 3</td>
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<td>Annual Examinations 4</td>
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<td>26-Jun-15</td>
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www.tcd.ie/Science/
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. For professional reasons lecture and tutorial attendance in all years is compulsory in the School of Engineering, the School of Dental Science, the School of Medicine, the School of Nursing and Midwifery, the School of Pharmacy and Pharmaceutical Sciences and for the B.Sc. in Clinical Speech and Language Studies. Attendance at practical classes is compulsory for students in all years of the moderatorship in drama and theatre studies and drama studies two-subject moderatorship.

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.

6 At the end of the teaching term, students who have not satisfied the school or department requirements, as set out in §§19, 24 and 25 above, may be reported as non-satisfactory for that term. Students reported as non-satisfactory for the Michaelmas and Hilary terms of a given year may be refused permission to take their annual examinations and may be required by the Senior Lecturer to repeat their year. 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](https://www.tcd.ie/undergraduate-studies/academic-progress/attendance-course-work.php).

Students will be returned as non-satisfactory for the **Science course** under the following rules:
- Semester 1: Non-satisfactory in modules making up 20 credits.
- Semester 2: Non-satisfactory in modules making up 10 credits at week 7.

**Plagiarism**

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.

[www.tcd.ie/Science/](https://www.tcd.ie/Science/)
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 2016-2017:
Copies of course timetables for all Junior Freshman Students will be available from the Science Course Office. Timetables will also be published on the Science Course Office notice-boards. 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.

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:

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

Students are advised to read the "Managing College" booklet. A PDF version can be found via the following link: https://www.tcd.ie/Senior_Tutor/Tutor%20Booklet%20Summer%202015.pdf

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 2016/17
http://www.tcd.ie/calendar/assets/pdf/tcd-calendar-h-regulations.pdf

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

**Lecture Room Name** | **Location**
---|---
Macneil3 | Hamilton Building
Joly 4 | Hamilton Building
Maxwell5 | Hamilton Building
Salmon Theatre | Hamilton Building
Synge Theatre | Hamilton Building
LTEE1 | Lecture Theatre 1, EE4/5 Science Building
LTEE2 | Lecture Theatre 2, EE4/5 Science Building
LTEE3 | Lecture Theatre 3, EE4/5 Science Building
EE.Mac Lab | East End Science Building
EE.PC1 | East End Science Building
EE.PC2 | East End Science Building
EE.PC3 | East End Science Building
Biology Laboratory | East End Science Building
Chemistry Laboratory | East End Science Building
CHLLT | Chemistry Large Lecture Theatre, Chemistry Building
CHSCLT | Chemistry Science Lecture Theatre, Chemistry Building
LB11 | Lloyd Building
MOYNLT | Moyne Lecture Theatre, Moyne Institute Building
Moyne Seminar Room | Moyne Seminar Room, Moyne Institute Building
Goldsmith Hall | Goldsmith Building, Pearse Street
Room 1A | Goldsmith Building, Pearse Street
Room 2A | Goldsmith Building, Pearse Street
PHYLLT | Physics Large Lecture Theatre, Physics Building
Physics Labs | Physics Building
SNIAMS | Sami Nasr Institute of Materials Science Building
SNIAM LT | SNIAM Lecture Theatre, SNIAM Building
SNIAM LR | SNIAM Lecture Room, SNIAM Building
SNIAM CR | SNIAM Conference Room, SNIAM Building
SNIAM CPL | SNIAM Computational Physics Laboratory, SNIAM Building
SNIAM LAB 4 | JS Advanced Material Laboratory, SNIAM Building
SNIAM LAB 1 | JF Physics Laboratory, SNIAM Building
SNIAM LAB 2 | SF Physics Laboratory, SNIAM Building
SNIAM LAB 3 | JS Physics Laboratory, SNIAM Building
<table>
<thead>
<tr>
<th>Location</th>
<th>Description</th>
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<tbody>
<tr>
<td>Main Lab</td>
<td>Geology Department, Museum Building</td>
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<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>
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<tr>
<td>GG.SEM B</td>
<td>Geography Seminar Room B, G</td>
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</tbody>
</table>
## Junior Freshman Science
### Semester One - 2016-2017

**26 September 2016 - 16 December 2016**

(Weeks 5-10, 12-16)

### University of Dublin
**Science Course Office (TR071)**

**Week 9 (October) Bank Holiday.**
**Week 11 Reading Week (7 - 11 Nov 2016)**

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<tr>
<th>Time</th>
<th>Monday</th>
<th>Tuesday</th>
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<tbody>
<tr>
<td>09:00</td>
<td>BY1101 (biology) in GOLDHALL Weeks 5-8, 10, 12-16</td>
<td>BY1101 (biology) in GOLDHALL Weeks 5-8, 10, 12-16</td>
<td>BY1101 (biology) in GOLDHALL Weeks 5-8, 10, 12-16</td>
<td>BY1101 (biology) in GOLDHALL Weeks 5-8, 10, 12-16</td>
<td>MA1101 (Maths) in MACNEIL3 Weeks 5-8, 10, 12-16</td>
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<tr>
<td>10:00</td>
<td>CM1101 (Chemistry) in GOLDHALL Weeks 5-8, 10, 12-16</td>
<td>CM1101 (Chemistry) in GOLDHALL Weeks 5-8, 10, 12-16</td>
<td>CM1101 (Chemistry) in GOLDHALL Weeks 5-8, 10, 12-16</td>
<td>CM1101 (Chemistry) in GOLDHALL Weeks 5-8, 10, 12-16</td>
<td>MA1101 (Maths) in MACNEIL3 Weeks 5-8, 10, 12-16</td>
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<td>MA1111 (Maths) in MACNEIL3 Weeks 5-8, 10, 12-16</td>
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<td>PY1P10 (Physics) in JOLLY4 Weeks 5-8, 10, 12-16</td>
<td>PY1P10 (Physics) in JOLLY4 Weeks 5-8, 10, 12-16</td>
<td>PY1P10 (Physics) in JOLLY4 Weeks 5-8, 10, 12-16</td>
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**NOTE:** Please consult your timetable via my.tcd.ie to ensure you have the correct timetable information. SCREENSHOTS ARE NOT ADVISED - timetables are subject to change.
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<tr>
<th>Time</th>
<th>Monday</th>
<th>Tuesday</th>
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<tr>
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<td>BY1102 (Biol.)</td>
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<td>MA1102 (Math.)</td>
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**NOTE:** Please consult your timetable via my.tcd.ie to ensure you have the correct timetable information. SCRENNSHOTS ARE NOT ADVISORY - Timetables are subject to change.
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.