### Academic Year Structure 2018/19

**Key Dates:**

<table>
<thead>
<tr>
<th>Event</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshers/Orientation Week</td>
<td>Monday 3 September to Friday 7 September 2018</td>
</tr>
<tr>
<td>Semester 1 Teaching begins</td>
<td>Monday 10 September 2018</td>
</tr>
<tr>
<td>Study/Review Week</td>
<td>Monday 22 October to Friday 26 October 2018</td>
</tr>
<tr>
<td>Semester 1 Teaching ends</td>
<td>Friday 30 November 2018</td>
</tr>
<tr>
<td>Semester 1 Revision Week</td>
<td>Monday 3 December to Friday 7 December 2018</td>
</tr>
<tr>
<td>Semester 1 Assessment Week</td>
<td>see below</td>
</tr>
<tr>
<td>Scholarship Examinations</td>
<td>Monday 7 January to 11 January 2019 ¹</td>
</tr>
<tr>
<td>Semester 2 Teaching begins</td>
<td>Monday 21 January 2019</td>
</tr>
<tr>
<td>Study/Review Week</td>
<td>Monday 4 March to Friday 8 March 2019</td>
</tr>
<tr>
<td>Semester 2 Teaching ends</td>
<td>Friday 12 April 2019</td>
</tr>
<tr>
<td>Semester 2 Revision Week</td>
<td>Monday 15 April to Friday 19 April 2019</td>
</tr>
<tr>
<td>Semester 2 Assessment Week</td>
<td>see below</td>
</tr>
<tr>
<td>Trinity week</td>
<td>Monday 29 April to Friday 3 May 2019</td>
</tr>
<tr>
<td>Formal Assessment weeks ²</td>
<td></td>
</tr>
<tr>
<td>Semester 1 examinations</td>
<td>Saturday 8 December to Friday 14 December 2018</td>
</tr>
<tr>
<td>Semester 2 examinations</td>
<td>Tuesday 23 to Saturday 27 April 2019</td>
</tr>
<tr>
<td></td>
<td>(and Tuesday 30 April and Thursday 2 May 2019 if required)</td>
</tr>
</tbody>
</table>

¹ It may be necessary to hold some Foundation Scholarship examinations in the preceding week.

² Please note that the dates of formal assessment weeks may extend to begin earlier or run later – examination schedules may not be finalised at this time.

**IMPORTANT NOTE:** The details contained in this booklet are subject to change. In the event of any conflict or inconsistency between the General Regulations published in the University Calendar and information contained in this course handbook, the provisions of the General Regulations will prevail.
Contents
1. Welcome to Geology at Trinity ................................................................. 5
   The B.A. Moderatorship in Science – Geology ........................................... 6
   Learning Outcomes .................................................................................. 6
   Graduate Attributes .................................................................................. 6
   Why are the Graduate Attributes important? ............................................ 6
   How will I develop these Graduate Attributes? ......................................... 6
2. Programme Structure ................................................................................ 8
   The European Credit Transfer and Accumulation System (ECTS) .......... 8
   Timetable .................................................................................................. 8
3. List of Modules .......................................................................................... 9
4. Module Outlines ........................................................................................ 10
   Senior Freshman Modules ........................................................................ 10
   GLU22905 Dynamic Earth 1: Rocks and Evolution 10 credits .............. 10
   GLU22906 Dynamic Earth 2: Structure and Microscopy 10 credits ....... 11
   Junior Sophister Modules ......................................................................... 13
   GLU33924: Geological Field Skills 1 10 credits ..................................... 13
   GLU33925: Geological Field Skills 2 ....................................................... 14
   GLU33926: Sedimentology 10 credits ....................................................... 15
   GLU33928: Structural Geology 5 credits ................................................... 17
   GLU33934: Introduction to Geochemistry 5 credits ............................... 17
   GLU33935: Stratigraphy and the Geology of Ireland 5 credits ............. 19
   GLU33936: Microscopy and Crystalline Rocks 10 credits ..................... 21
   GLU33937: GIS and mapping techniques 5 credits .................................. 22
   Senior Sophister Modules ......................................................................... 25
   GLU44901 Independent Project 15 credits ................................................. 25
   GLU44902 Fieldwork 5 credits ................................................................ 26
   GLU44904 Geological Literature 5 credits .............................................. 27
   GLU44906 Global Igneous Petrology 5 credits ........................................ 28
   GLU44912 Laboratory Project 5 credits .................................................... 29
   GLU44914 Petroleum Geology and Exploration 10 credits .................. 30
   GLU44919 Economic Geology 5 credits ................................................... 31
   GLU44922 Analysis in Geological, Earth and Environmental Research
       5 credits ............................................................................................... 33
   GLU44924: Micropalaeontology 5 credits ................................................. 34
   GLU44925: Applied Geophysics 5 credits ............................................... 35
GLU44927: Isotope Geochemistry and Geochronology  5 credits
GLU34923: Hydrology and Water Quality  5 credits

5. Attendance and Coursework

Field Courses
Non-Satisfactory Attendance and Coursework
Absence from College – Medical and Absence Certificates
Other Absences

6. Examinations and Assessment

Examinations
Foundation Scholarship Examination
Submission of Assessed Work
Deadlines and Penalties for Late Submission
Marking Schemes
Prizes

7. Plagiarism

8. Health and Safety

9. Additional Student Information and Support

Trinity Tutorial Service
Disability Services
Student Counselling
Useful College Websites

10. Contact Details
1. Welcome to Geology at Trinity

Geology is the science of our planet. It deals with processes operating inside the Earth and on its surface, today and back in time to the planet’s origin some 4.6 billion years ago. These processes may be brief and violent, such as earthquakes and volcanic eruptions, or they may be slow and drawn out, like the rise of majestic mountain ranges. Scientists from all major disciplines are drawn into geology: they work together to figure out just how the Earth and its abundant life came to be the way we find them today. Charles Darwin was, first and foremost, a geologist. Without a sense of ‘deep time’ his astonishing insight into evolution could never have happened. Geology was so central to scientific investigation in Darwin’s age that Trinity College saw fit to recognize the subject’s importance by erecting the splendid Museum Building. This building continues to be the home of geology in Trinity, and geological research is as active there today as it has ever been. Recent work has included the reconstruction of global geography 300 million years ago, ancient global warming, the precise measurement of the age of rocks, and the origin of planets.

The time perspective is important when analysing short-term fluctuations of climate, oceanic circulation and biodiversity as well as understanding the formation of our natural resources, their finite nature and sustainability of our species. The subject matter is utterly fascinating and forms an excellent basis for critical and logical thinking as well as a vocational training. Aside from its fundamental interest, geology has paved the way towards our modern industrialised society by showing how and where to find those resources – water, coal, iron, oil, and rare metals – upon which we so crucially depend. And now, as civilization strives to come to terms with the damage caused by over-exploitation of those resources, it is geologists who, through their understanding of the planet’s past, are best equipped to seek mitigating solutions to the threat of climate change, and to the risk of losing access to clean water. Geology is science at its broadest and at its most relevant for the future of humankind. Your own Geological journey starts here...
The B.A. Moderatorship in Science – Geology

This is the handbook for students enrolled in TR071 (Science) who are taking Geology modules in their second year, or who have selected to study Geology in their final (sophister) years. Entry to this degree programme is no longer available and from 2018 students interested in studying Geology at Trinity should apply to TR062 Geography & Geoscience.

Learning Outcomes
On successful completion of your Geology degree, you will be able to:

1. identify, formulate, analyse and suggest reasoned solutions to geological problems
2. identify earth materials and interpret three and four dimensional distributions of these materials from incomplete data sets
3. apply scientific procedure to solving problems
4. critically assess previously produced geological data sets and interpretations
5. work effectively as an individual, in teams and in multidisciplinary settings
6. communicate effectively with both the geological community and with society at large
7. update their knowledge and undertake further study with a high degree of autonomy.

Graduate Attributes

The Trinity Graduate Attributes represent the qualities, skills and behaviours that you will have the opportunity to develop as a Trinity student over your entire university experience, in other words, not only in the classroom, but also through engagement in co- and extra-curricular activities (such as summer work placements, internships, or volunteering).

The four Trinity Graduate Attributes are:

• To Think Independently
• To Act Responsibly
• To Develop Continuously
• To Communicate Effectively

Why are the Graduate Attributes important?
The Trinity Graduate Attributes will enhance your personal, professional and intellectual development. They will also help to prepare you for lifelong learning and for the challenges of living and working in an increasingly complex and changing world.

The Graduate Attributes will enhance your employability. Whilst your degree remains fundamental, also being able to demonstrate these Graduate Attributes will help you to differentiate yourself as they encapsulate the kinds of transversal skills and abilities, which employers are looking for.

How will I develop these Graduate Attributes?
Many of the Graduate Attributes are ‘slow learned’, in other words, you will develop them over the four or five years of your programme of study.
They are embedded in the curriculum and in assessments, for example, through undertaking independent research for your final year project, giving presentations and engaging in group work.

You will also develop them through the co-curricular and extra-curricular activities. If you help to run a club or society you will be improving your leadership skills, or if you play a sport you are building your communication and team-work skills.
2. Programme Structure

The Geology programme at Trinity employs a modular structure that combines compulsory and optional elements, thereby giving you some flexibility to develop a course that aligns with your interests.

In each year, teaching is delivered in two semesters with an examination period at the end of each semester. Trinity College assigns a credit value to each module based on the European Credit Transfer and Accumulation System (ECTS). Students take modules totalling 60 credits in each year of study.

**The European Credit Transfer and Accumulation System (ECTS)**

The European Credit Transfer and Accumulation System (ECTS) is an academic credit system based on the estimated student workload required to achieve the objectives of a module or programme of study. It is designed to enable academic recognition for periods of study, to facilitate student mobility and credit accumulation and transfer. The ECTS is the recommended credit system for higher education in Ireland and across the European Higher Education Area.

The ECTS weighting for a module is a measure of the **student input** or workload required for that module, based on factors such as the number of contact hours, the number and length of written or verbally presented assessment exercises, class preparation and private study time, laboratory classes, examinations, clinical attendance, professional training placements, and so on as appropriate. There is no intrinsic relationship between the credit weighting of a module and its level of difficulty.

The European norm for full-time study over one academic year is 60 credits. **1 credit represents 20-25 hours estimated student input**, so a 10-credit module will be designed to require 200-250 hours of student input including class contact time, assessments and examinations.

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

**Timetable**

Student timetables are available via MyTCD and a copy is available from the Office on request. Some modules will provide additional timetable information in class, via email or through Blackboard and it is important that you check these sources regularly for updates. Some elements of the course (e.g. fieldwork) may occur outside of the regular timetable.
3. List of Modules

<table>
<thead>
<tr>
<th>Senior Freshman</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GLU22905    Dynamic Earth 1: Rocks and Evolution</td>
<td>10</td>
</tr>
<tr>
<td>GLU22906    Dynamic Earth 2: Structure and Microscopy</td>
<td>10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Junior Sophister</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GLU33924     Geological Field Skills 1</td>
<td>10 M</td>
</tr>
<tr>
<td>GLU33925     Geological Field Skills 2</td>
<td>10 M</td>
</tr>
<tr>
<td>GLU33926     Sedimentology</td>
<td>10 M</td>
</tr>
<tr>
<td>GLU33928     Structural Geology</td>
<td>5 M</td>
</tr>
<tr>
<td>GLU33934     Introduction to Geochemistry</td>
<td>5 M</td>
</tr>
<tr>
<td>GLU33935     Stratigraphy and the Geology of Ireland</td>
<td>5 M</td>
</tr>
<tr>
<td>GLU33936     Microscopy and crystalline rocks</td>
<td>10M</td>
</tr>
<tr>
<td>GLU33937     GIS and mapping techniques</td>
<td>5 M</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Senior Sophister</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GLU44901     Project</td>
<td>15 M</td>
</tr>
<tr>
<td>GLU44902     Fieldwork</td>
<td>5 M</td>
</tr>
<tr>
<td>GLU44904     Geological Literature</td>
<td>5 M</td>
</tr>
<tr>
<td>GLU44914     Petroleum Geology and Exploration</td>
<td>10 M</td>
</tr>
<tr>
<td>GLU44919     Economic Geology</td>
<td>5 M</td>
</tr>
<tr>
<td>GLU44906     Global Igneous Petrology</td>
<td>5 O</td>
</tr>
<tr>
<td>GLU44912     Laboratory Project</td>
<td>5 O</td>
</tr>
<tr>
<td>GLU44922     Analysis in Geological, Earth &amp; Environmental Research</td>
<td>5 O</td>
</tr>
<tr>
<td>GLU44927     Isotope Geochemistry and Geochronology</td>
<td>5 O</td>
</tr>
<tr>
<td>GLU34923     Hydrology and Water Quality</td>
<td>5 O</td>
</tr>
<tr>
<td>GLU44924     Micropalaeontology</td>
<td>5 O</td>
</tr>
<tr>
<td>GLU44925     Applied Geophysics</td>
<td>5 O</td>
</tr>
</tbody>
</table>
4. Module Outlines

Senior Freshman Modules

GLU22905  Dynamic Earth 1: Rocks and Evolution 10 credits

Coordinator:  Dr. Una Farrell
Prerequisites:  
Semester:  Michaelmas Term
Contact Hours:  Four lectures and one three-hour practical per week

Module Learning Aims:  (1) to promote the understanding of how material is cycled and recycled within the Earth and how rock types record different aspects of this cycling.  (2) To provide (a) an understanding of form and function in fossil organisms and their links to living floras and faunas (b) an overall appreciation of the evolutionary record of life on Earth.

Module Content:  The module initially approaches the solid materials that make up the outer parts of the Earth - the lithosphere - namely rocks and their basic building blocks, minerals.  A pathway is taken through the rock cycle from initial formation from mantle material into igneous rocks, their subsequent breakdown at the Earth’s surface and reconstitution into sedimentary rocks and, finally the alteration of these rocks through burial at elevated temperatures and pressures.  Techniques of describing and reaching first stage interpretations of rocks and minerals in hand sample are covered.

Equipped with an appreciation of the dynamic natures of the solid Earth, the module then introduces the time dimension of life, which has existed on planet Earth for much of its history.  Fossil organisms are the data that record the evolution of life on the planet.

Learning Outcomes:  On successful completion of this module students should be able to:
• describe and identify common kinds of rock, and the minerals they contain, in hand sample
• describe and classify a broad range of organisms found in the fossil record, and explain the concepts of fossilisation, evolutionary sequences and lineages
• outline the uses of fossils in palaeobiological, palaeogeographic and evolutionary studies, and state the basic principles of taxonomic procedure

Assessment details: Theory examination (60%); practical examination (20%); in-course assessment (20%).

GLU22906 Dynamic Earth 2: Structure and Microscopy  10 credits

Coordinator: Dr David Chew
Prerequisites: GLU22905
Semester: Hilary Term
Contact Hours: Four lectures and one 3-hour practical per week

Module Learning Aims: (1) To investigate how, why and where rocks undergo deformation. (2) To understand the different plate tectonic environments, and their evolution in time and space (3) To be able to interpret two-dimensional representations of geological data (maps) in three dimensions. (4) To understand the physical and chemical properties of minerals and how minerals can be investigated using the polarised light microscope.

Module Content: This module investigates the structure of the Earth from the scale of plate tectonics through to investigation using the polarising microscope. The structural geology lectures cover the principles of rock deformation and the classification of structural features. The tectonics lectures provide an overview of active plate tectonic processes. These various processes are exemplified by a series of practical exercises that aim to develop an understanding of plate tectonics and the visualisation of structures in three dimensions. The module also introduces the principals of crystallography and the theory and practice of using a polarised light
microscope to look at minerals in thin sections of rock. The rock-forming minerals are examined in detail in terms of where they are found, what they look like through the microscope, what chemical elements they contain, and their physical stability.

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

- investigate and explain how, why and where rocks undergo deformation
- describe the different plate tectonic environments, and their evolution in time and space
- interpret two-dimensional representations of geological data (maps) in three dimensions
- describe the physical and chemical properties of minerals and describe how minerals can be investigated using the polarised light microscope.

**Assessment details:** Theory examination (70%); practical examination (15%); in-course laboratory assessment (15%).
Junior Sophister Modules

GLU33924: Geological Field Skills 1  10 credits

Coordinator: Dr Chris Nicholas
Prerequisites: JS Geology students only
Semester: Michaelmas Term
Contact Hours: 11 Days

Module Learning Aims: To introduce and practice the range of basic geological field skills needed by a geologist today, demonstrate some of the more interesting aspects of Arran's geological history and Scotland as a whole, and to give students experience of problem-solving with others and presenting their own ideas.

Module Content: The Isle of Arran in SW Scotland is often called 'Scotland in miniature' as it has an amazing variety of different rocks squeezed into a relatively small geographical area. Consequently, it is a perfect place to get to grips with geology in the field and to think about rocks on a large scale out of the classroom. This field course will spend time looking at sedimentary, igneous and metamorphic rocks, and after introducing some of the key basic field techniques needed to extract the most information from rocks in situ, and how to interpret the data, students will then undertake various problem-solving exercises as well as having the chance to try geological mapping on variety of scales.

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

- Locate themselves accurately in the field using a compass,
- Confidently use various items of geological equipment to gather and record data from rocks in situ, such as hand lens, hammer, compass-clinometer, and field note book,
- Make an interpretation of the geological origin and formation of any given rock exposure based on their own observational and measured field evidence,
• Confidently undertake basic geological mapping in the field using both topographic base maps and transparent overlay on satellite imagery,

• Synthesise data gathered from a series of rock exposures around an area to piece together its geological evolution and history.

Assessment details: In-course assessment 100%

Geological Field Skills 1, Isle of Arran, Scotland.

GLU33925: Geological Field Skills 2 10 credits

Coordinator: Dr David Chew
Prerequisites: GLU22905 and GLU22906
Semester: Hilary Term
Contact Hours: Weeks 32-33

Module Learning Aims: To build on the field skills gained in module GL3324, by introducing new techniques, developing and improving geological mapping skills and improving interpretative skills in the field.

Module Content: Undergraduate field courses provide vital experience in practising core subject skills. Much of this module will comprise a two-week residential field
course to a region of active tectonics. It will comprise a series of exercises in the techniques of geological fieldwork and mapping, and development of an understanding of how the geology of the field area is related to the tectonics of a region.

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

- accurately locate yourself in the field using topographic base maps, satellite imagery and/or GPS
- make essential field observations and measurements, including recognition of major rock types and geological structures
- use a compass-clinometer with familiarity to measure geological structures
- construct a geological map (field slips and interpretative map) and stratigraphic log and accurately record field observations in a notebook, as notes, sketches or tabulated data
- construct a geological cross-section on the basis of a geological map
- identify and interpret a range of sedimentary structures and their depositional environments
- identify diagnostic metamorphic assemblages in the field
- be familiar with a range of volcanic rocks and their modes of deposition and be able to use this information to determine eruptive style
- to evaluate the regional geology and tectonic setting in the context of an active orogenic belt

Assessment details: In-course assessment 100%

GLU33926: Sedimentology 10 credits

Coordinator: Dr Micha Ruhl
Prerequisites: GLU22905, GLU22906
Semester: Michaelmas Term
Contact Hours: Weeks 3-8 & 10-14, seven hours per week
Module Learning Aims: The module introduces how sediment is produced and transported at the Earth's surface, and the processes that lead to sediment becoming rock. We will investigate the different siliciclastic and carbonate depositional environments, and relate the information preserved in these sedimentary rocks to physical, chemical and biological processes that occurred during their formation.

Module Content: Sedimentary materials account for most of the Earth's crust, and much of our understanding of Earth history comes from their examination. This course provides an introduction to sedimentary processes and deposits that shape Earth's surface, including their description, formation and interpretation. In particular, the generation, transport, and preservation of sediment are studied as diagnostic tools to link surface processes with the geological records of Earth history and modern environmental change. The origin of a wide range of sedimentary rocks is investigated in theory and in the laboratory using field observations, stratigraphic sections, hand samples, and thin sections to decipher depositional environments and propose stratigraphic models.

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

- classify siliciclastic and carbonate sedimentary rocks;
- provide technical descriptions of common sedimentary rock types and textures from hand samples and thin sections;
- provide basic interpretations of depositional environments from outcrop observations, stratigraphic logs and petrological evidence;
- outline appropriate strategies for field and laboratory investigation of sedimentary rocks.

Assessment details: Theory examination (30%); practical examination (20%); in-course assessment (50%)
GLU33928:  Structural Geology  5 credits

Coordinator:  Dr David Chew
Prerequisites:  GLU22905, GLU22906
Semester:  Hilary Term
Contact Hours:  Weeks 22-27, nine hours per week

Module Learning Aims: This module aims to develop an understanding of structures in three dimensions by introducing the principal means of presenting structural data, namely maps, cross sections and stereographic projections.

Module Content: This module examines the geometries, kinematics and mechanics of rock deformation. It also deals practically with the representation of three-dimensional structural data using maps, cross-sections and stereographic projections.

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

- summarise the basics of rock rheology, the concepts of stress and strain, and the processes of brittle and ductile deformation;
- classify and identify rock fabrics, faults, fractures and fault zone rocks and describe and classify folds;
- be aware of the principal features of compressional, strike-slip and extensional tectonic systems;
- be confident presenting and manipulating data using stereographic projection.

Assessment details: Theory examination (50%); in-course assessment (50%)

GLU33934:  Introduction to Geochemistry  5 credits

Coordinator:  Dr Juan Diego Rodriguez-Blanco
Prerequisites:  GLU22905, GLU22906
Semester:  Michaelmas Term
Contact Hours:  Weeks 10-14, seven hours per week
**Module content:** This module introduces the chemical principles that control the chemical composition of large geological systems (e.g., Earth’s mantle, crust, ocean and atmosphere). We will acquire the ability to explain, interpret and predict the chemical processes that occur in aquatic, terrestrial and subsurface environments, which control the chemical composition of natural waters. This module focuses primarily on inorganic geochemistry, including the processes of anthropogenic inorganics loading to the environment. The module draws from insight provided by laboratory experiments as well as from empirical observations. Students will gain hands-on experience with the most widely used tools of geochemistry.

**Module Learning Aims:**
This module aims to:
(1) Provide an understanding of principles that govern mineral-fluid interaction processes and the chemistry of rocks;
(2) Illustrate the inter-relationship between mineralogy and geochemistry;
(3) Broaden skills for quantitatively testing hypotheses from qualitative field or microscope description;
(4) Illustrate how adsorption/desorption, absorption and surface precipitation process in minerals can be used to infer the chemistry of natural waters;
(5) Develop a broad understanding of the most important biogeochemical cycles (C, N, O, P) and their relevance for the environment;
(6) Demonstrate how elemental behaviour and abundance determine where elements can be found as economic resources.

**Learning outcomes:** On successful completion of this module students should be able to:
- Understand and discuss the basic principles that govern mineral-water interaction processes at the nano- and atomic scale;
- Use activity and Eh-pH diagrams to illustrate ion speciation and mineral stability in different environments;
• Identify the most important factors that control the C, N, O and P cycles on Earth from the nano to the megascale.
• Describe the importance of clay minerals on the physical and chemical properties of soils;
• Evaluate the role of anthropogenic activity in releasing elements into the environment;
• Analyse geochemical data using hydrogeochemical modelling software and draw appropriate conclusions.

Assessment details: Examination (50%), continuous assessments (50%)

GLU33935: Stratigraphy and the Geology of Ireland 5 credits

Co-ordinator: Dr Patrick Wyse Jackson
Prerequisites: None
Semester: Hilary Term
Contact Hours: Weeks 22-27, seven lecture hours per week

This module introduces the concept of stratigraphy detailing its various disciplines, and the regulations underpinning the modern stratigraphic framework. It will outline techniques in biostratigraphic recording and analysis of biological data from fossils in the field, their taxonomic description, and their biostratigraphic and palaeoecological use. The Geology of Ireland lectures focus on integrating the diverse geological processes that have acted during its geological evolution from the Precambrian to present.

Module Content:
This module will focus on two areas: in the first lectures and practical sessions will outline the concepts of stratigraphy, then concentrate on the practice of collecting fossils, recording data and determining their biostratigraphic value and taxonomic status, and then evaluating the information available from fossils and from fossil
assemblages to use for reconstruction of past environments. The second area will examine the dynamic geological history of Ireland and the various processes that have taken place over time, through a series of lectures and four one-day excursions in the Dublin district.

**Module Learning Aims:**

The aims are to provide (1) an understanding of stratigraphic and biostratigraphic theory and concepts; (2) a synopsis of methodologies in taxonomy; (3) guidelines on how to gather biological data from fossils in the field; (4) an understanding of the geological history of Ireland; (5) an understanding of the geological processes that have acted on Ireland during its geological history.

**Module Personnel:** Staff of the Geology Department

**Learning outcomes:**

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

- understand and discuss the basic principles of stratigraphy, biostratigraphy and taxonomic procedures

- select appropriate statistical and qualitative techniques when investigating fossils in the field and in the laboratory

- utilize fossils to determine the stratigraphic position of the units from where they were collected

- identify and describe modern ecological parameters that act on the biosphere and apply this information to the fossil record

- understand the geological history of Ireland, and the various processes that have been most influential on moulding its geological framework.

**Recommended Reading List:** to be advised at commencement of module

**Assessment details:** Theory Examination: 60%; Continual Assessment: 40%

**Module website:**
Module Content:

This module will to consolidate and expand upon knowledge of the chemistry and appearance of minerals developed in the Senior Freshman year. The module starts with an introduction to the crystallographic and optical properties of minerals and discusses the formation and stability of minerals. The module next investigates the most important metamorphic and igneous rocks at a range of scales (tectonic setting, outcrop, hand specimen and thin section).

Module Learning Aims:

This module aims to:

(1) Provide an understanding of the mechanisms of formation of minerals
(2) Provide an understanding of the mineral energetics and stability
(3) Broaden and deepen skills for identification and description of metamorphic and igneous rocks in hand specimen and thin section.
(4) Provide an understanding of how metamorphic and igneous are classified.
(5) Demonstrate how composition dictates the mineralogy of crystalline rocks.
(6) Develop an appreciation of how textural relationships amongst minerals can be used to infer the history of crystalline rocks.

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

- Identify the most important mechanisms of mineral crystallisation and transformation.
Describe the optical properties of major minerals and how they relate to crystal structure.

Describe how the chemistry of a rock dictates its mineralogy.

Correctly identify and classify major igneous and metamorphic minerals and rocks.

Interpret mineral textures.

Outline the various tectonic regimes in which crystalline rocks form.

**Assessment details:** Theory Examination (40%), Practical Examination (20%) Continuous Assessments (40%)

**GLU33937:** GIS and mapping techniques 5 credits

**Coordinator:** Dr Claire Ansberque

**Prerequisites:** GLU22905, GLU22906

**Semester:** Hilary Term

**Contact Hours and Timing:** Weeks 29-31, nine hours per week

**Module Content:**

The module introduces two geographic information system programs: the industry-standard ArcMap, and the open-source QGIS. The functionality of these programs relevant to geological fieldwork is explored. The export of maps produced in these programs and editing using the open-source graphics editor Inkscape is covered, as is exporting and importing data to Google Earth. Remotely-acquired data, including elevation models and satellite imagery, will be analysed and the uses of this data to link local fieldwork to the bigger-scale regional interpretation will be explored.

**Module Learning Aims:**

1. To provide familiarity with basic geological applications of the ArcMap and QGIS software packages, as well as graphics editing in Inkscape;
2. To create basemaps for geological fieldwork GL4401;
3. To provide familiarity with basic aspects of analyzing and interpreting remotely-sensed data, such as digital elevation models and satellite imagery.
Learning Outcomes:

On successful completion of this module students should be able to:
(1) Produce basemaps suitable for geological fieldwork;
(2) Generate digital fair-copy geological maps from field data;
(3) Use remotely-acquired data to place field observations in a regional context.

Assessment details: In-course assessment (100%)
Senior Sophister Modules

GLU44901 Independent Project 15 credits

Co-ordinator: Dr Chris Nicholas
Prerequisites: JS Geology
Semester: Michaelmas Term
Contact Hours: The project is based on six weeks of geological fieldwork undertaken prior to week 5 of Senior Sophister year.

Module Learning Aims: To reconstruct the geological history of an area based entirely upon field data, their interpretation and supporting petrography of collected samples.

Module Content: The GLU44901 'Project' continues to be highlighted by external examiners and potential industry employers as a cornerstone of the moderatorship in geology. It challenges the student to undertake a 6-week geological field survey of an area that they are initially unfamiliar with. By using their own careful field observations and measured data, they then piece together and interpret the geological evolution of the area. Completed geological maps, cross-sections and stratigraphic schemes for the area are then included as part of an oral presentation and a final report. In support of the field component, the petrology of rock samples collected during fieldwork can be described during the first weeks of the Michaelmas term, accompanied by limited thin sections and/or in-house geochemical analyses. The module is largely one of independent study, overseen by a project supervisor.

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

- plan and execute an independent geological field survey
- present the scientific findings in a professional manner by means of a written report and oral presentation

Assessment details: Six weeks fieldwork (60%); submitted project report and oral presentation (40%).
Co-ordinator: Dr Quentin Crowley
Prerequisites: JS Geology
Semester: Hilary Terms
Contact Hours: Weeks 32-33 (11 days)

Module Learning Aims:
This module aims to integrate all strands of geology by investigating geological problems in the field. Specific aims are to:

- demonstrate how the techniques and concepts you have acquired over your degree programme can be used to build up the geological history of an area,
- advance your field data collection, integration and interpretation skills,
- demonstrate the importance of a multi-disciplinary approach to unravelling the geological evolution of mountain belts.

Module Content: Building upon the six weeks of geological fieldwork undertaken as part of GL4401, this module takes a more applied approach to field geology. The destination and duration of the field excursion may change, but in previous years has comprised a ten day residential field trip visiting the Betic Chain of SE Spain.

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

- record and interpret data gathered in the field and assess the significance of these data in a regional context
- compare and contrast their own field data with previously published interpretations of field evidence.

Assessment details: Fieldtrip exercises and notebooks (60%); practical examination (40%)
Co-ordinator: Dr Patrick Wyse Jackson
Prerequisites: JS Geology
Semester: Michaelmas Term
Contact Hours: Weeks 3-8 2 hours per week; Fridays 1-2pm all year

Module Learning Aims: The aims are to provide (1) an understanding of the range of geological literature and data sources; (2) the means to develop literature reviews; (3) instruction on how to analyse and research papers and produce a critique; (4) an appreciation of early geological concepts and theories.

Module Content: This module will examine the diverse range of geological literature available, from printed publications to online resources. Using recent examples some geological controversies will be examined, and the salient points of the papers outline, critiqued and discussed. The lectures on the history and philosophy of geology will examine a number of topics focussing on the original ideas, how they were received and how these ideas have been accepted or rejected in modern geological understanding. Theses topics include the dating of the age of the Earth, the construction of the geological column and timescale, the nature of fossils, and the establishment of geophysics as a subject. Much of the module will be student-based learning.

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

- discriminate between well justified and poorly justified arguments in geological literature, and summarize the material for their own use
- describe the major theories developed by earlier geologists on the formation, age, and internal characteristics of the Earth, and on the formation and meaning of fossils
- identify and discuss current major problems in the earth sciences

Assessment details: Theory examination 100%
GLU44906  Global Igneous Petrology  5 credits

Co-ordinator:  Dr Emma Tomlinson
Prerequisites:  GLU33936 (GL3336)
Semester:  Michaelmas Term
Contact Hours:  Weeks 10-14, seven hours per week

Module Learning Aims: To gain a broad understanding of magma generation in the various tectonic environments; to become familiar with advanced analysis of geochemical data; to develop an appreciation of the importance of experimental and numerical studies.

Module Content: This module will provide an introduction to some of the current controversies and problems in igneous petrology. A new topic will be examined each week, starting with an introductory lecture, followed by time for reading and then a symposium session with talks and discussion. Topics range from “do plumes exist?” to “does magmatism cause mass extinctions”.

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

- use petrology, major and trace element chemistry and radiogenic isotope data from igneous rocks to interpret them in a plate-tectonic framework,
- read, assimilate and make critical judgement on published research and to synthesise information from a variety of sources.

Assessment details: Theory examination (50%), in-course assessments (50%)
Co-ordinator: Dr. Juan Diego Rodriguez-Blanco

Prerequisites: JS Geology

Semester: Michaelmas Term

Contact Hours: Although contact hours will appear formally on the timetable, there must be some flexibility depending on the availability of staff and relevant equipment. This module is largely one of independent study.

**Module Learning Aims:** The aim is to execute a piece of laboratory based geological research and present the acquired data and interpretations in a logical and professional manner.

**Module Content:** In some cases this research may be based on material collected during the field based project (GLU44901). The GLU44901 supervisor and the supervisor of the proposed laboratory project in consultation with the head of department and appropriate technical staff will assess the suitability of projects linked to GLU44901. Other projects may be chosen from a list presented at commencement of the first semester. Whilst the module is largely one of independent study, it will be carefully monitored at all stages and all students will be assigned a laboratory project supervisor.

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

- plan and carry out a laboratory based geological research project
- present the findings of such a project in a professional manner by means of a written report

**Assessment details:** Submitted project 100%
GLU44914  Petroleum Geology and Exploration  10 credits

Coordinator:  Dr Chris Nicholas
Prerequisites:  JS Geology
Semester:  Michaelmas term
Contact Hours:  Weeks 3-8, nine hours per week; 5 day residential field course

Module Learning Aims: The aim of this module is to give the student an introduction to the theoretical and practical aspects behind oil exploration in the 21st Century.

Module Content: The last of the world’s ‘easy’ oil discoveries have been made and now there is increasing global economic pressure to explore for hydrocarbons in more and more inaccessible regions, in an attempt to stretch out the planet’s last reserves and ease the changeover to renewable energy resources. Therefore, the petroleum industry has now entered a new phase, which targets oil and gas exploration in developing regions, which were previously considered to be uneconomic.

Two main strands are followed during the course of this module. Firstly, the principal theoretical concepts of petroleum generation, migration and accumulation are introduced. Secondly, this theory is illustrated in practice by investigating real-life examples of on going oil exploration in the frontier region of East Africa. In a series of problem-solving practical tasks, the student will use actual industry data to follow the main steps from initial exploration to drilling. Sessions each week will consist of lectures to present new theoretical material followed by practical sessions in which to apply various investigative techniques, including; drilling, electronic well log interpretation and ‘mud-logging’, well correlation and basin modelling, sequence stratigraphy and seismic interpretation. At the end of the module there is a field excursion to the classic coastal exposures of Co. Clare. This excursion is used to demonstrate high-resolution facies analysis and sequence stratigraphic principles in the field in a series of problem-solving exercises.

Learning outcomes: On successful completion of this module students should be able to:
• describe how oil and gas is generated and trapped
• interpret seismic sections and discuss the application of sequence stratigraphy
• give a detailed account of the concepts behind petroleum play systems and the recognition of petroleum play elements
• assess risk in prospects prior to drilling
• interpret electronic well logs and provide a discussion of the main structural and petroleum geology aspects of key East African play systems

Assessment details: Theory examination (40%); in-course assessment (35%); field course (25%)

<table>
<thead>
<tr>
<th>GLU44919</th>
<th>Economic Geology</th>
<th>5 credits</th>
</tr>
</thead>
</table>

Co-ordinator: Dr Sean McClenaghan
Prerequisites: JS Geology
Semester: Hilary Term
Contact Hours: Weeks 22-27; Seven hours per week

Module Learning Aims: To gain a broad understanding of the occurrence of the most important types of metal ore deposits. The students will become familiar with the petrogenetic environments in which ore deposits form and will be introduced to the economics of mineral exploration.

Module Content: The course introduces students to a wide range of base and precious-metal deposits with an emphasis placed on Porphyry Copper, Magmatic Nickel, VMS, SEDEX, and Irish-type Zn-Pb deposits. Thin sections, hand specimens and in some cases drill core are used to highlight specific features that define various mineral deposits. Students are trained in reflective light microscopy for the identification of ore minerals and their characteristic textures. Value assessment of mineralization based on the ore and gangue mineralogy, presence of known credit and penalty elements are addressed in laboratory practicals. Finally, the economics
and strategies for mineral exploration and production are covered through the use of case studies.

**Learning Outcomes:**

Upon successful completion of this course, students should be able to: characterize mineralized samples and assess the value of a resource based on the ore petrography (ore/gangue ratio), metallurgical factors, and assay/lithogeochemical data provided. Furthermore, students are expected to analyze economic factors controlling the viability of a commodity and devise strategies for the exploration and production of the resource.

**Assessment details:** Theory examination (60%), in-course assessments (40%)

Shedding light on the underground geology at Navan Mine!
GLU44922  Analysis in Geological, Earth and Environmental Research
5 credits

Co-ordinator:  Dr Robbie Goodhue
Prerequisites:  JS Geology
Semester:  Michaelmas Term
Contact Hours:  Weeks 10-14, seven hours per week

Module Learning Aims: The module instructs students in geochemical and mineralogical analysis. It (1) introduces the key analytical instruments used for researching natural and man-made materials, before (2) providing a basic understanding of the operation of such instruments, and finally (3) developing the concepts of selecting the most appropriate techniques and limits of methodology.

Module Content: The module will follow a series of environmental and geological samples from their collection, to obtaining data, to data processing and final interpretation. Emphasis will be placed on how to select a suitable analytical technique, how the sample is prepared and how the instrument is operated and calibrated. Practical sessions will afford students the opportunity to remotely operate several of the analytical instruments housed in TCD Geochemistry and experience of processing some real and ‘live’ data. The techniques considered may include: CF-IRMS, ICP-OES, LA-ICP-MS, XRD, XRF.

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

• have an understanding of several key methods used in the modern analysis of samples;
• have learned how to approach analysis;
• have developed a clear appreciation of correct method selection, data analysis, sources of error and principles of sound interpretation.

Assessment details: Theory examination (70%); in-course assessment (30%).
GLU44924: Micropalaeontology 5 credits

Coordinator: Dr Patrick Wyse Jackson
Prerequisites: none
Semester: Hilary Term
Contact Hours: Weeks 22-27, six hours per week

Module Learning Aims: The aims are (1) to introduce the subject of micropalaeontology, its scope, methods (including scanning electron microscopy) and potential; (2) to introduce the main groups of microfossils – calcareous nannoplankton, foraminifers, radiolaria, ostracodes and conodonts; (3) to demonstrate the practical use of these fossils in biostratigraphy, palaeoenvironmental analysis, oceanography and thermal maturation studies.

Module Content: This module will cover techniques for description and identification of the main microfossil groups both in theory and in practice. Some practical examples of the uses in biostratigraphy, palaeoenvironmental analysis and oceanography will be covered, and the use of fossils as sources of palaeoenvironmental data.

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

- describe and illustrate microfossils;
- identify individual microfossils to the level of group and use appropriate literature to identify them to the level of genus and species;
- apply micropalaeontology to the solution of geological problems.

Assessment details: Theory examination (50%); Continual Assessment (50%)
Module Learning Aims: The aims are to gain an appreciation of controls on geophysical images/models; to understand how to assess the information content and resolution of geophysical images/models; to gain an understanding of the importance of underlying physical principles in Earth model building.

Module Content: This course will provide an introduction to both the physical principles underlying and the field methods associated with a variety of geophysical techniques including: seismology, gravity, magnetic, electrical, electromagnetic methods. Processing, analysis and interpretation procedures will also be covered. The focus will be on applied problems and shallow geophysical applications.

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

- assess a geophysical model/image in terms of its information content and resolution;
- design and execute a small scale geophysical survey appropriate to the geological problem under investigation;
- understand the interrelationship between geology and geophysics in the wider Earth science context.

Assessment details: In-Course Assessment (100%)
Semester: Michaelmas

Contact Hours: 20 lecture hours and 15 practical hours

Module Content:

This module provides the theory and application of how to use isotope geochemistry of the rock record to elucidate evolution of geological processes. It will also demonstrate how radiogenic isotopes may be used for dating purposes to either constrain thermal evolution or provide an absolute temporal framework to study secular evolution of the Earth.

Module Learning Aims:

This module aims to provide an advanced insight into the behaviour of selected isotopes and their application to geological systems. This will be accomplished with an emphasis on student-lead paper reviews, hands-on experience of real data-sets, and discussion of the recent literature. The module will cover the theory and application of isotopes as tracers of geological processes, as well as the basis of geochronology and thermochronology.

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

- Discuss how isotopes may be used to gain a better understanding of evolution of the Earth’s crust, mantle and oceans.
- Construct isochrons for age calculations.
- Understand the principles and application of U-Pb zircon geochronology and low temperature thermochronology.

Recommended Reading List:
- Using Geochemical Data. Rollinson.
- Isotope Geology. Allègre.
- Radiogenic Isotope Geology. Dickin.

Assessment Details: 70% Theory examination, 30% Continuous Assessment.
Module Website: https://www.tcd.ie/Geology/undergraduate/modules/year4/gl4427
GLU34923: Hydrology and Water Quality 5 credits

Coordinator: Dr Catherine Coxon

Prerequisites:

Semester: Hilary Term

Contact Hours: Weeks 22-27, six hours per week

Module Learning Aims: This course aims to provide students with an understanding of hydrological processes, following the different pathways of water through the terrestrial part of the hydrological cycle. It also aims to familiarise students with the factors affecting groundwater quality, and to develop an understanding of groundwater quality issues in the context of integrated catchment management.

Module Content: The hydrology component of this module includes the following topics: the hydrological cycle and catchment water balances; rainfall and evapotranspiration; soil water and hillslope hydrology; river flow; hydrogeology; groundwater – surface water interaction. The water quality component is focussed primarily on groundwater, with topics including groundwater chemistry and natural groundwater quality problems; groundwater quality issues in rural and industrial settings; groundwater quality monitoring; groundwater vulnerability and protection. The interaction of groundwater and surface water quality is also considered.

Learning outcomes: On completion of this course the student should be able to:

- evaluate the role of different hydrological pathways in a range of catchment settings
- carry out calculations relating to catchment water balance, river flow and groundwater movement
- analyse the factors controlling aquifer hydrochemistry and contaminant transport processes;
- assess groundwater quality problems in both rural and industrial settings;
- evaluate groundwater vulnerability to pollution; understand the role of groundwater protection schemes and of integrated catchment management.

Assessment details: Theory examination (70%); In-course assessment (30%)
Mer de Glace, alpine denudation
5. Attendance and Coursework
Regular attendance of lecture and practical classes is a vital aspect of study at Trinity. Students are required to live in or near Dublin for the duration of each teaching term, including the study weeks. Persistent absence from College may result in the student being deemed ‘non-satisfactory’ (see below).

All modules require you to undertake independent study, comprising reading and note taking in addition to a range of coursework, some of which will be assessed. The precise form and balance of coursework will vary considerably between modules and it is your responsibility to ensure you are aware of the module requirements. Details concerning assessment requirements, value, marking criteria, deadline and submission process will be circulated by the module co-ordinator or lecturer when the assessment task is set.

Field Courses
Field teaching is a core component of Geological study at Trinity, and students are required to attend residential field courses as outlined in the list of modules. These courses will include work in the evenings and at weekends. Whilst every effort is made to minimise the cost of these trips, you will be expected to contribute toward them and should budget accordingly. Below are indicative costs based on previous years.

Trips within Ireland (e.g. Clare, Wexford): €200–€250
Arran: €500
Overseas (Spain / Greece): €600–€800

The precise timing and cost of trips will be circulated as soon as these details are available. Means tested grants are available via the Trinity Trust https://www.tcd.ie/alumni/groups/aandt/index.php and https://susi.ie/

Non-Satisfactory Attendance and Coursework
Students who miss more than a third of their course of study in any term, or who consistently fail to engage with coursework and online resources (i.e. failure to access Blackboard regularly) may be deemed ‘non-satisfactory’ with regards to fulfilling the course requirements of Geology. Students reported as ‘non-satisfactory’ may be refused permission to take their examinations. See the General Regulations in the College Calendar for further details.

Absence from College – Medical and Absence Certificates
Where a student misses an assigned laboratory practical class through illness, they should: (a) submit a Medical Certificate to the Science Course office (SF students) or School office (sophister students) 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 relevant 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, Sport or Other – 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).

6. Examinations and Assessment
Geology uses a combination of in-course assessments (coursework) and formal written examinations to evaluate your academic performance. The module outlines contain information on the types and relative weighting of assessments used. Further details will be provided during the module.

Examinations
Formal examinations will be held at the end of each semester. The regulations governing examinations, including the provision of supplemental examinations, are detailed in the College Calendar.

Examination timetables are published in advance of the dates of examinations. See the examinations office website for more details (http://www.tcd.ie/Examinations/Timetables/).

You must ensure that you are available for the duration of the examinations period as presented in the College Calendar (http://www.tcd.ie/calendar/).

Note: It is your responsibility to establish the dates, times and venues of examinations. No reminders will be sent to you.

The College employs anonymous marking where practically possible and results will typically be published by student number.
Foundation Scholarship Examination

Students in their Senior Fresh year are eligible to take the Foundation Scholarship examinations. Contact: Dr Emma Tomlinson tomlinse@tcd.ie

Students are expected to provide clear and reasoned answers to questions from a reasonable choice on two 2-hour examination papers. The first paper will examine topics covered in the JF module GL1101 and the SF module GL2205. The second paper (the ‘general’ paper) will examine a range of geological topics. Further information is available at: https://www.tcd.ie/academicregistry/exams/foundation-scholarship/

Submission of Assessed Work

It is your responsibility to ensure that you accurately note the deadline and procedure for submission of assessed work. A register of receipt will be kept for hard copies of submitted work. Electronic submission via Turnitin or Blackboard will be time stamped automatically by the system. For any other form of electronic submission (e.g. email), you must obtain acknowledgement from the member of the academic staff responsible that the submission has been received.

Unless otherwise stipulated, all written work must be word-processed.

**You must keep a paper and electronic copy of all work submitted for assessment.**

Deadlines and Penalties for Late Submission

You must ensure that you are available to submit course work by the deadline. Unless informed to the contrary, the late submission of any course work will incur a penalty of -5% per calendar day or part thereof, up to a maximum of five calendar days after which a zero mark will be given.

In cases where illness or other circumstances prevent the submission of work by a deadline, a certificate from a medical practitioner or a letter from the Tutor should be obtained setting out the circumstances. Certificates should, insofar as is possible, refer to the time period during which the illness or other condition prevailed. Certificates seeking an extension of a deadline should be submitted as early as possible (and preferably before the deadline is reached) to the relevant member of staff who may then grant an extension. If an extension is granted, the penalty for late submission will come into effect at the end of the extension period.

Marking Schemes

A range of marking rubrics are employed depending on the nature of the assessment task. As a general guide, Geology employs the following scheme for essays and examination answers.
<table>
<thead>
<tr>
<th>Class</th>
<th>Mark Range</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>90-100</td>
<td>EXCEPTIONAL ANSWER; This answer will show original thought and a sophisticated insight into the subject, and mastery of the available information on the subject. It should make compelling arguments for any case it is putting forward and show a rounded view of all sides of the argument. In exam questions, important examples will be supported by attribution to relevant authors and, while not necessarily giving the exact date, should show an awareness of the approximate period. In essays, the referencing will be comprehensive and accurate.</td>
</tr>
<tr>
<td></td>
<td>80-89</td>
<td>OUTSTANDING ANSWER; This answer will show frequent originality of thought and make new connections between pieces of evidence beyond those presented in lectures. There will be evidence of awareness of the background behind the subject area discussed, with evidence of deep understanding of more than one view on any debatable points. It will be written clearly in a style which is easy to follow. In exams, authors of important examples may be provided. In essays all important examples will be referenced accurately.</td>
</tr>
<tr>
<td></td>
<td>70-79</td>
<td>INSIGHTFUL ANSWER; showing a grasp of the full relevance of all course material discussed and will include one or two examples from wider reading to extend the arguments presented. It should show some original connections of concepts. There will be only minor errors in examples given. All arguments will be entirely logical and well written. Referencing in exams will be sporadic but referencing should be present and accurate in essays.</td>
</tr>
<tr>
<td>II-1</td>
<td>65-69</td>
<td>VERY COMPREHENSIVE ANSWER; good understanding of concepts supported by broad knowledge of subject. Notable for synthesis of information rather than originality. Evidence of relevant reading outside lecture notes and coursework. Mostly accurate and logical with appropriate examples. Occasional lapse in detail.</td>
</tr>
<tr>
<td></td>
<td>60-64</td>
<td>LESS COMPREHENSIVE ANSWER; mostly confined to good recall of coursework. Some synthesis of information or ideas. Accurate and logical within a limited scope. Some lapses in detail tolerated. Evidence of reading the assigned course literature.</td>
</tr>
<tr>
<td>II-2</td>
<td>55-59</td>
<td>SOUND BUT INCOMPLETE ANSWER; based on coursework alone but suffers from a significant omission, error or misunderstanding. Usually lacks synthesis of information or ideas. Mainly logical and accurate within its limited scope and with lapses in detail.</td>
</tr>
<tr>
<td></td>
<td>50-54</td>
<td>INCOMPLETE ANSWER; suffers from significant omissions, errors and misunderstandings, but still with understanding of main concepts and showing sound knowledge. Several lapses in detail.</td>
</tr>
<tr>
<td>III</td>
<td>45-49</td>
<td>WEAK ANSWER; limited understanding and knowledge of subject. Serious omissions, errors and misunderstandings, so that answer is no more than adequate.</td>
</tr>
<tr>
<td></td>
<td>40-44</td>
<td>VERY WEAK ANSWER; a poor answer, lacking substance but giving some relevant information. Information given may not be in context or well explained, but will contain passages and words, which indicate a marginally adequate understanding.</td>
</tr>
<tr>
<td>Fail</td>
<td>35-39</td>
<td>MARGINAL FAIL; inadequate answer, with no substance or understanding, but with a vague knowledge relevant to the question.</td>
</tr>
<tr>
<td></td>
<td>30-34</td>
<td>CLEAR FAILURE; some attempt made to write something relevant to the question. Errors serious but not absurd. Could also be a sound answer to the misinterpretation of a question.</td>
</tr>
<tr>
<td></td>
<td>0-29</td>
<td>UTTER FAILURE; with little hint of knowledge. Errors serious and absurd. Could also be a trivial response to the misinterpretation of a question.</td>
</tr>
</tbody>
</table>
Prizes

The Edge Prizes in Geology

Two prizes are awarded annually, one to the Junior Sophister who obtains the highest marks at the Junior Sophister honor examination in geology and whose work in that examination is of appropriate standard; the other to the Senior Fresh, intending to moderate in geology, who has shown most promise.

C.H. Holland Prize

This prize is awarded to the student obtaining the highest overall mark in the geology moderatorship.

W.E.A. Phillips Prize

This prize is awarded to the student who obtains the highest dissertation mark in the geology moderatorship.

7. Plagiarism

Plagiarism is interpreted by the University as the act of presenting the work of others as one’s own work, without acknowledgement. Plagiarism is considered as academically fraudulent, and an offence against University discipline. The University considers plagiarism to be a major offence, and subject to the disciplinary procedures of the University.

Plagiarism can arise from deliberate actions but also through careless thinking and/or methodology. The offence lies not in the attitude or intention of the perpetrator, but in the action and in its consequences.

Plagiarism can arise from actions such as:

a) copying another student’s work;

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

c) quoting directly, without acknowledgement, from books, articles or other sources, either in printed, recorded or electronic format;

d) paraphrasing, without acknowledgement, the writings of other authors.

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

- fail to distinguish between their own ideas and those of others;
- fail to take proper notes during preliminary research and therefore lose track of the sources from which the notes were drawn;
- fail to distinguish between information which needs no acknowledgement because it is firmly in the public domain, and information which might be widely known, but which nevertheless requires some sort of acknowledgement;
- come across a distinctive methodology or idea and fail to record its source.

All the above serve only as examples and are not exhaustive.
All students must ensure that they have a clear understanding of what plagiarism is, how Trinity deals with cases of plagiarism, and how to avoid it.

Consequently, you should:

1. Visit the online resources to inform yourself about how Trinity deals with plagiarism and how you can avoid it at http://tcd-ie.libguides.com/plagiarism.
2. Complete the ‘Ready, Steady, Write’ online tutorial on plagiarism. Completing the tutorial is compulsory for all students.
3. Familiarise yourself with the declaration that you will be asked to sign when submitting course work. Assignment submission forms can be downloaded from Geology’s undergraduate webpage: http://www.tcd.ie/Geology/undergraduate/.
4. Contact your College Tutor, your Course Director, or your Lecturer if you are unsure about any aspect of plagiarism.

8. Health and Safety

The School of Natural Sciences’ Safety Statement, field work manual and safety forms can be found at https://naturalscience.tcd.ie/healthsafety/. Please familiarise yourself with this information before beginning your program of study, in particular for before commencing any field or project work. Any questions or inquiries can be sent to the Safety Officer for Geology, Cora McKenna (mckennac6@tcd.ie), or directly to the School Safety Officer, Alison Boyce (NatSciHanS@tcd.ie)

9. Additional Student Information and Support

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.

Opening Hours
The Senior Tutors Office is open Monday - Friday from 9am - 5.30pm. Closed for lunch from 1-2pm.

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

What is a Tutor?
A Tutor is a member of the academic staff who is appointed to look after the general welfare and development of the students in his/her care. Whilst the Tutor may be one
of your lecturers, this is not always the case as the role of the College Tutor is quite separate from the teaching role.

**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.

Further information on the Senior Tutors Office and College Tutors may be found via the following webpage: Senior Tutor’s Office - [https://www.tcd.ie/seniortutor/students/undergraduate/](https://www.tcd.ie/seniortutor/students/undergraduate/)

**Disability Services**

The Disability Service aims to provide appropriate advice, support and information to help students and staff with disabilities. The Disability Service has in place a range of supports to ensure that students with disabilities have full access to the same facilities for study and recreation as their peers. Most students registering with the Disability Service request access to a range of supports that help the student reach their full potential while studying. Most students’ needs are accommodated through these supports. The student decides what level of support they require.

Further information on the support available may be found via the following link: [https://www.tcd.ie/disability/services/](https://www.tcd.ie/disability/services/)

For contact information or to make an appointment please contact the Disability Services – contact details are available via the following webpage: [https://www.tcd.ie/disability/contact/](https://www.tcd.ie/disability/contact/)

**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
- Email: student-counselling@tcd.ie

For further information visit the following webpage: [https://www.tcd.ie/Student_Counselling/](https://www.tcd.ie/Student_Counselling/)
Useful College Websites
Student life offers information on Supports and Services, Clubs and Societies, Student Unions etc., [https://www.tcd.ie/students/](https://www.tcd.ie/students/)

For information on Registration, Fees, Grants, ID Cards etc. visit the Academic Registry (AR) in the Watts Building or the visit the AR website: [https://www.tcd.ie/academicregistry/](https://www.tcd.ie/academicregistry/)

10. Contact Details

The Geology Undergraduate Teaching and Learning desk is in the School of Natural Sciences Office on the ground floor of the Museum Building:

Email: earth@tcd.ie
Tel: +353-(0)1 896 1074
Executive Officers: Sarah Guerin

Course Director:
Dr Robin Edwards BSc (Southampton), PhD (Dunelm)
Research Interests: Sea level change & climate; foraminifera; quantitative palaeoenvironmental reconstruction; oceanography; coastal change; environmental archaeology.
Contact: robin.edwards@tcd.ie

Director of Undergraduate Teaching and Learning:
Dr Mark Hennessy, BA (NUI), MA (Dublin), PhD (NUI)
Research Interests: Historical geography; history and philosophy of geography; history and theory of cartography; Australasia.
Contact: mhnnessy@tcd.ie

In the event of an emergency, dial Security Services on extension 1999

Security Services provide a 24-hour service to the college community, 365 days a year. They are the liaison to the Fire, Garda and Ambulance services and all staff and students are advised to always telephone extension 1999 (+353 1 896 1999) in case of an emergency.

Should you require any emergency or rescue services on campus, you must contact Security Services. This includes chemical spills, personal injury or first aid assistance.

It is recommended that all students save at least one emergency contact in their phone under ICE (In Case of Emergency).