

MSci Geophysics with a Year Abroad

This document provides a definitive record of the main features of the programme and the learning outcomes that a typical student may reasonably be expected to achieve and demonstrate if s/he takes full advantage of the learning opportunities provided. This programme specification is intended as a reference point for prospective students, current students, external examiners and academic and support staff involved in delivering the programme and enabling student development and achievement.

Programme Information

Award(s)	MSci		
Associateship	Royal School of Mines		
Programme Title	Geophysics with a Year Abroad		
Programme code	F664		
Awarding Institution	Imperial College London		
Teaching Institution	Imperial College London		
Faculty	Faculty of Engineering		
Department	Department of Earth Science and Engineering		
Mode and Period of Study	4 academic years full-time		
Cohort Entry Points	Annually in October		
Relevant QAA Benchmark Statement(s) and/or other external reference points	Honours Degrees in Engineering and Master's Degrees in Engineering		
Total Credits	ECTS:	270	CATS: 540
FHEQ Level	Level 7		
EHEA Level	2 nd cycle		
External Accreditor(s)	Geological Society of London		

Specification Details

Student cohorts covered by specification	2016/17
Person responsible for the specification	Dr Lorraine Craig, Director of UG Studies
Date of introduction of programme	October 2011
Date of programme specification/revision	July 2016

Description of Programme Contents

Understanding the Earth and how mathematical and physical laws can be applied to that study are the fundamentals of the degree course. Geophysicists understand the Earth and other planets through data collection, processing and interpretation, and make inferences and models based on the application of fundamental scientific principles. The course is designed to provide students with the interdisciplinary skills in physics, maths, chemistry, engineering and the geosciences to provide an understanding of this challenge and the possible solutions. A coherent and balanced approach to learning in the first two years will enable students to have time to explore the subject, develop their self-organised study and allow for more self-directed learning as the degree progress through the 4-years. Classroom teaching will be enhanced by fieldwork throughout the degree in addition to a range of data handling technique and skills.

Learning Outcomes

The Imperial Graduate Attributes are a set of core competencies which we expect students to achieve through completion of any Imperial College degree programme. The Graduate Attributes are available at: www.imperial.ac.uk/students/academic-support/graduate-attributes

Knowledge and Understanding of

- The Earth as a dynamic system, its evolution through time, uniformitarianism
- Petrology and petrological analysis and the interpretation of the provenance through hand specimens, petrology and field relationships from the micro- to macro-scale
- Basic mathematics, physics, chemistry and computer languages that are relevant to modern geosciences
- Geochemistry: in particular solid earth geochemistry, low temperature geochemistry, biogeochemistry, environmental geochemistry, study of the earth and planetary systems and their mineralogy
- Using Geophysical techniques in exploration, and applying mathematics and physics to studying the Earth as a planet
- Surface Processes: weathering and its consequences for sedimentation, soil development, geomorphology and geohazards
- Internal Processes: Petrological analysis and what it tells us about processes, volcanism and economic mineralisation
- Tectonics and geological structures: Deformation, plate tectonics and earthquakes
- Life on Earth through the study of palaeontology, paleobiology and the stratigraphic record on land and marine
- Geological maps and three-dimensional interpretation of surface and sub-surface geological systems acquired through knowledge of geological mapping and electronic mapping packages.

Intellectual Skills

Geological sciences require the collation and interpretation of information from a wide range of sources and scientific disciplines. Students will be trained how to do this on an informal basis through case studies and other lecture material, through problem-based learning and in tutorials, as well as learning how to conduct literature searches and to write scientifically. There are many unsolved problems in the geological sciences and students will be exposed to the controversies, allowing them to evaluate competing theories using their own scientific knowledge and skills:

- Synthesis: integrate theory and practice.
- Analytical: acquire and interpret data and test hypotheses.
- Apply geological principles to the solution of problems.
- Demonstrate the skills necessary to plan, conduct and report a programme of field geoscientific analysis.

Practical Skills

Fieldwork will train students to gather and interpret complex data and appreciate the uncertainty of some geological models. A range of computing courses is provided from year 1 that covers activities from image processing and computer-aided design, to interpretation of subsurface structures, to programming and numerical simulations.

Numeracy is an important part of the degree programme and students will learn to manipulate, analyse and present interpretations of data in graphs and diagrams as well as the ability to make estimates to assess the plausibility of calculated variables.

- Carry out fieldwork and associated risk assessments
 - Achieved by: fieldwork programme wherein students have to write and later evaluate risk assessments, and make field project proposals, map for five weeks in pairs mostly unsupervised; and making students use optical microscopy techniques
- Critically evaluate scope of modern techniques to petrological analysis
- Use current geoscientific concepts to interpret geological processes.
- Achieved by stable and radiogenic isotope methods, basin history modelling and structural analysis via stereonet
- Assess plausible schemes for deducing geoscientific information by data synthesis
- Application of concepts in specific applied geoscientific contexts
- Developed through independent mapping, earth science synthesis courses, basin analysis, seismic interpretation; also by specialist options in Year 3 in earth resources, environmental applications, petroleum exploration, engineering problems.
- Assessment by practical examinations, mapping reports, group presentations, vivas and poster presentations.

Entry Requirements

Academic Requirement	Minimum AAA overall to include Mathematics and Physics.
Non-academic Requirements	None
Home/EU/international students will be invited to attend an interview	
English Requirement	IELTS 6.5 with a minimum of 6.0 in each element or equivalent

The programme's competency standards document can be found at:
<http://www.imperial.ac.uk/engineering/departments/earth-science/current-student-staff-info/ug/>

Learning & Teaching Strategy	
Scheduled Learning & Teaching Methods	<ul style="list-style-type: none"> • Lectures • Tutorial
E-learning & Blended Learning Methods	<ul style="list-style-type: none"> • Group exercises • Laboratory • Fieldwork
Project and Placement Learning Methods	<ul style="list-style-type: none"> • Coursework • Reports
Assessment Strategy	
Assessment Methods	<ul style="list-style-type: none"> • Written Examination • Poster presentation • Seminar • Vivas
Academic Feedback Policy	
<p>Feedback is ongoing; it happens during practical classes, in workshops, in lectures, in tutorials and in almost any part of your learning. During fieldwork feedback is provided up to 12 hours each day, and there are other areas where students and staff provide feedback. Feedback is intended to extend your knowledge, skills and learning in a variety of ways.</p> <p>If there is written feedback on submitted coursework, it is provided within two weeks of submission. Some staff chose to give verbal feedback on coursework at the start of the next teaching session, others give written feedback. Not every course will be the same. If feedback is not provided by staff within two weeks of submitting written work and you have not been notified of a delay, we ask students to notify the Academic Tutor by e-mail.</p> <p>Where practical, and in some cases this will not be practical, staff will give feedback to the entire student group on the examinations assessment. Staff are normally extremely willing to give individual feedback to students, either their personal tutees or in class as the needs arise.</p>	
Re-sit Policy	
<p>The College's Policy on Re-sits is available at: www.imperial.ac.uk/registry/exams/resit</p>	
<p>At the discretion of the examiners, supplementary qualifying tests (SQT) may be offered to candidates whose performance is marginally unsatisfactory, normally in not more than one Element. The performance required to pass an SQT is determined by the examiners having regard to the nature of the SQT; the required level will not be less than the original pass mark, and may be set at a higher level.</p> <p>Supplementary qualifying tests are normally examined by written papers, or by re-submission of relevant project reports or coursework, and may include an additional oral examination; they may be used to examine the whole of an Element, or where the examiners deem it appropriate, one or more sub-elements. SQTs may be held at any appropriate time, but are normally held in September ahead of the start of the next session.</p>	

Supplementary qualifying tests do not constitute re-examination; rather, they provide a means by which a marginally unsuccessful candidate, who is otherwise qualified to proceed, may improve their preparedness and demonstrate their fitness to proceed successfully. Candidates whose performance in SQTs is found to be satisfactory by the examiners, will be deemed to have passed the appropriate Element, and, subject to satisfactory performance in all other Elements, will be deemed to have passed the year, and may proceed to the following year of the programme without penalty.

Where a supplementary qualifying test has been applied to a candidate, final marks appearing on transcripts and used in calculating final year and degree totals, shall be those derived following the SQT, such marks shall normally be capped to the original pass mark for the Element or sub-element that has been tested.

Candidates who are invited to re-attend and repeat the year must normally be re-examined and re-assessed in all Elements and sub-elements of the year including any that were nominally previously passed; marks are not capped during a repeated year. Repeating candidates will normally be transferred onto the BSc programme; they may only proceed onto the MSci programme with the special agreement of the examiners.

Candidates who fail the year, and who are not invited to re-attend and repeat the year, may retake examinations and be re-assessed in those Elements or sub-elements that they have previously failed. Such re-assessment should normally happen at the first available opportunity. Excluding any Supplementary Qualifying Tests that may be offered, re-assessment in any Element or sub Element is allowed once only.

Mitigating Circumstances Policy

The College's Policy on Mitigating Circumstances is available at: www.imperial.ac.uk/registry/exams

Assessment Structure

Marking Scheme

Year One

A student must:

- Achieve an aggregate mark of at least 40% in each element

Year Two

A student must:

- Achieve an aggregate mark of at least 40% in each element

Year Three

A student must:

- Achieve an aggregate mark of at least 40% in each element

Year Four

A student must:

- Achieve an aggregate mark of at least 50% in each element

Final Degree Classifications

Third – a student must achieve an aggregate mark of 40%

Lower Second – a student must achieve an aggregate mark of 50%

Upper Second – a student must achieve an aggregate mark of 60%

First - a student must achieve an aggregate mark of 70%

Year One (11.1r%)				
Element	Theory 1 (25%)	Theory 2 (25%)	Practical (25%)	Coursework (25%)
3.75 ECTS	Maths Methods 1 (25%)	<i>EITHER</i> : Chemistry for Geoscientists <i>OR</i> : Solid Earth Geochemistry (25%)	Numerical Methods 1 (25%)	Graphics & Statistics for Geoscientists (25%)
3.75 ECTS	Physical Processes (25%)	Maths Methods 2 (25%)	Programming for Geoscientists (25%)	Introduction to Field Geology (2.5 ECTS) (16.6r%) AND: Field Geology 1 (5 ECTS) (33.3r%)
3.75 ECTS	Dynamic Earth 1 (25%)	Surface Processes (25%)	Structural Geology 1 (25%)	
3.75 ECTS	Stratigraphy (25%)	Igneous and Metamorphic Processes (25%)	Earth Materials (25%)	Projects, Tutorials and Workshops 1 (25%)
	15 ECTS	15 ECTS	15 ECTS	15 ECTS

Year Two (22.2r%)				
Element	Theory 1 (25%)	Theory 2 (25%)	Practical (25%)	Coursework (25%)
3.75 ECTS	Applied Geophysics 1 (25%)	<i>EITHER:</i> Solid Earth Geochemistry <i>OR:</i> Low Temperature Geochemistry (25%)	Mechanics (25%)	Field Geophysics (25%)
3.75 ECTS	Vibrations and Waves (25%)	Maths Methods 4 (25%)	Numerical Methods 2 (25%)	Data Processing, Modelling and Interpretation of Morocco Data (50%)
3.75 ECTS	Global Geophysics (25%)	Seismology (25%)	Remote Sensing and GIS (25%)	
3.75 ECTS	Maths Methods 3 (25%)	Earth Resources (25%)	Structural Geology 2 (25%)	Projects, Tutorials and Workshops 2 (25%)
	15 ECTS	15 ECTS	15 ECTS	15 ECTS

Year Three (33.3r%)		
Element	Placement (80%)	Coursework (20%)
15 ECTS	Year Abroad (100%)	Independent Geophysics Project (100%)
15 ECTS		
15 ECTS		
15 ECTS		
15 ECTS		
	60 ECTS	15 ECTS

Year Four (33.3r%)				
Element	MSci Project (40%)	Electives (40%)	Coursework, Practical & Synopsis (20%)	
3.75 ECTS	MSci Project (100%)	Seven modules from elective group (A) (12.5% each)	<i>EITHER:</i> Research Conference <i>OR:</i> Field Geology 5 (50%)	
3.75 ECTS				
3.75 ECTS			Earth Science General Paper (Year 4) (50%)	
3.75 ECTS				
3.75 ECTS				
3.75 ECTS			Science Communication (12.5%)	
3.75 ECTS				
3.75 ECTS				
	30 ECTS	30 ECTS	15 ECTS	

Module List

Elective modules in year three and year four are offered Bi-annually and will therefore only be available in alternate years.

Code	Title	Core/ Elective	Year	L&T Hours	Ind. Study Hours	Place- ment Hours	Total Hours	% Written Exam	% Course -work	% Practical	FHEQ Level	ECTS
ESE 1.02	Chemistry for Geoscientists	ELECTIVE	1	24	69.75	0	93.75	100%	0%	0%	4	3.75
ESE 2.03	Dynamic Earth A	CORE	1	24	69.75	0	93.75	100%	0%	0%	4	3.75
ESE 2.04	Stratigraphy	CORE	1	24	69.75	0	93.75	100%	0%	0%	4	3.75
ESE 2.05	Introduction to Field Geology	CORE	1	36	26.5	0	62.5	0%	100%	0%	4	2.50
ESE 2.07	Earth Materials	CORE	1	24	69.75	0	93.75	100%	0%	0%	4	3.75
ESE 2.08	Igneous and Metamorphic Processes	CORE	1	24	69.75	0	93.75	100%	0%	0%	4	3.75
ESE 2.10	Maths Methods 1	CORE	1	24	69.75	0	93.75	100%	0%	0%	4	3.75
ESE 2.14	Field Geology 1	CORE	1	112	13	0	125	0%	100%	0%	4	5.00
ESE 2.15	Projects, Tutorials and Workshops1	CORE	1	44	49.75	0	93.75	0%	100%	0%	4	3.75
ESE 2.16	Structural Geology 1	CORE	1	24	69.75	0	93.75	100%	0%	0%	4	3.75
ESE 2.18	Programming for Geoscientists	CORE	1	24	69.75	0	93.75	100%	0%	0%	4	3.75
ESE 2.19	Graphics & Statistics for Geoscientists	CORE	1	24	69.75	0	93.75	0%	100%	0%	4	3.75
ESE 2.24	Physical Processes	CORE	1	24	69.75	0	93.75	100%	0%	0%	4	3.75

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Code	Title	Core/ Elective	Year	L&T Hours	Ind. Study Hours	Place- ment Hours	Total Hours	% Written Exam	% Course -work	% Practical	FHEQ Level	ECTS
ESE 2.27	Surface Processes	CORE	1	24	69.75	0	93.75	100%	0%	0%	4	3.75
ESE 3.06	Solid Earth Geochemistry	ELECTIVE	1	24	69.75	0	93.75	100%	0%	0%	5	3.75
ESE 3.09	Numerical Methods 1	CORE	1	24	69.75	0	93.75	100%	0%	0%	5	3.75
ESE 3.31	Maths Methods 2	CORE	1	24	69.75	0	93.75	100%	0%	0%	5	3.75
ESE 2.23	Vibrations and Waves	CORE	2	24	69.75	0	93.75	100%	0%	0%	4	3.75
ESE 3.01	Applied Geophysics 1	CORE	2	24	69.75	0	93.75	100%	0%	0%	5	3.75
ESE 3.02	Global Geophysics	CORE	2	24	69.75	0	93.75	100%	0%	0%	5	3.75
ESE 3.03	Earth Resources	CORE	2	24	69.75	0	93.75	100%	0%	0%	5	3.75
ESE 3.06	Solid Earth Geochemistry	ELECTIVE	2	24	69.75	0	93.75	100%	0%	0%	5	3.75
ESE 3.10	Maths Methods 3	CORE	2	24	69.75	0	93.75	100%	0%	0%	5	3.75
ESE 3.12	Projects, Tutorials and Workshops2	CORE	2	40	53.75	0	93.75	0%	100%	0%	5	3.75
ESE 3.13	Remote Sensing and GIS	CORE	2	24	69.75	0	93.75	100%	0%	0%	5	3.75
ESE 3.16	Structural Geology 2	CORE	2	32	61.75	0	93.75	100%	0%	0%	5	3.75

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Code	Title	Core/ Elective	Year	L&T Hours	Ind. Study Hours	Place- ment Hours	Total Hours	% Written Exam	% Course -work	% Practical	FHEQ Level	ECTS
ESE 3.20	Field Geophysics	CORE	2	88	5.75	0	93.75	0%	100%	0%	5	3.75
ESE 3.37	Mechanics	CORE	2	24	69.75	0	93.75	100%	0%	0%	5	3.75
ESE 3.42	Data Processing, Modelling and Interpretation of Morocco Data	CORE	2	120	67.5	0	187.5	0%	100%	0%	5	7.50
ESE 4.02	Maths Methods 4	CORE	2	24	69.75	0	93.75	100%	0%	0%	6	3.75
ESE 4.21	Numerical Methods 2	CORE	2	24	69.75	0	93.75	50%	50%	0%	6	3.75
ESE 4.36	Seismology	CORE	2	24	69.75	0	93.75	100%	0%	0%	6	3.75
ESE 4.48	Low Temperature Geochemistry	ELECTIVE	2	24	69.75	0	93.75	100%	0%	0%	6	3.75
ESE 4.24	Independent Geophysics Project	CORE	3	264	111	0	375	0%	100%	0%	7	15.0
N/A	Year Abroad	CORE	3	0	0	1500	1500	0%	100%	0%	6	60.0
ESE 4.05	Biogeochemistry	ELECTIVE (A)	4	24	69.75	0	93.75	100%	0%	0%	6	3.75
ESE 4.12	Dynamic Stratigraphy	ELECTIVE (A)	4	24	69.75	0	93.75	50%	50%	0%	6	3.75
ESE 4.16	Geohazards	ELECTIVE (A)	4	24	69.75	0	93.75	100%	0%	0%	6	3.75
ESE 4.17	Advanced Programming	ELECTIVE (A)	4	24	69.75	0	93.75	100	0	0	6	3.75

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Code	Title	Core/ Elective	Year	L&T Hours	Ind. Study Hours	Place- ment Hours	Total Hours	% Written Exam	% Course -work	% Practical	FHEQ Level	ECTS
ESE 4.19	Physical Oceanography	ELECTIVE (A)	4	24	69.75	0	93.75	100%	0%	0%	6	3.75
ESE 4.32	Geodesy and Geomagnetism	ELECTIVE (A)	4	24	69.75	0	93.75	100	0	0	6	3.75
ESE 4.33	Environmental Impact Assessment	ELECTIVE (A)	4	24	69.75	0	93.75	80%	20%	0%	6	3.75
ESE 4.34	Environmental and Engineering Geology	ELECTIVE (A)	4	24	69.75	0	93.75	80%	20%	0%	6	3.75
ESE 4.47	Palaeo and Environmental Magnetism	ELECTIVE (A)	4	24	69.75	0	93.75	100%	0%	0%	6	3.75
ESE 4.48	Low Temperature Geochemistry	ELECTIVE (A)	4	24	69.75	0	93.75	100%	0%	0%	6	3.75
ESE 5.01	Minerals Processing	ELECTIVE (A)	4	24	69.75	0	93.75	75%	25%	0%	7	3.75
ESE 5.02	Advanced Exploration Seismology	ELECTIVE (A)	4	48	139.5	0	187.5	60%	40%	0%	7	7.50
ESE 5.03	Advanced Applied Geophysics	ELECTIVE (A)	4	24	69.75	0	93.75	100%	0%	0%	7	3.75
EA 5.04	Field Geomorphology	ELECTIVE (A)	4	40	53.75	0	93.75	0%	100%	0%	7	3.75
ESE 5.05	Science Communication	CORE	4	19	74.75	0	93.75	0%	50%	50%	7	3.75
ESE 5.07	Field Geology 5	ELECTIVE	4	96	91.5	0	187.5	0%	100%	0%	7	7.50
ESE 5.10	Geodynamics	ELECTIVE (A)	4	24	69.75	0	93.75	0%	100%	0%	7	3.75

Module List

Elective modules in year three and year four are offered Bi-annually and will therefore only be available in alternate years.

Code	Title	Core/ Elective	Year	L&T Hours	Ind. Study Hours	Place- ment Hours	Total Hours	% Written Exam	% Course -work	% Practical	FHEQ Level	ECTS
ESE 5.11	Hydrogeology & Fluid Flow 2	ELECTIVE (A)	4	24	69.75	0	93.75	80%	20%	0%	7	3.75
ESE 5.12	Basin Analysis	ELECTIVE (A)	4	48	139.5	0	187.5	100%	0%	0%	7	7.50
ESE 5.15	Applied Sedimentology	ELECTIVE (A)	4	48	139.5	0	187.5	100%	0%	0%	7	7.50
ESE 5.18	Remote Sensing and GIS 2	ELECTIVE (A)	4	48	139.5	0	187.5	50%	50%	0%	7	7.50
ESE 5.20	Geophysical Inversion	ELECTIVE (A)	4	24	69.75	0	93.75	100%	0%	0%	7	3.75
ESE 5.22	Hydrothermal and Ore Forming Processes	ELECTIVE (A)	4	48	139.5	0	187.5	0%	100%	0%	7	7.50
ESE 5.23	Mining Water and Waste Management	ELECTIVE (A)	4	24	69.75	0	93.75	50%	50%	0%	7	3.75
ESE 5.26	Geomorphology	ELECTIVE (A)	4	24	69.75	0	93.75	100%	0%	0%	7	3.75
ESE 5.27	Earth Systems	ELECTIVE (A)	4	24	69.75	0	93.75	100%	0%	0%	7	3.75
ESE 5.28	MSci Project	CORE	4	128	622	0	750	0%	85%	15%	7	30.00
ESE 5.29	Earth Science General Paper	CORE	4	0	187.5	0	187.5	100%	0%	0%	7	7.50
ESE 5.31b	Flow and Reactive Transport	ELECTIVE (A)	4	24	69.75	0	93.75	100	0	0	7	3.75

Module List

Elective modules in year three and year four are offered Bi-annually and will therefore only be available in alternate years.

Code	Title	Core/ Elective	Year	L&T Hours	Ind. Study Hours	Place- ment Hours	Total Hours	% Written Exam	% Course -work	% Practical	FHEQ Level	ECTS
ESE 5.32	Physics of Planet Earth	ELECTIVE (A)	4	24	69.75	0	93.75	90	10	0	7	3.75
ESE 5.61	Research Conference	ELECTIVE	4	24	163.5	0	187.5	0%	100%	0%	7	7.50
N/A	Business for Professional Engineers & Scientists	ELECTIVE (A)	4	Various							6	6.00
N/A	Horizons	ELECTIVE (A)	4	Various							6	6.00

Supporting Information

The Programme Handbook is available at:

<http://www.imperial.ac.uk/engineering/departments/earth-science/current-student-staff-info/ug/>

The Module Handbook is available at:

<http://www.imperial.ac.uk/engineering/departments/earth-science/current-student-staff-info/ug/>

The College's entry requirements for undergraduate programmes can be found at:

www.imperial.ac.uk/study/ug/apply/requirements/

The College's Quality & Enhancement Framework is available at:

www.imperial.ac.uk/registry/proceduresandregulations/qualityassurance

The College's Academic and Examination Regulations can be found at:

<http://www3.imperial.ac.uk/registry/proceduresandregulations/regulations>

Imperial College is an independent corporation whose legal status derives from a Royal Charter granted under Letters Patent in 1907. In 2007 a Supplemental Charter and Statutes was granted by HM Queen Elizabeth II. This Supplemental Charter, which came into force on the date of the College's Centenary, 8th July 2007, established the College as a University with the name and style of "The Imperial College of Science, Technology and Medicine". Further details can be found at:

<http://www.imperial.ac.uk/admin-services/secretariat/college-governance/charters-statutes-ordinances-and-regulations/>

Imperial College London is regulated by the Higher Education Funding Council for England (HEFCE). Further details can be found at:

<http://www.hefce.ac.uk/reg/of/>