Department of Earth Sciences

UNDERGRADUATE STUDENT HANDBOOK

2023/24

Disclaimer

This document was published in September 2023 and was correct at that time. The department* reserves the right to modify any statement if necessary, make variations to the content or methods of delivery of courses of study, to discontinue courses, or merge or combine courses if such actions are reasonably considered to be necessary by the University. Every effort will be made to keep disruption to a minimum, and to give as much notice as possible.

* Please note, the term 'department' is used to refer to 'departments', 'Centres and Schools'. Students on joint or combined degree programmes should check both departmental handbooks.

Important information on terminology

- Degree Course – May also be referred to as 'degree programme' or simply 'programme', these terms refer to the qualification you will be awarded upon successful completion of your studies
- Module – May also be referred to as 'course', this refers to the individual units you will study each year to complete your degree course. Undergraduate degrees at Royal Holloway comprise a combination of modules in multiples of 15 credits to the value of 120 credits per year. On some degree courses a certain number of optional modules must be passed for a particular degree title.

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1 Introduction to your department

1.1 Welcome

Welcome to Royal Holloway. Royal Holloway, University of London (hereafter 'the University') is one of the UK's leading research-intensive universities, with six academic schools spanning the arts and humanities, social sciences and sciences. The Department of Earth Sciences was created at Royal Holloway in 1985 by the merger of former departments at Bedford, Chelsea and King's University's (all part of London University). The Department is committed to providing an educational environment in which learning and research are inseparable. It aims to foster academic excellence at all levels of study and was awarded the top grade of "Excellent" in a national Teaching Quality Assessment. The Research Excellence Framework (REF) exercise completed in 2014 ranked us 2nd among UK universities for world-leading and internationally excellent research. We are also ranked 15th in the UK with 95% overall satisfaction from our students (NSS 2020).

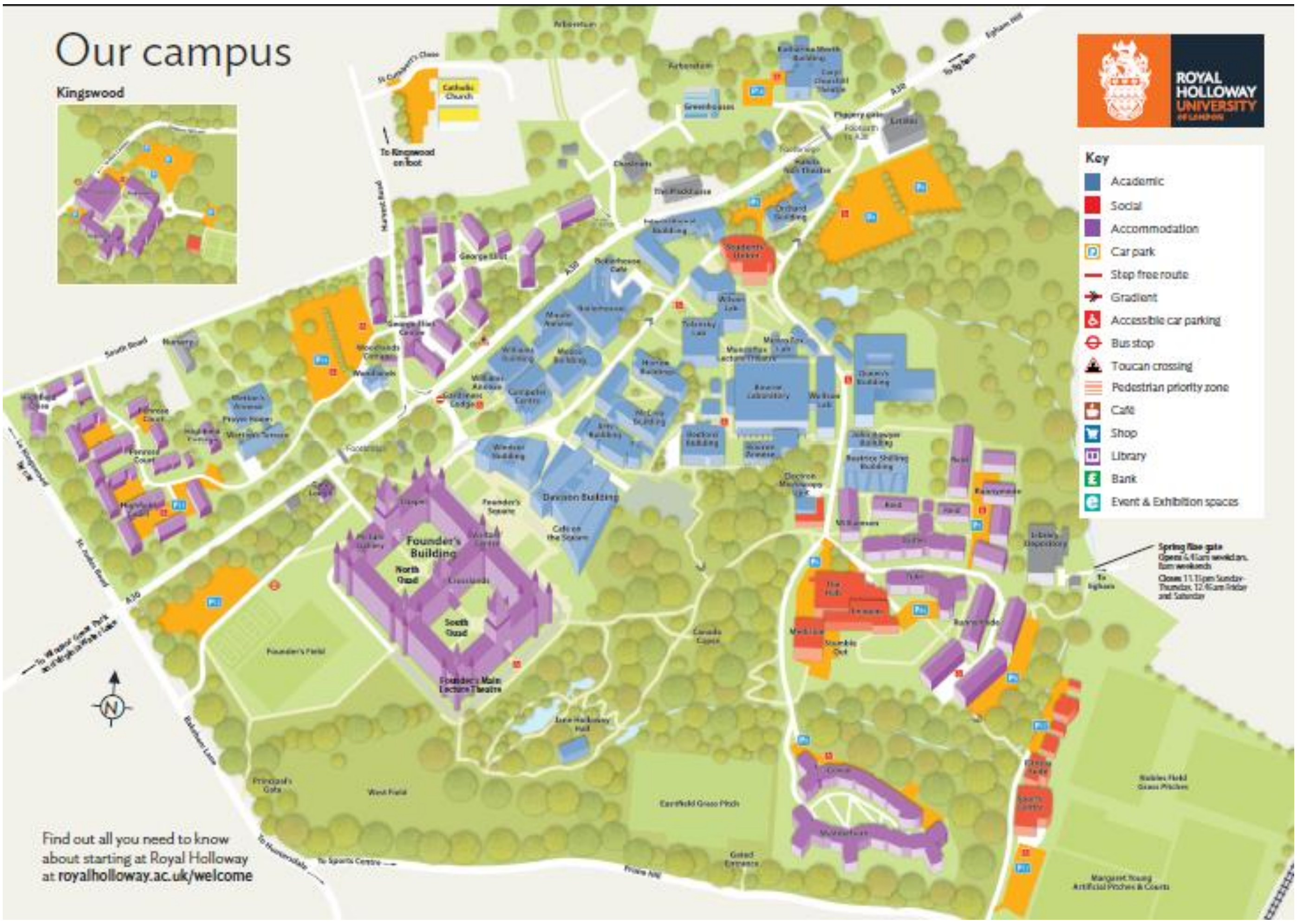
Our foremost objectives are to help you to realise your full intellectual potential, to raise your personal expectations and to strengthen your intellectual self-confidence. The Department has set itself the following goals in relation to undergraduate teaching:

1. to create an atmosphere of individual academic enterprise and self-reliance in which each student is challenged to develop his or her intellectual powers to the full.
2. to develop a teaching culture that offers every student the means to learn most effectively, according to individual ability.
3. to cultivate in students a capacity for logical, independent and critical thought, and an ability to propose, test and refute hypotheses objectively.
4. to stimulate an interest in, and a wide-ranging understanding of, the mechanics of Earth Processes and history, how they are analysed, measured and modelled, and how they and their products may be utilised to the benefit of humanity.
5. to enable students to develop technical competence in field and laboratory data analysis and computer techniques, to serve as a foundation for careers as professional geoscientists.
6. to enable students to develop transferable skills (personal, numerical, information and communication) to equip them for successful careers in science and in other disciplines.

1.2 How to find us: the Department

The Department of Earth Sciences is located in Queen's Building. This can be found on the University Campus Map as building 35. Most teaching staff offices and undergraduate laboratories are on level 2 and most undergraduate classes are held in the teaching laboratories 205, 240, 264 and the adjacent science block (the John Bowyer Building, 'JBB'). Part of the foyer on level 2 serves as a common room area for staff and students. All students are welcome to use this common room area.

1.3 Map of the Egham campus



Please note, student parking is very limited and is not available if you live in Halls or within 1.5 miles of campus. If you do live more than 1.5 miles away or have a particular reason why you need to come to campus by car, you must apply for a parking permit. If you have a motorbike or scooter you must also register the vehicle with University. Find more information about the Parking Permit portal here.

1.4 How to find us: the staff

CONTACT DETAILS

Administrative role	Name	Room	Phone (01784)
Head of Department	Dr Kevin Clemitshaw K.Clemitshaw@rhul.ac.uk	243	41 4026
	Prof. Jürgen Adam Jurgen.Adam@rhul.ac.uk	216	44 4258
Head of Year 1	Dr Queenie Chan queenie.chan@rhul.ac.uk		
Student/Staff Liaison	Dr Domenico Chiarella Domenico.Chiarella@rhul.ac.uk	281	44 3890
	Prof. Margaret Collinson M.Collinson@rhul.ac.uk	254	44 3607
Head of Research	Dr Alex Dickson alex.dickson@rhul.ac.uk	253	44 3834
Head of Careers, including Year Abroad and Year in Industry liaison	Prof. Howard Falcon-Lang Howard.Falcon-Lang@rhul.ac.uk	277	41 4039
Head of Postgraduate Research	Dr Rebecca Fisher R.E.Fisher@rhul.ac.uk	244	44 3628
Deputy Head of Department/ Head of Teaching and Fieldwork	Prof. Richard Ghail richard.ghail@rhul.ac.uk	245	27 6766
Head of Postgraduate Teaching	Dr Nathalie Grassineau n.grassineau@es.rhul.ac.uk	276	44 3810
Senior Tutor	Prof. Agust Gudmundsson Agust.Gudmundsson@rhul.ac.uk	282	27 6345
	Prof. Martin King m.king@es.rhul.ac.uk	238	41 4038
Head of Year 3	Dr David Lowry D.Lowry@rhul.ac.uk	276	44 3105
Head of Year 4	Dr Christina Manning c.j.manning@rhul.ac.uk	246	44 3835
Lyell Soc Staff Rep and Library Rep	Dr Jonathon Paul jonathan.paul@rhul.ac.uk		
	Dr Nic Scarselli Nicola.Scarselli@rhul.ac.uk	222c	44 3597
Head of Admissions	Prof. David Waltham D.Waltham@rhul.ac.uk	247	44 3617
Head of the Exam Board	Dr Ian Watkinson Ian.Watkinson@rhul.ac.uk	278	41 4046
Technical Operations Manager	Mr Dan Parsonage Dan.Parsonage@rhul.ac.uk	215	44 3595
Deputy Technical Operations Manager	Mr Kevin D'Souza k.dsouza@es.rhul.ac.uk	219	44 3610

IT Manager	Mr Mark Longbottom m.longbottom@es.rhul.ac.uk	224	44 3622
School Manager	Michelle Jux	W118	
Helpdesk	lse-school@rhul.ac.uk	W118	27-6884
Information Consultant (Library)	Information Consultant webpage	Library	

1.5 How to find us: the School office

The school office is located in the Wolfson Building, Room 118 on the ground floor. The Wolfson building is across the road from Queen's Building, as you come out the main doors (Referred to as "Wolfson Lab" on the map in Section 1.3)

1.6 The Department: practical information

1.6.1 Whom to contact

If you have any questions or doubts about any aspects of your modules, or any other queries about the department or University, please seek advice from your personal tutor, the Head of Year, Director of Teaching, the Head of Department or any other member of the academic staff. The Director of Teaching supervises student registration, ensures proper liaison between the Universityand students in the Department, and has overall responsibility for degree course structure and content. Within the Department, any changes to Degree Programme, module registration or exam entry, must be authorised by their signature.

I have a question about…	You should talk to…
Degree programme changes	Head of Year/Head of Teaching
Module registration	Head of Year /Head of Teaching
Exam entry	Head of Year /Head of Teaching
Lectures, practicals and assessment for a module	Module coordinator – see Section D for a list of all Module coordinators
Field trips	Field trip leader/ Module coordinator
Non-academic problems and general guidance on how to access University wellbeing and D&N services	Personal Tutor/Senior Tutor

1.6.2 Lyell Geoscience Society

This important feature of departmental activity is organised by undergraduate students with the assistance of postgraduate students and academic staff. The Lyell Geoscience Society Committee organises a programme of lectures by distinguished speakers, a social programme and occasional field excursions. The Society also arranges an annual symposium and dinner in mid/late February. The Lyell Geoscience Society is recognised by the Students' Union and, as such, is an official part of the activities of the University. The Society has a notice board in the foyer of the Department on which details of committee membership, future meetings and social events are displayed, and a website:
https://www.su.rhul.ac.uk/societies/a-z/lyellgeosciencesoc/

1.6.3 Research Seminars

There are multiple programmes of research seminars presented by staff, postgraduate students and academic visitors to the department. These may be on a wide variety of topics, and all students are very welcome to attend. Because studying geology is a bit like learning a language, first years students may find research level seminars a bit tricky to follows, but second, third and fourth year students will find a lot of benefit to attending. Details of forthcoming seminars are posted on the noticeboard at the top of the stairs, emailed from the organisers as appropriate, and on the TV screen in the foyer. Meeting the guest lecturers from other institutions can provide valuable perspectives, and helps with career development. From time to time, some courses have even been known to include an exam question from research seminars, so there are lots of incentives to attend!

1.6.4 Postgraduate study and research

At postgraduate level, we offer MSc degree courses in Energy Geoscience, Engineering Geology and Hydrogeology and Environmental Diagnosis & Management, and an MSc by Research, and we sustain a flourishing research school. We are internationally recognised for our strengths in several major research areas: Global Environmental Change (modern atmospheres, surface processes, palaeobiology, and ancient Earth systems), Geodynamics and Sedimentary Systems (sedimentology, mountain evolution, uplift, and erosion, numerical modelling, lithospheric processes) and Physics and Chemistry of Earth Processes (crust-mantle evolution, plumes and ridges, volcanic arcs, planetary science and meteorites). Our research activities influence our teaching. Many of the postgraduate research students are involved with teaching in the department, acting as demonstrators in practical sessions and on field trips.

1.7 Staff research interests

A list of staff interests is given below, to guide students seeking advice for project work or future careers.

Prof Jürgen Adam - Coupled tectonic, climate and surface processes; Geodynamic modelling of thrust belts, accretive and non-accretive convergent margins; Salt Tectonics in passive margin sedimentary basins; Physical simulation of rock deformation from basin to fracture scale; Fault & fracture mechanics, Tectonic modelling of structurally complex basins and reservoirs; Neotectonics and geohazards at continental margins and intra-continental strike-slip faults.

Dr Queenie Chan - is a planetary scientist. Her research focuses on understanding the earliest chemical reactions involving liquid water in the solar system, and how the individual events turned simple life's building blocks into increasingly complex molecules that ultimately yielded life.

Dr Domenico Chiarella – Sedimentology. Tidal deposits, mixed siliciclastic-bioclastic sediments, sedimentary petrography and provenance analysis, tectonic and sedimentation of coarse-grained deltas, seismic interpretation and attribute analysis, reservoir characterisation.

Dr Kevin Clemitshaw - Sources, sinks and trends of gaseous air pollutants that impact on health and climate. Tropospheric chemistry and measurements of nitrous acid. Atmospheric chemistry, transport and impacts of organic nitrates.

Prof Margaret Collinson - Tertiary floras, vegetation and climate; floras of the Cretaceous/Tertiary boundary event; evolution of wetland communities; fossil history of mammal/plant interactions; megaspore ultrastructure and the evolution of heterosporous plants; palynofacies; organic geochemistry and chemical composition of plant fossils and their role in kerogen formation.

Dr Alex Dickson – Trace metal geochemistry and isotope geochemistry of marine sedimentary deposits, palaeoclimate and palaeocenaography, environmental change during the Cenozoic and Mesozoic climate events.

Dr Rebecca Fisher - Modern climate change, measurement of greenhouse gases in the atmosphere, emissions calculations, stable isotope analysis of methane for source identification.

Prof Howard Falcon-Lang - the evolution of terrestrial ecosystems and palaeoclimates. Current projects include the origin and early evolution of reptiles in mid-Carboniferous, the collapse of the first rainforests in Late Pennsylvanian times, and the explosive appearance of flowering plants in the Cretaceous Period.

Dr James France - Determination of sources and quantification of greenhouse gases from a local, regional and global perspective. Snow and sea-ice chemistry and physics.

Dr Richard Ghail – Radar investigations of tectonic processes on Venus and Earth's continental areas, especially the London platform, applied to Civil Engineering activities. Lead Scientist on EnVision, an ESA/NASA mission to use radar to determine rates of geological activity on Venus and learn why it has evolved so differently to Earth.

Dr Nathalie Grassineau - Early life and the rise of oxygen in the Archaean, by determining microbial activity using carbon and sulphur isotopes. Volcanic activity and hydrothermal vents in spreading ridges, using stable isotopes. Director of the Wet Geochemistry laboratory, analysing geological, environmental and archaeological materials for major and trace elements.

Prof Agust Gudmundsson - Volcanotectonics, dyke emplacement and caldera formation; Seismotectonics, development of seismogenic faults; Reservoirs of oil, gas, ground water, and geothermal water; Rock fractures in geological processes

Prof Martin King – Snow, ice and atmospheric chemistry and physics; the effect of atmospheric aerosol on modern climate change; the calibration of Earth observing satellites using sea ice and desert dust.

Dr David Lowry – Use of stable isotopes to understand geological, environmental and atmospheric problems, including sources of greenhouse gases in the atmosphere, formation of mineral deposits and intrusions, and development of the Neoproterozoic rocks of Scotland. Development of new instrumentation for greenhouse gas analysis.

Dr Christina Manning – Application of whole rock and mineral geochemistry to better understand open system processes occurring in shallow level magma storage systems and how they affect eruptive behaviour.

Dr Jonathon Paul - Geohazard mitigation using new technology and social science approaches; hydrogeology and sustainable groundwater management; fluvial geomorphology and landscape development; effects of sub-lithospheric mantle convection on topography and the sedimentary record.

Dr Nicola Scarselli - Seismic geomorphology, structural geology and petroleum geology.

Prof Dave Waltham - Numerical modelling of seismic data, hanging wall and footwall deformation; carbonate platforms; evaporites; simple clastic systems.

Dr Ian Watkinson – Structural geology, particularly active tectonics, ductile shear zones, exhumation of metamorphic rocks and the major strike-slip faults of SE Asia. Geohazards and urban seismic vulnerability.

2 Support and advice

2.1 Support within your School

The School Helpdesk is there to help you with any questions or concerns you might have about your studies. Depending on your query, the Helpdesk will answer your questions then and there, put you in touch with a colleague who can help, or find out the answer and get back to you.

- Email: LSE-School@rhul.ac.uk

The inbox is monitored from Monday to Friday from 9:00am to 5:00pm and they aim to respond to all queries within one working day.

- MS Teams appointment with a member of the admin team: click here
- Tel: 01784 276 884

Alternatively, you can visit us in-person at the Helpdesk in the Wolfson main entrance on the left-hand side. We are available to speak to in-person from Monday to Friday from 10:00am to 4:00pm during term time.

The Department of Earth Sciences is proud of its diverse student cohort and we recognise that students may experience a variety of different issues, both personal and academic, during their time with us. We want to support all of our students to reach their potential and leave Royal Holloway, not just fantastic geologists but confident and capable adults. Academic issues can be directed to Lecturers, Module Coordinators, Personal Tutors, Heads of Year or the Director of Teaching. Personal issues should be directed to your Personal Tutor or the Senior Tutor. It is quite likely that your Personal Tutor or Senior Tutor will refer you to a specialist University service for further help. This is because we are not trained counsellors and we want to ensure that all our students get the best help possible. However, the department works alongside Student Well-being and D&N services to ensure that we do our best to support all students' needs. Support and Wellbeing

3 Communication

It is **vitally important that you keep in touch** with us and we keep in touch with you. Members of staff will often need to contact you to inform you of changes to teaching arrangements, special preparations you may have to make for a class, or meetings you might be required to attend. You will need to contact members of the Department if, for example, you are unable to attend a class, or you wish to arrange a meeting with your Personal Tutor.

3.1 Email

We will routinely email you at your University address and you should **therefore check your University email regularly** (at least daily). We will not email you at a private or commercial address. Do not ignore emails from us. We will assume you have received an email within 48 hours, excluding Saturdays and Sundays.

If you send an email to a member of staff in the department during term time, you should normally receive a reply within 3-4 working days of its receipt. Please remember that there are times when members of staff are away fromUniversityat conferences or undertaking research.

3.1.1 Guidance for emailing staff

- Include a formal salutation "Dear Dr Smith" or "Dear Jane" will be greeted more favourably than "Hey there".
- Introduce yourself and provide a context. During the first few weeks of term, despite our best efforts, staff might not know the names of everyone on their modules, especially if they are new or teaching Year 1 modules. It is helpful if you can remind the member of staff of who you are and the context in which you are writing.
- Your email should always be accompanied by a clear and intelligible subject line (e.g., "Query regarding GL1460 practical" or "Absence due to illness").
- Proof-read before clicking "send". You should always take a moment before sending your email to read through it to check for grammatical errors or spelling mistakes. Also, if you are including an attachment, make sure this is actually attached!
- Sit back, relax, and be patient. Members of staff will always endeavour to answer emails in a timely fashion, but their teaching, administrative, and research commitments will mean that an instantaneous response is not always possible. You should allow between **3 and 4 working days** (i.e., Mondays to Fridays, 9 a.m. to 5 p.m. only) for a reply. Staff are not expected to deal with emails during the evenings or over the weekend. Responses may be somewhat slower outside of term, when members of staff are at conferences, on fieldwork, or engaged in research (in such

cases, an out-of-office notification may let you know when you can expect a response to your email).

- Do not email staff to check routine information about modules, timetables and examinations which are published on Department notice boards and on the Department website; nor should you email to ask questions where the answer is easily available to you, such as in this handbook or on Moodle. Undergraduates should normally restrict the use of e-mail to short queries and the arrangement of meetings with staff.

3.2 Meetings

All teaching staff will hold weekly online office hours. The timings of these will be advertised on their module Moodle pages. You are only obliged to attend if you want to ask a question. You are not required to attend for the entire timeslot.

3.3 Post

All post addressed to you in Earth Sciences department is delivered to the student pigeonholes (alphabetical by surname) located outside Room 205. At the end of each term student pigeonholes are cleared of accumulated mail which is then destroyed. Important information from Academic Services is often sent by internal post and tutors sometimes return work to you via the pigeonholes so you are advised to check them regularly. If you need to leave a document for a member of staff, the pigeonholes for all staff are located in the departmental post/photocopy room (Room 257).

3.4 Notice boards

The official student notice boards are on the walls outside Room 201. Every effort is made to post notices relating to classes well in advance. We use the Earth Sciences Year 1,2,3 and 4, Moodle sites for general information pertaining to all students in the year. Module-specific information will be posted on the Moodle site for that module.

3.5 Personal Tutors

Personal Tutors are responsible for giving students guidance in their studies and for offering advice, should any academic or personal problems arise. Your Personal Tutor in your final year will normally be prepared to provide you with references for jobs or further study. Each single honours student is assigned a member of the teaching or research staff as a Personal Tutor, and the Personal Tutor will change each year.

Personal Tutors will organise tutorials, which will be a combination of individual and group tutorials. In exam terms Personal Tutors will be available (by arrangement) for consultation and to assist with revision. For some tutorials, students may be expected to complete some work. Other tutorials will provide the opportunity to discuss project work, problems with the module and study techniques.

If you fail to attend a tutorial, you must see your Personal Tutor (preferably in advance) to explain the reason and to find out what was covered. Attendance at tutorials is compulsory and is carefully monitored by the Department. Attendance requirements will vary between years and you will be informed of these by your tutor at the start of term 1.

3.5.1 Confidentiality

It is very important that you notify your Personal Tutor about any personal or family problems you may be facing, or if you are unhappy with the course or the University.A student may ask to discuss any matter in confidence with their personal tutor, Senior Tutor, the Head of Teaching or the Head of Department. If confidentiality has been requested, the issues will not be discussed with any other person without the permission of the student (but subject to University regulations). In some circumstances the student will be advised to approach another member of departmental or University staff that may be more qualified to provide help or advice.

3.5.2 Using your Personal Tutor as a referee

Your Personal Tutor is the first person to ask if you need a reference for summer vacation employment or for post-graduate training or work. Always ask, however, before using names on an application or *curriculum vitae*: the person concerned may be planning to be away on leave that would make him/her unavailable at the critical time, or there may be other reasons why he/she cannot act on your behalf on every occasion. You may find it helpful to let your personal tutor comment on your C.V. before sending it to prospective employers. It is in your own interest to remain in regular contact with your Personal Tutor throughout your period of study *and* after you have graduated, keeping them acquainted with your career plans and progress.

3.6 Questionnaires

At least once each year, students are asked to complete a detailed questionnaire on each of the modules they have taken. Completed questionnaires are returned anonymously, but give students the opportunity to comment on each module overall, the practicals, any coursework tasks, and individual lecturers. The views expressed in these questionnaires are used by the Department to review and, if necessary, improve teaching quality. A similar procedure is used to obtain student views on field courses.

The Department, the School and the University all continually review degree programmes and individual modules. These questionnaires form an important part of the quality assurance process in the department by providing a mechanism for students to take part in the review of modules.

3.7 Space

As an undergraduate in Earth Sciences the majority of your classes will be held in one of our 3 large teaching labs, Queens Building 240 and 264 and JBB-005. These teaching labs contain specimens, thin sections, microscopes and maps that are used in practical classes. We encourage students to engage with practical specimens out of timetabled classes and students are able to access our teaching rooms outside of normal teaching hours to do this. A risk assessment for the use of teaching spaces both during and outside of teaching hours can be found on the year group Moodle pages. For those of you who cannot easily access teaching spaces outside of hours the majority of our teaching specimens have been digitised over the past year and you will be able to access them on-line.

4 Teaching

Undergraduate teaching covers a diverse range of topics, delivered through a variety of teaching approaches including lectures, practicals and fieldwork. Teaching within the department aims to be interactive and to provide opportunities for students to develop deep knowledge of the subject, not just through listening to lectures but through applying theoretical knowledge to the interpretation of hand specimens, thin sections, maps and numerical data sets. Whilst our degree programmes consist of a high number of contact hours, to get the best out of your studies it is expected that you will undertake a significant amount of independent study in addition to this. In total (classroom and independent study) you should be allocating ~35 hours per week to your studies. This independent work should include revision of practical specimens covered in class as well as formal assignments and reading.

Study weeks

The department of Earth Sciences does not have formal study weeks. This is to allow us to fit the majority of field trips into term -time to minimise disruption on vacation periods. There may be breaks in study for individual modules which will be timetabled to align with a piece of independent work.

4.1 Types of Teaching

4.1.1 Moodle, MS Teams and self-learning

Our in person practical teaching will be underpinned by online resources and self-learning. Moodle is our virtual learning environment and each module has its own Moodle page. The Moodle page for each module will be used to lead you through the learning activities for each week of the module. You will find clear instructions about what pre, syn and post class activities you are supposed to do and how the module is going to be assessed.

Whilst we are committed to supporting your learning through high quality teaching and providing high quality teaching resources, the move to higher education requires a higher level of self-motivation and commitment from you. Moodle provides module coordinators with a variety of tools to help us monitor student engagement and we will be using that, alongside attendance and assessment submission data, to keep an eye on your progress. In addition you should contact the module coordinator or your tutor if you have any problems.

4.1.2 Lectures

In any science degree course, lectures provide the main avenue for transferring new knowledge and understanding. You will have to adapt to a variety of styles and speeds of lecturing. In most cases if lectures are given live in class a recording of the lecture or a narrated PowerPoint will also be made available to help with revision later in the year, but this is at the discretion of the module coordinator.

Lectures merely define your learning agenda - they are no substitute for individual study, and it's your job to fill in the gaps in your notes, and to do enough reading to grasp the material covered.

4.1.3 Practical classes

Practical work lies at the heart of all core modules in the Department, and it usually takes the form of a class that complements the preceding lecture. Practical's test and extend your understanding of module content, train you in essential skills, help you to become familiar with minerals, rocks and fossils, and acquaint you with modern methodology (e.g., in geochemistry and in geophysical exploration). Many practicals are so designed that you learn through investigation and are able to draw scientific conclusions for yourself, thereby gaining confidence in your own powers of reasoning.   In addition to your lecturer, 1 or 2 postgraduate demonstrators also undertake teaching in practical classes. This means that there is more opportunity to ask questions and you should engage with all the help available to get the most out of these practical sessions.

You should generally take with you to every practical class:

- the lecture notes for the module concerned;
- notes from previous practicals in the module;
- where asked to do so, print outs of practical materials
- any relevant textbook (*e.g.* for mineral identification);
- relevant equipment (*e.g.* microscope key, hand-lens, knife, protractor, coloured pencils, eraser);
- a calculator;
- where specified, a practical notebook with graph pages.

4.1.4 Field trips

Fieldwork is the glue that brings together all aspects of the taught programme in Earth Sciences, as well as providing a chance for staff and students to get to know each other. It provides the opportunity to apply the theoretical knowledge and practical skills learnt in class to large-scale geology. The fieldwork programme is designed to provide progressive training over years 1 and 2 in preparation for field work associated with year 3 dissertation projects, either mapping or environmental data collection. To get the most out of fieldwork you must treat fieldtrips as learning opportunities rather than holidays. Whilst we do visit some beautiful places, both in the UK and abroad, it is important to remember that we are there to work and as time in the field in limited it is vital that you do not waste the opportunity.

Field trip costs are paid for by the University. This covers the cost of travel and accommodation but students must cover the costs of food on most field trips.

In our undergraduate field-training programme we seek:

- to excite interest in Earth Sciences and enhance individual motivation;
- to reinforce and build on knowledge and understanding gained in lectures and practicals;
- to help students to gain confidence and become skilled in analysing 3D relationships;
- to train all students in the essential practical skills of field geology, geophysics and geochemistry, and to

enable each to gain in confidence, competence and self-reliance through practical experience;
- to train all students in safe field practice and establish a culture of individual responsibility for the well being of self and others;
- to provide an alternative channel for informal but formative contact between staff and students.

Details of forthcoming field trips will be posted on the module Moodle page. This will also include details of the safety briefing held before each trip. Every student going on the trip is formally required to attend the briefing. If you miss a briefing, you must see the leader immediately. Failure to attend a briefing will result in you not being permitted to attend the field trip.

Any questions related to field work should be directed to the Head of Teaching and Fieldwork, Richard Ghail (Richard.Ghail@rhul.ac.uk)

Codes of practice
Field classes and independent field work are undertaken following the code of practice set out by the Geologists' Association and a safety code for field work prepared by the Committee of Heads of University Geoscience Departments, as summarised in the Earth Sciences Student Safety Handbook issued to all students on enrolment.

Each field trip has been risk assessed to ensure the safety of the field trip. Prior to field trips students will be required to attend a mandatory briefing where the risks of the trips will be outlined. All students are asked to sign a risk assessment to say that they understand the risks involved and agree to behave in the manner outlined in the briefing to ensure the safety of the group is not compromised. It is also imperative to have suitable field equipment at a minimum this must include robust field boots with ankle support, no shoes or trainers, a waterproof jacket, a safety helmet and a day sack. Students without suitable equipment will be deemed unsafe to study in the field and not permitted to work in the field until they have the appropriate equipment.

Fieldwork safety and Specialist Equipment
The Department requires each student to possess his/her own approved Fieldwork Pack, which contains safety helmet, first aid kit, whistle, safety blanket, eye protection (when using hammer), field notebook, hand lens, compass clinometer, grain size comparator card, and geological time scale card. This is provided as part of the 1st year fieldwork package for which fees must be paid through the Online Store (see https://onlinestore.rhul.ac.uk). The pack must be taken on all field excursions and used when instructed. Excursion leaders have the authority to exclude from a trip any student who is inadequately clothed or equipped. Notebooks may also be purchased separately from the Online Store; all other equipment may be purchased from Geo Supplies (www.geosupplies.co.uk) or UKGE Ltd (www.ukge.com).

4.1.5 Independent work and reading

To get the most out of your time within the Earth Sciences department you will need to undertake independent learning alongside your timetabled classes. This time should not just be spent undertaking formal assignments but also practising crucial practical skills. You are able to access teaching resources outside of class both online and in the departmental teaching spaces and you should make use of this to supplement the work you do in class.

Independent reading is an essential ingredient of a good honours degree. Science thrives on controversy and on fresh insights, and although in lectures we try to embrace opposing points of view and introduce you to stimulating new ideas, we cannot present the arguments as vividly as the combatants themselves: there is no substitute for reading the books and research papers in which the story unfolds year by year or month by month. To gain a good degree, therefore, it is essential that you read widely, to enhance your understanding, to broaden your knowledge of the science, and to keep abreast of progress.

We do not expect all students to purchase all module texts, and many are available in the library or as electronic versions from the library catalogue.

You should aim to keep abreast of major developments in Earth Sciences. Certainly by the second year, you should aim to look at *Geology*, *Nature Geoscience*, *Journal of the Geological Society*, *Nature*, *etc.* Many journals have automatic "table of contents" email notifications which you can sign up to, enabling you to keep abreast of major developments. Whilst reading lists are provided for every module, science is constantly evolving, and there is every chance that you can pick up on brand new and exciting results on a subject that were not available when the class was given. You are strongly encouraged to engage with the literature.

4.2 Types of Assessment

The majority of modules within Earth Sciences are assessed through multiple methods; with almost all having coursework and exam components. Coursework varies between modules from reports to presentations to assessed practicals. The aim of most coursework is to test that you have met the learning objectives for practical skills that are not easily tested in the final theoretical exams. This is why attendance in practical sessions is so important. Undergraduate exams are all scheduled in term 3. The weightings of coursework and exam can be found on the University module catalogue here.

4.2.1 Written Assignments

In years 1 and 2 you will gain training in scientific writing in the form of literature reports that will require you to research a specific topic using the scientific literature. You will receive formative feedback on your progress prior to submission from your personal tutor and through peer review. In the third and fourth years you will have to write extended project reports that, in addition to summarising the current state of published research on the topic in question, will report your own project objectives, measurements and conclusions.

4.2.2 Coursework and practical assessments

Many of the modules in Earth Sciences have learning outcomes associated with the understanding and application of practical skills such as thin section analysis, fossil identification and numerical skills. These are not easily assessed through theoretical exams and so are tested through coursework assessments and in class timed closed or open book practical tests. The exact requirements for all coursework assessments will be outlined during the module and any questions should be directed to the module coordinator.

4.2.3 Oral Presentations

In some modules you may be required to give a talk on material that you have researched. Bear the following points in mind when preparing an oral presentation as these aspects will most likely be assessed:

- Assess how much material you can present in the time allowed. Stick to the guidelines and practice your talk a few times before to check on the length.
- Select the subject matter carefully: pick out the topics that you think your audience will find the most interesting. Make sure that there is a clear and logical structure and list the important headings as 'bullet points'. Ensure there is adequate scientific quantity and quality in the talk.
- Know your subject inside out. Last-minute preparation of material for oral presentation is rarely successful. Be prepared for questions.
- Never just read verbatim from written text - a boring experience for your audience. Spoken and written English are quite different animals. Prepare skeleton notes for your talk, and then just speak naturally to your audience using the notes to prompt you only when necessary. Try to face the audience during the talk. Try to get a colleague to check that you can be heard clearly at the back of the room.
- Prepare informative presentation slides showing simple figures, tables or 'bullet point' lists to help your audience to assimilate the information. There should not be large chunks of text on each slide. Make sure your slides are easy to read from the back of the room. Do not pack in too much detail. Check your colour schemes.
- Provide sources for all of the information and images in the talk.

4.2.4 Examinations

For some modules you will be required to sit an examination in term 3. You will have access to past papers for all modules and if there are any changes to the question style or format of the exam you will be informed of the change and provided with an example. For 23-24 all written exams will be taken online.

4.2.5 Marking Criteria

Specific marking criteria for each assessment will be made available on Moodle but all work will be marked in accordance to the following departmental marking descriptions.

Marking descriptors and criteria for long answer exam questions and essays

Class	Examinations: long (essay) answer	%	Marking Criteria
1st	Deep understanding; near comprehensive knowledge; high levels of ability in analysis; significant originality;direct focus on question; answer complete for the time available; coherent structure; intensive, critical, independent reading beyond reading lists; extensivere ferencing; fluent style; no or very minor errors of spelling, punctuation or grammar	90+	An exemplary piece of work
		85	Outstanding in most criteria 1-7
	Deep understanding; detailed knowledge; high levels of ability in analysis; some originality; coherent structure; answer nearly complete for the time available; focus on question; intensive, critical, independent reading possibly beyond reading lists; extensive referencing; fluent style; no or very minor errors of spelling, punctuation or grammar	78	Evidence of excellence in most criteria 1-7
		72	Evidence of excellence in some criteria, particularly 1-5
2:1	Clear understanding; wide-ranging knowledge; effective analysis; coherentstructure; focus on question; answeradequate for the time available; evidenceof directed reading; may have somereferencing; adequate style; few errors ofspelling, punctuation or grammarAn adequate answer,shows reasonablecompetence, someerrors or	68	A good performance in most criteria 1-7
		65	A good performance in most criteria 1-5
		62	Does sufficiently well in criteria 1-5 to show evidence of clear understanding
2:2	Some general understanding and knowledge; some errors in analysis; adequate structure; may not focus on question; answer nearly adequate for the time available; little evidence of reading; little or no referencing; simple style; some errors of spelling, punctuation or grammar	58	A good attempt but insufficient critical analysis (2 + 6) for a 2:1
		55	Usually an adequate performance in most criteria
		52	May be weaknesses but sufficiently competent in criteria 1-5 for a 2:2
3rd	Limited general understanding and knowledge; errors in analysis; sketchy structure; poor focus on question; answer deficient for the time available; little or no evidence of reading; no referencing; simple style; significant errors of spelling, punctuation or grammar	48	Likely to be a lack of focus on the question (criteria 4) with insufficient performance in criteria 1-5 to merit a 2:2
		45	Weak performance in some criteria, especially 1-5
		42	Weak performance across all criteris but sufficient material to pass
Fail	Inadequate understanding and knowledge; numerous errors in analysis; poor structure; poor focus on question or has mis-interpreted question; answer deficient for the time available; no evidence of reading; no referencing; poor style; significant errors of spelling, punctuation or grammar	30-39	Criteria 1-5 not addressed to a sufficent level. Some elements of criteria criteria 6-10 may be OK
	Very poor understanding and knowledge; numerous errors in analysis; very poor structure; very poor focus on question; no evidence of reading; no referencing; inadequate style; significant errors of spelling, punctuation or grammar	20-29	Poor performance in most criteria
	Little or no understanding or knowledge; evidence of confusion in analysis; chaotic or fragmentary structure; lack of focus on question; no evidence of reading; no referencing; inadequate style; numerous errors of spelling, punctuation or grammar	10-19	Very poor perfomrance in most criteria.
	No understanding of subject; fails to offer any analysis; fails to answer the question; zero mark awarded where no significant attempt has been made to answer question	0-9	Answer largely irrelevant to question, minimal, possibly incomplete. 0 if work submitted 24 hours after deadline.

Marking descriptors and criteria for scientific reports and dissertations

Class	Report and Dissertation	%	Marking Criteria
1st	Deep understanding of the subject area; significant originality of ideas; significant originality in research aims; originality in data collection or methodology; high levels of ability in appropriate techniques of analysis; critical commentary on research design and methodology; clear evidence of intensive, critical, independent reading; extensive referencing and professional bibliography; fluent, accessible style;professional standard of presentation with no or very minor errors of spelling, punctuation or grammar; likely to be of publishable quality	90+	An exemplary piece of independent research; may be publishable as a journal article with further editing
		85	Outstanding in most criteria 1-7, approaching professional standards
	Deep understanding of the subject area; significant originality of ideas; may show originality in research aims or originality in data collection or methodology; high levels of ability inappropriate techniques of analysis; may have critical commentary on research design and methodology; clear evidence of intensive, critical, independent reading; extensive referencing and professional bibliography; fluent, accessible style; professional standard of presentation with few errors of spelling, punctuation or grammar; may be of publishable quality	78	Evidence of excellence in most criteria 1-7
		72	Evidence of excellence in some criteria, particularly 1-5
2:1	Clear understanding of the subject area; clear statement of research aims and methodology; possible originality of ideas;shows some originality in data collection or analysis; shows ability in appropriate techniques of analysis; some commentary on research design and methodology; evidence of independent reading; adequate referencing and professional bibliography; adequate structure and style;moderately professional standard of presentation with some errors of spelling, punctuation or grammar.	68	A good performance in most criteria 1-7
		65	A good performance in most criteria 1-5
		62	Does sufficiently well in criteria 1-5 to show evidence of clear understanding
2:2	Some general understanding of the subject area; adequate statement of research aims and methodology; little or no originality of ideas; shows some familiarity in appropriate techniques of analysis; limited originality in data collection or analysis; lacks commentary on research design and methodology; limited evidence of independent reading; adequate referencing and adequate bibliography; adequate structure and style; moderately professional standard of presentation with errors of spelling, punctuation or grammar.	58	A good attempt but insufficient critical analysis (2 + 6) for a 2:1
		55	Usually an adequate performance in most criteria
		52	May be weaknesses but sufficiently competent in criteria 1-5 for a 2:2
3rd	Limited understanding of the subject area; vague statement of research aims and methodology; no originality of ideas; shows limited familiarity in appropriate techniques of analysis; limited originality in data collection or analysis; lacks commentary on research design and methodology; little evidence of independent reading; adequate referencing and adequate bibliography; adequate structure and style; poor to moderate standard of presentation with errors of spelling, punctuation or grammar.	48	Generally a weak dissertation but with some areas of better quality in criteria 1-5
		45	Weak performance in some criteria, especially 1-5
		42	Weak performance across all criteris but sufficient material to pass
Fail	Very limited understanding of the subject area; vague or confused statement of research aims and methodology; shows only basic familiarity in appropriate techniques of analysis; very limited originality in data collection or analysis; lacks commentary on research design and methodology; little evidence of independent reading; poor referencing and adequate bibliography; poor structure and style; poor to moderate standard of presentation with significant errors of spelling, punctuation or grammar.	30-39	Criteria 1-5 not addressed to a sufficent level. Some elements of criteria criteria 6-10 may be OK
	Little or no understanding of the subject area; vague or confused statement of research aims and methodology; lacks basic familiarity in appropriate techniques of analysis; little or no originality in data collection or analysis; lacks commentary on research design and methodology; very little or no evidence of independent reading; very poor referencing and poor bibliography; poor structure and style; poor standard of presentation with significant errors of spelling, punctuation or grammar.	20-29	Poor performance in most criteria
	Little or no understanding of the subject area; no clear statement of research aims and methodology; lacks basic familiarity in appropriate techniques of analysis; no originality in data collection or analysis; lacks commentary on research design and methodology; no evidence of independent reading; lacks referencing and lacks bibliography; very poor structure and style; very poor standard of presentation with significant errors of spelling, punctuation or grammar.	10-19	Very poor performance in most criteria.
	No significant attempt has been made to carry out the piece of work or present a report on it.	0-9	Answer largely irrelevant to question, minimal, possibly incomplete. 0 if work submitted 24 hours after deadline.

Marking descriptors and criteria for seminars, oral and poster presentations

Class	Seminar, oral and poster presentation	%	Marking Criteria
1st	Evidence of excellent understanding of topic; material presented accurately and in depth; very clearly structured; excellent use of highly effective diagrams, very professionally presented; all sources acknowledged; oral presentations very clear, audible, concise and thoroughly rehearsed; excellent ability to answer questions	90+	An outstanding presentation
		85	Outstanding in most criteria 1-7, approaching professional standards
	Evidence of very good understanding of topic; material presented accurately and in depth; very clearly structured; very good use of effective diagrams, very professionally presented; all sources acknowledged; oral presentations very clear, audible, concise and thoroughly rehearsed; very good ability to answer questions	78	Evidence of excellence in most criteria 1-7
		72	Evidence of excellence in some criteria, particularly 1-5
2:1	Evidence of good understanding of topic;material presented generally accurate andin adequate depth; well structured; someeffective diagrams, near-professionallypresented; most sources acknowledged;oral presentations generally clear, audible,concise and rehearsed; reasonable abilityto answer questions	68	A good performance in most criteria 1-7
		65	A good performance in most criteria 1-5
		62	Does sufficiently well in criteria 1-5 to show evidence of clear understanding
2:2	Evidence of adequate understanding of topic; material presented generally accurate and in adequate depth; adequately structured; adequate diagrams, adequate presentation; some sources acknowledged; oral presentations adequate in terms of clarity and audibility; limited ability to answer questions	58	A good attempt but insufficient critical analysis (2 + 6) for a 2:1
		55	Usually an adequate performance in most criteria
		52	May be weaknesses but sufficiently competent in criteria 1-5 for a 2:2
3rd	Little evidence understanding of topic; material presented often inaccurate and inadequate in depth; poorly structured; poor diagrams, adequate presentation; few sources acknowledged; oral presentations poor in terms of clarity and audibility; little ability to answer questions	48	Generally a weak presentation but with some areas of better quality in criteria 1-5
		45	Weak performance in some criteria, especially 1-5
		42	Weak performance across all criteris but sufficient material to pass
Fail	Very poor understanding of topic; material presented generally inaccurate and inadequate in depth; very poorly structured; very poor diagrams, poor presentation; sources not acknowledged; oral presentations poor in terms of clarity and audibility; little ability to answer questions	30-39	Criteria 1-5 not addressed to a sufficent level. Some elements of criteria criteria 6-10 may be OK
	Little understanding of topic; material presented inaccurate and inadequate in depth; very poorly structured; very poor diagrams, poor presentation; sources not acknowledged; oral presentations poor in terms of clarity and audibility; no ability to answer questions	20-29	Poor performance in most criteria
	No understanding of topic; material presented inaccurate and inadequate in depth; very poorly structured; very poor diagrams, very poor presentation; sources not acknowledged; oral presentations very poor in terms of clarity and audibility; no ability to answer questions	10-19	Very poor performance in most criteria.
	No significant attempt has been made to carry out the piece of work or make a presentation on it.	0-9	Presentation largely off topic, minimal, possibly incomplete. 0 if work submitted 24 hours after deadline.

Marking descriptors and criteria for short answer or numerical questions and course work exercises.

Mark (%)	Class	Examinations: short or numerical answer	Coursework exercises
90-100	1st	A complete answer to the question	A complete answer to the question or questions;displays full understanding of the topic; shows complete competence at the skills tested.
80-89		A near-complete answer with a few trivial errors or omissions	An almost complete answer to the question or questions; displays full understanding of the topic; shows very high level of competence at the skills tested.
70-79		A near-complete,competent answer with only minor errors or omissions	A very good answer to the question or questions;displays a good understanding of the topic;shows a high level ofcompetence at the skills tested.
60-69	2:1	An adequate answer,shows reasonablecompetence, someerrors or omissions	A good answer to thequestion or questions;displays an adequateunderstanding of the topic;shows a reasonable level ofcompetence at the skillstested.
50-59	2:2	Adequate understanding, answer competent but incomplete a few errors or omissions	An adequate answer to the question or questions; displays an adequate understanding of the topic; shows a moderate level of competence at the skills tested.
40-49	3rd	Limited understanding, basic, limited answer, some errors or omissions	Only a basic answer to the question or questions; displays very limited understanding of the topic; shows a little competence at the skills tested.
30-39	Fail	Some evidence of understanding or competence, errors and omissions, fails to provide an adequate answer	Fails to satisfactorily answer the question or questions; displays very limited understanding of the topic; shows very limited competence at the skills tested.
20-29		Little evidence of understanding the question or being able to provide an adequate answer; errors and omissions; perfunctory attempt at answer	Fails to answer the question or questions; displays almost no understanding of the topic; shows little or no competence at the skills tested.
10-19		Perfunctory attempt at answer, largely erroneous	Fails to answer the question or questions; displays no understanding of the topic; shows no competence at the skills tested.
0 –9		No significant attempt has been made to answer the question	No significant attempt has been made to carry out the coursework

* To be used in conjunction with quantitative markschemes for coursework and short answer exam questions.

4.2.6 Expectations

A satisfactory programme of study at university requires both the students and the department to enter an informal 'contract' of obligations and expectations which all should seek to abide by.

What you can expect from us

The Department is committed to effective teaching, but we judge our success in terms of how well *you* learn. We will do all we can to stimulate your interest in Earth Science, to make the aims of each module clear, to train you by means of interesting and fulfilling practicals, fieldtrips and projects, to provide support that is matched to your individual needs, and to monitor and guide your progress. We hope our enthusiasm for the subject will prove infectious, and will stimulate you to pursue your studies energetically. Most of all, we hope you will find the Department a friendly, supportive and stimulating place in which to work. Our interest in you will not come to an end at the graduation ceremony.

As a student you can expect the department to:

- Provide lectures, practicals and field courses in a series of modules that will make up your degree programme
- Take reasonable steps to assist students who are disadvantaged through illness or other problems
- Take steps to ensure that your working environment is safe, both in the department and in the field
- Nominate a personal tutor who will provide tutorials and act as your point of contact with the department
- Assess and examine your work
- Provide verbal or written feedback on coursework where appropriate
- Organise a schedule of fieldwork appropriate for your degree programme
- Subsidise the cost of most field modules which are part of the degree programme
- Provide a feedback mechanism for student evaluation of modules through questionnaires
- Provide reasonable notice of all coursework deadlines, changes to programmes and fieldwork arrangements by electronic mail or display of notices
- Treat all students in a fair and just manner without any form of prejudice

What we expect of you

If your degree course has not challenged you to grapple with difficult concepts, to become skilled in new and demanding techniques, and to push your intellectual powers to the limit, then you will not have used your opportunity to the full. Employers of graduates are interested not only in the knowledge you have acquired (though knowledge is obviously relevant to careers in Earth Sciences), but also in personal qualities like self-reliance and initiative, and in your capacity to think rationally and independently, to apply scientific principles to new problems, to work in a team, to write clear reports within a firm deadline, and so on. *These are qualities that develop from your efforts rather than being taught*. They depend on many factors, among them the energy you put into your studies and the resourcefulness with which you pursue your career goals. Nevertheless we want you to enjoy your studies here; if you enjoy what you do, you will work harder and learn more effectively.

As a student you are expected to:

- Attend all lectures, practicals and field courses unless you are ill or have other acceptable cause for absence
- Keep the department fully informed of any factors that may seriously affect your studies
- Follow all safety instructions in the field and laboratory
- Attend all tutorial sessions arranged with your personal tutor and keep him/her fully informed of any problems which may affect your studies
- Complete all coursework by set deadlines and attend all examinations
- Behave responsibly in classes and ensure that your actions do not distract others (e.g. phones are switched off and no inappropriate computer use).
- Behave responsibly and in accordance with all instructions from staff whilst in the field
- Pay the student contribution to field courses in instalments by the published dates
- Fill in all module questionnaires (anonymously) and provide constructive feedback
- Check e-mail accounts regularly (preferably daily)
- Always behave in a manner that will not bring the department or University into disrepute.

5 Degree structure

Full details about your programme of study, including, amongst others, the aims, learning outcomes to be achieved on completion, modules which make up the course and any course-specific regulations are set out in the course specification available through the [Course Specification Repository](#).

5.1 Department specific information about degree structure

Students are currently admitted to four-year, MSci degree programmes in the Department (Geoscience, Environmental Geoscience, Geoscience with an international year, Environmental Geoscience with an international year), and three-year, single honours, BSc degree programmes (Geology, Petroleum Geology, Digital Geosciences and Environmental Geology).

Degree programmes at Royal Holloway are composed of a number of module credits, normally 120 module credits for each stage of the BSc (3-year) and MSci (4-year) degrees. Modules may be 'mandatory (condonable fail)' i.e. taken by all students on a particular degree programme, 'mandatory (non-condonable fail)' must be taken and passed for progression, or 'optional' i.e. students may choose from a range of options, particularly in the 3rd and 4th years of the degree programme. The course structure for each of the degree programmes offered in the Department of Earth Sciences is shown below along with a list of all modules offered by the Department of Earth Sciences. Modules in other departments may also be taken in place of optional modules as part of a degree programme but there are limits to the number and type of such modules which may be taken.

To help you make good progress in your studies at RHUL, we have a simple online module SS1001 in 'Academic Integrity' which will guide you through preparing your assignments using the best academic standards. You will need to successfully complete this short module in your first year, and you can have as many attempts as you like before the deadline to pass it.

Year 1 Modules			
Code	**Title**	**Module Content**	Module coordinator
1101	**Evolving Earth**	This module introduces the 4.6 billion year history of our Evolving Earth, and provides students with the skills to interpret that history themselves. The module is subdivided into two complimentary streams which that closely integrate together. One stream (palaeontology) considers the story of life from its origin, through to the rise and fall of the dinosaurs, and concluding with our own recent human evolution It focuses on major events in evolution, and introduces students to the key concepts including systematic palaeontology, palaeoecology, palaeobiology, evolution, and taphonomy. The other stream (sedimentology) considers earth surface processes and palaeoenvironments, and teaches students how to recognise the changing environments through time using techniques including rock classification, textural analysis, facies analysis and graphic logging, palaeoflow analysis, and stratigraphy. Because life and environments have co-evolved and are co-dependent, palaeontology and sedimentology need to be taught in close parallel, providing students with a powerful synthetic understanding of how our Earth has evolved in the past, and continues to change in the future.	H. Falcon-Lang
1201	**Dynamic Planet**	Earth is a dynamic and evolving planet with a record of plate tectonic and environmental change over its 4.6 billion year history. This module explores the geological structure and the processes that shape our planet and other planets within our solar system, from the planetary heat engine that powers plate motion and leads to the surface expression of these forces in volcanoes and earthquakes, to the use of maps, minerals and rocks to unlock the story in the rocks beneath our feet.	C. Manning
1301	**Human interaction with the Earth System**	With the adoption of the Paris Agreement and the recent COP26, a seismic societal shift towards issues related to sustainability and climate change is taking place globally. The next generation of geoscientists are now required to understand the complex interrelations between human activities and a changing Earth system. With this module, students will explore key themes at the core of human-Earth interaction such as anthropogenic climate change, geohazards, environmental pollution, and sustainable exploitation of energy resources and energy-critical elements.	N. Scarselli

1350	**Introduction to Environmental and Climate Change**	This module will introduce students to the concept of Earth System interactions, as a framework for understanding the causes and consequences of environmental and climate change. Lectures will cover the physical and chemical features of the Lithosphere, Atmosphere, Hydrosphere and Biosphere; the processes that link these parts of the Earth System together; and the consequences of disturbing these interlinked systems. Term 2 will introduce students to the mechanisms that drive climate change, and the tools that scientists have at their disposal to quantify past climate change. The module will retain a strong focus on the interactions between the physical Earth and human activities, addressing the many ways that humans can manage natural systems for the benefit of current and future generations. The module is illustrated with examples of environmental and climate change from throughout Earth's varied 4.5-billion-year history.	A Dickson
1401	**Climate, ocean and atmosphere**	Understanding the causes and trajectory of climatic change is an important task. In this module, students will learn about three interconnected phenomena: the global climate system, and the atmospheric and oceanic processes that regulate the climate system over timescales of seconds to millions of years. These topics will be taught with an emphasis on the acquisition of practical skills in data handling and manipulation, statistics and interpretation, and by exposing students to active research topics in atmospheric and oceanic chemistry and the understanding of climate change. The module will introduce a wide range of themes that will be a springboard for more in-depth study of advanced climatic concepts in years 2–4.	A Dickson
1500	**Physics and Chemistry of the Earth**	Basic physics and chemistry for the Earth sciences: an outline of principles, techniques and their application in a geological and Earth Science context. Chemistry of the Earth – atoms and atomic structure, the Periodic table, origins of the elemental abundance in the solar system, introduction to geochemical analysis, composition of the Earth, interpretation of phase diagrams, evolution of the atmosphere, and simple box modelling Geophysics to investigate the Earth: Newton's Laws, kinematics, circular motion, planetary orbits, gravity, magnetism, electricity, resistivity, stress, strain, seismicity, and isostasy.	M King
1900	**Earth Scientists toolkit**	This course provides training in key skills required for a career in Earth and Environmental sciences. The content will be split into 3 blocks; Numerical methods and basic coding – which will provide students with an understanding of the common numerical methods that underpin quantitative sciences and provide them with an introduction to coding as a background for year 2 and 3 modules; Field skills where students will learn how to measure, observe and record data in the field and use these observations to interpret the geological and environmental evolution of a field area; observational and analytical skills a series of seminars where students will hone their observational and analytical skills whilst becoming familiar with a range of geological and environmental materials.	C Manning

Year 2 Modules

Code	Title	Module Content	Module coordinator
2200	**Stratigraphy and Past Sedimentary Environments**	This course covers the principles of stratigraphic analysis and the reconstruction of past sedimentary environments. The general aims are: to provide a core of training in stratigraphic techniques; to outline key events in the history of life; and it is also intended that the students will develop the ability to undertake self-directed learning through independent reading and literature research. The course contains a number of related elements: A. Stratigraphic techniques: lecture/practical sessions on Geochronology methods and limitations; Litho-, Bio- and Ichno- logging and facies analysis; influence of sea-level and climate. ; B. Reconstructing past environments: palaeogeographic map construction; using geochronology and geochemistry to aid reconstruction	H Falcon-Lang
2210	**Geological Evolution and Deep Time Synthesis**	This course uses the regional geology of the UK to provide case studies for synthesising geological data and undertaking palaeoenvironmental analysis. The course aims to show how the spectrum of geological processes (e.g. tectonic, volcanic, sedimentation) and data (e.g. maps, logs, specimens) can be integrated to understand the origin and development of a region. A key goal is for students to develop the ability to undertake self-directed learning through independent reading and data collection. In the process, students should gain a deeper understanding of the origin and evolution of British Isles, and the insights it provides into geological environments globally. The course contains a number of related elements: A. Case studies in regional geology: comprising an extended case study of the Caledonides and a series of studies of aspects of depositional palaeoenvironments in UK regional geology, and B. Mapwork practicals (7 sessions) geological map interpretation exercises based on UK geology	D. Lowry / H Falcon- Lang

2320	**Geohazards**	The module will cover hazards associated with geological activity, their causes and risk management including topics such as volcanoes, earthquakes and radon. Additionally the module will cover hazards associated the exploitation of geological resources and associated anthropogenic activity. Students will work in small groups to prepare a presentation on a city of their choice outlining geohazards (causes and management) that are pertinent to that city. Throughout the module students will be assessed formatively on a number of practicals that draw together a variety of geological, numerical and geochemical data that require analysis and interpretation of these data.	Q. Chan
2330	**Practical Meteorology**	The aim is to provide students with a working knowledge of basic meteorology without complex calculus suitable for those students studying Environmental and Earth System science courses in the college. The course will begin with atmospheric basics and terminology including didactic sessions and workshops/practicals on solar radiation, thermodynamics, water vapour, stability, clouds and precipitation. It will progress into skill sessions (lectures and practicals) on radar, interpreting satellite maps and weather reports and finish with sessions (lectures and practicals) putting it all together (review and consolidation) for understanding of winds, fronts, air masses and thunderstorms. The course will finish up with lectures and practicals demonstrating how basic meteorological understanding can be applied for career useful consideration of meteorological hazards: tropical and extra tropical cyclones, regional winds, boundary layers and pollutant dispersal, numerical weather prediction and atmospheric optics. The structure is designed to introduce new concepts early on, deliver skills for being able to deliver basic meteorology and then review and consolidate learning in topics that are fun, important and in the case of thunderstorms still at the forefront of meteorological research. The course will use a two-pronged approach with basic mathematics (algebra) and concepts thus avoiding the advanced calculus that makes advanced Meteorology unpalatable to some. The course is built for all science students from both schools of science to be able to undertake. Meteorology is an excellent vehicle for teaching the application of basic science tenets to real world issues which have impacts on everyone's daily life and thus reinforces basic science training. The Meteorology course will be excellent preparation for the modern climate change course (GL3650) and would be an important component of any new programme in environmental sciences. The course will enhance a range of transferrable skills in critical reading, presentation of complex ideas and the synthesis of diverse data and sources. The course should also be useful to any modern citizen trying to understand the changing climate around them.	R. Fisher / M. King
2400	**Igneous and Metamorphic Geology**	Modules 1 and 2: Igneous and Metamorphic Geology Fractional crystallisation, silica saturation concepts, alkali basalt differentiation series, undersaturated rocks and minerals, potassic alkaline rocks, granites, case studies of the British Tertiary and Lesser Antilles. Metamorphic facies and associations, petrogenetic grids, metamorphic phase diagrams, metamorphic reaction types and rates, metamorphic textures and fabrics; interrelationships between deformation and metamorphism; P-T-t paths; thermochronology.	C Manning
2410	**Geochemistry**	This module builds on the first year Chemistry of the Earth module by introducing further, more complex, chemical concepts relevant to the Earth Sciences. The emphasis in the first term is on basic chemical systems though practical classes are designed to demonstrate the relevance and application of these concepts in an Earth Science context. The second term introduces techniques more directly applied to Geology, such as isotope geochemistry. Students do a small project involving the analysis and interpretation of a geochemical dataset which will be assessed in the form of a written report.	Q. Chan
2460	**Research in Earth, Climate and Environmental Change**	In this research led module skills in scientific writing, communication and data interpretation will be developed alongside an understanding of current research topics in Earth, Climate and Environmental Change. A series of seminars will be led by experts on a range of research topics in the field of Earth, Climate and Environmental change. From these seminars students will gain an understanding of cutting edge research and the way in which research projects are planned and carried out. A literature review exercise on one of the research topics from the seminar series will be undertaken with support from tutors. Students will receive training in techniques for literature searching, synthesising a large quantity of literature and reference managing. Data interpretation skills will be developed through a short guided quantitative project. Students will query, test and plot data in different ways using skills learnt in year 1. Example datasets could be long temporal meteorological datasets to assess climate trends or spatially varying datasets of pollutants. Students completing this module will have an excellent understanding of current issues and research in Earth, Climate and Environmental Change and will be well prepared for the independent research projects that will be carried out in year 3.	R Fisher
2530	**Introduction to Planetary Geology and Geophysics**	The course serves as an introduction to planetary science and introduces students to the structure of the solar system, the nature and evolution of planetary bodies and the interpretation of surface features. The aim of the course is to place the structure, composition and evolution of the Earth within the context of the formation and evolution of the solar system. The course offers an exploration of the Solar system, its physical and chemical characteristics, origin and evolution. Exploration methods involve remote sensing image analysis, geophysics and geochemistry. Processes of impact cratering, volcanism, tectonism and gradation determine planetary	Q. Chan / D. Waltham / R. Ghail

		morphologies. Planetary interiors and atmospheres build knowledge and understanding of planetary processes. Systematic study of the Earth-Moon system, terrestrial planets and outer giants, planetary satellites, comets and meteorites creates an holistic and critical appraisal of planetary evolution.	
2600	**Structural Analysis**	Evolution of geological structures in terms of processes and their interaction in regional tectonic settings worldwide. Module 1: Introduction to structural geology: Structural elements, geological structures (folds, faults, fractures), and concepts (stress, strain, rheology) Module 2: Introduction to regional tectonic systems and examples of global tectonics Google Earth Project: Presentation of a major tectonic structure as part of a 'virtual class' field trip around the world (term 2)	I Watkinson
2740	**Sustainable Energy**	Their current and potential use for producing electricity (and space heating from solar energy) and relevant economic and environmental aspects will be also presented. The focus is on quantitative aspects and on the understanding of the relevant physics. The module will cover the basic concepts of energy science, including conservation of energy, elementary thermodynamic concepts, energy efficiency, and related topics. Then it moves on to the principles of solar energy; the source - the radiation from the sun - and how the solar radiation is transformed into electricity (PVs) and heat (solar thermal). Solar farms are discussed, but the focus is on the urban potential and how structural geology principles can help to assess the potential. The module moves on to wind energy. The students are familiar with fluid flow from geology, and those principles are used to explain how wind turbines work to produce electricity. On-shore and off-shore turbines and wind farms are explained and their potential, particularly for the UK, assessed. As for marine energy, only wave and tide energy is discussed, and the focus is on the potential in the UK (which is unusually great for this type of energy). The module will also introduce the students to the principles of deep and shallow geothermal energy, and its current and potential use for producing electricity and space heating (and, for heat pumps, also space cooling). The module will underline the ideal combination between geothermal energy (which is steady source – always there) and other but non-steady renewable sources (solar, wind and wave energy).	A Gudmundsson
2901	**Advanced Scientific & Field Skills**	The principal aim is to develop advanced geological field skills. The field skills component is based around a series of activities in an area of Igneous and Metamorphic rocks (6 days) and field mapping in an area of Sedimentary rocks (6 days) and comprises an advanced practical class designed to develop the core skills required of a geologist. Practical activities include: A. Preparing a geological map, B. Describing and interpreting sedimentary rocks using the graphic log technique, C. Describing and interpreting igneous and metamorphic rocks, D. Analysing structural features using stereonets, E. Constructing scaled cross-sections through structurally complex terrains, and F. Inferring the geological history of a region.	I. Watkinson / J. Adam
2902	**Earth Scientists' Practical Toolkit**	The purpose of this module is to provide advanced practical skills in the interpretation and synthesis of laboratory and field data, supported by literature research, and to be able to communicate as much through a presentation and report.	I. Watkinson / D. Lowry
2904	**Earth Scientists' Environmental Toolkit**	By the end of the module students should have gained an appreciation of some aspects of anthropogenic impact on the environment by visiting a range of field sites, understand the principles of environmental sampling, including sampling strategies, sources of error and sample contamination issues. Students should experience of a range of sample preparation methods and how to produce analytical data for a number of different sample types and understand how ICP-AES can be used for environmental analysis and gained practical experience of laboratory techniques. The module will provide experience of safe laboratory working practices and develop team working skills, including time management, negotiation, and co-operation. Students will further develop their data analysis and report writing skills and be able to plan and undertake an independent field-based environmental project.	N. Grassineau
2905	**Earth Scientists' Digital Toolkit**	To embed GIS and programming skills for the creation, analysis and interpretation of geospatial data and coding skills to facilitate data collection, analysis, modelling and interpretation. The module explains the origin of GIS and trains students in the creation of georeferenced point, line and polygon data, combine raster and vector data, and data analysis. It also introduces Python and the use of arrays, reading and writing, branching and repeating, and plotting.	R. Ghail / D. Waltham

Year 3 Modules			
Code	Title	**Module Content**	Module coordinator
3010	**Advanced Techniques in Geoscience**	The module aims to teach students advanced level key geological and transferable skills. Data Handling - a lecture and practical module on retrieval and handling of geological data which revises and extends numerical skills introduced in years 1 and 2. Presentation skills – presentation exercise to improve spoken, visual and other aspects of communication in geology. Advanced Field Skills - includes data collection, teamwork and site investigations.	D Lowry
3131	**Independent Project**	Students will either generate new scientific data and observations or analyse existing data that have not previously been subjected to detailed and critical analysis. Students have to present the results of their research in both a written form and as an oral presentation. Topics will be chosen during the summer of the 2nd year after discussion with a relevant staff supervisor. The staff member will supervise the project during the 3rd year by directing the research, ensuring adequate progress and dealing with related issues (e.g. safety).	N. Scarselli
3210	**Advanced Topics in Sedimentology**	To study selected topics in sedimentology, particularly those attracting current research interest. The emphasis in this module is on sedimentary processes, on depositional environments, and on the role of climate in sedimentary processes. Current topics include: weathering, soil formation, alluvial and deltaic deposition, glacial sedimentation/"Snowball Earth" events, carbonate platform sedimentation, and the use of trace fossils in sedimentology.	D Chiarella
3300	**Hydrogeology**	The global water cycle – structure and properties of water: the hydrological cycle and its fluxes. Flow to rivers. Darcy's Law and groundwater flow calculations. Aquifers - their nature and distribution. Pumping of water from the ground. The chemistry of groundwater. Pollution and remediation. Chemical weathering and water chemistry – Types of weathering – silicate, carbonate. Karst formation and morphology – cave systems and speleothem development. Ocean water and evaporites. Ocean islands and the problems of water supply. The hydrothermal water cycle. Mid-oceanic ridges – hydrothermal vent communities.	J. Paul
3321	**Environmental Geology Independent Project**	Under tutorial guidance, the independent project involves students in research into some aspect of environmental geology, such as groundwater pollution, waste management, subsidence, etc. Further information, including notes concerning the style of presentation will be available at the time a topic is selected and approved. Students are expected to give a verbal account of their project to their supervisor and tutor during the Lent Term. The project is examined orally by the External Examiners.	N. Grassineau
3330 /2330	**Advanced Practical Meteorology**	The module will begin with atmospheric basics and terminology including didactic sessions and workshops/practicals on solar radiation, thermodynamics, water vapour, stability, clouds and precipitation. It will progress into skill sessions (lectures and practicals) on radar, interpreting satellite maps and weather reports and finish with sessions (lectures and practicals) putting it all together (review and consolidation) for understanding of winds, fronts, air masses and thunderstorms. The module will finish up with lectures and practicals demonstrating how basic meteorological understanding can be applied for career useful consideration of meteorological hazards: tropical and extra tropical cyclones, regional winds, boundary layers and pollutant dispersal, numerical weather prediction and atmospheric optics.	R. Fisher / M King
3451	**ECENCE Research Project**	A research topic in the field of Earth and Environmental Sciences will be chosen in the summer before the start of year 3 after discussion with a relevant staff member. Projects can be field and/or laboratory based, generating new scientific data, or they can be computational, analysing existing data that has not been subject to detailed and critical analysis. Early in term 1 students will submit a project plan to the supervisor and course leader and will receive written feedback on the project plan. Formative feedback will also be provided at the end of term 1 following presentations showing progress made so far. Students will be expected to regularly meet with their project supervisor for guidance. At the end of the project students will present the results of their research as a scientific report and as an oral presentation.	R. Fisher
3530	**Planetary Geology and Geophysics**	The course serves as an introduction to planetary science and introduces students to the structure of the solar system, the nature and evolution of planetary bodies and the interpretation of surface features. The aim of the course is to place the structure, composition and evolution of the Earth within the context of the formation and evolution of the solar system. The course offers an exploration of the Solar system, its physical and chemical characteristics, origin and evolution. Exploration methods involve remote sensing image analysis, geophysics and geochemistry. Processes of impact cratering, volcanism, tectonism and gradation determine planetary morphologies. Planetary interiors and atmospheres build knowledge and understanding of planetary processes. Systematic study of the Earth-Moon system, terrestrial planets and outer giants, planetary satellites, comets and meteorites creates an holistic and critical appraisal of planetary evolution.	Q. Chan / D. Waltham / R. Ghail

3600	**Advanced techniques in tectonic and structural interpretation**	This module is designed to develop advanced skills in structural and tectonic analysis. Topics covered include brittle and ductile deformation mechanisms, stress & strain analysis, and fracture processes & analysis.	A Gudmundsson
3700	**Subsurface Analysis**	This course will provide students with knowledge and skills that are used in geological aspects of exploration for hydrocarbons. The course will build on general geological principles from the 1st and 2nd years to apply them to petroleum geology. Topics covered in the course will include the petroleum system concept, including definitions of play, lead, prospect, risk, uncertainty, an introduction to the exploration and production workflow, seismic processing and interpretation of seismic images of basin fill, basic well log analysis, reservoir sedimentology, static and dynamic reservoir modelling, charge modelling, and basic volumetric analysis applied to a trap mapped on 2D seismic data.	D Chiarella
3780	**Subsurface Storage of CO_2 and Energy**	The module will introduce participants to the Geoscience (and wider background) needed to understand the exploitation of the subsurface for the storage of carbon dioxide (to reduce greenhouse gas emissions) and the storage of renewable energy (e.g. compressed air storage within salt). These new uses of the subsurface are expected to become significant businesses through the 2020s (as a response to the Paris Climate Agreement) and the Petroleum Industry has the necessary skills, knowledge and resources to develop these. As a consequence, many of our future graduates are likely to find significant career opportunities in these new areas rather than in traditional hydrocarbon extraction. The module introduction will cover the environmental, economic, political and social background so that participants understand the business model that will enable this new industry (specifically the how and why of carbon pricing). The module will then investigate the geophysical methods required to evaluate potential subsurface structures. This module will also look at the science behind subsurface utilization (e.g. issues such as what structures and sediments are needed and how these are similar to, or different from, the structures and sediments that form hydrocarbon reservoirs). In summary, the module aim is to produce graduates who will be able to explore and exploit sedimentary basins in all the different ways in which they are likely to be important during the 21st century.	D. Waltham
3800	**Advanced Palaeontology**	A module of advanced lectures which illustrate currently developing concepts or methodologies in Palaeontology. These involve detailed studies of some plant, invertebrate and vertebrate groups, including both macrofossils and microfossils, whose emphasis reflects research strengths in the Department. The lectures cover areas such as environmental proxies, evolution, palaeoenvironmental analysis, fossil preservation and a range of other geological applications. Students undertake an advanced literature review of specialist subject.	M Collinson
3850	**Engineering Geology and Rock Mechanics**	Engineering Geology provides a practical understanding of how geology affects civil engineering. At the end of the module students should have an appreciation of how geology is incorporated within the civil engineering design process and how it influences construction and excavation. The module will develop those aspects of geology which are of the greatest importance to professional civil engineering, construction. The geological controls on geotechnical properties and their spatial distribution will be discussed in the context of case histories dealing with major engineering works including slopes, excavations, foundations and waste disposal. Rock mechanics is concerned with all structures that are built in or on rock, including structures formed from the rock itself, such as slopes and caverns, and engineering structures such as dams and foundations. This module will introduce and familiarise students with the principal concepts and techniques used in the discipline, and help students appreciate more advanced issues.	R.Ghail
3880	**Palaeoclimates**	The Earth's climate has changed across geological time, due to the interaction of a huge array of inter-related climate forcing agents. These changes have been reconstructed using many different lines of chemical, biological and physical proxy data, and mechanistically interrogated using computer simulations (Earth-System models). In this module, students will be taught about the key features of major climatic events in Earth's history and should gain an appreciation of the typical rates and magnitudes of change that characterise these episodes. A key aim of the module is to demonstrate some of the techniques used for quantitative palaeoclimate reconstruction, and for students to learn the critical evaluation skills needed to interpret these datasets. These skills will be developed through class practical exercises and a summative task that requires the interpretation of a raw palaeoclimate dataset.	A. Dickson
3901	**Independent Geological Field Mapping**	Students rank a list of possible field mapping areas in order of their preference and are allocated one of their preferred choices. They attend trip planning meetings with the area supervisor. Students live together in small groups for a minimum of 4 weeks of fieldwork at the end of the second year, and make a geological map of an area typically of 15-25 sq km. Areas are chosen to satisfy safety and academic demands. They offer a wide variety of opportunities to apply theoretical knowledge in many different earth science subject areas, and offer intellectual challenges that can be tackled by students of a range of abilities. Prior to the field the students have one week to familiarize themselves with their base maps, with available remote sensing data, and with the risks and hazards of the area, producing a rough map of main features that the expect to see and how to access them. Field supervision is provided by academics during the early part of the fieldwork with evening discussion and review of progress. The student then works	

		independently to produce a field map accompanied by a complete field record. During the first term of the 3rd year opportunities are provided for discussion of the data record (in the form of field notebooks and maps), results and interpretation with the field supervisor, and with other academic staff at defined feedback sessions. Further study of rocks and other data from the field area is undertaken. By early in the second term of the 3rd year students have prepared an illustrated written report and a high quality interpreted geological map. The project aims to use the field data to understand the stratigraphy, structure and geological history of the area studied.	
3940	**Methods Of Environmental Investigation**	By the end of the course students should: • Have gained an appreciation of some aspects of Man's impact on the environment through industrial activity by visiting a range of field sites • Understand the principles of environmental sampling, including sampling strategies, sources of error and sample contamination issues • Have gained experience of a range of sample preparation methods and how to produce analytical data for a number of different sample types • Understand how ICP-AES, IC and ICP-MS can be used for environmental analysis and gained practical experience of all techniques • Have gained experience of safe laboratory working practices • Have developed team working skills, including time management, negotiation, and co-operation • Have further developed their report writing and presentation skills • Be able to plan and undertake an independent field-based environmental project	

Year 4 Modules

Code	Title	Module Content	Module coordinator
4012	**Independent Geoscience Project**	Under the guidance of a departmental supervisor the student will design and execute an independent research project which will be submitted for examination as a report (ca 12000 words). Data collection will either be field-based or laboratory-based and may involve an industrial placement. Field based projects will normally be based on 7-10 days of field work. Data handling using statistical techniques must be integrated into the project. A vital aspect of the project development will be regular presentation of results in the form of seminars to their peer group and staff a number of times during the final year. The final seminar will be assessed by a panel of staff.	M King
4020	**Formation and Evolution of the Continents**	This module will provide students with an in depth understanding of the physical and chemical processes that have occurred throughout the history of the Earth. From the Early Earth through the accretion of continental crust to the present day tectonic configuration, students will learn to integrate a range of geological observations and data to investigate some of the current questions about the evolution of the Earth. This module will include research led teaching focussing on areas of active research within the department such as subduction and accretionary processes, development and evolution of mantle heterogeneity, continental growth and super continents, structural deformation processes at a variety of different tectonic settings and the fundamentals of lithosphere geodynamics and deformation. Enhance a range of transferrable skills including critical reading, presentation of ideas and synthesis of diverse data and sources.	C Manning
4040	**Evolution of the Modern Earth**	This module will integrate sedimentary, palaeontological, oceanographic and atmospheric information from the geological and modern record to understand the evolution of the modern Earth. Students will investigate the climate record through geologic time and what it can tell us about the future challenges of climate change, utilising a varied range of palaeoclimatic proxies from both palaeontology and sedimentology and looking at the range of climate data. They will explore the links between climate, tectonics and sedimentary systems. They will assess the intimate relationship between the evolution of land life and the evolution of the atmosphere.	M Collinson
4100	**Research Proposal and Critical Review**	Students will first formulate a short research proposal and then provide a critical review of another proposal. In both cases, and under the guidance of a supervisor, the first task will be to write a case for support, the second, to write a critical review. These will include: statement of problem, objectives of new research, and an outline of the methodology to be used, particular strengths and weaknesses with respect to undefined questions and hypotheses, scientific flaws, feasibility of methodology and costs, alternative approaches and methodology.	R Fisher
4300	**Water Quality**	This module begins with fundamental aquatic science and hydrological and hydrogeological processes that impact surface and groundwater. It continues with the treatment and management of water and wastewater, including study visits to water and wastewater treatment plants. The module includes a practical introduction to chemical and ecological monitoring of water quality.	M King

4310	**Air Pollution**	This module is concerned with the dispersion and conversion of gaseous and particulate air pollutants derived from man-made and natural sources, their impacts on the environment, and policy-related management issues. Air quality strategies and measurement methods are also considered. There are study visits to various monitoring networks in the London region.	K Clemitshaw
4322	**Independent Environmental Geoscience Project**	An independent project, planned by the student with initial guidance and reasonable supervision by academic staff, based on the collection of data and later analysis of that data. The project provides an opportunity to apply many aspects of environmental geology skills acquired during the earlier years of the degree module.	M King
4380	**Environmental Inorganic Analysis**	A practical introduction to the quantitative analysis of a wide range of inorganic and radionuclide contaminants derived from fossil-fuel combustion, agriculture, and the manufacturing, extractive, waste and nuclear industries. It emphasises the use of appropriate sampling strategies, preparation processes and analytical methods required to produce quality assured and quality controlled data for elements, ions, solids and radionuclides in different environmental media.	N Grassineau
4920	**Geological Mapping 2**	The second part of the mapping module (equivalent to GL3901). Report, fair copy map, cross-sections, stratigraphic columns.	R. Ghail
4930	**Field & Research Skills**	The aim is to equip students with the skills and techniques to undertake research. The module will include scientific ethics, the intelligent and efficient design of research or experiments, including how to capture, store and deal with data and meta-data, project planning, how to publicise your science, press release, video, outreach etc, an Introduction to Unix/Linux and a scripting language such as python. Data reduction and interrogation with Igor or R or python with plotting publication ready data to maximum effect. Uncertainty in scientific measurement and modelling and how to propagate it. An introduction to basic electronics and interfacing your computer to an experiment and log/capture data, and ending with image capture and analysis.	A Dickson

5.2 Change of course

It is possible to change between degree courses in Earth Sciences providing you have completed the required mandatory component for the new course. This becomes much more challenging after the start of year 2 when the course content becomes more unique. If you are thinking about changing degree course, it is best to do this before the start of year 2. The exception to this is moving between BSc and MSci courses which can be done until the end of Term 2 in year 3 (assuming you have studied the mandatory modules).
If students are wishing to graduate with a BSc at the end of the third year of the MSci course, they must alert the Chair of the Department Assessment Board, Ian Watkinson, and LSE-School@rhul.ac.uk **as soon as possible**. Please note, it can take Student Admin some time to process this sort of request and issue the final transcript, so students should be prepared for a delay (particularly if you are applying to another institution).

6 Facilities

6.1 Facilities and resources within your department

6.1.1 Teaching Laboratories

As an undergraduate in Earth Sciences the majority of your classes will be held in one of our 3 large teaching labs, Queens Building 240 and 264 and JBB-005. These teaching labs contain specimens, thin sections, microscopes and maps that are used in practical classes. We actively encourage our students to utilise the teaching spaces outside of timetabled hours to engage with practical specimens and activities and we welcome the use of our social spaces.

6.1.2 Microscopes

Every student who requires one is issued with a microscope in a locker. There is a £20 charge for the key. Any faults should be reported to Dan Parsonage (Room 265 in the Foyer) immediately; no attempt should be made to repair the equipment. This year there will be special mounts for all microscopes to allow students to use their mobile phones to image through the microscope. This is to reduce face to microscope contact as microscopes are hard to clean and to enable students to take photographs of samples through the microscope to post on Q and A forums to access help with mineral identification.

6.2 The Library

The Library is housed in the **Emily Wilding Davison Building**.

Details, including Library Search, dedicated subject guides and opening times can be found online from the Library home page.

The Ground Floor of the Library contains a High Use Collection which includes many of the books assigned for undergraduate modules. . The rest of the Library collections are on the upper floors. There are plenty of study areas and bookable rooms to carry out group work, as well as many areas to work on your own. The Library contains a large number of PCs and has laptops to borrow on the ground floor to use in other study areas.

The Information Consultant for Earth Sciences is Debbie Phillips, who can be contacted at Deborah.phillips@rhul.ac.uk. Debbie is based in the Emily Wilding Davison Library.

The Library provides a range of training sessions designed to enhance your existing library and research skills. These are available in both class-based and self-study formats. For information on available sessions and to book a place, go to: https://intranet.royalholloway.ac.uk/students/campus-life/the-library/welcome-to-the-library.aspx

6.3 Photocopying and printing

The departmental printers and photocopier are reserved for staff use. Copier-printers (MFDs) for students are located in the Library, the Computer Centre and many PC labs, which will allow you to make copies in either black and white or colour. Further information is available here.

If you require copying to be done for a seminar presentation, you need to give these materials to your tutor to copy on your behalf. Please make sure that you plan ahead and give the materials to your tutor in plenty of time. Many of the PC labs are open 24 hours a day, 7 days a week. Alternatively, there are computers available for your use in the Library, and Computer Centre.

If you require copying to be done for a seminar presentation, you need to give these materials to your tutor to copy on your behalf. Please make sure that you plan ahead and give the materials to your tutor in plenty of time.

6.4 Computing

How to find an available PC

7 Assessment Information

7.1 Anonymous marking and cover sheets

Where possible all coursework should be submitted by candidate number to allow for anonymous marking. Exceptions will be field notebooks that are marked during trips where students are encouraged to label their field notebooks to ensure they can be returned to them if lost and online assessments such as quizzes, which are submitted through Moodle. For final year mapping projects students are encouraged to anonymise notebooks prior to submission.

7.2 Submission of work

Deadlines for assessed projects and reports will be given at the time the work is set. All modules in all years have elements of coursework which form part of the assessment of the module. You will receive notification of the submission dates for all other assessed. Unless otherwise stated all work should submitted via Turnitin by the day of the deadline. All coursework is now paperless except for work produced in the field. For all other paper-based submissions, students are expected to scan their work (most mobile phones have a camera app that will do this) for submission via Turnitin. If the submission is image only (no typed text), Turnitin will require a short written statement, e.g. 'This submission is a scanned copy of my own original work', to allow submission. Any changes to these dates and deadlines for submission of work will be posted on Moodle and/or students will be informed by e-mail. It is your responsibility to ensure that the correct files are submitted by the time of the deadline.

Deadlines for assessed projects and reports will be given at the time the work is set. All modules in all years have elements of coursework which form part of the assessment of the module. You will receive notification of the submission dates for all other assessed coursework (NB. never on a Friday for 'hard' copies). Unless otherwise stated the work should be handed in to the School Helpdesk (Wolfson Building Room 118) by 14h00 on the day of the deadline. Any changes to these dates and deadlines for submission of work will be posted on Moodle and/or students will be informed by e-mail.

In most cases, your coursework should be submitted anonymously (i.e. using candidate number rather than name).

7.3 Penalties for over-length work

Work which is longer than the stipulated length in the assessment brief will be penalised in line with Section 13, paragraph (5) of the University's Undergraduate Regulations:

Section 13 (5)

Any work (written, oral presentation, film, performance) may not be marked beyond the upper limit set.

The upper limit may be a word limit in the case of written work or a time limit in the case of assessments such as oral work, presentations, films or performance. In the case of presentations, films or performance these may be stopped once they exceed the upper time limit.

In addition to the text, the word count should include quotations and footnotes. Please note that the following are excluded from the word count: candidate number, title, module title, bibliography and appendices.

7.4 What to do if things go wrong – Extensions to deadlines

Please refer to the Extensions Policy and guidance on the University's webpage about Applying for an Extension.

Please note:
Students can apply for a **two working day** extension for all coursework **except**:

- In-class assessments
- Assessments submitted during a fieldtrip
- Moodle Quizzes

Students can apply for a **five working day** extension only for coursework which is weighted 50% or above of the module total.

7.5 Support and exam access arrangements for students requiring support

Some students at the University may have a physical or mental impairment, chronic medical condition or a Specific Learning Difficulty (SpLD) which would count as a disability as defined by the Equality Act (2010) that is, "a physical or mental impairment which has a long-term and substantial effect on your ability to carry out normal day-to-day activities". It is for such conditions and SpLDs that Disability and Neurodiversity Services (previously called Disability and Dyslexia services) can put in place adjustments, support and exam access arrangements. Please note that a "long-term" impairment is one that has lasted or is likely to last for 12 months or more. Find out more about Disability & Neurodiversity Services

If you have a disability or SpLD you must register with the Disability and Neurodiversity Services Office for an assessment of your needs before adjustments, support and exam access arrangements can be put in place. There is a process to apply for special arrangements for your examinations – these are not automatically put in place. Disability and Neurodiversity Services can discuss this process with you when you register with them. Please see section 2 above for further guidance about registering with the Disability and Neurodiversity Services Office. Please let us know about your disability by completing the form on our registering your disability page.

Please note that if reasonable adjustments, including exam access arrangements, have been put in place for you during the academic year, the Sub-board will not make further allowance in relation to your disability or SpLD.

7.6 Academic misconduct - Plagiarism

What is Plagiarism?

'Plagiarism' means the presentation of another person's work in any quantity without adequately identifying it and citing its source in a way which is consistent with good scholarly practice in the discipline and commensurate with the level of professional conduct expected from the student. The source which is plagiarised may take any form (including words, graphs and images, musical texts, data, source code, ideas or judgements) and may exist in any published or unpublished medium, including the internet. Plagiarism may occur in any piece of work presented by a student, including examination scripts, although standards for citation of sources may vary dependent on the method of assessment.

Identifying plagiarism is a matter of expert academic judgement, based on a comparison across the student's work and on knowledge of sources, practices and expectations for professional conduct in the discipline. Therefore, it is possible to determine that an offence has occurred from an assessment of the student's work alone, without reference to further evidence.

It is most important that you acknowledge any work by other people that you have used in your report. You may wish to quote a passage directly from the text of a paper or book (in which case inverted commas should be used to identify the quoted passage), or reproduce a figure or table, or merely use information or data from the publication in your own synthesis. If you wish to quote a passage directly, it must be short (ideally no more than 2 sentences), in inverted commas, referenced, and such quoted passages should make up less than 5% of your total text. In all such cases, you must refer in your text (or in a relevant figure caption) to the published source of the information, for example as 'Bloggs (1994)', and provide bibliographic details in your reference list, *e.g.*Bloggs, J. 1994. Organic pollutants in groundwater. *Environmental Geochemistry*. 23, 1-16.

Internet sources: You should not place too much reliance on internet sources of information. Most of these are unregulated and not subject to the same rigorous editing as is the case with books and journals. It may be appropriate to use the occasional image or diagram, but for factual information it is almost always much better to consult a written source.

8 Health and safety information

The Health and Safety webpage provides general information about our health and safety policies.

8.1 Code of practice on harassment for students

The University is committed to upholding the dignity of the individual and recognises that harassment can be a source of great stress to an individual. Personal harassment can seriously harm working, learning and social conditions and will be regarded and treated seriously. This could include grounds for disciplinary action, and possibly the termination of registration as a student.

The University's Code of Practice on personal harassment for students should be read in conjunction with the Student Disciplinary regulations and the Complaints procedure.

8.2 Lone working policy and procedures

The University has a 'Lone Working Policy and Procedure' that can be found here.

Lone working is defined as working during either normal working hours at an isolated location within the normal workplace or when working outside of normal hours.

The type of work normally conducted by Earth Sciences undergraduate students is classified as a low risk activity and as such the following advice is relevant:

- Lone working is permitted, but it is good practice to ensure that a second person is aware of the first person's location and that they have access to means of communication.
- It is recommended that the second person could be a relative/friend who knows where the first person is located and approximate time of return. Relevant details should be exchanged (e.g. campus number and security telephone number).
- Inspections/risk assessments of the work area are by the Departmental Health and Safety Co-ordinator to ensure that hazards have been identified, risks controlled and provisions for emergencies are in place (e.g. escape routes open, firefighting equipment, first aid etc.).

Note that the principles contained in the above section will apply to **students undertaking any duties outside of campus, including fieldwork**.

Any health and safety concerns should be brought to the attention of the Departmental Health and Safety Coordinator or the University Health and Safety Office.

It is likely that most activities will take place onUniversitypremises. However, the principles contained in the above section will apply to students undertaking duties off campus.