WELCOME

Welcome to Oxford, or welcome back to Oxford!

This handbook is provided for students on the BA in Geology and MEarthSci in Earth Sciences for the academic year 2025-26. Whether you are arriving for the first time, or returning for another year, you should find that it contains the key information that you need to navigate your way around the Earth Sciences degree course:

- how the course is taught;
- course structure;
- details of options;
- logistics of practical work and fieldwork; and
- modes of examination and assessment.

This handbook also contains all of the important dates (of teaching terms, course-work submission deadlines, field courses and so on), that you will need to be aware of through the year.

This handbook is only available online. This and other web-based resources can be found through the 'undergraduate course' links on the departmental website:

https://www.earth.ox.ac.uk/teaching/undergraduates/course-information/

Please refer to the online version which will be updated as necessary during the year.

If you have any questions regarding the course or the Department, please consult this handbook first – it is a mine of information; however, if you can't find the answer to any particular questions you have relating to the course, you should contact your college tutor or the Undergraduate Course Advisor.

It is important to note that this handbook only pertains to this current academic year, and a new handbook is issued each academic year: the Earth Sciences course is constantly evolving as staff change and knowledge develops.

Stuart Robinson (Associate Head of Department for Teaching)

David Pyle (Undergraduate Course Advisor)

The Examination Regulations relating to this course are available at:

https://examregs.admin.ox.ac.uk/

If there is a conflict between information in this handbook and the Examination Regulations then you should follow the Examination Regulations. If you have any concerns, please contact:

emma.brown@earth.ox.ac.uk

The information in this handbook is accurate as at 19 August 2025. However, it may be necessary for changes to be made in certain circumstances, as explained at:

www.ox.ac.uk/coursechanges

If such changes are made, the Department will publish a new version of this handbook together with a list of the changes and students will be informed.

CHANGES TO THE HANDBOOK SINCE 2024-25 version

1. General update and overhaul.

CHANGES TO THE HANDBOOK SINCE v1.2

1. Two instances of gendered pronouns removed.

CHANGES TO THE HANDBOOK SINCE v1.3

1. 3rd year marking forms on p100-116 updated.
2. Guidance on use of AI section added p13-16.
3. Guidance on AI use in coursework added to Examining Conventions Appendix on p96. P98,p100, p101 and p103.

CHANGES TO THE HANDBOOK SINCE v1.4

1. Practical session for *Structural Geology* coursework on p96 corrected from Week 1 to Week 8 of Hilary Term.

CHANGES TO THE HANDBOOK SINCE v1.5

1. 3rd year independent project submission details updated.

CHANGES TO THE HANDBOOK SINCE v1.6

1. Information on printing updated on p21 and p66.

CHANGES TO THE HANDBOOK SINCE v1.7

1. Deadline for *Introduction to Geological Processes* updated on p30 and p95.

CHANGES TO THE HANDBOOK SINCE v1.8

1. Deadline for *Structural Geology* updated on p30 and p95.
2. Deadline for *Structural Geology and Map Interpretation* updated on p43 and p97.

CHANGES TO THE HANDBOOK SINCE v1.9

1. Deadline for *Invertebrate Palaeobiology* updated on p30 and p95.

How to use this handbook

At the beginning of this handbook, you can find general information, organised alphabetically, relating to all undergraduate students in 2025-26. You will then find separate sections for 1st, 2nd, 3rd and 4th years, including course details and other important information. **At the beginning of each of these sections is a table of important dates – please put these dates in your diary now.** At the end of the handbook are the appendices, relevant to all students.

Other sources of information

1. Examination Regulations: These can be accessed online at:
https://examregs.admin.ox.ac.uk/

2. Online Handbook: This can be accessed on the departmental website here:
https://www.earth.ox.ac.uk/teaching/undergraduates/course-information/

and on Canvas:
https://canvas.ox.ac.uk/

3. Lecture List:
http://wise-tt.com/wtt_ou_earth/

4. **University Student Handbook**: This contains essential information for students, and can be found here:
http://www.proctors.ox.ac.uk/handbook/handbook/

5. **Health and Welfare**: The University website has a general guide to student health and welfare issues
https://www.ox.ac.uk/students/welfare?wssl=1

Contents

STUDENT WELFARE

The first point of contact for welfare issues in the Department is the Head of Administration and Finance, Hannah Lingard:

hannah.lingard@earth.ox.ac.uk

Though student health and welfare are primarily college responsibilities, and tutors and other confidential advisers make up a sympathetic and effective network of support for students, you should always feel free to approach staff in the Department with any issues or concerns you may have, especially if any incidents occur in the Department.

Mental Health

Members of Faculty and other Departmental staff care about your wellbeing as well as your academic progress and are here to help you. If you are struggling in any way, please do not feel you must suffer in silence. However shocking you think the issue may be, or at the other end of the spectrum however frivolous you think it may be, we have probably come across it before or even gone through something similar ourselves. We will take you seriously and do whatever we can to help. If we cannot speak with you there and then, we will make an appointment. If we cannot answer your questions, we will find out. If you do not feel comfortable visiting an office, please email one of us.

Please do also look out for each other – in Earth Sciences we are a close community, and none more so than when we are in the field, so do keep an eye on your fellow students and offer your support and/or help if you think that it is needed.

The Department also has trained Mental Health First Aiders amongst its staff:

james.bryson@earth.ox.ac.uk
elisabeth.crabbe@earth.ox.ac.uk
hamish.hay@earth.ox.ac.uk
darren.hillegonds@earth.ox.ac.uk
bruce.levell@earth.ox.ac.uk
claire.nichols@earth.ox.ac.uk
stuart.robinson@earth.ox.ac.uk
laura.stevens@earth.ox.ac.uk
zoe.turner@earth.ox.ac.uk
andrew.walker@earth.ox.ac.uk
louise.wright@earth.ox.ac.uk

The University's Counselling Service aims to see students as soon as possible but cannot provide instant access to a mental health professional. To make an appointment, please contact counselling@admin.ox.ac.uk.

The *Proctors' and Assessor's Memorandum*, which is available from colleges, provides general information on welfare, finance, health and recreation, as well as on student conduct and on the running of University examinations.

The University also has a number of self-help resources online here:

https://www.ox.ac.uk/students/welfare/counselling/supporting-your-mental-health-oxford

Harassment

The Department and the University do not tolerate harassment in any form. The Department has several trained harassment advisors:

Ashleigh Hewson (ashleigh.hewson@earth.ox.ac.uk)
Darren Hillegonds (darren.hillegonds@earth.ox.ac.uk)

Helen Johnson (helen.johnson@earth.ox.ac.uk)
Conall MacNiocaill (conall.macniocaill@earth.ox.ac.uk)

The role of harassment adviser is an informal one and intended to be a first point of approach for members of the University. Any discussions are treated in strictest confidence, and the complainant stays in control of the process throughout. Formal action will only be taken if the complainant wishes to pursue it.

The University's harassment procedures for students are detailed at:

https://www.ox.ac.uk/about/organisation/harassment-and-sexual-misconduct

We also expect members of the community to be responsible bystanders if they witness unacceptable behaviour:

https://edu.admin.ox.ac.uk/bystander

Support for Young Adult Carers

Information about the University's support for young adult carers can be found here.

Oxford University Student Union

Oxford SU Advice offers free, confidential and independent information, advice, and guidance on navigating collegiate university, CCAT and OIA processes. They have a wide range of online resources available on their website. If you need further support you can get in touch with them via their Online Form.

What do SU Advice do?
We offer free, confidential, independent advice to all students studying or suspended from award-bearing courses at the University of Oxford, whether matriculated or not. We specialise in helping students navigate collegiate University, CCAT and OIA processes and can help students to understand support options available at Oxford and beyond. Support outside of our remit includes emergency support, emotional support/counselling, legal advice or advocacy, visa advice, financial advice and housing advice - instead, we recommend students check out our A-Z of Accessing Support for appropriate support in these areas.

How can students get support?
You can find out how students can access our support and what they can expect of us in our Advice Agreement.

Firstly, we ask students to check out our online resources. then get in touch via our short online form if they would like:

- An answer to a question not answered online
- To request an appointment (either in person or via Teams)
- An adviser to check over a copy of their draft statement and/evidence
- To request an adviser attend a meeting or hearing with them as supporter (subject to availability)

We've just launched a range of new online resources to help students self-navigate these processes. These include topics such as:

- Academic Appeals for both taught and research students (including Transfer of Status or Confirmation of Status)
- Mitigating Circumstances, Late Submissions/Extensions, Missed Exams
- Reporting incidents such as sexual violence, harassment, discrimination, bullying
- Responding to allegations of academic or non-academic misconduct including sexual violence
- Migrating colleges
- Fitness to Study
- Dispensation applications for taught and research students
- Residency requirements for both taught and research students

Over the academic year, we'll be finalising the creation of resources on other processes, including guides for key processes at each college.

External Support

- **Nightline** is an independent listening, support and information service run for and by students, offering instant messaging, Skype and telephone support.
- **Samaritans** is an independent listening service – always available 24/7 by telephone or online chat.
- **NHS** Mental Health Helpline is open 24/7 for people who need mental health care when their situation is not life threatening.
- **Togetherall** is an NHS-approved service providing mental health support 24/7 to students, wherever you are in the world. Register free with your Oxford email to talk online to a mental health professional using the ‘message a wall guide’ feature or connect with other students through online forums.
- **Oxford Safe Haven** offers short-term support out-of-hours for people in Oxfordshire who are experiencing a mental health crisis including suicidal thoughts, via telephone and face-to-face support.
- You also have the option of speaking to your GP who will have access to wider support and resources, if you wanted to.

GUIDANCE ON THE USE OF AI

Guidance on the use of AI in the Earth Sciences undergraduate course and assessments

Background

Generative Artificial Intelligence (Gen AI) tools are capable of rapidly finding, synthesising and analysing information. However, these tools should not be seen as substitutes to, or a short-cut for, developing skills in, and understanding of, our subject. Whilst AI may be capable of producing an 'answer' for any prompt, the user still needs to possess the background knowledge, understanding and critical insight to be able to analyse, verify and appropriately apply the output from AI. You are ultimately responsible for all work you submit, including any errors or violations of this guidance introduced by Gen AI.

This document outlines general guidance on the use of AI in the undergraduate (MEarthSci and BA) course in Earth Sciences and specific guidance for summative assessments. This document should be read in conjunction with the University's guidance on the use of GenAI in learning and assessments.

If, at any point, you have questions as to whether your intended use of Gen AI is permitted or not, please seek advice in advance from your college tutor, the course lecturer, the Undergraduate Course Advisor or the Head of Teaching. Please also note that, as Gen AI tools are a rapidly developing technology, the policy and guidance may be changed in the future, so always ensure you are working in-line with the latest guidance, available in the handbook and read any emails circulated providing updates.

Use of AI in formative work in Earth Sciences

We strongly recommend that if you choose to use Gen AI tools in your studies, you use those that are supported through the University (e.g. ChatGPT Edu, Microsoft Copilot) –other available tools may collect your data and use it in unknown ways. Always check the terms and policies carefully before providing any data or information to such non-supported tools.

Gen AI can generally be used in your independent study for the following purposes:

- organising your own notes, including revision notes
- compiling information from independent reading and lectures etc

For formative independent work you are set (e.g. non-assessed practical work, tutorial work), Gen AI may be used for the following tasks, unless explicitly prohibited by the lecturer or tutor setting the assignment:

- formatting of lists or bibliographies, although we strongly recommend using dedicated reference management software (e.g. Endnote, Zotero, RefWorks).
- improving your grammar by an AI tool specifically designed and intended for that purpose.
- assistance in writing code (except where prohibited), including translation of existing code into a different programming language. Students should approach the use of GenAI to generate new code with caution, as it can be prone to errors.

Gen AI must not be used for generating original writing (i.e. copying, or paraphrasing, partial or complete sentences from Gen AI into your submitted work).

Gen AI can be used to help improve spelling and grammar. You may also use Gen AI to help with structure and rephrasing of your own original writing (e.g. asking Gen AI questions such as, "have I used a consistent subject in this paragraph", "how can I make this sentence less wordy", or "Can you give some examples of paragraphs that have or lack coherence because of a consistent subject?"). Everything you supply to Gen AI must be your own creation – you cannot copy and paste other people's words and ask Gen AI to rephrase the sentences for you.

To search for literature, we strongly recommend using the tools provided through Library Services (e.g. Scopus, Web of Science, Georef); Gen AI should not be the main tool you use as it can be very unreliable. If you do use Gen AI, you must verify the relevance, correctness and unbiasedness of the references (and always check the original source).

Use of AI in summative assessments in Earth Sciences

Earth Sciences follows the University guideline that:

"Unauthorised use of AI in work submitted for assessment constitutes cheating and plagiarism under University rules, penalties for which include failing the relevant assessment and, in appropriate cases, expulsion."

(see: https://www.ox.ac.uk/students/life/it/guidance-safe-and-responsible-use-gen-ai-tools)

For some coursework assessments in Earth Sciences (specified below), limited use of AI is authorised.

In all assessments, Gen AI **may not** be:

- used for generating original writing (i.e. copying, or paraphrasing, partial or complete sentences from Gen AI into your submitted work);
- used to improve original writing, beyond spelling, grammar and rephrasing of original writing.

For assessments where AI is permitted, the submitted materials must include a statement of declaration that outlines whether AI has been used and, if it has, what aspects of the work it has been used for. The declaration must take the format provided below and must be included at the start of the submitted essay or report. Failure to do so will constitute a breach of the University's guidelines on use of AI in assessments and will be treated as Academic Misconduct.

If you have used Gen AI, you must provide the following statement:

"Generative Artificial Intelligence tools have been used in the production of this piece of work.

I acknowledge the use of *[List tools used, e.g., ChatGPT Edu*] to *[List uses, e.g., improving spelling and grammar throughout the essay; plotting data in Figure X, Y; debugging code presented in Appendix A]"*

Preliminary Examinations (1st year) coursework practical assessments

- *Crystals and Minerals*
- *Igneous and Metamorphic Petrology and Processes*
- *An introduction to geological processes (Sedimentary rocks and sedimentary processes)*
- *Invertebrate Palaeobiology*
- *Geological Maps*
- *Structural Geology*
- *Mathematics: Statistics and Scientific Computing*

The use of AI is **not** authorised.

Final Honours School, Part A1 (2nd year) coursework practical assessments

- *Igneous Petrology*
- *Series Analysis and Scientific Computing*

- *Metamorphic Petrology*
- *Sedimentary Petrology*
- *Structural Geology and Map Interpretation*

The use of AI is **not** authorised.

Final Honours School, Part A2 (3rd year) coursework

Independent project ("mapping project")

A declaration of any AI use must be included (this does not count for the word limit of the exercise).

Gen AI **may be** used:

- to search for literature. However, we strongly recommend using the tools provided through Library Services (e.g. Scopus, Web of Science, Georef); GenAI should not be the main tool you use. If you do use Gen AI, you must verify the relevance, correctness and unbiasedness of the references (and always check the original source);
- to format lists or bibliographies, although we strongly recommend using dedicated reference management software (e.g. Endnote, Zotero, RefWorks);
- to improve your grammar by an AI tool specifically designed and intended for that purpose;
- to assist with graphing your own data, provided this is explained in the caption and declared correctly;
- to assist with writing of code, including generation of new code and translation of existing code into a different programming language, provided this is explained in the submitted materials and declared correctly. We caution against the generation of code by Gen AI.

Gen AI **may not** be used:

- for generating original writing (i.e. copying, or paraphrasing, partial or complete sentences from Gen AI into your submitted work);
- to improve original writing, beyond spelling, grammar and rephrasing of original writing.

3rd year extended essay

A declaration of any AI use must be included (this does not count for the word limit of the exercise).

Gen AI **may be** used:

- to search for literature. However, we strongly recommend using the tools provided through Library Services (e.g. Scopus, Web of Science, Georef); GenAI should not be the main tool you use. If you do use Gen AI, you must verify the relevance, correctness and unbiasedness of the references (and always check the original source);
- to format lists or bibliographies, although we strongly recommend using dedicated reference management software (e.g. Endnote, Zotero, RefWorks);
- to improve your grammar by an AI tool specifically designed and intended for that purpose.

Gen AI **may not** be used:

- for generating original writing (i.e. copying, or paraphrasing, partial or complete sentences from Gen AI into your submitted work);
- to improve original writing, beyond spelling, grammar and rephrasing of original writing.

Final Honours School, Part B (4th year) coursework

Independent Research Project

A declaration of any AI use must be included (this does not count for the word limit of the exercise).

Gen AI **may be** used:

- to search for literature. However, we strongly recommend using the tools provided through Library Services (e.g. Scopus, Web of Science, Georef); GenAI should not be the main tool you use. If you do use Gen AI, you must verify the relevance, correctness and unbiasedness of the references (and always check the original source).
- to format lists or bibliographies, although we strongly recommend using dedicated reference management software (e.g. Endnote, Zotero, RefWorks);
- to improve your grammar by an AI tool specifically designed and intended for that purpose
- to assist with graphing your own data, provided this is explained in the caption and declared correctly
- to assist with writing of code, including generation of new code and translation of existing code into a different programming language, provided this is explained in the submitted materials and declared correctly. We caution against the generation of code by Gen AI.

Gen AI **may not** be used:

- for generating original writing (i.e. copying, or paraphrasing, partial or complete sentences from Gen AI into your submitted work);
- to improve original writing, beyond spelling, grammar and rephrasing of original writing.

GENERAL INFORMATION A-Z

Here is the essential information about Earth Sciences.

This is information for 2025-26 only.

Accreditation

The undergraduate courses are accredited by the **Geological Society of London.**

Academic Administration Office

This is the office that looks after the undergraduate course and all related matters. It is located in room 10.33 on the ground floor, and usually has core hours during term of:

Monday	8.30am-4.00pm
Tuesday	8.30am-4.00pm
Wednesday	7.00am-4.00pm
Thursday	7.00am-3.00pm
Friday	9.00am-2.00pm

Academic Administration Team

Emma Brown
Academic Administrator
emma.brown@earth.ox.ac.uk
Monday 6.45-4.00 (Home)
Tuesday 6.45-4.00 (Home)
Wednesday 6.50-3.00 (Office)
Thursday 6.50-3.00 (Office)
Friday 6.45-4.00 (Home)
Every other Friday non-working

Nigel Perrin
Academic Administration Officer
nigel.perrin@earth.ox.ac.uk
Monday 8.00-4.00 (Office)
Tuesday 8.00-4.00 (Office)
Wednesday 8.00-4.00 (Office)
Thursday 8.00-4.00 (Home)
Friday 8.00-4.00 (Home)

Liz Crabbe
Academic Administrative Assistant
elisabeth.crabbe@earth.ox.ac.uk
Monday 9.00-2.00 (Home)
Tuesday 9.00-2.00 (Home)
Wednesday 9.00-2.00 (Office)
Thursday 9.00-2.00 (Office)
Friday 9.00-2.00 (Office)

Elizabeth Crowley, Departmental Librarian
(Departmental Library, Ground Floor)
elizabeth.crowley@earth.ox.ac.uk
Monday 8.30-1.00 (Library)
Tuesday 8.30-12.30, 1.30-2.30 (Library)
Wednesday 8.30-12.30 (Library)
Thursday 8.30-12.30 (Library)
Friday 8.30-12.30 (Library)

Aims and Objectives of the Department

1. To provide students with a course of the highest academic quality in a challenging but supportive learning environment.

2. To provide students with a broad, balanced knowledge of Earth Sciences.

3. To develop transferable skills related to problem solving, communication, practical techniques and computing.

Building

The Department moved to the current building in 2010, enjoying world-class teaching and research facilities. The formal teaching facilities (laboratories, lecture rooms and library) are all located on the ground floor, connected by the atrium and the undergraduate common area. Tutorials take place either in academic offices, or in meeting rooms on L2 or 04. Access to the building out of hours is controlled by your university swipe cards, with entry through the door next to the rotating door at the front of the building, or through the bike shed at the back of the building.

Careers Advice

The University Careers Service is available for advice and guidance right from the very start of your course. They can advise you on how and where to gain relevant work experience and internships outside of term time, as well as provide mentoring opportunities, CV workshops and advice on graduate careers. You can sign up via their website: http://www.careers.ox.ac.uk/, or visit their office at 56 Banbury Road. The University Geological Society (OUGS) also organise one-to-one sessions with our dedicated Careers Advisor in the Department, and a geoscience careers fair in Michaelmas Term.

The Department holds an annual Careers Fair in Michaelmas term each year.

Our alumni – those who have graduated before you – may also be a valuable resource: Earth Sciences alumni are forging careers in a wide range of industries and roles where the skills learned during the undergraduate course can be applied, as well as a few who are putting those skills to good use in entirely unrelated fields.

Alumni frequently visit the Department to advise students and share their experience of life beyond University - whether as part of a recruitment event or in smaller, face-to-face sessions. Many of you will find internships through alumni connections. Department alumni are also members of a dedicated Linkedin group, which you can join to start your career networking well before Finals:

https://www.linkedin.com/groups/3379392

Undergraduate contributions to the annual alumni magazine are particularly welcome, as are volunteers for alumni events.

If you have any questions, or would like to contact one of our alumni for careers advice, please don't hesitate to contact the Outreach and Communications Manager: alumni@earth.ox.ac.uk.

Communication

Please ensure you regularly check your university email address, as this is the primary form of communication used to send students important information.

Staff have pigeonholes in the corridor by the administration offices on the ground floor of the building. Staff can also be contacted via Microsoft Teams if they are available. Email addresses, telephone numbers and room numbers are provided for key staff in Appendix 5 at the back of this handbook. Contact details for other members of the Department may be found on the Department website.

Disability Contact

The Department has three Disability Contacts.

The lead contact is the Head of Administration and Finance, Hannah Lingard (room 20.10, ext. 72007, hannah.lingard@earth.ox.ac.uk).

For specific building-related matters, please contact the Building Manager, Ashleigh Hewson (room 10.32, ext. 72054, Ashleigh.Hewson@earth.ox.ac.uk).

For specific academic-related matters, please contact the Academic Administrator, Emma Brown (room 10.33, ext. 72043, Emma.Brown@earth.ox.ac.uk).

Feedback and Consultation

Feedback from students

Each term, feedback questionnaires are carried out online. You can help us improve the course by commenting (anonymously) on those aspects of the teaching you found particularly helpful or areas in which you see scope for change. These comments and questionnaires are read by teaching staff and discussed by the Joint Consultative Committee (Undergraduate) [JCC(U)] and the Teaching Committee. Students are encouraged to pass comments and suggestions for improvements to the JCC(U) at any time, via the student reps, or the academic office. There is also a google form for non-urgent comments and suggestions for JCC(U) to consider, which goes to the Undergraduate Course Advisor, David Pyle.

The Department also conducts regular student surveys on general and pastoral issues.

The feedback questionnaires are very important, and we strongly encourage you to complete them when requested. They are your opportunity to have your say about the modules on your course. Lecturers value hearing your views. The feedback results will also be included in various internal and external reports and reviews, and are used to assess the Department and University.

Feedback to students

Feedback is provided in many different ways, including written comments on work, reports on tutorials, verbal discussion during tutorials or classes, as well as qualitative (i.e. A, B, C) or quantitative marks. Feedback is designed to guide students to achieve the levels of understanding described in the exam descriptors and learn how to pursue independent learning, even when explicit numerical values are not assigned to verbal or written answers. Students are provided with a wide range of both formal and informal feedback in tutorials and in discussions with instructors in classes, practicals, and on field courses.

In first and second years, students take "collections" at the start of Hilary Term. These are papers sat under conditions similar to those of formal examinations. They are designed to provide feedback to students about exam performance and advice on how to prepare for the formal examinations in Trinity Term.

Work completed for practicals or fieldwork exercises may be assigned a mark. In some cases, these marks do not aggregate to your degree result, but you should treat them as important indicators of the quality of your work. In addition, tutorial work will also commonly be assessed, and your college will take a keen interest in the standards you achieve. Again, any marks awarded do not contribute to your degree classification, but they do provide valuable feedback to you on your understanding of the material of the course.

Green Impact

Green Impact is a national programme designed to support environmentally and socially sustainable practice in organisations. In 2019 the Department formed a new team to be the Department's ambassadors for Green Impact, and they are working with everyone in the Department to reduce waste and our carbon footprint. Our Department currently holds a Gold award for the building and the laboratories. This was achieved by commitment from all members of the Department in various ways, for example, our efforts towards reducing waste, recycling, and other initiatives for saving energy and reducing our carbon footprints. If you would like further information regarding the Green Impact scheme, please contact the Building Technician jason.dowsing@earth.ox.ac.uk.

Libraries

Students can use at least three libraries to access Earth Sciences resources: the Departmental Library and the Radcliffe Science Library (RSL), as well as their own College Library. Books can be borrowed from the Departmental and College Libraries; the Radcliffe Science Library is mainly for reference, but some undergraduate textbooks can be borrowed. . There are a wide range of electronic journals available via the library catalogue, SOLO, and there are some hard copy journals in the basement – ask the librarian for access.

The Departmental Library, as well as housing books , contains maps, memoirs of geological surveys from around the world, and a large collection of reprints that are available for borrowing. A computer terminal gives access to the library catalogues (SOLO) and other electronic resources. (See Appendix 6 for more information.) There is also a freestanding monitor where you can connect your laptop.

Lockers

Lockers are available for undergraduate students in the atrium area. Padlocks are available at Reception for a £5 deposit, or you can provide your own . Items left in a locker are stored at your own risk.

Please use a locker, rather than leaving possessions in the atrium, as the atrium is the first impression visitors have of the Department. The Building Manager's team will do regular sweeps of the atrium area and remove any items left there.

Outdoor Clothing and Field Equipment

Throughout your course, your fieldwork will take you to a variety of terrain and weather conditions; it is therefore essential that you have suitable outdoor clothing for all eventualities. Relatively inexpensive good quality clothing can be purchased from specialist outdoor equipment retailers who can also provide useful advice e.g. Cotswold Outdoors[1], Blacks/Millets, Ellis Brigham, GO Outdoors or an independent shop, ideally visiting in person to check fit. Decathlon and Sports Direct are both good options for getting outdoor gear and base layers, and other reasonably priced brands include Berghaus, Craghoppers, Peter Storm, Gelert and Regatta. It may also be worth looking on eBay, Vinted and Facebook Marketplace for affordable secondhand gear – it is best to get things that are almost new.

NB The only specialist outdoor equipment retailer in Oxford is Mountain Warehouse on Broad Street. There is also a Decathlon on the outskirts of Oxford. The other closest stores are Cotswolds in Bicester and Go Outdoors in Swindon.

As first years proceed into the field early in Michaelmas Term, students should ensure that they have the following on arrival or soon after:

- Waterproof jacket and trousers.
- Suitable clothing using layering principles (video here) - it is important to be able to add or take away suitable layers as climatic conditions change. **Cotton clothing or denim jeans are not suitable for fieldwork.**
- Stout waterproof walking boots with good ankle support, and appropriate socks. Walking boots should be comfortable to wear with one pair of thin cotton socks and one pair of walking socks. You should also buy walking socks (often places will throw these in for free if buying boots). **IMPORTANT: MAKE SURE YOU BREAK IN YOUR BOOTS BEFORE WEARING THEM FOR LONG DAYS IN THE FIELD. Trainers are not suitable for fieldwork. If you arrive on a field course without the appropriate footwear, course leaders may not allow you out into the field.**
- Field bag or small rucksack (up to 35l), suitable for keeping items dry and spacious enough to carry spare clothing, notebooks, water and packed lunch. Also a waterproof liner or large plastic bag.
- Warm hat, scarf and gloves.
- Sun screen, sun hat and sunglasses.
- Water bottle or pouch.
- Small personal first aid kit.

If you are not sure what to buy, you can discuss this with your tutor on arrival in Oxford, or you may also wish to seek advice from other Earth Sciences students at your college who are already on course.

The Department are aware that the kit required for these field courses can be expensive, and for some students this could cause difficulties. Therefore, thanks to generous donations, there is now a fund available for students in need to apply for assistance with purchasing the necessary field kit. There is a maximum of £200 per application. You can apply to this fund no more than twice during the duration of the four-year course. There is a set amount in this fund so once fully allocated, applications to this fund will be closed. To obtain an application form please email:

elisabeth.crabbe@earth.ox.ac.uk

The following items will be provided by the department and issued to you on arrival:

- Hard hat
- Safety goggles
- Fluorescent safety vest
- Geological hammer
- Folding 2m rule
- Compass clinometer
- Geolens
- Field notebook (additional notebooks can be purchased from the online store (https://www.oxforduniversitystores.co.uk/product-catalogue/earth-sciences), although there is limited availability).
- Mapping pen

Outreach and Communications

Undergraduates are encouraged to get involved in outreach during their time in Oxford. Outreach activities aim to promote Earth Sciences as a subject and encourage potential students to apply to university. These activities are coordinated by the Outreach and Communications Team.

The types of outreach and public and community engagement (PCER) activities performed by the Department include:

- Working with local schools and developing resources
- Attending science fairs, museum exhibitions and community centre activities
- Widening participation activities, such as the UNIQ Summer School
- Hosting academic taster sessions for prospective applicants
- Recruitment activities, such as the Undergraduate Open Days

If you would like to get involved in outreach or PCER during your time in the Department and would be interested in hearing about upcoming opportunities, please email outreach@earth.ox.ac.uk to join the outreach mailing list (es-outreach-list@maillist.ox.ac.uk).

The Outreach and Communications Manager and the Outreach and Communications Assistant are also responsible for managing external communications (website, news articles, press relations, social media), internal communications (staff intranet, departmental newsletters) and branding.

As you progress through your studies, please notify the Communications Team of any news you want to share, and they will help to select appropriate channels. This might include:

- Awards and prizes, which can be celebrated externally and in newsletters
- Opportunities, updates and events, which can be publicised internally when appropriate
- Photographs and video from fieldwork and placements, which can be shared via social media

Oxford University Geological Society (OUGS)

The Oxford University Geological Society organises lectures, field excursions and social events throughout the year. Through attending these activities you will not only get to know your fellow students much better, but will also benefit academically. It currently costs £30 for life membership.

Personal Details

On registration you will be required to complete your personal details, but you can update these via student self-service at any point during the academic year. Guidance can be found here:

https://www.ox.ac.uk/students/selfservice/

In 2023-24 the way in which the University records and uses student gender data was enhanced. On (re)registration, students are asked to confirm their 'legal sex' and title, and invited to provide the gender they identify with, and personal pronouns. Students can update this information at any time, via Student Self Service. When providing legal sex (in line with legal documents such as birth certificate, Gender Recognition Certificate, or passport), students will be able to choose 'Other' in addition to the existing options of 'Male' or 'Female', if their legal document recognises a sex other than male or female.

Printing

The Department does not provide physical copies of printed handouts to undergraduates as standard, based on student feedback that most do not require or use them and to aid in the Department and University's sustainability goals. All teaching rooms have multiple electric sockets to enable you to use an electronic device instead.

The Department will provide £60 printing credit per year to print if you do require printed materials, but we would urge you to consider carefully whether this is truly necessary. To give some context, in 2022-3 the Department saved approximately 225,000 sheets of paper by going mostly paperless for lectures. This equates to a saving of just over 1 tonne of CO^2 per year, excluding the carbon costs of delivery, printing, ink, and disposal. Paper consumption also has an impact on biodiversity, as well as a carbon saving.

Undergraduate printing is sent to "Follow-Me Queue". The printer in the computing lab is now capable of printing in both Grayscale, and Colour. However, if you require printing in A3, you must collect your print job from the Reception printer. You must use your University Card to release the print job. Any previously issued PIN numbers will no longer work on the new system. Your £60 annual allowance will reset automatically every October.

Your printer credit balance will appear automatically (in the top-right of the screen) when you login to the PCs in the Computer Lab.

Third year students are also allowed to print up to six copies of the map on the A0 printer in Office level 2. If any student experiences issues and finds six is not enough, they should flag this with the Department's IT section (itsupport@earth.ox.ac.uk) as soon as possible."

Prizes for Outstanding Academic Work

In recognition of outstanding academic achievement, prizes are awarded at the end of Trinity Term. Some are financial awards, which may have spending conditions attached, and others may take the form of a membership to a society or journal subscription. Many of these are funded by external sponsors (such as the Keith Cox Prize, International Seismological Society, Palaeontological Association, Mineralogical Society, British Geophysical Association, Met Office Academic Partnership, Schlumberger, AWE, BP, Shell). Sometimes the Department may also have the opportunity to nominate candidates for national awards.

A selection of the type of awards likely to be available can be found below:

- Best performance in 1st year Mathematics & Geophysics
- Best 2nd Year Performance in practical aspects of the course
- Best performance in 2nd year
- Best 3rd or 4th year performance in Palaeontology
- Best 3rd year performance in Mineralogy
- Best 2nd year mapping exercise in Assynt
- Best FHS mapping report
- Best 3rd year performance in geochemistry
- Best 3rd year performance in geophysics
- Best 3rd year extended essay
- Best overall 3rd year performance in FHS
- Best 3rd year Geophysics essay

- Outstanding 4th year project on climate
- Best 4th year performance in Geophysics
- Best 4th year project
- Best overall performance in 4th year FHS
- Outstanding contributions to improving equality, diversity in inclusivity in Earth Sciences
- Recognising extraordinary commitment to public and schools engagement

Reference Requests

If students would like to request a reference from a member of Faculty a notice period of **at least two weeks** is required. Undergraduates applying for graduate programmes requiring references just after Christmas or in January should agree this with individuals before the end of week 8 of Michaelmas Term. Members of Faculty are not obliged to provide references for undergraduates without this prior notice.

Safety

More information on safety can be found in **Appendix 10.**

Note that all planned field and laboratory activities should be discussed in detail with the appropriate academic and technical staff in order to define specific safety procedures. This should include proper handling of all equipment, instrumentation and chemicals.

Safety in the Field

Fieldwork as part of the Earth Sciences degree involves an element of risk. Training in identifying these risks and the safety procedures required to minimise them form an integral part of the course. The Department takes the safety aspects of fieldwork very seriously and all students are given training in field safety. This training begins in the first year of study with compulsory pre-course safety briefings for all field courses, and this procedure continues in all subsequent years; these safety briefings are mandatory for all students attending the field course, non-attendance without prior agreement with the Field Course Leader, or without sufficient reason (e.g. illness) may result in a student being denied a place on the field course. We reserve the right to seek reimbursement from the student for any expenditure that cannot be recouped from suppliers as a result of their failure to attend a field course due to missing the safety briefing. A safety course and a first aid course are provided to 2nd year students to prepare them for their summer mapping projects. Any student found breaching the safety guidelines will be removed from a field course. In addition, complete risk assessments must be carried out for all projects prior to the commencement of any fieldwork. The department encourages students to feel comfortable and empowered to raise safety concerns when on field courses. This can include where there is imminent danger to an individual or at other times during and after field classes. Concerns should be raised with the field class leader(s) in the first instance.

If students have any health issues that may affect their participation in a field course, they will be asked to provide a letter from their GP confirming that they are fit to participate in the various aspects of the course (a list of specific points for your GP to respond to will be provided). It is the responsibility of the student to ensure that the field course leader and academic administration staff are aware of their health issues. The student should ensure they discuss with them how their health issues might affect participation in the field course and any special requirements that need to be addressed, in good time before the field course.

Safety in the Department

The Deputy Departmental Safety Officer (Buildings/Facilities/Services) is Mr Ashleigh Hewson, Tel: 72054; e-mail: Ashleigh.hewson@earth.ox.ac.uk), who should be alerted or consulted on all general safety issues in the department.

Safety in the Laboratories

The Departmental Safety Officer (Laboratories) is Jerry Tian (zheyu.tian@earth.ox.ac.uk).

Principal laboratory safety issues arise for undergraduates in the fourth year of study. Laboratory Managers with responsibility for safety within specific laboratories are listed in the Statement of Safety. All students will receive rigorous safety instructions before they are allowed to carry out laboratory work in connection with their 4th year projects. It is the student's responsibility to obtain explicit approval before entering any laboratories or beginning any new activities.

Student Representation

Departmental Level - Joint Consultative Committee (Undergraduate) (JCC(U))

Concern about any aspects of the course can be discussed by the Joint Consultative Committee (Undergraduate) of the Earth Sciences Faculty (JCC(U)). This committee consists of two student representatives from each year, the Undergraduate Course Advisor and administrative staff. It meets once a term. Students are encouraged to contact a student representative before the meeting if they have issues they would like to be discussed. The issues raised by the students are also brought to Teaching Committee, and then to Departmental Committee, for further discussion. A student representative is invited to attend the Teaching Committee meeting each term.

Volunteers from the 1st year students are requested at the induction meeting and informally. Please contact enquiries@earth.ox.ac.uk if you want to become involved.

Undergraduate representatives are also sought for other departmental committees. See Appendix 12 for a diagram of the committee structure.

Divisional Level

JCC(U) representatives may also be invited to attend regular meetings along with others from departments in the Division of Mathematical, Physical and Life Sciences (MPLS). Student members are expected to represent the interests and concerns of students on all undergraduate courses at Divisional level, including joint courses, and will be expected to liaise with appropriate representatives on their departmental Joint Consultative Committee as necessary.

University level

Student representatives sitting on the Divisional Board are selected through a process organised by the Oxford University Student Union (OUSU). Details can be found on the OUSU website (https://www.oxfordsu.org/) along with information about student representation at the University level.

Study Skills

Essay Writing, Numerical Skills and scientific programming

The complex nature of geological information means that essay writing is still a necessary skill for tutorials and examinations. The essay style to be aimed for here should generally be that of a short scientific review article. Non-numerical answers should be provided with a logical structure, introduction, clear headings, labelled figures, and a conclusion. Parts of the course (notably the geophysical options) draw more greatly upon numerical skills. Scientific programming skills are developed throughout the course, initially using Python (1st year) and Matlab (introduced in 2nd year). Other programming tools may be introduced in 3rd and 4th year, depending on choice of options or research project. Essay writing, numerical skills and scientific programming can be improved through a range of tutorial classes which are available.

Laboratory Work

Skills in handling geological materials are introduced during scheduled practical classes in the Department, and during tutorial classes. These materials will include sedimentary, igneous and metamorphic rocks, fossils, structures, geological maps, geophysical and geochemical data. The interpretation of geological maps is considered a core skill, which requires three-dimensional thinking. It is expected that students will have basic computer and word-processing skills. Practicals will include work in the Computing Laboratory, while preparation for essays and reports is likely to involve extensive use of library facilities and internet searches.

Fieldwork

There are up to ninety days of fieldwork, including field training and a four- to six-week Independent (usually Mapping) Project, in the BA and MESc degrees. Careful observations on outcrops in the field notebook should be accompanied by careful and reasonably accurate field sketches which should follow the OASIS rule (orientation, annotation, sketch what you see, interpretation, scale), together with quantitative measurements such as strike and dip. Careful organisation, neat writing, and scientific drawing skills should be developed. Remember that the independent mapping project comprises a significant percentage of your final Part A mark (see Appendix 1).

Please note that all field courses are provisional, and may have to be re-arranged, altered or cancelled on occasion.

Academic Integrity

Plagiarism is a breach of academic integrity. It is a principle of intellectual honesty that all members of the academic community should acknowledge their debt to the originators of the ideas, words, and data which form the basis for their own work. Passing off another's work as your own is not only poor scholarship, but also means that you have failed to complete the learning process. Deliberate plagiarism is unethical and can have serious consequences for your future career; it also undermines the standards of your institution and of the degrees it issues.

For further information see Appendices 1 and 7. This will also be covered in mandatory training sessions with the Departmental Librarian: Credit Where Credit's Due (1st Yr), Beyond Google… (2nd Yr) and Studying with AI: Academic Integrity (3rd Yr)

Teaching Laboratories

The Mineralogical Laboratory

The Mineralogy Laboratory is the teaching laboratory equipped for mineralogical and petrological study.

One of the principal activities in the laboratory is the study of **thin sections** of geological materials with the polarising **microscope**. Each student is encouraged to develop and practise good technique in optical mineralogy and skill in mineral identification.

Students should consult the following video on setting up their microscope:

For any problems with your microscope please contact any of the staff who teach petrology or Emily Donald (Geofacilities Laboratory Manager; email: emily.donald@earth.ox.ac.uk)

The laboratory contains extensive collections of teaching materials, including mineral specimens, hand specimens of rocks, thin sections of rocks and minerals, and crystal models (to illustrate both morphology and internal structure). There is a small reference library of relevant handbooks to aid study and identification. Students are encouraged to use all of the reference materials which are available, but are also asked to take care with delicate samples, and to replace everything after use. Curatorial catalogues have been prepared for collections in both teaching labs.

There are facilities for a whole class to view microscope images via a digital camera attached to a polarising microscope, and thin sections can also be viewed at low magnification (valuable for examining microstructures) on the *Petroscope*, an adapted microfiche reader fitted with polarisers. There is one in each teaching laboratory.

The Elementary Laboratory

Contains collections of fossils (invertebrate fossils and microfossils) and sedimentary rocks used in practicals and geological maps.

Invertebrate palaeontology
There are separate stacks of drawers of material for practicals in the first year and second year. During the second year, students are especially recommended to examine the taxonomic drawers relating to bivalves, echinoderms, cephalopods, brachiopods, corals, trilobites and graptolites, in conjunction with provided notes. These fossils are used to illustrate the morphology and diversity of each group covered in the lecture course.

The Computing Laboratory

PC workstations are linked to a Windows server.

Every student is given their own account, email facility and personal file space. Printing and scanning facilities are available. Students have access to a standard set of Windows office applications. Other more specialized software is used for teaching, notably mathematical packages (such as Matlab) and software for 3D visualization of geological structures.

Teaching Modes

Students will find that their scheduled teaching time breaks down *approximately* as follows for each year:

1st year: Lectures 55%, Practicals 45%

2nd year: Lectures 55%, Practicals 45%

3rd year: Lectures 60%, Practicals 40%

4th year: Project 50%, Seminars 50%

Students are expected to spend at least 40 hours a week studying, including the scheduled teaching, so a good portion of students' time should be spent on private study.

Lectures

Lectures are the principal means by which the course content is delivered to students. Lecturers will use lectures to outline the areas of knowledge they wish the student to be familiar with, to emphasise particularly important concepts, and to motivate students in their learning. Attendance at lectures is crucial. Skipping lectures is always a big mistake, even if you copy lecture notes from someone who has attended, as you may misunderstand the notes of someone who has misunderstood the lecture. While many lecturers may use PowerPoint or other electronic media in their lectures, this is not always the most effective way of explaining concepts or delivering information – and you will find that the ways that lecturers run their classes vary significantly from person to person.

Supplementary material and reading lists can be found on Canvas, to provide you with the means to review subjects covered in the lecture and to help you study a subject in further detail. It is good practice to incorporate this material into your lecture notes either by annotation during the lecture or afterwards.

Lectures will usually be recorded and made available on Canvas, but students should not rely on recordings instead of attending lectures in person. This does not present the opportunity to ask questions and interact with your peers, and recordings can go wrong.

We aim to optimize our teaching to students' needs and to this end students are encouraged to provide feedback on each lecture course. (See example Departmental Questionnaire in Appendices).

Practicals

Practical work supplements and extends the lecture courses. Practical problems allow you to determine whether you really understand the content of the lectures; they also give an opportunity for you to develop key skills (e.g.

observational or computational) and familiarize yourself with a range of materials that can only be covered briefly in the time available in lectures. Usually the practical work set should be completed within the hours timetabled for it. However, in some classes you will be expected to complete practical work over a more extended period of time. In some cases, answers to practical exercises may be made available (either at the time, or on Canvas, or in a later class); but in other practicals you are expected to check your progress with the staff who are running the practical.

In most practicals your work will either be assessed or checked for completeness. Records of completion and the practical work itself may be requested by the examiners, who may use it in helping to define borderlines for degree classes.

Students in their 1st and 2nd year are assessed on work completed in practical and computing classes, contributing 20% towards their 1st year grade, and 25% towards their 2nd year grade (see Appendix 1 - EXAMINING CONVENTIONS).

Independent Reading

Students are expected to supplement all aspects of formal teaching with independent reading in order to obtain a greater understanding of the curriculum as defined in lectures, practicals and field courses. Students can receive guidance from lecturers and tutors, but should also develop an ability to identify relevant subjects, and to navigate effectively through the literature. The librarian and your tutors can provide guidance on how to get started.

There are vast amounts of information available to you via the internet. Although all literature should be approached critically, particular care should be taken with choosing web sources. Lecturers will usually provide suggestions for further reading in their course handouts, and they may also recommend specific web-based resources to support their courses. In many cases, this information will be accessible through Canvas.

Fieldwork

Field classes are an important aspect of the Earth Sciences, and attendance is considered compulsory, except where mitigating circumstances exist (for example, due to medical conditions). Students with concerns about their ability to participate in field classes should discuss with their tutor and/or the specific field class leaders in the first instance, as we seek to be as accommodating as possible. When students are unable, with permission, to attend the whole, or part, of a field class in-person, alternative, virtual exercises can often be provided instead. We reserve the right to seek reimbursement from a student for any expenditure that cannot be recouped from suppliers (e.g. pre-booked accommodation or travel) as a result of their failure to attend a field course without the prior permission of the Head of Teaching.

Teaching in the field works along different lines to in the lecture theatre or practical laboratory. One of the principal early skills that we want you to develop is an ability to make and record your own accurate observations of field phenomena, and to be able to draw scientifically rigorous conclusions from these observations. Good notebook technique is essential to this endeavour: notebooks are not used in the same manner as for lecture notes but will instead often contain accurate labelled drawings and measurements together with essential information about place and time. You may also find it useful to use a notebook to hypothesize on relationships between different field data. Field course leaders will expect students to show initiative in making their own observations and drawing their own conclusions.

Fieldwork is carried out in all weathers, from intense sunshine to driving rain. You should be properly equipped in terms of clothing and equipment for any weather conditions (essential items include: stout walking boots, rain gear (jacket and trousers), cold weather and sunny weather headgear - see Outdoor Clothing and Field Equipment above).

Hard hats, reflective jackets and goggles will be issued to you by the Department. You must have a sturdy notebook of at least A5 size, a x10 hand lens, a geological hammer, and a compass clinometer. At induction the following will be available: Compass clinometer; hand lens; hard hat; safety goggles; pick/hammer; high visibility vest; field notebook; folding 2 metre rule; tick twister; water bottle; and a mapping pen. Additional notebooks can be purchased from the online store (https://www.oxforduniversitystores.co.uk/product-catalogue/earth-sciences), other items can be borrowed from the the Department, although there is limited availability. Please contact the Academic Office in room 10.33 if you need to borrow any items.

To follow University regulations all students must complete apply for university travel insurance. The Academic Administration team will send details about this prior to the start of each field course, and you should ensure you apply promptly when you have the necessary detail.

Assessment of Practical Work and Fieldwork

Practical classes and field work are an essential component of the course in Earth Sciences, and work completed for practical or fieldwork exercises may be assigned a mark. Candidates in Part A may be required to hand in their practical work, field notebooks and any field assignments relating to courses undertaken in their second and third years of study for consultation by the examiners. This provision is in addition to the requirement to hand in work from specific practical classes that contribute to the 1st and 2nd year grades (see Appendix 1 – EXAMINING CONVENTIONS).

Student performance on field courses will be routinely monitored, for example by inspection of field notebooks, and after each field course students will be graded by the field course leader on a four-point scale (absent/unsatisfactory/satisfactory/excellent). Examiners may take into account these records of practical and fieldwork, in particular with regard to the attendance record of the candidates, and to any marks awarded for assignments, when awarding classes. Material handed in from practical classes will be taken as evidence of attendance.

For candidates whose attendance record is deemed unsatisfactory (for example, candidates who have failed to complete practical and fieldwork classes without good reason), the examiners have the discretion to reduce the final degree class of the candidate. Examiners may also take into account evidence of excellent performance in field or practical work when drawing up class boundaries.

Tutorials

Tutorials provide a flexible forum for small-group teaching, normally in combinations of between two and four students. Tutorials are the responsibility of the colleges, and will usually be arranged by your college tutors. Some tutorials, focusing on core skills or knowledge, are organised collectively by the college tutors and all students are expected to sign-up for, and attend, these tutorials. All of the college tutors in Earth Sciences are also academic staff in the Department. Tutorials will be given principally by academic staff (often, but not always by, a college tutor); they may also be conducted by research staff or senior graduate students. The normal frequency of tutorials is on average two per week in year one (every 1st year student should expect to receive one tutorial per week in mathematics, and one other tutorial per week covering any aspects of the remainder of the course); and one per week in years two and three. There are no formal tutorials in year four, where instead you will receive close project supervision from one or more project supervisors. Note that tutorial provision is the responsibility of the individual colleges, and so specific provisions should be discussed with college tutors.

The principal purpose of tutorials is to allow exploration of a subject beyond the confines set in lectures or by the examinations, and this can be tailored to the specific interests of the students and the tutor. A tutorial also allows the tutors to monitor closely individual academic progress, and hence provide appropriate advice for further academic development. Work set in tutorials can be in a variety of styles. Common modes are: tutorial essays; hand-specimen interpretation; problem sets; focused map interpretation; and oral presentations (individual or team). Tutors will often be happy to modify the work set to suit a particular tutorial group, especially in the later years of study. While information that is considered an essential part of the curriculum is not provided in tutorials (i.e. there are no essential or required tutorials), tutorials are intended to provide greater understanding of the examined curriculum. All tutors fill out online assessment forms each term that are provided to each student's college and which are used to follow up, and give feedback on, student progress. If you have any concerns of any sort about tutorials, or if you feel that you need tutorials on particular topics, you should contact your college tutor.

Computing

Some courses will make use of the computer teaching laboratory. Generally, many aspects of the course will require manipulation of a numerical dataset and/or interactive comparison of observations with models. As a result you should become confident users of spreadsheet software and other data analysis programmes. Additionally, lecturers may use the laboratory to develop theoretical concepts.

Seminars

Departmental seminars are held at noon on Fridays during term. These are research seminars in which leading scientists from a variety of disciplines present and discuss work in their particular fields of interest. This is a good opportunity for you to see how science is really done and **attendance at these seminars is compulsory for 4th year students**. Many 3rd year students will also find these seminars helpful or interesting, and of course all undergraduates are welcome to attend.

4th year options are partly taught as seminars, with students taking turns to research a topic and deliver a presentation on it to the rest of the class.

Term Dates

- **Michaelmas Term 2025** Sunday 12 October to Saturday 6 December 2025
- **Hilary Term 2026** Sunday 18 January to Saturday 14 March 2026
- **Trinity Term 2026** Sunday 26 April to Saturday 20 June 2026

University Museum of Natural History

The Oxford University Museum of Natural History houses the University's scientific collections of zoological, entomological, palaeontological, mineral and rock specimens, accumulated over the course of the last three centuries. The Museum has a very close historical association with the Department, and still has joint staff appointment and tutorials and practical classes are sometimes held there. We strongly encourage you to visit and make use of the resources there.

Vacations

The Oxford terms are short and much of the reading that is set during lectures and practicals can only be completed during vacations. This is equally true of Christmas, Easter and Summer vacations, although much of the Easter vacation may also be taken up with field courses. Vacations additionally provide an essential opportunity for you to concentrate on completion of map and research project reports. However, you should also ensure you rest.

Virtual Learning Environment

Canvas

Course information, learning support materials provided by lecturers, reading lists, lecture recordings, past exam papers, exam reports, and other useful information (including this handbook) can be found on Canvas, the University's centralised Virtual Learning Environment (https://login.canvas.ox.ac.uk/). It can be reached through any web browser, from anywhere, using the same username and password as for your College email.

Websites

University website	**https://www.ox.ac.uk/students**
Department website	**http://www.earth.ox.ac.uk/**
Quality Assurance	**https://www.qaa.ac.uk/**
Data Protection Guidelines	**https://compliance.admin.ox.ac.uk/data-protection-policy**
Careers	**http://www.careers.ox.ac.uk/**
The Language Centre	**http://www.lang.ox.ac.uk/** to begin and improve foreign language skills.
IT Services	**http://www.it.ox.ac.uk/** has many useful computing courses.

Canvas	https://login.canvas.ox.ac.uk/
Equal Opportunities and Harassment	https://edu.admin.ox.ac.uk/home
Student Counselling Service	http://www.ox.ac.uk/students/welfare/counselling/
Safety Office	https://safety.admin.ox.ac.uk/home
Occupational Health	https://occupationalhealth.admin.ox.ac.uk/

FIRST YEAR COURSE

Deadlines

Please note:

1. Some of these dates are based on previous years, and may be subject to change. Every effort will be made to notify students of any changes as soon as possible. In the meantime, PLEASE PUT THESE DATES IN YOUR DIARY NOW. You may not receive further reminders about some items.
2. These deadlines relate to departmental business, and you may have other important dates relating to college business.
3. Examination and some field course dates are in italics, as they will be confirmed nearer the time.
4. Deadlines in bold are included in the examination regulations or conventions and you may be penalised by the examiners if you do not meet them.

TERM	**WEEK**	**DAY**	**TIME**	**ITEM**
Michaelmas Term	Week 0	Friday	2.15pm	Welcome and Induction
	Week 1			Library, IT, Outreach and Field Induction
	Week 2	Sun 19 – Wed 22 Oct	9.30am departure (TBC)	Pembrokeshire field course
	Week 7	Thursday	12.00pm	Deadline for *Crystals & Minerals, Igneous & Metamorphic Petrology and Processes* coursework.
Hilary Term	Week 0	Friday	9.30am	Collections
	Week 5	Friday	12.00pm	Deadline for *Introduction to Geological Processes* coursework.
	Week 7	Thursday	12.00pm	Deadline for *Invertebrate Palaeobiology* coursework.
	Week 8	Wednesday	2-4pm	*Structural Geology* coursework session and deadline for work at 4pm.
Easter Vacation	N/A	*TBC*	*TBC*	*Arran field course*
Trinity Term	Week 1	Thursday	2.00pm	Practical exercise for *Statistics/Scientific Computing*
	Week 1	Friday	2.00pm	Deadline for practical assessment of *Statistics/Scientific Computing*
	Week 2	Tuesday	2-4pm	*Structural Geology* coursework session and deadline for work.
	TBC	TBC	TBC	Local field courses
	Week 7	*Mon - Fri*	*Times TBC*	*Prelims examinations*

Induction

Undergraduate Induction takes place on the Friday afternoon of 0th week and early Michaelmas Term. The purpose of Induction is to introduce students to departmental life as an undergraduate, and to show them the facilities on offer. Students will receive briefings from the Head of Department and Undergraduate Adviser, and support staff.

Tutorials

The normal frequency of tutorials in the first year is on average two per week in year one (every 1st year student should expect to receive one tutorial per week in mathematics, and one other tutorial per week covering any aspects of the remainder of the course).

"Collections"

Informal examinations may be taken in the Department or in your college. Marks from collections are good indicators of the progress you are making with particular strands of the course: colleges may in some circumstances insist that certain marks are achieved in collections.

Examinations

Please see Appendix 1: Examining Conventions.

COURSE STRUCTURE

1st year, 2025-26

Michaelmas Term	Hilary Term	Trinity Term
A10106W1 **Planet Earth: Geosphere** 24 hours Mac Niocaill (14 total) Porcelli (6L), Koelemeijer (4L)	*A10106W1* **Planet Earth: Geosphere II + Modern Climate Processes** 22 hours Johnson (12 + 2P), Katz (5), Cosmidis (cover Porcelli 3)	*A10106W1* **Planet Earth: Building a Habitable Planet** 6 hours Parry (3), Saupe (3)
A10107W1 **Fundamentals of Geology I:** Crystals & Minerals, Igneous/Metamorpic petrology and processes Bryson (16), Nichols (8), Pyle (8)	*A10107W1* **Fundamentals of Geology I:** An Introduction to Geological Processes 12L + 8P Hilton	*A10107W1* **One-day field courses** Malverns, Westbury-on-Severn, Cumnor Robinson, Hilton, Blundy
A10107W1 **Fundamentals of Geology II:** Structural Geology Maps 8L + 8P Nichols	*A10107W1* **Fundamentals of Geology I:** Invertebrate Palaeobiology 8L + 12P Anderson	
A10109W1 **Chemistry, Physics & Biology:** Chemistry Physics (mechanics) Mather 15H Hawthorne 12H	*A10107W1* **Fundamentals of Geology II:** Structural Geology/Maps 16P Cartwright	*A10109W1* **Chemistry, Physics & Biology:** Biology 12L Bouman
A14351W1 **Maths: Calculus/** intro scientific computing 16L, 6T Koelemeijer (12), A. Walker (4)	*A10109W1* **Chemistry, Physics & Biology:** Chemistry (aqueous chemistry) Physics (thermodynamics) Cosmidis 15H Marquardt 12H	*Maths revision* Smith (2), Walker (2), Koelemeijer (2)
	A14351W1 **Maths: Statistics/** scientific computing 16L, 6T Smith (12), A. Walker (4)	

Fieldtrips:
Pembrokeshire
Arran
Local fieldtrips

L=Lecture
P=Practical
T=Tutorial

Course Synopses

Reading lists can be found on the Canvas page for each module.

Details of all courses, including reading lists and lecturers, may be subject to change by individual instructors.

The First Year Course
Earth Sciences students come to Oxford with a range of A-level subject combinations. The first year course is therefore designed to bring all incoming students up to the same level of knowledge in the fundamentals of geology, as well as in the underpinning disciplines of maths, physics, chemistry, and biology, as applied to Earth Science.

Credit Where Credit's Due

Michaelmas & Hilary Terms

This course provides a structured introduction to the academic practices essential for success in Earth Sciences. Throughout eleven sessions, students will develop the practical, reflective, and research skills needed to navigate Oxford's academic environment.

In Michaelmas Term, the emphasis is on foundations: students are introduced to Oxford's library system, and begin to practise core skills in academic writing, reading strategies, and the responsible use of sources. Sessions address plagiarism and the use of AI tools, while also exploring the processes of reading, writing, and drafting scientific work.

In Hilary Term, the course builds on these foundations with more advanced sessions: critical reading, note-making, paraphrasing and quoting; citation and referencing (including figures and charts); research resources; and the use of bibliographic and reference management software. Students will also visit key departmental and Bodleian library collections, including the Radcliffe Science Library, the Well-Being Room, and the Bodleian Map Room.

Practical exercises and discussions run throughout, encouraging students to experiment with different approaches to reading, writing, and research, and to reflect on their developing practice. The course culminates in an assessed assignment based on the geology of Arran, which provides a guided opportunity to integrate research, referencing, and academic writing.

Topics:

- Introduction to Oxford Libraries
- Pembroke Assignment
- Academic Writing
- Plagiarism
- AI Usage
- Reading & Writing Process
- RSL Tour & Well-Being Room
- Reading, Note-taking, Paraphrasing, Quoting
- Referencing & Citation (including figures and charts)
- Search Skills & Bibliographic Databases
- Bibliographies & Reference Management Software
- Map Room visit
- Arran Assignment (directed research and essay writing)

Planet Earth: Geosphere (Michaelmas term)

Prof C MacNiocaill, Prof D Porcelli, Prof P Koelemeijer
A review of key topics in Earth Sciences, including the principal chemical, physical and biological processes operating on the planet today and through Earth history.

Topics:

- Nucleosynthesis

- Solar system formation
- Moon formation
- Terrestrial planets, meteorites
- Giant planets, comets, asteroids
- Planetary Differentiation
- Bulk Composition of the Earth
- Global calculations: Mass balances, fluxes
- Mixing calculations
- Geological Timescale
- Precambrian
- Early Palaeozoic
- Late Palaeozoic
- Mesozoic
- Paleogene
- Seismology
- Elastic properties of the Earth
- Wave propagation, Snell's law
- Travel-time curves
- 1D and 3D Earth structure
- Gravity Anomalies
- Post Glacial Recovery
- Isostasy and Geoid
- Continental Drift
- Seafloor spreading and plate tectonics
- Consequences of plate tectonics
- Heat Flow and age of Earth
- Thermal and mechanical structure of plates
- Flow of rocks
- Melting of the Mantle
- Movement, storage and eruption of magma
- Global energy balance

Planet Earth: Modern Climate Processes

Prof H Johnson, Prof R Katz, Prof J Cosmidis

Modern Climate Processes: Physics of the Atmosphere and Ocean
Prof H Johnson

This set of 12 lectures/practicals will introduce the physics that govern the circulation of the atmosphere and ocean, and hence the Earth's climate.

Lecture Topics:
- Global surface energy balance
- Forces on a rotating planet
- Basic dynamics of the atmosphere and ocean
- Atmospheric general circulation
- UK weather
- Ocean circulation - forcing and large scale features
- Ekman currents in the ocean
- Wind-driven ocean gyres
- Atlantic meridional overturning circulation
- El Nino Southern Oscillation (ENSO)
- Tides

Modern Climate Processes: Physics of the Cryosphere and Sea Level
Prof R Katz

This set of five lectures will introduce the physics that govern the volume and flow of perennial ice on Earth, and, relatedly, the level of the ocean surface relative to the land surface.

Lecture Topics:
- Components of the cryosphere
- Physics governing ice deformation and basal sliding
- Marine ice sheets: dynamics and potential instabilities
- UK glacial deposits and past ice sheets
- The science of sea level

Modern Climate Processes: Hydrology and Chemical Transport
Prof J Cosmidis
This set of three lectures will cover groundwater systems and aquifers; groundwater flow; adsorption and colloids; chemical transport in groundwater, rivers, and estuaries; hydrothermal vents.

Planet Earth: Habitable Planet

Prof L Parry, Prof E Saupe

Lecture Topics
- Building a habitable planet: origins
- Origin of life: biological constraints
- Geological evidence for the earliest life
- Towards complexity: photosynthesis and the emergence of eukaryotes
- Ediacaran enigmas and the Cambrian Explosion
- The conquest of land

Exam descriptor
Multi-part questions, that may require a mixture of short answers (definitions, explanations, diagrams) and longer (short essay) answers.

Further suggestions for reading, and links to other relevant resources will be available in the Online Reading list for this course.

Fundamentals of Geology I

Crystals & Minerals, Igneous/Metamorphic petrology & processes (Michaelmas Term)
Prof C Nichols, Prof J Bryson & Prof D Pyle

This part of the course consists of a survey of the important mineral groups and their natural occurrences. It begins with an overview of bonding forces in crystals, the packing of individual atoms and molecules within mineral structures, their interaction with light and fundamentals of petrographic microscopy, and the thermodynamic controls on mineral composition and structure. The rest of the course focuses on the systematics of the major mineral groups, incorporating their chemical composition, their crystallographic structures, and where they occur on Earth. Particular emphasis is placed on putting minerals into a geological context; why certain mineral associations occur where they do, both laterally on the surface of the Earth, and vertically down into the crust and the interior of the Earth. Lectures are complemented by practicals where students learn the physical and optical (using petrological microscopes) properties of the common rock-forming minerals, and how to identify them, both in hand specimen and thin-section.

Topics:
- Crystallography and material properties
- Symmetry and miller Indices
- Introduction to optics
- Introduction to silicates
- Orthosilicates, garnets, Al2SiO5
- Inosilicates
- Tectosilicates
- Carbonates
- Binary Phase Diagrams
- Igneous Rock Classification
- Magmatic Differentiation
- Introduction to Metamorphic Petrology

- Introduction to Microscopes

An Introduction to Geological Processes (Hilary Term)
Prof B Hilton

This part of the course provides an introduction to the broad range of processes that operate at Earth's surface and the sediments that result. Through lectures and practicals the course will provide training in how sediments are classified and described; how features of sedimentary rocks can be used to determine the environment of deposition; and an introduction to how sedimentary rocks and sequences can be used to unravel Earth history through time. The course will also highlight how the principles being described have broader relevance to a range of Earth science issues.

Topics:

- Weathering and erosion
- Sediment composition, textures and classification
- Sedimentary structures
- From sediment to rock
- Lakes and Deserts
- Rivers
- Deltas and Barrier Islands
- Marine environments
- Turbidity flows
- Ocean chemistry (nutrients, CCD, gases, salt)
- Pelagic sediments
- Shallow water carbonates
- Evidence for climate change from the geological record
- Graphic logging

Invertebrate Palaeobiology (Hilary Term)
Dr R Anderson
8 Lectures, 6 x 2hr Practicals

This component focuses on major aspects of the fossil record and its interpretation and use by geologists.

Course themes:

- Types of fossils
- Fossilisation processes
- The origins of animal diversity
- Ecology of fossil organisms
- Geological time and biostratigraphy
- Evolution
- Macroevolution
- Extinction
- Major invertebrate fossils, identification and ecology

Fundamentals of Geology II

Structural Geology & Maps (Michaelmas Term, Hilary Term)
Prof C Nichols

This is a general introduction to the skills of interpreting geological maps and of visualising geological structures in three dimensions. We will begin by learning, mainly through artificial, simplified maps, how the three-dimensional shapes of rock bodies are represented on geological maps. We also learn how to deduce a sequence of geological events, and how to construct vertical cross-sections through the geological structures. Later in the course we will then apply these skills on published geological maps. The Hilary Term sessions are also used to give feedback on the Collection exercise.

There are extensive online resources on Canvas.

Topics:

- Introduction to Maps
- Planar dipping strata

- Folded rocks
- Unconformities
- Faulted rocks
- Igneous rocks on geological maps
- The interpretation of published geological maps

Fundamentals of Geology Field Courses

These will take place in Trinity Term. Please see under Field Courses for details.

Chemistry, Physics & Biology

Prof T Mather, Prof J Hawthorne, Prof J Cosmidis, Prof H Marquardt & Prof H Bouman

Key basic science skills as applied to Earth Science problems.

Chemistry
Prof T Mather

General themes and outcomes
The aim is to get the whole class to a similar level of knowledge, slightly above advanced school chemistry, regarding the properties and interactions of the elements. This knowledge underpins future parts of the Earth Sciences course.

Lecture-by-lecture outline (with total number of lectures/practicals)
Each 1-hour lecture is accompanied by a 2-hour problems class. The idea is to cement concepts introduced or revised in the lecture and to allow those students who did not take advanced chemistry at school extra time to ask questions and practice the concepts. The topics covered in each of the 5 blocks of 3 hours are:

1. An introduction to atomic theory (includes atomic structure, molar calculations and problems for classical mechanics when applied to the atomic scale)
2. The behaviour of electrons (includes the quantisation of energy, the wave character of electrons, an introduction to wavefunctions and solving the Schrödinger equation and atomic orbitals)
3. Relating electron configurations to atomic properties and bonding (includes the Aufbau principle, electron configurations of the elements, effective nuclear charge, periodicity and the periodic table, ionic bonding, covalent bonding and the valence shell electron pair repulsion – VSEPR – model for predicting molecular shape)
4. Further consideration of molecular bonding and structure (includes valence bond theory, molecular orbital theory and crystal field theory)
5. Examples of application atomic properties to geosciences problems (includes Goldschmidt's classifications and ionic properties and melt-mineral partitioning behaviour)

Practicals and techniques learned/used
Specific kills acquired/revised will include:
- Interpreting atomic and mass numbers
- Molar calculations
- Wavelength, energy, frequency calculations
- Predict the shape of simple molecules using VSEPR
- Explain the bonding in simple molecules using valence bond and molecular orbital theories
- Make predictions about trace element melt-mineral partitioning behaviour from ionic properties

Exam descriptor
Multi-part questions with some calculation, some conceptual and some descriptive parts.

Aqueous Chemistry
Prof. Julie Cosmidis

General themes and outcomes
The goal of this course is to become familiar with general principles of the chemistry of aqueous solutions and their applications to the study of natural waters.

Lecture-by-lecture outline

1. Basic principles
2. Equilibrium thermodynamics / Practical 1
3. Acids and bases, alkalinity
4. The carbonate system / Practical 2
5. Dissolution-Precipitation
6. Complexation / Practical 3 (Stability diagrams)
7. Redox reactions / Practical 4 (Eh-pH diagrams)

Exam descriptor:
Problems including calculations and short-answer questions on concepts.

Physics
Prof J Hawthorne, Prof H Marquardt

General themes and outcomes
This course aims to equip you with a strong foundation in classical mechanics, covering key topics such as the motion of rigid bodies and fluid dynamics. Designed to bring all students to a consistent level of understanding regardless of prior physics background, the course will build on this knowledge, applying fundamental physical principles to solve problems in Earth Sciences. Mastery of these concepts is essential for success in future courses throughout your degree program.

Lecture-by-lecture outline

Michaelmas term (Classical Mechanics and Fluid Dynamics)

This course consists of 12 hour-long lectures, each featuring a 45-minute presentation followed by a 15-minute session dedicated to solving accompanying problems. The topics covered include:

1. Vectors, Newton's Laws of Motion, and Kinematics
2. Projectile Motion and Resisted Motion
3. Energy, Work, and Power
4. Oscillating Pendulum – A Case Study
5. Circular Motion
6. Gravitation
7. Fluid Mechanics
8. Simple Fluid Flow Problems
9. Scaling I
10. Scaling II
11. Heat Transport in Fluids
12. Dimensional Analysis

Michaelmas Term (Classical Mechanics and Fluid Dynamics)

We will use **"Classical Mechanics" by Michael Cohen** as a reference text for this course. It is available for free as a PDF (see below) and can also be obtained as an iBook. While the book covers a wide range of topics, we will focus specifically on the aspects of mechanics that are relevant to geophysics, rather than covering the entire content.

https://live-sas-physics.pantheon.sas.upenn.edu/sites/default/files/Classical_Mechanics_a_Critical_Introduction_0_0.pdf

Hilary Term (Thermodynamics)

The purpose of the Physics (Thermodynamics) course in Hilary Term is to introduce you to the physics of energy, which is fundamental to much of Earth Sciences. The first half of the course will focus on the kinetic theory of gases, which explains how macroscopic features of a gas system (e.g. pressure, temperature, volume) arise from the microscopic motions and forces of molecules. The remainder of the course will introduce classical thermodynamics, including the 1st and 2nd laws, Carnot engines, entropy and the physics of phase transitions. In addition to the lectures, this course will involve three quantitative problem sets.

Exam descriptor:

Problems including calculations and short-answer questions on concepts.

Biology
Prof H Bouman

General themes and outcomes
The aim of the course is to acquaint the class with the fundamentals of cell biology, from the elemental composition of life to the expression of genes. The course is designed for students with a limited knowledge of cellular and molecular biology. The lecture material will provide an overview of the structural components of life and how they function which will serve as a useful background for future courses covering the climate system and biogeochemical cycles.

Lecture-by-lecture outline
This course consists of 12 lectures. The topics covered in each lecture are:

1. Introduction to Cell Biology
2. Chemical composition of cells
3. Macromolecules (Proteins, Lipids, Carbohydrates, Nucleic Acids)
4. Energy and Metabolism
5. Photosynthesis
6. Respiration
7. DNA Structure
8. Central Dogma
9. Transcription
10. Translation
11. Gene Regulation
12. Summary

Mathematics

Prof P Koelemeijer, Dr T Smith & Dr A Walker

Lecture-by-Lecture Outline

Michaelmas Term
16 Hours of Lectures, 8 Tutorials
L1-2: Ordinary differentiation.
L3-5: Partial differentiation.
L6-7: Integration and its applications.
L8: Power series (Taylor, Maclaurin, exp, sin, cos), Binomial Theorem and limits.
L9-12: Ordinary differential equations and complex numbers.
L13: Introduction to scientific computing (2 hrs).
L14: Fundamentals of procedural programming (2 hrs).

Hilary Term
16 Hours of Lectures, 8 Tutorials
Lecture sessions are two hours in length and designed to provide hands-on experience with Python.
L1: Scientific programming and data analysis (2 hrs).
L2: Scientific programming and statistics (2 hrs).
L3: Probability, distributions, and random variables (2hrs).
L4: Moving from probability to statistics, distribution functions, and statistical errors (2hrs).
L5: Common statistical tests, data uncertainty, and hypothesis testing (2hrs).
L6: Chi-square test and analysis of variance among and within groups (ANOVA) (2hrs).
L7: Bivariate data, linear regression analysis, and identifying outliers (2hrs).
L8: Multivariate data, principal component analysis, and covariance (2hrs).

Trinity Term
3 revision lectures

General themes and outcomes

Earth Sciences students come to Oxford with a range of A-level subject combinations. The first-year maths course is therefore designed to bring all incoming students up to the same level of knowledge in the fundamentals of calculus, differential equations, probability, statistics, and scientific computing as applied to Earth Science.

Practicals and techniques learned/used

- Formulating and solving problems mathematically
- Formulating a mathematical problem in a manner that can be solved numerically on a computer
- Basic computer science, programming, and data-visualization skills
- Using probability and statistics to interrogate Earth Science data

There will be a collection at the start of Hilary Term covering material from Michaelmas Term. There will be a practical coding exercise at the start of Trinity Term covering the Scientific Programming and Probability and Statistics material. The exam in Trinity Term will include questions related to all three parts (Calculus, Computing, Statistics), with no calculators allowed.

The normal frequency of maths tutorials in the 1st year is on average one per week.

FIELD COURSES

Health Issues

If students have any health issues that may affect their participation in a field course, they will be asked to provide a letter from their GP confirming that they are fit to participate in the various aspects of the course (a list of specific points for your GP to respond to will be provided). **It is the responsibility of the student to ensure that the field course leader and academic administration staff are aware of their health issues.** The student should ensure they discuss with them how their health issues might affect participation in the field course and any special requirements that need to be addressed, in good time before the field course.

Alternative Travel Arrangements

We encourage students to travel with the main group as much as is practicable.

Students who do not intend to travel as part of the main group for field courses must inform the Academic Office as soon as possible. **Students must make their own arrangements to and from an agreed location** (such as the airport or accommodation) and they must work around the timings of the group. For example, if the course includes a flight the student must arrive at the airport before or at the same time as the group so as not to cause a delay, and on the return they must depart at the same time or later than the group.

For courses with flights, students can be reimbursed for their alternative travel arrangements up to the cost of the flights per person on the group booking, minus any cost that the Department may have already paid and cannot reclaim. An eExpenses Claim Form must be completed, and submitted with original itemised receipts (https://finance.admin.ox.ac.uk/claiming-expenses-departmental-guidance). Details will be provided on request.

For courses without flights, alternative travel arrangements would be at the student's own expense as the Department would still incur the cost of the coach.

Some field courses may be self-catered and where this is the case you will receive a subsistence payment towards the cost of your food; if you will be missing any part of the field course (with prior agreement from your College Tutor and the Field Course Leader), your subsistence payment will be adjusted to take this into account.

Safety Briefings

A safety briefing will be held for each field course. These briefings are mandatory for all students attending the field course, non-attendance without prior agreement with the Field Course Leader, or without sufficient reason (e.g. illness) may result in a student being denied a place on the field course. We reserve the right to seek reimbursement from the student for any expenditure that cannot be recouped from suppliers as a result of their failure to attend a field course due to missing the safety briefing.

Accommodation and Catering

Please note that accommodation will likely require students to share rooms, in the case of some accommodations these will be dorm rooms. If you require your own room this must be supported by a Student

Support Plan (SSP) issued by the Disability Advisory Service (DAS) (https://www.ox.ac.uk/students/welfare/disability); please note that we cannot guarantee that a single room can be provided, even with an SSP, but we will do our best.

Before each field course you will be asked to complete a Basic Information survey, this survey is a way for us to gather details such as who you would prefer to share a room with, if you are discussing an SSP but do not yet have one, if you have any medical or dietary requirements, etc. If you do not complete this survey by the deadline we will do our best to arrange the field course with the information we have on your student record and from information you provided for previous field courses.

Some field courses will be catered and you will need to declare any dietary requirements ahead of time so that the caterer can order appropriate food. Other field courses will be self-catered, and you will be expected to work with other students who you share accommodation with (such as a caravan) to plan and cook your meals; for these field courses there will be an opportunity to purchase food at the start of the field course and a subsistence allowance will be provided (the amount will vary depending on the field course, and will be reduced accordingly if you plan to miss any part of the course). To be able to process subsistence payments (where necessary), you will be asked to complete a form with your bank details; a deadline will be communicated when the form is circulated and any late requests for payments will not be accepted.

Sometimes the transport for a field course will leave very early in the morning, out of term. Students are not permitted to stay overnight in the building as the Department is not insured for this. If you do not have accommodation for the night prior to departure, you should contact your college to arrange this.

Pembrokeshire

This four-day field course takes place over a long weekend during the first term, so as to introduce students as soon as possible to the techniques of studying geological features in the field. From the relationships between rocks one can deduce the sequence of events (sedimentation, igneous intrusion, folding and faulting) and so determine the geological history of the area.

The first day is spent at Marloes Bay, and the second around St David's, and the third at West Angle Bay and Tenby. Students learn a range of skills:

- Identifying different types of rock in the field, and deducing what environment they formed in.
- Examining their textural features and structures, and distinguishing those that form at the time of deposition from those that form later.
- Using the geological compass-clinometer to measure the orientation of rock strata and other features.
- Assembling all this information on rock type, environment, structure and sequence of events, to determine the evolution through geological time of this part of the Earth's crust.

In the evenings, the day's observations are discussed and brought into the wider context of the geological evolution of Wales.

Arran

The island of Arran, in the Firth of Clyde, is a fascinating outdoor laboratory of geology. Its rock record and landforms reveal most of the geological history of northern Britain from the Late Precambrian to the present day. It is famous for the astonishing variety of its igneous rocks in lavas, dykes, sills and plutons. It lies astride the geological boundary between Scotland's Midland Valley and the metamorphic rocks of the Caledonian mountain belt in the Scottish Highlands.

Here, students learn the fundamental skills of field geology: observing rocks at all scales, recording and measuring field data, and the techniques of geological mapping. Mapping is one of an Earth scientist's most fundamental skills. It comprises the ability to record and interpret the three-dimensional patterns and relationships of rock bodies, and to work out the sequence of events that formed them. As part of the training, students learn:

- to record information in a field notebook: descriptive notes and measurements of thickness, distance, orientation;
- to make detailed and clearly labelled sketches of features seen in outcrop, with interpretation;
- to log sedimentary successions in continuous outcrop and interpret environments of deposition; and.
- to record outcropping rock types, measurements and other data on field slips - copies of topographic base maps taken into the field.

On return from the field, students learn to compile the final version of a geological map from their field slips and recorded data, adding further interpretation in the form of cross sections and an account of the geological history.

Local Geology

These sessions in Trinity Term examine geology accessible within a short coach journey from Oxford, illustrating topics that are covered in the Fundamentals of Geology courses, and allowing students to practice fundamental field mapping and observational skills introduced in previous field excursions. Dates and final destinations will be confirmed during the year and are dependent on access and tides.

Excursion 1 (whole day): This field excursion examines the igneous, sedimentary and metamorphic rocks of the Malvern Hills and considers the relationships between landscapes and geological structures,

Excursion 2 (whole day): Examination and interpretation of the sediments across the Triassic-Jurassic boundary at Garden Cliff, Westbury-on-Severn, and the Middle Jurassic Inferior Oolite Group at Leckhampton Hill, Gloucestershire.

Excursion 3: (whole day): This field excursion examines the Upper Jurassic sedimentary rocks of the hills around Oxford and introduces the concept of ‘green line’ mapping.

SECOND YEAR COURSE

Deadlines

Please note:

1. Some of these dates are based on previous years and may be subject to change. Every effort will be made to notify students of any changes as soon as possible. In the meantime, PLEASE PUT THESE DATES IN YOUR DIARY NOW. You may not receive further reminders about some items.
2. These deadlines relate to departmental business, and you may have other important dates relating to college business.
3. Examination and some field course dates are in italics, as they will be confirmed nearer the time.
4. Deadlines in bold are included in the examination regulations or conventions and you may be penalised by the examiners if you do not meet them.

TERM	**WEEK**	**DAY**	**TIME**	**ITEM**
Michaelmas Term	N/A	N/A	N/A	Begin to consider mapping area.
	0th week	Fri 3 – Thur 9 Oct	1.30pm departure (TBC)	Dorset field course
	Week 2	Thursday	11.00am	*Beyond Google* session, Library
	Week 2	Monday	9.00am	Deadline for *Beyond Google* assignments
	Week 5	Thursday	11am-12.30pm	GIS Training
	Week 5	Thursday	12.00pm	Deadline for *Igneous Petrology* practical work
	Week 6	Friday	4.00pm	Deadline for summer independent project choice
	Week 8	Monday	12.00pm	Deadline for *Maths/Scientific Computing* practical work
Hilary Term	N/A	N/A	N/A	Consider mapping area (if applicable)
	Week 0	Friday	9.30am	Collections
	Week 2	N/A	N/A	Risk Assessment Forms for mapping available
	Week 5	Thursday	12.00pm	Deadline for *Metamorphic Petrology* practical work
	Week 6	Friday	4.00pm	Submit mapping plan to Richard Palin
	Week 8	TBA	TBA	Final approval of mapping area by Mapping Committee
	Week 8	Thursday	12.00pm	Deadline for *Sedimentary Petrology* and practical work
	Week 8	Friday	4.00pm	Submit Risk Assessment Form and insurance form for mapping area to Reception.
Easter Vacation	*N/A*	TBC	*TBC*	*Assynt field course*
Trinity Term	Week 2	Friday	12.00pm	Deadline for *Structural Geology and Map Interpretation* practical work (practical session on Wednesday 10-12)
	Week 6	*Days TBC*	*Times TBC*	*2nd Year examinations*

	Week 8	N/A	N/A	Bank details forms for Mapping payments due
	TBC	*TBC*	*TBC*	Somerset field course
Long Vacation	*N/A*	*TBC*	*N/A*	Independent Project work

Second Year
The second year course will go beyond the introductory level and equip students with a more comprehensive knowledge of Earth Sciences topics as well as develop practical skills in observation and data manipulation.

The course is broadly subdivided into five parallel themes, although some courses straddle multiple areas.

1. *Earth Deformation and Materials* including Structural Geology and Map Interpretation, Earthquakes seismology and active tectonics
2. *Sedimentary environments and palaeobiology*, including Sedimentary Basins, Sediment Generation and Diagenesis, Stratigraphy and Environments, and Evolution
3. *Petrology* including igneous and metamorphic petrology, and planetary materials and meteorites
4. *Geochemistry, Climate and Carbon Cycle*, including Thermodynamics, Stable Isotopes, Radiogenic Isotopes, Climate Change and Carbon Cycling
5. *Mathematical & Geophysical Tools*, including Geophysical Methods, Remote Sensing, Series Analysis and scientific computing

Assessment will be by theory examination in the form of three three-hour papers sat in Trinity Term and practical assessments through the year for some courses.

Field training takes place in Dorset before Michaelmas Term, in Assynt, Scotland, at Easter and in Somerset, after the Trinity Term examinations.

Tutorials

The normal frequency of tutorials in the second year is on average one per week.

Practical Work

Please note students should keep hold of any practical work (lab notes, field notebooks etc.) undertaken throughout the year, as 3rd year students may be required to hand in all practical work from second and third year following the Part A2 examinations at the end of third year.

Details of assessed practical work contributing to Part A1 grades can be found in Appendix 1.

Examinations

Please see Appendix 1: Examining Conventions.

COURSE STRUCTURE

2nd year, 2025-26

Michaelmas Term	Hilary Term	Trinity Term
Paper 3 A14629W1 **Earthquakes, seismology & active tectonics** Walker R. (8) Hawthorne (8) 16	*Workbook assessment* **Structural Geology & Map Interpretation** Cartwright (12), Walker, R. (4) 16	*Paper 2 A14628W1* **Evolution** Dunn 6 hours
Paper 3 A14629W1 **Geophysical Methods** Mac Niocaill (8) + Cartwright (8) 16	*Paper 3 A14629W1* **Remote Sensing** Walker, R. (6), Bouman (6) 12	
Paper 1 A14627W1 & Workbook assessment **Igneous Petrology** Pyle 16	*Paper 1 A14627W1 & Workbook assessment* **Metamorphic Petrology** Palin 16	
Paper 2 A14628W1 **Stable isotopes** Rickaby 12	*Paper 2 A14628W1* **Radiogenic isotopes** Henderson *12*	*Paper 1 A14627W1* **Planetary Materials & Meteorites** Bryson 6
Paper 2 A14628W1 **Carbon cycle** Hilton (6) Henderson (6) 12	*Paper 1 A14627W1* **Sedimentary Basins** Levell 16	
Paper 3 A14629W1 **Thermodynamics** Wood 12	*Paper 2 A14628W1* **Climate change** Johnson (7), Rickaby (3), Henderson (1), Kettlety (1) 12	
Paper 3 A14629W1 & workbook assessment **Maths: series analysis and scientific computing** Marignier 16	*Paper 1 A14627W1 & workbook assessment* **Sediments: generation and diagenesis** Robinson 16	*Paper 1 A14627W1 & workbook* **Stratigraphy and environments** Robinson 12

Fieldtrips:
Dorset
Assynt
Somerset

L=Lecture
P=Practical

Course Synopses

Reading lists can be found on the Canvas page for each module.

Details of all courses, including reading lists and lecturers, may be subject to change by individual instructors.

Beyond Google…

This training is **compulsory** for all second-year undergraduates. It must be completed **individually** — **not** in pairs or groups.

You are expected to work through the videos and assignments **in the order provided**. Skipping ahead or completing them out of sequence will reduce their effectiveness and may affect your marks.

Where?

- **Videos and assignments**: https://canvas.ox.ac.uk/courses/293539

Live session: Library

When?

- **Videos and assignments available from**: Tuesday 23rd September
- **Submission deadline**: Monday 20th October (2nd Week)
- **Live session (Library):** Thursday 23rd October (2nd Week), 11 AM-12 noon

Instructions:

- Each exercise includes a video which you are **required to watch in full**. These videos provide the information and skills you need to complete the assignments.
- Use the assignment text boxes to upload your notes.
- As a **minimum**, you must include a **1-2 sentence summary** of each video.
- Viewing data is recorded. **We will check that you have watched each video in full.** This information contributes to your overall mark.

Assessment:

Each assignment is marked. These are used to gauge:

- your existing knowledge,
- your understanding of the skills covered in the videos,
- any areas where you may need support from your tutor.

The entire training should take **no more than three hours**.

What the training covers:

You will take a closer look at tools such as **Google** and SOLO and be introduced to **three academic databases** you may not have used before.

The course also covers:

- how to construct a literature search,
- recognising different types of literature and assessing its quality,
- using your results to refine or extend your search,
- a short refresher on avoiding plagiarism.

Accessibility:

- All videos are **fully captioned** and can be viewed in **full screen**
- **Scripts and slides** are provided

If you have accessibility requirements or any questions about the training, please contact me: elizabeth.crowley@earth.ox.ac.uk

Earth Deformation & Materials

Structural Geology and Map Interpretation
Profs J Cartwright and R Walker

This practically oriented course deals with fundamental aspects of structural geology and presents the basic techniques of structural analysis. The course is a mixture of lectures and practicals. The practicals will introduce a range of geological structures at a range of scales using different observational methods from satellite based to outcrop to subsurface (seismic and well data). The structures to be analysed will be set in their tectonic context. Assessment will take the form of an open book practical assignment equivalent to a single practical session and will take place towards the end of term with a deadline of Week 8 submission.

Earthquakes, seismology and active tectonics
Prof R Walker & Prof J Hawthorne

Theory of faulting (JH)

L1. Failure (Griffith, Coulomb) criteria; initiation of faulting; effects of pore fluid pressures

L2. Stress in the Earth: Mohr circles; Anderson's theory of faulting; fault dips

P1. Mohr construction for stress and implications for fault slip

Earthquakes (JH)

L3. Observing earthquakes: refraction; wave propagation and the ray parameter; P-wave take-off angles and azimuths; seismic wave travel times; strike, dip and rake.

L4. The processes that drive earthquakes; frictional weakening; rupture propagation; aseismic slip

P2. Earthquake mechanisms: readings of first arrivals; take-off angles, azimuth and distance; stereographic projection; fault type.

Active Tectonics and earthquake geology (RTW)

L13. Regional tectonics, overview: earthquake mechanisms, topography and patterns of deformation for the Alpine-Himalayan belt, western USA, New Zealand.

L14. Continental extension. Geomorphology of normal faulting. Examples and case studies from Greece, Tibet, and the Basin and Range.

P7. Extensional faulting in earthquakes

L15. Role and geomorphology of strike-slip faulting: examples and case studies from Iran, Tibet, Turkey, California and New Zealand.

L16. Continental shortening. Geomorphology of thrust faulting. Examples and case studies from New Zealand, Iran, the Caucasus.

P8. Active faulting and folding: combining evidence from imagery, topography and drainage patterns.

Sedimentary environments and palaeobiology

Sedimentary Basins

Prof. Bruce Levell

10 hours lectures and 6 hours practicals over 4 weeks (weeks 1-4)

The aims of this course are for students:

(1) to be able to accurately describe a sedimentary basin and its infill and recognise key large scale stratigraphic geometries in cross-sections and maps
(2) to understand, in broad outline, the lithospheric processes that govern the formation of sedimentary basins, and the large scale sedimentary processes that lead to the filling of those basins with sediments.
3) to understand the interplay between basin formation mechanisms, sea level and sediment supply variations and the associated sedimentary facies and stratigraphic architecture.
4) to make connections between sedimentary basin analysis and material in other courses such as geodynamics, sedimentary geology, palaeontology,

The course is structured in two main parts: (1) the interpretation of seismic sections across sedimentary basins (2) the interactions among the processes of relative sea level, change, (primarily addressing subsidence) and sediment supply.

Practicals provide an opportunity to use seismic and well data to infer the stratigraphic and structural evolution of sedimentary basins, to reconstruct subsidence histories and to place basin evolution in a wider tectonic context.

Specific learning outcomes are:

1.Geodynamics: Be able to describe how rift and foreland basins are formed and evolve.
2.Integration: Be able to explain how the sedimentary geometry and lithology of a clastic basin-fill in a rift or a foreland setting relates to the basin-forming processes (ie Both how the basin-forming processes predict the sediments and how studying the sediments allow unravelling of the basin-forming processes)
3.Stratigraphy: Understand how accommodation space is created, how the sedimentation patterns depend upon the rates of relative sea level rise and of sediment input, and what parameters these two rates in turn depend upon.
4.Seismic: Be able to make logical deductions about basin subsidence from seismic sections using the observed stratigraphic patterns.

Sediments: generation and diagenesis
Prof S Robinson

This course aims to develop a comprehensive understanding of the physical, chemical, and biological processes that generate sediments at the Earth's surface, building on knowledge gained in year 1. The course examines the production and diagenesis of siliciclastic grains, carbonate geochemistry, the mineralogy and generation of limestone particles, and the origins of siliceous rocks. Emphasis is placed on the petrographic identification of these sediments as well as secular changes through Earth history. The course will have 8 one-hour lectures and 4 two-hour practicals, that will involve petrographic examination of thin sections.

Lectures

Lecture 1	Introduction to siliciclastic sediment generation, composition and provenance
Lecture 2	Siliciclastic sediments in thin section and clastic diagenetic features
Lecture 3	Carbonate geochemistry
Lecture 4	Carbonate grains – modern skeletal grains
Lecture 5	Carbonate grains 2 – ooids, ancient skeletal grains, and mud
Lecture 6	Carbonate factories
Lecture 7	Carbonate diagenesis
Lecture 8	Origin & diagenesis of siliceous sediments

Practicals

Practical 1	Clastic sediments in thin section
Practical 2	Quaternary carbonate grains and diagenesis
Practical 3	Ancient carbonate grains in thin sections
Practical 4	Siliceous rocks in thin section

Exam descriptor
Written exams: Multi-part questions, that may require a mixture of short answers (definitions, explanations, diagrams) and longer (short essay) answers. Questions may require the application of knowledge from this course and *Stratigraphy and Environments* (Trinity Term).

Practical work: A practical work book will be completed in the practical sessions and in your own time that will be submitted in week 8 of term.

Online resources
The virtual microscope is a great way of seeing what assorted rocks look like in thin section. There are a number of different collections available, including this one from the University of Leeds, which includes a number of good examples of sandstones - you can even rotate the stage! I recommend Leeds samples 05, 07, 08, 09, 10 and 19 but there are lots elsewhere in the collection too, so have an explore! https://www.virtualmicroscope.org/content/leeds (Links to an external site.)

For carbonates, the following is an amazing and excellent website showing major grains and cement types with very clear images. Unfortunately you can't interact with images (unlike the virtual microscope) but this is an excellent resource to help you learn to identify the major grain types: https://carbonateworld.com

Stratigraphy and environments
Prof S Robinson

This course will look at the tools used by geologists to understand past environments, timescales and environmental change. The course will have 6 one-hour lectures and 3 two-hour practicals, that will involve examination of trace fossils, petrographic examination of thin sections, description of hand specimens and interpretation of sedimentary structures.

Lectures

Lecture 1	Introduction to stratigraphy
Lecture 2	Biostratigraphy, magnetostratigraphy and the GPTS
Lecture 3	Cyclostratigraphy and the Geological Timescale
Lecture 4	Introduction to the principles of facies analysis
Lecture 5	Trace fossils and their importance in facies analysis
Lecture 6	Sedimentary facies analysis applied to clastic coasts

Practicals

Practical 1	Trace fossils in OUMNH
Practical 2	Description and interpretation of specimens from the middle Jurassic of Yorkshire
Practical 3	Facies interpretation of the middle Jurassic of Yorkshire

Exam descriptor
Written exams: Multi-part questions, that may require a mixture of short answers (definitions, explanations, diagrams) and longer (short essay) answers. Answers may require the application of knowledge from this course and *Sediment generation and diagenesis* (Hilary Term).

Evolution

Dr F Dunn
6 Lectures

Lectures will introduce key evolutionary concepts that are important for well-rounded Earth Scientists, including the evidence that led Darwin to the theory of evolution by natural selection, the mechanisms of heredity, population genetics, species concepts and speciation, and phylogenetics. This information will be parsed into the following lectures:

1. Darwin and the origin of evolutionary thought
2. Heredity and population genetics
3. Species, speciation, and levels of selection
4. Macroevolution and biogeography
5. Phylogenetics and calibrating the fossil record
6. Great transformations (transitions to land, evolution of whales, etc)

Petrology

Igneous Petrology

Prof D Pyle

The second-year igneous petrology course brings together the practical study of igneous rocks in hand-specimen and thin-section with ideas around the origin, evolution and eruption of magmas, and the use of phase diagrams to understand melting and crystallisation paths. The course builds on concepts and skills developed in the first year. Topics covered in the 8 lectures and 8 practicals include:

- description and interpretation of igneous rocks in hand specimen and thin section
- use of simple phase diagrams to understand the origin and evolution of igneous rocks, including crystallisation and melting paths under equilibrium and fractional conditions
- outlines of the main controls on magmatism and magmatic rocks in different tectonic settings.

Exam descriptor
Written exam: One multi-part question, that may require a mixture of short answers (e.g. interpretation of a phase diagram) and longer (short essay) answers.

Practical work: A practical workbook will be completed in practical sessions, and in your own time, and will be assessed at the end of week 5.

Metamorphic Petrology
Prof R Palin

The metamorphic petrology course builds on the study of mineralogy and petrology begun in the first year and serves as a solid basis for the interpretation of mineral assemblages and textures of metamorphic rocks. Topics covered include: equilibrium and disequilibrium; metamorphic reactions; graphical analysis of phase relations; estimating pressure and temperature of equilibration; inferring P-T-time-deformation histories; metamorphic fluid composition and phase relations; and fluid-rock interaction. Extensive support materials are available in the section 'Metamorphic Petrology' on Canvas and on ORLO.

Planetary Materials and Meteorites
Prof J Bryson

This course will discuss the geology and geochemistry of a range of extra-terrestrial rocks to build an introductory understanding of how solids formed in our solar system and how these went on to build planetary bodies. It will take concepts that students have been learning throughout the other courses in their second year and recontextualise them by applying them to other planetary bodies. This will include a number of asteroids, the moon, and Mars. The course will be complemented by a tutorial, where we will view the meteorites together in the OUNHM and discuss the contents of the lectures with the samples in front of us. Approximate structure:

1. The formation of the solar system and planets
2. Chondrites and their petrology
3. Achondrites and their petrology
4. Radiometric dating of meteorites
5. Stable isotopes in meteorites
6. The formation and evolution of the Moon
7. Tutorial in the OUNHM using their meteorite collection to better understand the course.

Geochemistry, Climate and Carbon Cycle

Thermodynamics

Prof B Wood

The thermodynamics part of the course will cover: Thermodynamic functions; chemical potential; free energy; entropy; enthalpy and heat capacity. Hess's law; stable and unstable mineral assemblages. Solid-solid reactions; calculation of simple phase diagrams. Fluids; perfect gas laws; pressure-volume-temperature relationships for imperfect gases; fugacity. Calculations and reactions involving fluids and solids. Activity and standard states; Activity-composition relations for ideal and non-ideal solid solutions. Aqueous solutions; ions and complexes; solubility, Redox potential.

Stable isotopes
Prof R Rickaby
This course aims to give the students the principles of stable isotopic fractionation such that they are armed to understand the information yielded by the huge diversity of isotopic systems. The aim is to build an understanding of how the habitable planet came into being as evidenced from isotopic systems. It will cover the mechanisms for equilibrium isotopic fractionation, clumped isotopologues, and the temperature dependence that yield crucial tools for unravelling Earth's thermal history. The mechanistic basis of kinetic fractionation will introduce stable isotopic methods for understanding the hydrosphere now and in the past and for enzymatic reactions and how we can delve into past history of life and metabolisms on the planet. The course also includes an element of project work where students' investigative skills will be pitted against each other to determine the ultimate isotope system for the future.

Radiogenic isotopes
Prof G Henderson
This course covers the use of radiogenic isotope chemistry for geological dating, including methods for determining: the age of the Earth, rock formation and metamorphism ages, early solar system chronology, 14C ages, exposure ages, the rates of continental growth and planetary degassing, thermal histories of crustal rocks,

and the rates of volcanic and environmental processes. Using isotopes for identifying different processes and tracing in the environment and within the Earth is also covered.

The Carbon Cycle
Prof B Hilton & Prof G Henderson
The course will cover the fundamental components of the carbon cycle and focus on the key processes that govern greenhouse gas concentrations in the atmosphere. It will also consider the coupled biogeochemical cycles of elements, while introducing a variety of geochemical approaches used to study the carbon cycle.

Following an introduction to the carbon cycle, the course will cover the following themes: The operation of the carbon cycle over geological timescales (volcanism, weathering and organic matter burial); The role of the terrestrial biosphere; The ocean biosphere; Inorganic carbon in the ocean; Glacial-interglacial change in atmospheric CO_2; The 20th Century; and The future carbon cycle.

The course will combine lectured material with hands-on material for the students (e.g. data analysis, calculations, and computer-based model exercises). Some will also feature practical demonstrations.

The course will not use a single textbook, but rely on several, on the primary literature, and on web resources.

Climate Change
Prof H Johnson, Prof R Rickaby, Prof G Henderso, Dr T Kettley
This course will provide an introduction to climate change in 12 hours. It will start with a brief reminder of what sets global mean temperature, and a discussion of palaeoclimate processes, before moving on to cover recent climate change. The course will review how climate has changed, why we are confident it is due to anthropogenic greenhouse gas emissions, and what the impacts are on physical and biological Earth systems. It will cover climate model projections of future climate change, and discuss the actions required to solve the climate change problem. A practical exercise focused on modelling global mean temperature will illustrate some of the key points. In the final session we will discuss some broader aspects of the problem, beyond the fundamental science.

Lectures:
1. Climate change – what sets global mean temperature?
2. Palaeoclimate – Introduction to the study of past climates
3. Palaeoclimate – What can we learn from the past?
4. Our warming planet
5. Response of the physical system
6. Response of the biological system
7. Future climate change
8. Solving the problem
9. Greenhouse gas removal strategies
10. Not just a scientific challenge….

Practical:
Python computing exercise (2 hours) - Modelling global mean temperature

Examinations:
This course will be assessed by examination in the Part A1 exams. Questions will typically have multiple parts and require a mixture of short answers (definitions, explanations, diagrams, calculations) and longer (short essay) answers.

Mathematical & Geophysical Tools

Series analysis and scientific computing
Dr A Marignier

In this course, we are going to develop and use the mathematical machinery of Fourier analysis. At the end of the course, you will be able to:

- Analyse and understand series data (e.g. measurements) using Fourier series.
- Understand how to calculate and interpret power spectra.
- Understand how these techniques are used in Earth Sciences and beyond.

Topics Include
- Fourier Series
- Series Analysis

- Fourier Transform & Spectra
- Discrete Fourier Transform
- Spherical Harmonic and Wavelet Transforms
- Intro to Linear Algebra

Geophysical Methods
Prof C MacNiocaill & Prof J Cartwright
An introduction to gravity, magnetic, and seismic methods of geophysical exploration. Instrumentation and field survey design. Data reduction and processing techniques. Geological interpretation of gravity, magnetic and seismic reflection and refraction data.

Remote Sensing
Prof. R Walker and Prof. H. Bouman
In the first part of the course, we will examine how satellite imagery is acquired, and explore the use of passive remote sensing and digital elevation data in assessing land cover, environment, and geology in terrestrial settings. We will examine how visible, near infra-red and short-wave infrared image bands can be combined in a range of settings.

- The use of multi-spectral data in remotely mapping geological materials
- The use of normalised ratio techniques to assess vegetation cover
- The display and use of digital elevation data

The course will combine lectures with computer-based practicals (e.g. data analysis and visualisation).

The course will draw on material from textbooks, the primary literature and on-line resources.

Suggested Text:
There are a number of textbooks that cover remote sensing and the basics of satellite image interpretation e.g. Lillesand et al., Remote Sensing and Image Interpretation.

In the second part of the course, we will examine the use of passive remote sensing as a tool for investigating variability in the physical and biogeochemical properties of the surface marine environment. We will discuss how we define and measure seawater optical properties. We will then explore how visible spectral radiometry is used in a variety of applications, including

- Mapping chlorophyll concentrations
- Studies of phytoplankton phenology
- Determination of phytoplankton physiology
- Ocean carbon cycles
- Monitoring water quality

The course will combine lectures with computer-based practicals (e.g. data analysis and visualisation).

The course will draw on material from textbooks, the primary literature and on-line resources.

FIELD COURSES

Health Issues

If students have any health issues that may affect their participation in a field course, they will be asked to provide a letter from their GP confirming that they are fit to participate in the various aspects of the course (a list of specific points for your GP to respond to will be provided). **It is the responsibility of the student to ensure that the field course leader and academic administration staff are aware of their health issues.** The student should ensure they discuss with them how their health issues might affect participation in the field course and any special requirements that need to be addressed, in good time before the field course.

Alternative Travel Arrangements

We encourage students to travel with the main group as much as is practicable.

Students who do not intend to travel as part of the main group for field courses must inform the Academic Office as soon as possible. **Students must make their own arrangements to and from an agreed location** (such as the airport or accommodation) and they must work around the timings of the group. For example, if the course includes a flight the student must arrive at the airport before or at the same time as the group so as to not cause a delay, and on the return they must depart at the same time or later than the group.

For courses with flights, students can be reimbursed for their alternative travel arrangements up to the cost of the flights per person on the group booking, minus any cost that the Department may have already paid and cannot reclaim. An eExpenses Claim Form must be completed, and submitted with original itemised receipts (https://finance.admin.ox.ac.uk/claiming-expenses-departmental-guidance). Details will be provided on request.

For courses without flights, alternative travel arrangements would be at the student's own expense as the Department would still incur the cost of the coach.

Some field courses may be self-catered and where this is the case you will receive a subsistence payment towards the cost of your food; if you will be missing any part of the field course (with prior agreement from your College Tutor and the Field Course Leader), your subsistence payment will be adjusted to take this into account.

Safety Briefings

A safety briefing will be held for each field course. These briefings are mandatory for all students attending the field course, non-attendance without prior agreement with the Field Course Leader, or without sufficient reason (e.g. illness) may result in a student being denied a place on the field course. We reserve the right to seek reimbursement from the student for any expenditure that cannot be recouped from suppliers as a result of their failure to attend a field course due to missing the safety briefing.

Accommodation and Catering

Please note that accommodation will likely require students to share rooms, in the case of some accommodations these will be dorm rooms. If you require your own room this must be supported by a Student Support Plan (SSP) issued by the Disability Advisory Service (DAS) (https://www.ox.ac.uk/students/welfare/disability); please note that we cannot guarantee that a single room can be provided, even with an SSP, but we will do our best.

Before each field course you will be asked to complete a Basic Information survey, this survey is a way for us to gather details such as who you would prefer to share a room with, if you are discussing an SSP but do not yet have one, if you have any medical or dietary requirements, etc. If you do not complete this survey by the deadline we will do our best to arrange the field course with the information we have on your student record and from information you provided for previous field courses.

Some field courses will be catered and you will need to declare any dietary requirements ahead of time so that the caterer can order appropriate food. Other field courses will be self-catered, and you will be expected to work with other students who you share accommodation with (such as a caravan) to plan and cook your meals; for these field courses there will be an opportunity to purchase food at the start of the field course and a subsistence allowance will be provided (the amount will vary depending on the field course, and will be reduced accordingly if you plan to miss any part of the course). To be able to process subsistence payments (where necessary), you will be asked to complete a form with your bank details; a deadline will be communicated when the form is circulated and any late requests for payments will not be accepted.

Sometimes the transport for a field course will leave very early in the morning, out of term. Students are not permitted to stay overnight in the building as the Department is not insured for this. If you do not have accommodation for the night prior to departure, you should contact your college to arrange this.

Dorset

This seven-day field course focuses on the Mesozoic (Triassic-Cretaceous) sedimentary rocks deposited during the development of the Wessex Basin and the younger Cenozoic (Eocene) rocks of the Hampshire Basin. The rocks are spectacularly exposed in cliff sections along the East Devon and Dorset coastline, and are examined at Budleigh Salterton, Ladram Bay, Lyme Regis, Charmouth, West Bay (Bridport), Portland, Durdle Door, Lulworth Cove and Hengistbury Head (near Bournemouth). The focus is on the sediments and the fossils they contain, with a view to interpreting ancient environments and the origin of the sedimentary basin in the context of Mesozoic and Cenozoic Earth history. Also of interest are the geological conditions that led to the formation of oil reserves in this region.

The course reinforces many fundamental aspects of geological observation and acquisition of field data that were introduced in year 1. In the evenings, time is spent analysing data collected during the day, and learning about related research studies in this area.

Worbarrow Bay, Dorset. The Late Jurassic to Cretaceous sediments were folded during earth movements related to the Alpine mountain-building.

Assynt

The far north-west of Scotland is an area of classic geology, containing one of the first major overthrust zones to be recognised, and an area of intensively studied Precambrian gneisses widely regarded as a model for the nature of the lower continental crust. The course has a number of objectives:

1. Training in a variety of geological mapping techniques involving a range of rock types and geological settings, including highly deformed rocks and metamorphic terrain, in preparation for students' independent work.
2. An opportunity to link the study and description of rocks in the field with examination of the same rocks in the laboratory.
3. A study of the geological evolution of north-western Britain through about three billion years of Earth history.
4. The acquisition, processing and geological interpretation of gravity and magnetic data.

Precambrian red sandstones, laid down by river systems 1000 million years ago, make up the bulk of the mountain Quinag.

The principal focus of the course, however, is on recording information, and on the techniques of geological mapping. Mapping is one of an Earth scientist's most fundamental skills. It comprises the ability to record and interpret the three-dimensional patterns and relationships of rock bodies, and to work out the sequence of events that formed them. As part of the training, students learn:

- to record information in a field notebook: descriptive notes and measurements of thickness, distance, orientation;
- to make detailed and clearly labelled sketches of features seen in outcrop, with interpretation;
- to record outcropping rock types, measurements and other data on field slips - copies of topographic base maps taken into the field; and
- to make interpretive sketches of the geological features of a large area by making "sky-line cross-sections" from panoramic views.

We learn and practise a variety of mapping techniques:

- Mapping an area of a few square kilometres by visiting essentially all outcrops and tracing out geological boundaries by observation and inference.
- Walking a traverse across a succession of rock types, collecting information for constructing a geological cross-section.
- Mapping well-exposed areas of outcrop in detail by pace-and-compass traverse and grid mapping.
- Logging sedimentary successions in continuous coastal outcrop.
- Mapping and measuring folded and metamorphosed rock sequences, and inferring complex three-dimensional structure.

On return from the field, students learn to compile a final version of the geological map from their field slips and recorded data, adding further interpretation in the form of cross sections and an account of the geological history.

This course also includes professional instruction on fieldwork safety and survival in remote and rugged terrain.

Looking for the unconformity: on the right, banded metamorphic gneisses formed in the deep crust, uplifted, eroded, and locally covered by a veneer of sediment; on the left, shallow-dipping siltstones and sandstones of the 1200 million-year-old Stoer Group, which overlie the gneiss.

Somerset

This residential five-day field course is aimed at improving your field skills in structural geology and sedimentology/stratigraphy. The practical components will involve making basic structural and sedimentological observations and some mapping exercises.

The course is based on the southern margin of the Bristol Channel Basin, and the main outcrops span from the Triassic to the Jurassic, and include a range of sedimentary lithologies. The structures visible at outcrop on exceptional wave cut platform and cliff exposures comprise extensional faults, strike-slip faults, inverted extensional faults along with folds at shorter and longer wavelengths and a range of natural fractures and veins. The area was subjected to a lengthy evolution involving basin subsidence, phases of extensional and contractional deformation, along with two periods of regional uplift. We will attempt to reconstruct the basin evolution from the observations we make over the 5 days.

Independent Project

OVERVIEW

All students undertake an independent project during the summer vacation at the end of their second year. Starting from the academic year 2023-24, we are offering a limited choice of different types of projects. However, it is expected that most students will continue to undertake a geological mapping project. The choice of projects for 2025-26 are:

- Geological field mapping project (available to all students).
- Geochemical field mapping project (available for 4 to 8 students).
- Geophysical data analysis project (available for 4 to 8 students).

A briefing session introducing the different projects will be held early in Michaelmas Term. Due to the complexity involved with organising and running geochemical and geophysical projects, numbers are capped for this year. Students wishing NOT to undertake a geological field mapping project will be asked to submit their preferences to the academic office before the end of 6th week. If project types are oversubscribed, first preference will be given to students with relevant mitigating circumstances and/or relevant information on their Student Support Plans. For remaining places, a lottery will be held to assign projects. If any students miss-out on their choices, then they will be expected to complete a geological mapping project. If a very low number of students wish to undertake a particular type of project, then the Department can decide not to run that project type.

In exceptional circumstances, such as when health issues make it difficult to go into the field, students will always have the option of undertaking a desk-based project, instead of field mapping. Students who feel they have sufficient reasons to undertake a desk-based mapping exercise should raise this with their tutor as early as possible in second year, and submit a case for consideration by the Mapping Panel. **It is the responsibility of the student to ensure that they raise any health issues well in advance of the summer mapping exercise.** They may be asked to provide a letter from their GP confirming that they are not fit to participate in the mapping exercise.

Geological field mapping project (available to all students)

The project consists of 4-6 weeks of geological mapping of an area of 11-15 km^2 in a location of the students' choice. The total mapped area will depend on the terrain, rock exposure and the complexity. In recent years, students have mapped in areas as diverse as New Zealand, Alpine Europe, Northern Norway, Greenland, as well as the British Isles.

In addition to mapping, specialised investigations should also be undertaken, involving further study such as structural analysis, petrology, palaeontology, or sedimentology. The mapping area should be reasonably compact and have a sufficient degree of natural or artificial exposure to allow effective mapping. It should contain distinct and mappable rock-types, and lack large areas of uniform lithology. There should be a sufficient level of stratigraphic or structural complexity to present a challenge. The rocks need not span a wide range of ages: lateral facies variations within a single stage, complex structure, or detailed intrusive and extrusive relations in an igneous centre, could all be suitable for mapping. Areas where recent detailed maps have been published should be avoided.

For reasons of safety, you are required to work in pairs. Although you will be mapping together during the day, all observations must be marked individually on your field-sheets and the projects will be written up individually. We recommend that in **Michaelmas term, students start to think about where they would like to map and consult as widely as possible with members of staff about their chosen areas**. We also recommend that pairs organise themselves into groups of four or more to map adjacent areas. In addition to the mapping, a specialised investigation of some aspect of the geology in your field area should be undertaken, which might involve detailed structural, palaeontological, petrological or sedimentological analyses.

Final approval of the projects takes place by the end of Hilary Term of the 2nd year. Each student group meets with the mapping committee, who assess the projects in terms of the geological suitability, logistics and, most importantly, safety. In addition, risk assessments must be carried out on all the areas.

The aim is to produce:

(i) a field map, normally drawn on a topographic base (aerial photographs may be used as an aid in mapping where available). If a topographic base is unavailable, you may construct a base from aerial photographs (subject to the panel's approval). If the only available topographic base does not include contours, then you should make some attempt to show the topography.

(ii) a field notebook(s). This should be a sturdy hard-backed notebook, and be kept tidy and legible. Grid-references or other information should be included to allow notes to be keyed to your maps. Field sketches should have scales and orientation.

(iii) structural sections and sedimentological logs, if applicable to the geology of the region. These should be drawn up as far as possible while you are in the field area.

(iv) a collection of representative rock specimens, *(*about fist-sized and as fresh as possible) from which thin sections may be prepared, and photographs of outcrops and landscapes to supplement field sketches. In some mapping areas, samples and thin sections already exist in the Department collection, so students may be asked to use those in the first instance rather than collect new materials.

(v) In the report on the mapping project, the student's main task is to explain clearly the geology of their area, taking reasonable account of previous literature. At the same time, they have to show they have done a good job in the field, and can interpret their observations both critically and imaginatively, and with good scientific sense: no easy matter!

Specific support for these projects will be provided in the form of:

- Advice on choice of field areas and safety issues (Mapping panel and college tutors; Michaelmas and Hilary Terms of 2nd year).
- Mapping questionnaires from previous students (in the library)
- GIS tutorial support (Trinity Term).
- Additional field training during Somerset field class (post-exams, Trinity Term).
- Online resources regarding digitisation of maps.
- Geological and topographical maps (in the library)
- Tutorial at start of Michaelmas Term of 3rd year to discuss plans for write-up.

Geochemical field mapping project (available for 4 to 8 students)

These projects aim to assess how bedrock geology controls geochemical transfers of elements in rivers. The project consists of 4-6 weeks of fieldwork that combines geological mapping and geochemical measurements of stream and river waters. The area covered will be ~7-10 km^2 in a location in the UK or EU.

Geological mapping will be undertaken to provide a context on the likely chemical weathering processes that may impact the geochemistry of natural waters. The requirements of the mapping area are similar to those for a geological mapping project: it should be compact and have a sufficient degree of exposure; it should contain distinct and mappable rock-types; there should be a level of stratigraphic or structural complexity.

In addition, the mapping area should also have lithological variability which will expect to impact on the stream/river chemistry. This could include regions where there are large contrasts in rock types across the landscape, and/or contrasts in vegetation or land use or temperature (i.e. elevation), which combine to drive changes in silicate and carbonate weathering process. Alternatively, other suitable locations may have areas of mineralisation and metal deposits, or be where mining/extraction has taken place in the past, present or may be expanded in the future. With the main geological structures identified, in field measurements of stream/river chemistry will be made with hand-held probes (of pH, temperature, conductivity). These measurements can be made spatially, and over time during the project. In addition, at selected sites samples of filtered stream/river water will be collected for further analysis in Oxford.

For reasons of safety, you are required to work in pairs. Although you will be working together during the day, all observations/measurements must be marked individually on your field-sheets and notebooks, and the projects will be written up individually. We recommend that in **Michaelmas term, students start to think about where they would like to map and consult as widely as possible with members of staff about their chosen areas**. We also recommend that pairs organise themselves into groups of four or more to map adjacent areas.

Final approval of the projects takes place by the end of Hilary Term of the 2nd year. Each student group meets with a mapping sub-committee, who assess the projects in terms of the geological and geochemical suitability, logistics and, most importantly, safety. In addition, risk assessments must be carried out on all the areas.

The aim is to produce:

(i) a field geological map, normally drawn on a topographic base (aerial photographs may be used as an aid in mapping where available). If a topographic base is unavailable, you may construct a base from aerial photographs (subject to the panel's approval). The map should show the location of geochemical measurements, and present some summary of measured values (e.g. mean pH, conductivity, etc.,) as points.

(ii) a field note-book(s). This should be a sturdy hard-backed notebook, and be kept tidy and legible. Grid-references or other information should be included to allow notes to be keyed to your maps. Field sketches should have scales and orientation. Geochemical data collected in the field should be organised clearly.

(iii) Stratigraphic column (and structural sections/sedimentological logs applicable to the geology of the region). These should be drawn up as far as possible while you are in the field area.
(iv) The geochemical data in a well organised spreadsheet or data file, and some summary plots of patterns through the mapping area (e.g. geochemical cross sections).
(v) A collection of filtered stream and river samples, clearly labelled and traceable to location and other complementary field geochemical data. These will be analysed for their major ion content in Oxford.
(vi) In the report on the mapping project, the student's main task is to explain clearly the geology of their area and its link to the measured river geochemistry. At the same time, they have to show they have done a good job in the field, and can interpret their observations and data both critically and imaginatively, and with good scientific sense: no easy matter!

Specific support for these projects will be provided in the form of:

- Advice on choice of field areas and safety issues (Mapping panel and college tutors; Michaelmas and Hilary Terms of 2nd year).
- Introductory session on GIS by Martin Davis from the Bodleian Library (Michaelmas Term)
- Additional GIS tutorial support (Trinity Term).
- Additional one day equipment and sample training (post-exams, Trinity Term).
- Online resources regarding digitisation of maps.
- Tutorial at start of Michaelmas Term of 3rd year to discuss plans for write-up.

Geophysical data analysis project (available for 4 to 8 students)

In this project, you will examine origins of seismic signals in an area or areas of interest. Environmental, tectonic, and anthropogenic signals are all potential targets. For instance, you may examine seismic waves produced by cascading rivers in New Mexico, by ocean waves on remote islands, by traffic in the UK and France, or by tectonic tremor in Costa Rica. Indeed, you will be encouraged to observe and consider a range of sources your chosen areas.

Over Hilary and Trinity terms, you will choose an area of interest based on a signal you hope to encounter and examine. During the summer, you will begin by processing and examining variations in seismic amplitude through time. You will identify patterns within the amplitude variations and further examine particular signals of interest. Finally, you will compare the seismic amplitude variations with other observations, such as river depth, ocean height, time of day and week, or GPS displacement, so that you can better interpret the observations.

In addition to a visual analysis of the datasets, you will perform some quantitative analysis of the observations. This could be quite simple: a set of histograms or a linear regression between ocean wave height and seismic amplitude, for example, which lets you estimate how much increasing wave height increases ground shaking. Or it could be more complex: perhaps a neural network that maps atmospheric pressure, wave heights at various frequencies, and surface temperature to the amplitude of ground shaking.

Students are encouraged to work in pairs where appropriate, though ideally on overlapping, not identical, topics or areas. Each student must download, process, and interpret their data individually, but you are encouraged to collaborate and troubleshoot coding problems in pairs or groups.

The aim is to produce:

(i) A catalogue of the seismic signals observed in a given area.
(ii) An interpretation of those signals, based on:
  a. A manual inspection of the data after various processing steps.
  b. A quantitative analysis of the seismic data or a quantitative comparison of the data to another dataset.

Specific support for these projects will be provided in the form of:

- 4 guided exercises to work through, coupled with tutorials, during Hilary and Trinity term (some post-exams), to learn to:
  - Download, filter, and plot the seismic data.
  - Download and analyse other datasets.
  - Identify earthquakes and roughly locate seismic sources.
  - Perform simple and complex regressions between datasets.
- Advice on choice of areas (Geophysics panel and college tutors; Hilary and Trinity Terms of 2nd year).
- Tutorial at start of Michaelmas Term of 3rd year to discuss plans for write-up.

Funding and insurance

Students undertaking field-based projects will be given £500 towards the cost of their Summer Mapping. Payments will be made by BACS in Trinity Term.

Additional funding for fieldwork will usually be provided by Colleges and this should be discussed with your college tutor.

Students must have travel insurance regardless of their destination. This can be as part of a family scheme, bought independently or via the University Scheme. Students must submit an insurance application form online, or provide a photocopy of their insurance document along with their risk assessment form to the Academic Administration Office.

BEFORE TRAVELLING – A CHECKLIST

(i) Attend the talk on safety in the field (you will need to sign a form to show that you have done so).
(ii) Complete the Independent Fieldwork Risk Assessment form (see and discuss your plans, in depth, with the Field Teaching Officer - Dr Richard Palin, who will be particularly concerned with safety). The panel will want to be assured that you are aware of potential hazards in the area, and that you have planned suitable control measures to reduce risks to an acceptable level.
(iii) Complete the University Travel Insurance form.
(iv) Demonstrate that you have suitable clothing and footwear and other necessary equipment.
(v) Collect the safety pack loaned by the Department (against a deposit), consisting of a whistle, survival bag, torch, and spare batteries. In addition, it is highly desirable to have a mobile telephone, though they may not always work in remote mapping areas. Also collect other documentation (safety information, addressed envelope, names and telephone numbers of members of the Department who can be contacted while you are in the field).
(vi) Hand in the information sheet, giving details of the precise location of your mapping project, the names of all members of your group, where you are planning to stay and any points of contact, the dates of your fieldwork, and also a preliminary assessment of likely hazards in the mapping area.
(vii) In addition, you are strongly advised to discuss your plans widely, especially with your college tutor and anybody close to you (family, friends etc.) - this way you will be able to take into account a wide range of experience and points of view before going to your mapping area.

IN THE MAPPING AREA

- As a group undertake a reconnaissance of each mapping area. Use your initial reconnaissance to update your risk assessment. Record in your field notebook any amendments to the nature and severity of hazards, and how you plan to address these hazards to minimise the risks.
- Return the addressed envelope with your updated address, dates of mapping, and any new information about potential hazards in your mapping area. If you don't feel confident about working in the area at this stage, you should take appropriate and sensible action. Use your common sense - you are ultimately responsible for your project, including your own safety in the field.
- In the same place as the rest of the group, exchange information each day, and inform a local independent party (hostel guardian, police officer, shopkeeper) where you plan to map and what time you expect to return.
- Further notes on mapping technique are also available on Canvas.
- For geological field mapping projects, the Department will allow for up to six thin-sections to be prepared for you, so collect samples with this in mind. If you have carbonate rocks, you may also be able to make your own acetate peels for microscope investigations.
- For geochemical field mapping projects the Department will allow for up to 20 samples per pair to be analysed for major dissolved ions (by Ion Chromatography).

BACK IN OXFORD IN MICHAELMAS TERM 2026

Thin Sections
Guidance will be provided regarding preparation of samples for thin sectioning and, with training and oversight, students are expected to cut their own samples. This will happen in weeks 1 and 2 at the beginning of the Michaelmas term of their third year. Thin sections will be returned to students later in Michaelmas Term. Each student can have a maximum of 6 thin sections made, where their mapping group comprises 1 or 2 students; for groups of 3, each student can have a maximum of 4 thin sections made (i.e. a maximum of 12 thin sections per

group). Each group should think carefully about the purpose of each section and avoid any unnecessary duplication (e.g. there may be no point in making thin sections from two different outcrops of the same lithology from the same formation). Thin sections can be shared amongst the group and your own descriptions and/or images can be included, where appropriate, in the final write-up. Note that not all thin sections from your group need to be described either in part or in full in the write-up if the inclusion of additional sections will not add to the substance of your report.

In some mapping areas, thin sections already exist in the Department collections and students will be asked to use these in the first instance.

Geochemical analyses
Students will be trained before fieldwork on the collection of samples and provided with filtration equipment. In week 1, all samples must be submitted in a box, all bottles clearly labelled with sample code, and submitted with a data file (e.g. excel table) which has columns: name of sampler, date, time, X co-ordinates, Y co-ordinates (or these can be latitude and longitude), type (stream, river, spring), field probe measurement values (e.g. pH, temperature, conductivity), general lithology upstream. The datasheet will be printed out and included with the samples. There will be an opportunity to undertake a lab tour and discuss how the samples will be analysed and the quality control steps taken in Michaelmas term of their third year. Data will be returned to students later in Michaelmas term.

What you will eventually need to hand in (Hilary Term 2027)

For Geological Mapping Projects:

A copy of their final report
A paper copy of their A0 mapping poster
Field note books
Field slips
Thin sections and thin section data sheet (containing details of thin section localities and other associated documents

For Geochemical Mapping Projects:

A copy of their final report
A paper copy of their A0 mapping poster
Field note books
Field slips

For Geophysical data analysis Projects:

A copy of their final report
A paper copy of their A0 poster
A catalogue of signals they have identified or described, in a well organised and accessible format. The format should be chosen to be appropriate for the signals of interest.
Representative, readable samples of codes they have used to analyse the data.

THIRD YEAR COURSE

Deadlines

Please note:

1. Some of these dates are based on previous years, and may be subject to change. Every effort will be made to notify students of any changes as soon as possible. In the meantime PLEASE PUT THESE DATES IN YOUR DIARY NOW. You may not receive further reminders about some items.
2. These deadlines relate to departmental business, and you may have other important dates relating to college business.
3. Examination and some field course dates are in italics, as they will be confirmed nearer the time.
4. Deadlines in bold are included in the examination regulations or conventions and you may be penalised by the examiners if you do not meet them. ALL EXAMINATION MATERIAL SHOULD BE HANDED IN TO THE ACADEMIC ADMINISTRATION OFFICE (10.33,ground floor Office Wing near Reception)

TERM	WEEK	DAY	TIME	ITEM
Michaelmas Term	Week 1	Monday	12.00pm	Briefing about rock sample preparation for thin sectioning .
	Week 1	Thursday	4.00pm	Submit scanned copy of field notebooks and field slips via OneDrive.
	Week 4	Thursday	11.00am	*Studying with AI* session
	Week 4	N/A	N/A	3rd year essay approval forms available.
	Week 8	TBA	N/A	Thin sections available for collection.
	Week 8	Friday	N/A	Return essay approval form.
	Week 8	N/A	N/A	Collect mapping questionnaire, for inclusion with mapping project.
Hilary Term	**Week 1**	**Tuesday**	**12.00 noon**	**Submit independent project via Inspera**
	Week 1	**Thursday**	**12.00 noon**	**Submit independent project practical material to Academic Administration Office (10.33)** ***All physical materials should be collected in one box file. All thin sections and OUGS questionnaires should also be handed in with the project.***
	Week 3-4	*TBC*	*TBC*	A list of supervisors and some suggestions for 4th year projects will be available on **Canvas.**
	Week 3-4	*TBC*	*TBC*	Briefing on 4th year project allocation process
	Week 8	Friday	4.00pm	Submit application for research project.
Easter Vacation	*TBC*	*TBC*		*Spain Field course*
Trinity Term	**Week 0**	**Thursday**	**12.00 noon**	**Submit 3rd year essay.**
	Week 4-6	*Days TBA*	*Times TBA*	*Part A examinations*

	Week 7	*Wed - Fri*	N/A	Examiners can request practical work.
	Week 7	*TBC*	*TBC*	Finals Photo
	Week 9	Friday	4pm	Finals Party

Tutorials

The normal frequency of tutorials in the third year is on average one per week.

In Michaelmas Term, each student will receive two Department tutorials - one specific to their type of mapping project and one on scientific literature. For all other tutorials, students should liaise with their college tutors. Tutorials in Michaelmas and Hilary Term should be viewed largely as opportunities to explore aspects of the taught options and to develop and practise practical and computational skills. Tutorial provision will vary between courses and students should not attempt to undertake all possible tutorials and are not expected to complete tutorials across all their options. In general, students should organise their own schedule in liaison with their tutor to meet their interests and academic needs. Details of how tutorials will be coordinated for different options are presented in the table below. Additional to this, college tutors may also organise or suggest other activities that are beneficial to your academic development.

For those of you intending to take, in particular, Geophysics of the Deep Earth, Vector Calculus, or Biological and Physical Oceanography, a short series of tutorials on Linear Algebra will be available from Michaelmas Term onwards. Details will be circulated by email in due course. Linear algebra concepts (e.g. working with data in matrices and vectors) are relevant to those working with any system of equations, which might also be useful for some 4th year projects.
Revision classes and tutorials will be available ahead of the exams in Trinity Term and can be organised by discussing your needs with college tutors in the first instance.

Term	Course name	Faculty lecturers	Examples of tutorial topics/exercises available	Who can students/college tutors contact to access tutorials?
MT	Natural resources and the energy transition	Ballentine, Palin, Blundy	Essay topics or interactive reviews/discussions of any themes in the course	Richard Palin or the DPhil student(s) that demonstrate the course
MT	Analytical methods	Bryson, Cosmidis, Marquardt, Wade	Exploration of some course topics through discussion and questions	James Bryson
MT	Vector Calculus & Continuum Mechanics	Katz	Problem sets	Rich Katz will advertise potential tutors to students during taught course
MT	Plate Tectonics	Palin, Hawthorne	Essay topics or interactive reviews/discussions of any themes in the course	Richard Palin or the DPhil student(s) that demonstrate the course
MT	Biological & Physical Oceanography	Bouman, Johnson	Problem sets	Approach the course organisers
HT	Chemistry of Earth's interior	Ballentine, Wade	Essay topics; geochemical data analysis	Don Porcelli

HT	Geophysics of the deep Earth	Koelemeijer, Pusok, Marquardt	Problem sets	Paula Koelemeijer will advertise potential tutors to students during the taught course
HT	Volcanology, Igneous Processes & Petrogenesis	Pyle, Mather, Aubry	Discussion and written questions around petrogenesis; volcanic eruptions, deposits and hazards; volcanic volatiles and their impacts	Approach the course organisers
HT	Quantitative Palaeobiology	Saupe, Parry	Problem sets	Erin Saupe, Luke Parry
HT	Biogeochemistry of Earth's surface	Robinson, Cosmidis, Hilton	Essay topics; geochemical data analysis; petrology skills	Approach the course organisers

Independent Project

EXAMINATION ENTRY

Examination entry for the 3rd year independent project will consist of three options (assessment codes to be confirmed), of which student should pick their project type:

- Geological Mapping Projects
- Geochemical Mapping Project
- Geophysical Data Analysis Project

There will also be two sub-options for each project type:

- Main project – to be submitted digitally via Inspera by noon on **Tuesday of Week 1, Hilary Term**
- Practical material – to be submitted in hard copy to the Academic Administration Office (10.33) by noon on **Thursday of Week 1, Hilary Term**

PROJECT SUBMISSION

As outlined above, the main project should be submitted digitally via Inspera.

For the practical material, students are required to submit this a single standard box file the physical components. The Academic Office has a limited supply of box files which can be provided on request.

Full details of what is required for each project and guidance on report length, report content and poster content are provided on p98.

Note that failure to submit one or more of the components listed below will result in failure of the entire project.

All hard copy project submissions should include a signed declaration form. Geological and geochemical projects should also submit the Geolsoc Questionnaire and Map in hard copy.

<u>**For Geological Mapping Projects**</u>

To be (submitted digitally via Inspera by noon on Tuesday of Week 1, Hilary Term:
A copy of their final report

To be submitted in hard copy to the Academic Administration Office (10.33) by noon on Thursday of Week 1, Hilary Term

one paper copy of a final map poster;
field note books, field slips, fair-copy maps (if you made one), any field cross sections or stratigraphic logs;
the thin sections you had prepared and an associated sample datasheet;

<u>**For Geochemical Mapping Projects**</u>

To be (submitted digitally via Inspera by noon on Tuesday of Week 1, Hilary Term:
A copy of their final report

To be submitted in hard copy to the Academic Administration Office (10.33) by noon on Thursday of Week 1, Hilary Term

one paper copy of a final map poster;
field note books, field slips, fair-copy maps (if you made one), any field cross sections or stratigraphic logs;

<u>**For Geophysical data analysis Projects**</u>

To be (submitted digitally via Inspera by noon on Tuesday of Week 1, Hilary Term:

A copy of their final report;
A catalogue of signals you have identified or described, in a well organised and accessible format. The format should be chosen to be appropriate for the signals of interest.
The code that was written as part of the project that was used to analyse the data shown in the report and on the poster.

To be submitted in hard copy to the Academic Administration Office (10.33) by noon on Thursday of Week 1, Hilary Term

One paper copy of a poster outlining the quantitative analysis of the dataset(s)

POSTER PRINTING

You have access to our A0 printer located on O2 (Office Wing floor 2) at the end of the corridor using the A0 print queue which is set up on the computers in the computing laboratory. You are allowed to print up to six copies, including all drafts and your final copies. To send a job to the printer, you will need to print to the printer named "A0 Follow-Me Queue", separate from the "Follow-Me Queue", and then tap your card to release the print job.

When printing please make sure that you have set the page size correctly and the orientation etc. before you press the "Print" button.

It is advised that you print most of your drafts as A4 pages just to check the layout and only then print a full-sized draft. It is also advised that you plan to print your first full-sized draft well before the deadline. The Department will be closed over Christmas and New Year, so there will be no support staff available to help over that period. Remember that printing a large poster takes some time and printers are finicky, so don't leave it until the last minute!

Any IT issues, please contact the Earth Sciences IT team by submitting a ticket (itsupport@earth.ox.ac.uk). You will have been allocated printing credits to cover the cost of report printing. If you need to trim any excess paper off the edge of your poster there is a large guillotine outside the entrance to O3.

Further details about submitting your project can be found in the <u>appendices</u>. This should be taken as the definitive list of items to be handed in and the format for handing them in.

Practical Work

Please note students should keep hold of any practical work (lab notes, field notebooks etc.) undertaken throughout the year, as 3rd year students may be required to hand in all practical work from second and third year following the Part A2 examinations at the end of third year. It is no longer a requirement to hand in practical work, but the examiners reserve the right to request it. Therefore, students should ensure they have their work from second and third year available to hand in, if requested, in Trinity Term. If the examiners wish to see practical work, they will make a request between Wednesday and Friday of Week 7 in Trinity Term.

Third Year Essay

As part of the third year course, students complete a 4000-word essay on a substantial scientific problem of their choice that is sufficiently unresolved to allow scope for critical evaluation and independent thought. The extended essay is understood by the examiners to be an independent piece of work and written according to the structure and style of a review paper. For example, see the “information for authors” for the journals: Earth Science Reviews:

https://www.sciencedirect.com/journal/earth-science-reviews/publish/guide-for-authors

and the Journal of the Geological Society:

http://www.geolsoc.org.uk/jgs_authorinfo

These provide suggestions of the style, presentation and layout which are appropriate for this essay.

References should be cited in the text using the standard ‘Name-Date’ referencing style, with in-text citations of the author(s) name and date of publication (e.g. Smith, 2009); and references listed in alphabetical order of authors surname in a reference list at the end of the report.

https://libguides.bodleian.ox.ac.uk/reference-management/referencing-styles

Third year essays are entirely independent and have an initial “advisor” rather than a supervisor. The role of the advisor is to help you discuss and refine your ideas for your essay. They can help you define the topic and provide some suggestions for an initial reading list. The advisor should be a member of faculty, an independent research fellow, or, possibly a postdoc. Students should expect to have a meeting of no more than an hour with their advisor, before submitting their chosen title to the Academic Office (see below). No tutorials may be provided, nor any input given by the advisor beyond initial definition of the subject area. We suggest that initially you discuss your ideas with your college tutor, who may suggest who to approach to be the advisor if you do not already have a clear idea. You should start to consider your essay topic and approach an advisor to arrange a meeting by mid Michaelmas term.

The Academic Administration Office will ask you to complete a questionnaire on your third year essay subject area towards the end of Michaelmas Term, via Canvas.

The arrangements for approving essay titles and for regulating the amount of interaction with members of academic staff are laid down by the Faculty’s Teaching Committee.

The examiners will reward very clearly written essays that assimilate existing information and demonstrate critical skills and demonstrate a familiarity with, and an understanding of, a significant amount of primary literature, originality, and well-argued independent thought.

Further information about submitting your essay is available in the appendices.

Examinations

Please see Appendix 1: Examining Conventions.

COURSE STRUCTURE

COURSE STRUCTURE
3rd year, 2025-26

Each student takes 6 optional papers

Michaelmas Term	Hilary Term	Trinity Term Revision
Paper 2 (A18818W1) **Natural Resources and the Energy transition** Palin (12), Ballentine (10), Blundy (2) 24	*Paper 10 (A18471W1)* **Chemistry of Earth's interior** Ballentine (15)), Wade (9) 24	
Paper 1 (A18468W1) **Analytical methods** Bryson (6), Cosmidis (6), Marquardt (6), Wade (6) 24	*Paper 9 (A18472W1)* **Geophysics of the deep Earth** Marquardt (8), Koelemeijer (8), Pusok (8) 24	
Paper 5 (A18469W1) **Vector Calculus and Continuum Mechanics** Katz 24	*Paper 6 (A14882W1)* **Volcanology, Igneous Processes & Petrogenesis** Pyle (6), Mather (12), Aubry (6): 24	
Paper 8 (A17843W1) **Plate Tectonics** Palin (12), Hawthorne (12) 24	*Paper 7 (A13478W1)* **Quantitative Palaeobiology** Saupe (12) & Parry (12) 24	
Paper 3 (A10647W1) **Biological & Physical Oceanography** Bouman (9), Johnson (9), Vogt-Vincent (6) 24	*Paper 4 (A18819W1)* **Biogeochemistry of Earth's surface** Cosmidis (6), Hilton (8), Robinson (10) 24	

L=Lecture
P=Practical

Fieldtrips:
Spain

Course Synopses

Reading lists can be found on the Canvas page for each module.

Details of all courses, including reading lists and lecturers, may be subject to change by individual instructors.

Studying with AI: Academic Integrity

This mandatory study skills session will be held on Thursday 6 November. This interactive session will cover plagiarism and the university's policy on usage of AI software. We will also give a recap on academic quality resources to help you prepare your 3rd year essays and planning your fourth-year projects.

Discussion Session with Luke Parry & Elizabeth Crowley: 11 AM, Thursday 6th November (4th week), Seminar 2
Hands-On Session with Rachel Scanlon & Elizabeth Crowley: midday, Thursday 6th November (4th week), Computing Lab

Prerequisites for 4th year options

4th year options for 2025-26 have the following prerequisites:

Paper 1: Palaeobiology – it is recommended students take the 3rd year Quantitative Palaeobiology option, but students who wish to take the 4th year option will be considered on a case by case basis.

Paper 2: Planetary Science – none.

Paper 3: Structure & Dynamics of the Earth's Mantle – it is recommended that students take Geophysics of the Deep Earth in the 3rd year, but reading can be suggested if they have not.

Paper 4: Co-evolution of Earth and Life – it is useful for students to take 3rd year Biogeochemistry of the Earth's surface and/or Quantitative Palaeobiology, but not essential.

Paper 5: Rock & Palaeo-magnetism – none.

Paper 6: Environmental Geophysics – it is useful but not essential for students to take the 3rd year Natural Resources and Geophysics of the Deep Earth options.

Paper 7: Topics in Volcanology – it is recommended that students take the 3rd year Volcanology option, but reading can be suggested if they have not. The Greek field trip to Santorini is also a good starting point for those who don't take 3rd year volcanology.

Paper 8: Topics in Climate Science – it is recommended that students take the 3rd year Biological & Physical Oceanography option, but reading can be suggested if they have not.

Paper 1. Analytical Methods

Prof J Bryson, Prof J Cosmidis, Prof H Marquardt, Prof J Wade

The analytical methods course will introduce the theory behind a range of common analytical tools used Earth Sciences and complement this with hands on experience in the labs within the Department. The course is designed to introduce a fundamental understanding and provide hands-on experience ahead of fourth year projects that use these techniques. The course will be taught in two-week portions:

1. James Bryson: Microscopy
2. Jon Wade: Compositional Measurements
3. Luca Stigliano & TBC: Diffaction & Mass spectrometry
4. Julie Cosmidis: Spectroscopy

Each section will typically include 3 one-hour lectures on the methods, followed by one three-hour slot in the lab demonstrating the concepts learnt in the lectures. We will discuss both how to collect and analyse data from these methods.

Paper 2: Natural Resources and the Energy Transition

Prof R Palin, Prof C Ballentine, Prof J Blundy

This is an 8-week course divided into two main streams. Firstly, focused on the processes by which metals are concentrated in the Earth's crust, and the tectonic settings within which these processes take place. Secondly, how we understand the fluid environment which controls groundwater, hydrocarbon migration, and unconventional related resources. The interface between metals and fluids will focus on metal-bearing brines.

The topics covered include: introduction to mineral resources, igneous, magmatic, magmatic-hydrothermal, sedimentary, surficial, and supergene-ore forming processes, metamorphic ore deposits, and ore deposits in a global context. General overview of geohydrology and water as a resource. Review of the petroleum system (source rocks, hydrocarbon generation, primary and secondary hydrocarbon migration, reservoir rocks, traps and seals) and how we apply this to model unconventional resource exploration (helium, natural hydrogen). Reference will be made to Carbon Capture and Storage, Nuclear Waste disposal and Geothermal Resource. Recovering metal from geothermal systems.

Paper 3: Biological & Physical Oceanography

Prof H Bouman &, Prof H Johnson, & Prof N Vogt-Vincent

Outline

Biological Oceanography
Prof H Bouman & Prof N Vogt-Vincent
12 Lectures

This course aims to explore some of the basic principles of biological oceanography. The course will explore the relationship between the physicochemical properties of the marine environment and planktonic communities, including phytoplankton, bacteria, and zooplankton, as well as trophic dynamics in marine food webs. The use of in situ and satellite observations to study the spatial and temporal patterns in the distribution and abundance of marine organisms will be explained through both lectures and practical demonstrations. The role of ocean biota in global biogeochemical cycles will also be discussed.

Physical Oceanography
Prof H Johnson & Prof N Vogt-Vincent
8 Lectures, 4 Problem Classes

The aim of this course is to develop simple dynamical models that explain the observed structure and underlying causes of the large-scale ocean circulation.

L1: Observing the ocean.
L2: The wind-driven circulation re-visited.
L3-5: Western boundary currents and the homogeneous model for wind-driven gyres.
L6: Vertical structure of wind-driven gyres.
L7: Structure of the overturning circulation.
L8: Multiple equilibria and abrupt change of the overturning circulation.

The Physical Oceanography part of the course will rely heavily on the material taught in Planet Earth (Physics of the Atmosphere and Ocean) which you should review before we get started.

Practicals and techniques learned/used:
- Manipulation of equations and basic calculations.
- Computational analysis of data.
- Scientific reasoning.

Suggested Texts

Physical Oceanography
Students do not need to buy a textbook but will find helpful material in the following, which are all available in the Department and College libraries:

- *Ocean Dynamics and the Carbon Cycle*, Williams and Follows, Cambridge University Press

An excellent book that covers the material in this module at an appropriate level.

- *Atmosphere, Ocean and Climate Dynamics*, Marshall and Plumb, Elsevier

Another really good resource for this module.

- *Introduction to Physical Oceanography*, Stewart, Academic Press

A free textbook (http://oceanworld.tamu.edu/home/course_book.htm) that covers some of the material and can be downloaded as a PDF.

- *Ocean Circulation*, Open University Course Team, Pergamon Press

Gives a very good introduction to some of the more basic dynamical concepts, with very few mathematical details.

- *Atmospheric and Oceanic Fluid Dynamics*, Vallis, Cambridge University Press

Good textbook that covers all the material in this module including mathematical derivations, although aimed at a higher level.

Paper 4. Biogeochemistry of the Earth's Surface

Prof J Cosmidis, Prof B Hilton, Prof S Robinson

The course aims to provide an overview of a range of biogeochemical processes and their products based on modern observations, experimental approaches and the geological record. The course starts by examining modern day Earth Surface Geochemistry, where a suite of inorganic and biological processes act to cycle carbon and other elements between the atmosphere, land and oceans. The course will then investigate microbial processes in modern settings, focusing on how microbial metabolisms impact both fluid chemistry and mineralogy in depositional environments. We will seek to understand what traces of these microbial processes (biosignatures) can be recorded over geological time scales. Finally, the course will explore how modern surficial inorganic and biological geochemical processes are recorded by the geological record through lithologies and geochemical proxies. We will explore how we can reconstruct past ocean chemistry and carbon cycling and the importance of consideration of diagenetic processes.

Lectures and practicals will explore the following themes:

Weathering and its role in the carbon cycle;
Aqueous geochemistry of rivers;
How and why organic matter persists in soils and sediments;
Microbial carbonates
Microbial cycling of key redox sensitive elements, S, Fe and P
Microbial biosignatures
Chemical sediments as archives of Earth's past surface biogeochemistry
Using carbonates as archives of past weathering and sea-water chemistry
Fidelity and assessment of archives of past seawater chemistry

Paper 5: Vector Calculus & Continuum Mechanics

Prof R Katz

This course aims to teach you the most important concepts and methods of vector calculus, and hence provide you with a basis to understand the great field theories of physics. It introduces you to one of these field theories, continuum mechanics, and develops the equations of viscous fluids and elastic solids. Unusually for an introductory course, it also introduces viscoelasticity. Although there are a few applications to geoscience, this is mostly a mathematics/physics course that prepares you for quantitative topics in geophysics (seismology, mantle convection, ocean circulation, etc).

We cover: Integrating along curves, surfaces and volumes; vector operators Div, Grad and Curl; integral theorems (Divergence theorem and Stokes theorem); Laplace and Poisson equations and solutions; tensors and tensor fields; Lagrangian acceleration of continua; Cauchy stress balance in a continuum; rheological models of fluids and solids; mass and momentum conservation equations; incompressible flow; rotating flow; elastodynamics; elastic waves; thin-plate theory.

This course is strongly encouraged for those taking 3rd year Geophysics of the Deep Earth. It will help your understanding in courses on oceanography and climate.

The course will follow a detailed set of course notes that will be published on Canvas.

Paper 6: Volcanology, Igneous Petrogenesis & Petrogenesis

Prof T Mather, Prof D Pyle & Prof T Aubry

General themes and outcomes
This 24-hour course will provide an understanding of the ways in which volcanoes can erupt, the products of various types of eruption, the environmental and climatic impacts of eruptions and the formation and evolution of magmas. We use some case studies of eruptions, and some examples of magmatism in rifts and subduction zones to explore the guiding concepts.

Course outline
Each week, we will have either a 1-hour lecture accompanied by a 2-hour problems class, or two hours of lectures and a 1-hour problems class. Practicals are used to cement concepts introduced in the lectures.

Topics covered include:

- Volcanic volatiles – introduction: explores what they are, how they are measured, where they come from and the factors governing the composition of emitted gases.
- Volcanic volatiles – impacts: explores the range and timescale of different styles of volcanic emissions.
- Volcanic volatiles – eruption styles: explores the connections between magmatic volatile contents, material properties, magma dynamics and eruption styles and cyclicity.
- Volcanic eruptions: processes, deposits, sizes and impacts.
- Volcanic products: formation and evolution of magmas.
- Volcanic eruptions: case studies.
- Magmatism in volcanic arcs.

Practicals and techniques learned/used
Specific skills acquired/revised will include:

- Be able to calculate volcanic fluxes from simplified field data, including the petrological method, and comment on degassing processes in light of such data
- Use volcanic degassing budget, eruption style and environmental archive data to comment on the likely impact of volcanic activity
- Conceptual understanding of magma dynamic models of degassing and eruption style
- Interpretation of processes of emplacement from volcanic deposits
- Analysis and interpretation of geochemical data from volcanic rocks and minerals to understand processes of magma formation and evolution.

Exam descriptor
Multi-part questions with some calculation, some conceptual and some descriptive parts.

Paper 7. Quantitative Palaeobiology

Prof L Parry & Prof E Saupe

The aim of this 24-hour course is to examine the history of life on Earth and the processes that have governed its evolution. The course will provide a quantitative framework for understanding both small-scale evolutionary changes and broad-scale evolutionary processes, including speciation and extinction. Students will learn how to tell evolutionary time, to understand what the fossil record can tell us about life's great transformations, and to interpret large-scale patterns of change over geological time. Practicals will provide an opportunity to hone analytical skills by estimating processes such as drift and selection, modelling the birth and death of lineages, and inferring phylogenetic trees.

Paper 8. Plate Tectonics

Prof R Palin & Prof J Hawthorne

Course description
Introduction to the theory of plate tectonics as a first-order framework with which the evolution of the Earth's lithosphere in space and time may be described and understood. Key topics include: the mechanisms of mountain building, crustal growth and destruction, volcanism and seismicity in intraplate and plate-margin setting; secular changes in plate tectonic processes and products over geological; the relationships between plate tectonics and ore deposits, and also the evolution of life; and regional case studies of modern-day tectonic environments and the processes that occur there. Laboratory exercises will involve qualitative and quantitative analysis of geophysical, geochemical, geochronological, and petrological data and techniques that constrain the large-scale dynamics of the Earth.

Course aims
- Familiarize you with how the Earth 'works' and how the processes and products of plate tectonics – which are many – have evolved over time
- Learn how to describe and interpret tectonic features (at various scales) in terms of the fundamental geological processes that formed them
- Examine Earth's place within the solar system, and consider why other planets may not 'operate' in the same way, but are still geologically active

You will use tools and techniques developed to qualitatively describe and quantitatively constrain the physico-chemical conditions that characterize (or at one time characterized) the Earth, today and in the geological past. Lectures will focus on processes and more theoretical aspects of plate tectonics and large-scale planetary evolution, with this knowledge being applied in the labs. It is assumed at the start of the course that you possess a basic understanding of petrology and tectonics.

Paper 9. Geophysics of the deep Earth

Prof P. Koelemeijer, Prof Walker & Dr A Pusok

1. Seismology: seismic waves and internal structure (Koelemeijer)
- (a) Introduction to seismology, inverse problems (1 lectures)
- (b) Seismic data (Body waves, surface waves, normal modes) (3 lectures)
- (c) The 1D Earth (1 lecture)
- (d) The 3D Earth from seismic tomography (1 lecture)
- (e) Beyond tomography (1 lecture) + 1-2 tutorials

2. Mineral physics: materials, properties and structure ()
- (a) Physical properties, elasticity, plasticity, transport properties (2 lectures)
- (b) Mineralogy of the Earth, and how do we know it (2 lecture)
- (c) Mantle phase transitions and impact on physical properties (1 lecture)
- (d) Techniques to measure/compute relevant properties (2 lecture) + optional lab tutorial

3. Geodynamics: convection, tectonics and heat flow (Katz)
- (a) Rayleigh-Benard convection (2 lectures)
- (b) Mantle convection and plate tectonics (2 lectures)
- (c) Secular cooling of the whole Earth (1 lecture and 1 computer lab)
- (d) Cooling and subsidence of the ocean floor (1 lecture).

4. Interdisciplinary and advanced topics (all)
- (a) Upper mantle (Katz)
- (b) Mid mantle (Walker)
- (c) Core-mantle boundary (Koelemeijer)

Paper 10. Chemistry of Earth's interior

Prof C Ballentine & Prof J Wade

The course will cover the chemical structure, dynamics, and evolution of the Earth's interior. This will include the chemical composition and heterogeneity of the major reservoirs, the formation of the core and lithosphere, heat production, the distribution of volatiles, cycling of water, the redox state of the mantle, and model approaches for understanding recycling and mantle evolution. There will be a balance of lectures and practicals.

FIELD COURSES

Health Issues

If students have any health issues that may affect their participation in a field course, they will be asked to provide a letter from their GP confirming that they are fit to participate in the various aspects of the course (a list of specific points for your GP to respond to will be provided). **It is the responsibility of the student to ensure that the field course leader and academic administration staff are aware of their health issues.** The student should ensure they discuss with them how their health issues might affect participation in the field course and any special requirements that need to be addressed, in good time before the field course.

Alternative Travel Arrangements

We encourage students to travel with the main group as much as is practicable.

Students who do not intend to travel as part of the main group for field courses must inform the Academic Office as soon as possible. **Students must make their own arrangements to and from an agreed location** (such as the airport or accommodation) and they must work around the timings of the group. For example, if the course includes a flight the student must arrive at the airport before or at the same time as the group so as to not cause a delay, and on the return they must depart at the same time or later than the group.

For courses with flights, students can be reimbursed for their alternative travel arrangements up to the cost of the flights per person on the group booking, minus any cost that the Department may have already paid and cannot reclaim. An eExpenses Claim Form must be completed, and submitted with original itemised receipts (https://finance.admin.ox.ac.uk/claiming-expenses-departmental-guidance). Details will be provided on request.

For courses without flights, alternative travel arrangements would be at the student's own expense as the Department would still incur the cost of the coach.

Some field courses may be self-catered and where this is the case you will receive a subsistence payment towards the cost of your food; if you will be missing any part of the field course (with prior agreement from your College Tutor and the Field Course Leader), your subsistence payment will be adjusted to take this into account.

Safety Briefings

A safety briefing will be held for each field course. These briefings are mandatory for all students attending the field course, non-attendance without prior agreement with the Field Course Leader, or without sufficient reason (e.g. illness) may result in a student being denied a place on the field course. We reserve the right to seek reimbursement from the student for any expenditure that cannot be recouped from suppliers as a result of their failure to attend a field course due to missing the safety briefing.

Accommodation and Catering

Please note that accommodation will likely require students to share rooms, in the case of some accommodations these will be dorm rooms. If you require your own room this must be supported by a Student Support Plan (SSP) issued by the Disability Advisory Service (DAS) (https://www.ox.ac.uk/students/welfare/disability); please note that we cannot guarantee that a single room can be provided, even with an SSP, but we will do our best.

Before each field course you will be asked to complete a Basic Information survey, this survey is a way for us to gather details such as who you would prefer to share a room with, if you are discussing an SSP but do not yet have one, if you have any medical or dietary requirements, etc. If you do not complete this survey by the deadline we will do our best to arrange the field course with the information we have on your student record and from information you provided for previous field courses.

Some field courses will be catered and you will need to declare any dietary requirements ahead of time so that the caterer can order appropriate food. Other field courses will be self-catered, and you will be expected to work with other students who you share accommodation with (such as a caravan) to plan and cook your meals; for these field courses there will be an opportunity to purchase food at the start of the field course and a subsistence allowance will be provided (the amount will vary depending on the field course, and will be reduced accordingly if you plan to miss any part of the course). To be able to process subsistence payments (where necessary), you will be asked to complete a form with your bank details; a deadline will be communicated when the form is circulated and any late requests for payments will not be accepted.

Sometimes the transport for a field course will leave very early in the morning, out of term. Students are not permitted to stay overnight in the building as the Department is not insured for this. If you do not have accommodation for the night prior to departure, you should contact your college to arrange this.

Spain

The third-year field trip to Spain is a synoptic field trip, that will bring together many aspects of the course. It is based in a field-centre in Urra, in the centre of the Sorbas basin, Almería, southern Spain. The spectacular setting provides a wide-ranging introduction to the geology and tectonics of Almería. The geological history mainly relates to the past 20-30 Ma, during which a mountain range formed, and then collapsed; a volcanic arc was active, and then burnt out; and a series of basins adjoining the Mediterranean sea formed, filled with clastic sediments and carbonates, and then dried out, leaving a gypsum crust across the landscape. The location also offers multiple challenges for earth and environmental scientists to address: from the legacies of mining, to the impacts of water extraction, climate change, and natural hazards.

4th Year Field courses

Students will be consulted on the fourth year field course in Trinity Term, and will be asked to choose whether they wished to attend the Greece or Bermuda field course. Further information on both courses can be found in the 4th year section of this handbook.

Fourth Year Research Projects

In the fourth year, students carry out a research project under the supervision of a member of the academic staff. The purpose of the project is to introduce students to scientific research first hand. In most cases, students work as part of a team on a topic that may involve laboratory work, computation, or fieldwork. The projects suggested include those of a geological, geochemical and geophysical nature, and may also be of a theoretical or an observational character.

Allocation process

Third-year students should start to give some thought to project areas and potential supervisors they may be interested in by the beginning of Hilary Term of third year. Early in Hilary Term a member of the Faculty will give a brief introduction to the process of choosing a project, and the nature of project work (etc.), in a one hour timetabled presentation. All of this information will also be made available on Canvas, including a listing of Faculty and the projects being offered. Reports of past projects can also be found in the library, and former students are also valuable sources of information about project areas and potential project supervisors. We aim to provide an updated list of possible projects suggested by staff for circulation by Week 4 of Hilary Term.

The choice and definition of a research project is first and foremost the responsibility of the student. Students should examine the list of advertised projects carefully and are encouraged to discuss projects of interest with the relevant supervisors. These projects will all have been financially and logistically pre-approved by the Academic Administrator, Head of Teaching and Undergraduate Course Advisor. Students can also suggest projects of their own based on their aptitudes and interests. Your suggested potential projects should be discussed with appropriate members of staff and/or your tutor at an early stage in Hilary Term. Please approach the potential supervisor with a short proposal of around 200 words initially.

Students should complete a Canvas questionnaire (which will be made available in Hilary Term) on their project choices by the end of Week 8 of Hilary Term. All choices should have been discussed with, and, if self-designed, nominally approved by, the potential supervisor(s). Students will be asked to submit 4 choices, ranked in order of preference. In order to ensure everyone receives a project they are happy with, it is essential that four choices are provided. Students designing their own project with a supervisor should still submit 4 choices as a 'self-designed' project will still need to be approved by the Academic Administrator, Head of Teaching and Undergraduate Course Advisor. They may also consult Teaching Committee. Any students experiencing difficulty identifying project areas should discuss this with their college tutor at an early stage.

Approved projects will be allocated according to the students' preferences as far as possible, but subject to the proviso that no individual supervisor will usually have a load of more than two full projects (or equivalent). We will endeavour to inform students of their project allocation by the beginning of Trinity Term. For most projects this will leave plenty of time for planning and seeking financial support (e.g. for projects involving fieldwork). The project allocation process aims to achieve a complex balance between student's choices, supervisor workload and the projects that are available – once project allocation is complete there is limited scope to change, so please consider your choices carefully!

Timetable for project work and the long vacation

The 4th year research project should be a project that is self-contained, and started and completed by the student during their final academic year. There should be no expectation that the student will undertake laboratory training, data collection or analysis during the vacation (i.e. before Week 0 of the Michaelmas Term of their 4th year). Occasionally, there may be excellent projects which could only be completed if the student was to start working over the summer vacation e.g. for sample collection in the field, or an external laboratory, such as a national facility. Where this is necessary this should be made very clear in the project proposal and supervisor and student should outline how the student will be supported, financially and practically.

The time available to students between the end of their third year exams (in early June) and the late September field class/start of term in October offers an opportunity for students to undertake paid internships, paid summer research placements or other employment at a very important stage in terms of their course progression, and their exploration of future post-graduate opportunities. For many reasons, it would be beneficial to students to take up such paid opportunities outside the department, and in areas which are not related to their final-year project. Our primary focus is on supporting students' opportunities to gain wider experience during their final vacation as undergraduates. In some cases, summer placement work may have direct relevance to 4th year projects. Students who wish to use work completed on summer placements towards a project may be able to do so, subject to approval by the Head of Teaching, Undergraduate Course Advisor and Chair of Examiners. In examples where summer placements are not firmed up until later in Hilary or Trinity terms, the students should nonetheless submit an application to the Head of Teaching with as much detail as possible. Finally, during the summer vacation students are free in their own time, if they choose, to prepare for their project by, for example, reading around the topic, learning a new programming language or practising using a piece of software. However, in general they should not be conducting research that will be presented in their final project.

Project fieldwork

If you will be undertaking fieldwork in relation to your project, you or your supervisor must submit a risk assessment form to the Department Fieldwork Safety Supervisor at least three weeks before departure. Once the form has been approved and signed you should submit it to the Academic Administration Office, and upload it with your travel insurance application:

(http://www.admin.ox.ac.uk/finance/insurance/travel/). Please discuss this with your supervisor and organise this with them well in advance of travel.

FOURTH YEAR COURSE

Deadlines

Please note:

1. Some of these dates are based on previous years, and may be subject to change. Every effort will be made to notify students of any changes as soon as possible. In the meantime PLEASE PUT THESE DATES IN YOUR DIARY NOW. You may not receive further reminders about some items.

2. These deadlines relate to departmental business, and you may have other important dates relating to college business.

3. Examination and some field course dates are in italics, as they will be confirmed nearer the time.

4. Deadlines in bold are included in the examination regulations or conventions and you may be penalised by the examiners if you do not meet them.

TERM	WEEK	DAY	TIME	ITEM
Michaelmas Term	N/A	21-29 Sept		Bermuda field course
	N/A	21 Sept-1 Oct		Greece field course
Hilary Term	Week 1	Friday	12.00pm	Submit up to 8-page project progress report to supervisor
Trinity Term	Week 0	Friday	N/A	Submit first draft of 4th year project to supervisor
	Week 1	Friday	N/A	Supervisor to return draft project to student
	Week 2	**Thursday**	**12.00pm**	**Submit 4th year project**
	Week 3/4/5/6	*Date TBA*	*Time TBA*	*Project viva with project markers*
	Week 7	*Dates TBA*	*Times TBA*	*Part B examinations*
	Week 9	*TBC*	*TBA*	*Vivas with External Examiner*
	Week 9	Friday	4pm	Finals Party

Fourth Year Research Projects

In the fourth year, students carry out a research project under the supervision of a member of the academic staff. The purpose of the project is to introduce students to scientific research first hand. In most cases, students work as part of a team on a topic that may involve laboratory work, computation, or fieldwork. You should already have been allocated a project and supervisor before the end of your third year.

Responsibility for the project lies with the student and you should be proactive in seeking support and guidance as you complete your project. **If you experience any problems with your project at any point, please ensure you discuss this with somebody as soon as possible. If you feel unable to approach your supervisor, please contact your tutor, the Undergraduate Advisor, Head of teaching, or one of the academic administration team.**

In early Hilary Term, the Undergraduate Advisor and Head of Teaching will advertise office hours for students to discuss any project concerns confidentially.

Information about submitting your project is available in the appendices.

Supervision and training

Students should expect to have regular contact with their supervisor(s) over the course of the project, with more intensive support being usual in the initial and final stages of the project. Usually this will be a minimum of an hour per week during Michaelmas and Hilary Terms, or eight hours per term for both terms. Students should discuss the pattern of project supervision with their supervisor(s) at an early stage of the project. The support given by supervisors in meetings, or by email, may include formal discussion of research, feedback on the student's writing, analysis of results and direction to the relevant literature, as well as discussions of anything else needed for the investigations to progress smoothly. Further support will be given in the techniques required for the student to carry out their research including, for example, training in software, use of equipment, and so on. Students should note that (i) it is in the nature of research that not all projects will require the same type or level of support and (ii) for some projects the supervisor will personally deliver specialist training, whilst for others training and advice may be provided by technical staff or researchers associated with the research area. Students should also note that access to and use of departmental facilities (e.g. the SEM, etc.) will often require advance booking and discussion with the appropriate technical or research staff. Students are encouraged to discuss their likely requirements with their supervisors and plan their work accordingly.

Formal supervision of the project ends at the end of Week 0 of Trinity Term, with the submission of the draft project to the lead supervisor. After this point, the only feedback on the project will be the one-page review by the supervisor; it is the responsibility of the student to complete the final revisions to the project.

Progress Report

Students should submit an 8-page progress report to their supervisor by Friday of Week 1 in Hilary Term. This is an informal process, and is not examinable. The aim is to provide an additional opportunity for feedback whilst the project is still in progress. There are no formal requirements for the format of the report, but it might typically include a short introduction to the project, some preliminary data or analysis of the work in progress, and a plan for the work remaining to be done. Feedback will be provided by the supervisory in a timely manner (confirmed within 1 week of submission by the student) and should be received before the end of 4th week at the latest.

Project fieldwork

If you will be undertaking fieldwork in relation to your project, you or your supervisor must submit a Risk Assessment form to the Department Fieldwork Safety Supervisor at least three weeks before departure. Once the form has been approved and signed you should submit it to the Academic Administration Office and upload it with your travel insurance application

(http://www.admin.ox.ac.uk/finance/insurance/travel/). Please discuss this with your supervisor and organise this with them well in advance of travel.

Tutorials

There are no formal tutorials in year four, where instead you will receive close project supervision from one or more project supervisors.

Revision tutorials or classes are not available for 4th year options, as, based on past experience, we believe that they are of limited assistance for students at this stage of their academic careers and the style of assessments. Instead we feel it is more helpful to summarise some advice about the exams:

- Do look at the mark scheme for written answers that is in the handbook — this is the guide we use when marking.

- If you are aiming for a first-class mark, you will need to do considerable reading in addition to what was assigned in the course. A high scoring (i.e. 80+) first-class-level answer will likely refer to relevant ideas, methods and questions beyond those explored in detail in the course or provided on the reading list, and make insightful connections and comparisons.

Two suggestions to achieve high marks (i.e., going beyond just reviewing the papers/notes from the course):
- Find a recent review article on topics you think might be on the exam and try to produce a written outline of its arguments.
- Amongst the papers cited in that review, look for the most cited, download them, and try to produce a half-page summary of each.

Practise planning coherent, logically-structured answers to past questions and thinking about which papers would be relevant to cite and/or describe in more detail in that context. A well-organised answer that refers to literature and ideas explored in the course, and beyond, stands a good chance of getting good marks (i.e. solid 2:1 and above) – disorganised answers are likely to fare more poorly.

Examinations

Please see Appendix 1: Examining Conventions.

COURSE STRUCTURE

4th year, 2025-26

Each student takes 4 optional papers, plus 4th year project.

Michaelmas Term	Hilary Term	Trinity Term Revision
Paper 6 (A18473W1) **Environmental Geophysics** Hawthorne, R. Walker 16	*Paper 2 (A18475W1)* **Planetary Science** Ballentine (8), Wade (4), Nichols (4) 16	
Paper 7 (A10817W1) **Topics in Volcanology** Pyle (4), Mather (4), Blundy (4), Aubry (4) 16	*Paper 5 (A10822W1)* **Rock & Palaeomagnetism** Mac Niocaill 16	
Paper 8 (A18474W1) **Topics in Climate Science** Bouman, Johnson, Rickaby, Vogt Vincent 16	*Paper 1 (A10818W1)* **Palaeobiology** Saupe (8) and Parry (8) 16	
Paper 4 (A18338W1) **Coevolution of Earth and Life** Anderson , Rickaby , Cosmidis 16	*Paper 3 (A14758W1)* **Structure & Dynamics of the Earth's Mantle** Katz (8), Koelemeijer (8), Marquardt (8) 16	

Fieldtrips:
Greece/Bermuda

Note: 4th year courses are mostly seminar-style

Course Synopses

Reading lists can be found on the Canvas page for each module.

Details of all courses, including reading lists and lecturers, may be subject to change by individual instructors.

Prerequisites for 4th year options

4th year options for 2025-26 have the following prerequisites:

Paper 1: Palaeobiology – it is recommended students take the 3rd year Quantitative Palaeobiology option, but students who wish to take the 4th year option will be considered on a case by case basis.

Paper 2: Planetary Science – none.

Paper 3: Structure & Dynamics of the Earth's Mantle – it is recommended that students take Geophysics of the Deep Earth in the 3rd year, but reading can be suggested if they have not.

Paper 4: Co-evolution of Earth and Life – it is useful for students to take 3rd year Quantitative Palaeobiology, but not essential.

Paper 5: Rock & Palaeo-magnetism – none.

Paper 6: Environmental Geophysics - it is useful but not essential for students to take the 3rd year Natural Resources and Geophysics of the Deep Earth options.

Paper 7: Topics in Volcanology – it is recommended that students take the 3rd year Volcanology option, but reading can be suggested if they have not. The Greek field trip to Santorini is also a good starting point for those who don't take 3rd year volcanology.

Paper 8: Topics in Climate Science – it is recommended that students take the 3rd year Biological & Physical Oceanography option, but reading can be suggested if they have not.

Paper 1: Palaeobiology

Prof E Saupe & Prof L Parry

Topics will address major current debates and controversies in the fields of Palaeobiology and Evolution. For example: How reliable is the fossil record? Major evolutionary radiations. Biodiversity through time. Animal origins and the Cambrian Explosion. Dinosaur palaeobiology, evolution and the origin of birds. Hominid origins and evolution. Neanderthals and the origin of anatomically modern humans. The order and selection of these topics may vary depending on student interest.

Paper 2: Planetary Science

Prof C Ballentine, Prof J Wade, & Prof C Nichols

The course will examine the processes involved in solar system formation and establish the large-scale chemistry of the Earth. Topics will include solar nebula condensation, growth of planets, timing of Earth formation and segregation of the core, evolution of Mars, redox state of the Earth, the distribution of water within the Earth and the formation of a habitable planet. The classes adopt the style of a research seminar with students presenting a synthesis of research papers each week for discussion.

Paper 3: Structure & Dynamics of the Earth's Mantle

Prof R Katz, Prof P Koelemeijer & Prof H Marquardt

The course is primarily designed to address the question, "How do the dynamics and material properties of the mantle give rise to plate tectonics?". Topics to be covered include: forces giving rise to plate motions; the basic material requirements of plate tectonics; the transition between brittle fracture and ductile flow; the asthenosphere; mid-ocean ridge processes; subduction-zone processes; whole mantle upwellings, phase transitions in the deep mantle and the fate of subducted slabs. This multidisciplinary course is organized around student presentations and discussions of chosen papers, as well as brief introductory or background material presented by the lecturers.

Paper 4: Coevolution of Earth and Life

Prof J Cosmidis, Prof R Rickaby & Dr R Anderson

This option considers how life and the environment have coevolved in a constant feedback between the geosphere and the biosphere to try and understand how key controls of the biogeochemistry and climate have evolved. The course is run principally as a seminar series in which all students will have an opportunity to discuss key papers on particular topics or themes which may well run across the course of Earth history. Typical topics covered include origin of life, oxygenation of the planet, the emergence and feedback between biomineralisers and photosynthesises, and confront the topics of the Anthropocene and whether Gaia exists.

Exam descriptor
Usually multi-part questions based on data interpretation and/or answering a high-level question using the literature assimilated by the student over the course.

Paper 5: Rock and Palaeo-magnetism

Prof C MacNiocaill

The magnetic record in rocks and minerals carries information that can be used to study problems in a very diverse range of geological, environmental and archaeological fields. This course will cover the fundamental physics that underpins the technique, and will use case studies to illustrate the application of the technique. These may include:- the dynamics of Earth's magnetic field; the fundamentals of rock and mineral magnetism; studies of climate change through magnetic properties of sediments and soils; the emplacement temperatures and transport dynamics of pyroclastic flows; aspects of continental deformation and terrane migration; and plate motions, the fixity of hotspots and geodynamic reference frames.

Paper 6: Environmental Geophysics

Prof R Walker & Prof J Hawthorne

The aim of this course is to provide an introduction to the geophysical methods that are used in geotechnical engineering. An objective is to provide students with exposure to real-world industry applications. The format of the course will include an overview of basic principles, coupled with presentations from industry experts, including a lecture on entrepreneurialism and business ethics. Topics covered include: landslides and slope stability; windfarms siting; carbon capture and geologic storage; and seismic risk and hazard assessment. Each topic will be covered with two hours of lectures and a one hour small-group student presentation.

Paper 7: Topics in Volcanology

Prof D Pyle, Prof T Mather, Prof J Blundy & Prof T Aubry

General themes and outcomes
This course will focus on a range of current problems in volcanology, through a series of eight 2-hour seminars. The first 2-hour session will provide an introduction to the course, and will cover some introductory material. For each of the following weeks we shall pose a question, which will set the theme for the papers under discussion. Everyone attending the course will be expected to read 4-6 papers each week. The first paper or papers will be either recent review or overview papers, or some that present the "current" consensus view. The other three papers will present more specific view points on the subject and will be the focus of the student-led seminars and discussion. Topics that we shall cover will include the atmospheric and environmental impacts of volcanic emissions and hazard, risk and predictability of eruptions, magmatic plumbing systems and volcanoes and geothermal systems as resources. The last session of the term is usually a team 'pitch' session where students frame a future research programme, or address a challenge, using what they have learnt during the course.

Lecture-by-lecture outline
These vary from year to year as we aim to keep the course refreshed with current topics.

Practicals and techniques learned/used
Specific skills acquired/revised will include:

1. High-level familiarity with the cutting edge of volcanological research
2. Critical reading of the current scientific literature
3. Developing question asking skills
4. Presentation skills

Exam descriptor
Usually multi-part questions based on data interpretation and/or answering a high-level question using the literature assimilated by the student over the course.

Paper 8: Topics in Climate Science

Prof H Bouman, Prof H Johnson, Prof R Rickaby & Prof N Vogt-Vincent

In a series of eight, two-hour, student-led seminars, this course will cover hot research areas in oceanography and climate: subjects where rapid advances are being made, or important problems are being identified. The topics selected will span diverse aspects of oceanography and glaciology including biology, chemistry, physics, as well as the intersections between these areas. Each topic will be introduced briefly by a faculty member, and then covered by a number of student presentations based on set reading and practical exercises. Examples of subjects covered in recent years include:

- Ocean de-oxygenation
- Role of trace metals in the carbon cycle
- Arctic change
- Sea-level
- AMOC and its role in the climate system
- Ice-ocean interactions
- Ice-shelf collapse

There is no set textbook; reading will be from the recent primary literature.

Practicals and techniques learned/used
- Critical reading of scientific literature.
- Conceptual understanding of ocean and cryosphere physical and biogeochemical processes and how we observe and model them.
- Presentation and discussion skills.

Exam descriptor
Usually multi-part questions based on data interpretation and/or essay style answer based on project work and supplementary reading.

FIELD COURSES

Health Issues

If students have any health issues that may affect their participation in a field course, they will be asked to provide a letter from their GP confirming that they are fit to participate in the various aspects of the course (a list of specific points for your GP to respond to will be provided). **It is the responsibility of the student to ensure that the field course leader and academic administration staff are aware of their health issues.** The student should ensure they discuss with them how their health issues might affect participation in the field course and any special requirements that need to be addressed, in good time before the field course.

Alternative Travel Arrangements

We encourage students to travel with the main group as much as is practicable.

Students who do not intend to travel as part of the main group for field courses must inform the Academic Office as soon as possible. **Students must make their own arrangements to and from an agreed location** (such as the airport or accommodation) and they must work around the timings of the group. For example, if the course includes a flight the student must arrive at the airport before or at the same time as the group so as to not cause a delay, and on the return they must depart at the same time or later than the group.

For courses with flights, students can be reimbursed for their alternative travel arrangements up to the cost of the flights per person on the group booking, minus any cost that the Department may have already paid and cannot reclaim. An eExpenses Claim Form must be completed, and submitted with original itemised receipts (https://finance.admin.ox.ac.uk/claiming-expenses-departmental-guidance). Details will be provided on request.

For courses without flights, alternative travel arrangements would be at the student's own expense as the Department would still incur the cost of the coach.

Some field courses may be self-catered and where this is the case you will receive a subsistence payment towards the cost of your food; if you will be missing any part of the field course (with prior agreement from your College Tutor and the Field Course Leader), your subsistence payment will be adjusted to take this into account.

Safety Briefings

A safety briefing will be held for each field course. These briefings are mandatory for all students attending the field course, non-attendance without prior agreement with the Field Course Leader, or without sufficient reason (e.g. illness) may result in a student being denied a place on the field course. We reserve the right to seek reimbursement from the student for any expenditure that cannot be recouped from suppliers as a result of their failure to attend a field course due to missing the safety briefing.

Accommodation and Catering

Please note that accommodation will likely require students to share rooms, in the case of some accommodations these will be dorm rooms. If you require your own room this must be supported by a Student Support Plan (SSP) issued by the Disability Advisory Service (DAS) (https://www.ox.ac.uk/students/welfare/disability); please note that we cannot guarantee that a single room can be provided, even with an SSP, but we will do our best.

Before each field course you will be asked to complete a Basic Information survey, this survey is a way for us to gather details such as who you would prefer to share a room with, if you are discussing an SSP but do not yet have one, if you have any medical or dietary requirements, etc. If you do not complete this survey by the deadline we will do our best to arrange the field course with the information we have on your student record and from information you provided for previous field courses.

Some field courses will be catered and you will need to declare any dietary requirements ahead of time so that the caterer can order appropriate food. Other field courses will be self-catered, and you will be expected to work with other students who you share accommodation with (such as a caravan) to plan and cook your meals; for these field courses there will be an opportunity to purchase food at the start of the field course and a subsistence allowance will be provided (the amount will vary depending on the field course, and will be reduced accordingly if you plan to miss any part of the course). To be able to process subsistence payments (where necessary), you will be asked to complete a form with your bank details; a deadline will be communicated when the form is circulated and any late requests for payments will not be accepted.

Sometimes the transport for a field course will leave very early in the morning, out of term. Students are not permitted to stay overnight in the building as the Department is not insured for this. If you do not have accommodation for the night prior to departure, you should contact your college to arrange this.

Bermuda

This course focuses on oceanography (physical, chemical, and biological); carbonate depositional environments (marine, terrestrial, and karstic), and the connections between climate, oceanographic process and sediment deposition and diaganesis.

The course is hosted at the Bermuda Institute for Ocean Sciences and runs for eight days including travel. Activities include:

i. an overnight excursion on an ocean-going research vessel to experience field-based oceanography in the open Atlantic. This introduces use of CTD and sampling equipment to assess subsurface conditions and investigates the circulation and chemistry of surface and deep-water masses including NADW. The ecosystem of the North Atlantic Gyre is also investigated and samples returned to the labs in BIOS to study species and function.

ii. Excursions on a smaller vessel to areas of the Bermuda coast where the reef environment can be observed from the boat and whilst in the water. These excursions assess both the biological ecosystem, and the production of sediment in a carbonate platform environment. Another excursion assesses the lower oxygen environments of a lagoonal setting.

iii. Evening exercises involve training in the very widely used Ocean Data View software, and investigation of the impressive time series of ocean data from offshore Bermuda to provide context to the observations made in the field.

iv. The carbonate sedimentology of the island is studied during a day excursion around the island, investigating the sequence of dunes and soils that accumulate in response to climate and sea-level change during the Pleistocene.

v. Observations in one of the many caves on Bermuda consider the formation of such karstic features, the development of speleothems, and their use as sealevel and paleoclimate archives.

This course will use and build upon material in the climate, oceanography, sedimentology, and palaeobiology aspects of the undergraduate course.

Greece

This course is a pre-sessional and optional course for a limited number of students.

The Greek field course is mainly concerned with active geological processes, providing several aspects of training not otherwise available in the field programme. One aim is to demonstrate the importance of an integrated geological study that makes use of geophysical and geochemical data, and evidence from sediments and fossils, to build up a picture of active deformation of the continental crust. The course focuses on two related investigations:

1. An active volcano, Santorini, in the Aegean Sea.
2. Active faulting and its effect on sedimentation in the Gulf of Evvia and Gulf of Corinth regions.

The island of Nea Kameni - the site of active volcanism in the centre of the present Santorini caldera. This island is visited by boat during the field course in order to see very recently erupted volcanics, and ongoing hydrothermal activity.

Days 1 to 3 are spent on Santorini, examining the great variety of eruptive rock types and the details of the volcanic sequences related to major eruptions. Evening exercises include using field data to calculate the duration and volume flux of the Minoan eruption. We also see the destructive power of the eruption at the Minoan excavations in Akrotiri.

The Minoan deposits at Oia. The Minoan eruption deposited up to 10 metres of volcanic deposits, initially as fallout, but then as hot pyroclastic flows, about 3600 years ago. This eruption entirely wiped out civilization on the island, and may have played a significant role in the collapse of the Minoan civilization centred on Crete.

Days 4 to 10 are spent on the mainland of Central Greece. We begin in the Locris area, at the north end of the Gulf of Evvia. We learn about the pattern of faulting related to extension of the crust, its control on sedimentation, and the sequence of faulting through time, by observing features of the landscape around Kamena Vourla, Kallidromon, and Parnassos. We then move South to the Gulf of Corinth, stopping on the way to visit the active faulting near Thebes, including the 1981 Plataea-Kaparelli fault scarps. The Gulf of Corinth preserves a variety of sediments deposited during its evolution, and in particular reveals the interplay between movements of the crust and sea-level change.

At the fault face. This large fault surface in limestone, at Arkitsa, close to the south coast of the northern Gulf of Evvia, was revealed when scree covering it was excavated for use in road construction. The fault surface shows prominent striations and corrugations, the orientation of which show an oblique sense of movement associated with the rotation of crustal blocks necessary to accommodate the overall deformation in the region. There is a discoloured band between the excavated fault surface and the vegetation above, which may represent the slip that occurred in the most recent earthquake.

APPENDICES

Appendix 1 – EXAMINING CONVENTIONS

Introduction

Examination conventions are the formal record of the specific assessment standards for the course or courses to which they apply. They set out how examined work will be marked and how the resulting marks will be used to arrive at a final result and classification of an award.

These conventions apply to the 3-year BA in Geology and 4-year MEarthSci in Earth Sciences for the academic year 2025-26. The Departmental Committee of the Department of Earth Sciences is responsible for approving the conventions.

The degree course is divided officially into two sections with a hurdle at the end of the first year. This test, the Preliminary Examination in Earth Sciences (otherwise known as the First Public Examination - or Prelims) must be passed in order to proceed to the Final Honour School (usually shortened to 'Finals') that is examined in years 2, 3 and 4.

PLEASE ALSO REFER TO THE EXAMINATION REGULATIONS FOR THE CURRENT ACADEMIC YEAR.

You can find them online at:

https://examregs.admin.ox.ac.uk/

Examination Entry

This is co-ordinated by the Examination Schools. For details, please see:

http://www.ox.ac.uk/students/academic/exams

www.ox.ac.uk/students/academic/exams/timetables

Past Papers and Exam Reports

Exam reports for the previous academic year are made available to students on Canvas, once they have been approved by the appropriate departmental and University committees. It is usually possible to publish internal reports by the end of Michaelmas Term and external reports (plus departmental response) by the end of Hilary Term. Past papers are also available on Canvas.

Ongoing Feedback

Work completed for some practicals and fieldwork exercises may be assigned a mark that does not aggregate to your degree result. You should use these marks as important indicators of the quality of your work. In addition, tutorial work will also commonly be assessed, and your college will take a keen interest in the standards you achieve. Again, these marks do not contribute to your degree classification, but they do provide valuable feedback to you on your understanding of the material of the course.

Note that finals examiners may take into account **completion** and standards achieved in practical and fieldwork exercises that do not aggregate to your degree result when they set the borderlines between classes of degree.

Students are also provided a wide range of informal feedback in tutorials and in discussions with instructors in classes, practicals, and on field courses.

Notes on Examinations in 2025-26

The format of the Trinity Term 2025 examinations will be as follows:

- CEAS 1st year Prelims examinations will be in-person written exams, and practical coursework submitted throughout the academic year.
- XNEG 2nd year Part A1 will be in-person written exams, and practical coursework submitted throughout the academic year.
- DNEG/DGEL 3rd year Part A2 examinations will be in-person written exams, plus submission of the independent project and extended essay.
- DNES 4th year Part B examinations will be in-person written exams.

Submissions will be digital, via Inspera for the 3rd year extended essay and 4th year project. All other submissions will be hard-copy unless otherwise notified. Details regarding submissions will be circulated closer to the deadlines.

Examining Procedures

University Cards
Candidates must bring their university cards with them.

Candidate numbers
Please ensure you have your candidate number with you (NOTE: this is not the same as your student number). You can locate your candidate number on the Examination and Assessment Information page in Student Self Service or by looking on the top of your individual examination timetable.

Dress for Examinations
In all years, Academic Dress (sub-fusc) must be worn for all examinations, including the practicals and any interviews with external examiners.

Procedure after Examinations
All candidates are reminded of the Proctors' regulations that they should leave the area of the Examination Schools, Ewert House or the Department of Earth Sciences, whichever is applicable, as soon as the papers are ended and not celebrate near the Schools, Ewert House or the department. Candidates should leave the area quietly, in order not to disturb any candidates with extra time still in examinations.

"Trashing" is prohibited by university regulations:

https://www.ox.ac.uk/students/academic/exams/behaviour-after-exams?wssl=1

Calculators, books, etc. in Examinations

Calculators
1. The candidate shall ensure that the power supply of the calculator is adequately charged.
2. No calculator for which a mains supply is essential will be allowed.
3. Any calculator deemed by the Proctors or examiners to cause a disturbance will be prohibited.
4. Output by the calculator shall be by visible display only.
5. Candidates shall clear any user-entered data or programmes from the memories of their calculators immediately before starting each examination.
6. No storage media external to the calculator are permitted.
7. Input to the calculator during the examination shall be by its own keys or switches only.
8. (The examiners, invigilators, Proctors and the Registrar may inspect any calculator during the course of the examination.

Books, notes. etc. in Examinations
No books or papers of any sort may be brought into the examinations.

Scrap paper will not be provided in exams. Preliminary calculations, notes, etc. must be written in the answer books and should be scored through to indicate that it is not intended for consideration by the examiners as part of the completed answer.

Mobile phones
Mobile phones will not be permitted in the department on the days during which practical examinations are in progress. Candidates must leave them at home, or deposit them with an invigilator for safe keeping. If you are found with a mobile phone in the examination, this breach of regulations may be reported to the proctors and lead to a reduction in grade or outright failure of the examination.

Microscopes
Please note the following for the 1st and 2nd year practical components: candidates should report any microscopes that are not in good working order to the faculty member responsible for the class.

Equipment
Candidates must bring all the usual equipment for a practical (pencils, coloured pencils, ruler, protractor, rubber, pens, hand lens etc.

Please note that candidates should not communicate directly with the examiners or the examinations secretary regarding the examinations. In the first instance, candidates should contact their college tutor with any queries or concerns.

Information on (a) the standards of conduct expected in examinations and (b) what to do if you would like examiners to be aware of any factors that may have affected your performance before or during an examination (such as illness, accident or bereavement) are available on the Oxford Students website:

www.ox.ac.uk/students/academic/exams/guidance

IN TRINITY TERM STUDENTS SHOULD ENSURE THEY REMAIN IN OXFORD UNTIL THE END OF FULL TERM, OR THE END OF WEEK NINE FOR FOURTH YEAR STUDENTS.

Prelims

The results of the Preliminary Examination are not classified (into 1st, 2nd class etc.), but candidates are required to pass every paper if they are to continue into the Second Year. Candidates who do not pass a Prelims paper at the first attempt will have to resit, and pass, that paper in September. Candidates who fail three or more papers at the first attempt will have to resit, and pass, all Prelims papers in September. The top candidates may be awarded a Distinction, and outstanding performance may also lead to an award from the student's college.

Finals

The marks of the 2nd year Part A1 examinations contribute to the final Part A mark at the end of 3rd year. Part A results are nominally classified. Candidates are required to achieve at least a nominal 2.2 to proceed to Part B. Candidates who achieve lower than a nominal 2.2 will be awarded the BA in Geology. Candidates who fail Part A may resit once the following year, but may not proceed to 4th year and will be awarded the BA in Geology. Candidates who withdraw from 4th year and do not plan to return will be awarded the BA in Geology.

Examiners

Each year, the Departmental Committee of the Department of Earth Sciences elects three Prelims Examiners and three Finals Examiners from among the academic staff of the department. Usually internal examiners will serve for three years. In addition, the Departmental Committee nominates two External Examiners – one for Part A and one for Part B. Usually, the Part A External Examiner for one year becomes the Part B External Examiner for the same cohort of students in the following year. The External Examiners have two principal roles. The first is, under guidelines imposed nationally and by the University, to report on the standards of the examinations and the procedures under which they are carried out. The second role is to act as moderators and arbitrators within the examination procedures.

For 2025-26, the External Examiners are as follows:

Part A – TBC
Part B – Professor Jenni Barclay, University of Bristol

Assessors

All eligible senior members of the staff of the Department of Earth Sciences who have taught courses to the candidates are invited to become Assessors for Parts A and B of the Final examination. Assessors may set and mark questions and papers, but they play no part in the final aggregation of marks and classification of degree results.

Queries, Concerns, Extensions, and Factors Affecting Performance

If you have a legitimate reason you are unable to hand in your coursework on time, are sick, or have other extenuating circumstance that might affect your examination performance you should contact your Tutor and College Office as soon as you become aware of this. They will submit your case to the Proctors for assessment.

Similarly, if any kind of extenuating circumstance arose during your examinations, you should contact your Tutor and College office, and consider formally submitting a Factors Affecting Performance case following your examinations.

You should not contact the Examiners or the Academic Administrator.

Penalties

Deadlines
Students should ensure they plan ahead to hand in their work before the published deadline. If examination material is handed in after the deadline, the work will be marked as usual but the following penalties will be applied:

- up to 24 hours 5%
- 24-48 hours 10%
- 48-72 hours 20%
- 72-96 hours 30%
- 96-120 hours 40%
- 120 hours-14 days 50%
- Over 14 days ***Fail***

Note that the cumulative penalties will be deducted from the mark (when expressed out of 100%) as percentage points, but the overall mark cannot go below 10%. For example, if a student hands in a piece of work 20 hours late, and that work in itself is worth 65%, the tariff indicates a deduction of 5% leading to a final mark of 60%.

This penalty may be reduced or waived, in particular when, in view of exceptional circumstances, the Proctors have given prior permission for late submission. Therefore if special factors make it likely that you will not make a deadline, you should ensure that well before the deadline you contact your Tutor and College Office.

Note that non-submission of a required assessment for Final Honour School will result in an overall Fail for the whole Final Honour School.

Plagiarism
The University and Department will not tolerate plagiarism, and reserve the right to run examined work through Turnitin or other plagiarism software. Where cases of bad academic practice are identified, this could result in reduction of marks for impacted exam, module or piece of coursework. More serious instances of plagiarism are referred to the proctors and have a potential outcome on the candidates entire degree class.

Declaration of Authorship
The project or essay must be the student's own work, and a declaration to that effect must be written and signed at the front of the document that is handed in.

Word Count
Students must also declare the word count at the front of the document. If it is suspected a piece of work is over the declared word count, the student will be requested to hand in an electronic copy of the work. The word count will be confirmed, and the electronic copy will be checked against the hard copy to ensure they are identical. If a student is over the word count, marking will cease once the word count has been reached.

Examination paper rubric
Where a candidate has failed to answer a compulsory question, or failed to answer the required number of questions in different sections, the complete script will be marked and the issue flagged. The board of examiners will consider all such cases so that consistent penalties are applied. A mark of zero shall be awarded for any part or parts of questions that have not been answered by a candidate, but which should have been answered. Where a candidate has answered too many questions from an examination paper or section of a paper, answers with the lowest marks will be excluded, until the requisite number of answers is reached. If a candidate has answered ***more*** than the required number of questions on an examination paper, or in a section on an examination paper, the lowest question mark will be removed.

Turnitin

The 3rd year extended essay and 4th year project are submitted digitally via Inspera, and as such are automatically run through Turnitin to highlight similarities with existing documents. The examination board will check the Turnitin scores for each piece of work. They will apply the following procedures, and penalties where necessary:

- Apply additional filters (bibliography, quoted text, cited text and small matches are not automatically exclude in Inspera).
- Check candidates who scored at over 10% similarity once additional filters are applied.
- Check instances where text from more than 1% of a paper could be found in the submission, and checked for long strings of text that are not part of a figure caption, table, or table caption.
- Check "hidden text" flags for long strings of hidden text (i.e. white text blending into document background, with the aim of fooling Turnitin).
- Check "replaced characters" flags (similar character from other alphabets included with the aim of fooling Turnitin – usually in Earth Sciences these are simply maths or chemistry content).

If Turnitin flags up any issues, these will be dealt with by the examiners; penalties may apply in the case of serious bad academic practice.

Use of AI for submissions

Generative Artificial Intelligence (Gen AI) tools have great potential to aid scholarship and research through their ability to rapidly find, synthesise and analyse information. However, these tools should not be seen as substitutes or a short-cut for developing skills and understanding of our subject. Whilst AI may be capable of producing an 'answer' for any prompt, the user still needs to possess the background knowledge, understanding and insight to be able to critically analyse and appropriately apply the output from AI.

You should familiarise yourself with the University's guidance on use of AI:

https://www.ox.ac.uk/students/life/it/guidance-safe-and-responsible-use-gen-ai-tools

We strongly recommend that if you choose to use Gen AI tools in your studies, then you use those that are supported through the University (e.g. ChatGPT Edu, Microsoft Copilot etc) as other available tools may use your data and information in unknown ways. Always check the terms and policies carefully before providing any data or information to such non-supported tools.

For Earth Science coursework assessments, guidelines are provided below for each piece of submitted work as to whether AI should not be used or can be used for some tasks.

Descriptors for Marking

Each answer to a question in written and practical papers is allocated a mark in the range 0-100, according to the Marking Descriptors given in Appendix 1. The marks for each answer are added to give a total for each paper, except that if more than the specified number of questions is answered, answers with the lowest marks will be excluded, until the requisite number of answers is reached.

Mapping Reports, 3rd-Year Essays and 4th-Year dissertations are allocated marks in the range 0-100, according to relevant class descriptors (please see appendices containing marking forms).

Marking Procedure

Prelims scripts and practical work are single marked "blind". If a candidate is failing, their material will be second-marked. All Finals exam scripts are double-marked "blind". Assessors will not be made aware of any late submission. Each assessor has the model answer, but neither assessor has knowledge of the mark assigned by the other during double marking. Assessors do not write on scripts during the marking process, except to indicate objective errors, e.g. in a calculation. Where a significant discrepancy (i.e. over 10%) occurs between the two marks, either the script is returned to the assessors to agree a mark jointly, or the script is moderated by the examiners. The same procedure is applied to essay assignments and projects. The fourth-year project is double marked by two internal assessors and moderated by the Examiners. The 3rd year independent ("mapping") project is double marked internally and is moderated by the Examiners. Part A1 practical assessments are single-marked "blind" using a marking scheme pre-approved by the examiners and are subsequently checked independently to ensure all parts have been marked and correctly totalled and recorded.

Results

Results are usually finalised and available to students around the following times:

1st Year Prelims – Mid July

2nd Year Part A1 – Mid July

3rd Year Part A2 – Friday of Week 7 in Trinity Term

4th Year Part B – Thursday of Week 9 in Trinity Term

It cannot be guaranteed results will be available at these times, but we will keep students informed of any delays.

Interviews with External Examiners

The External Examiners will be present at, and contribute to, the Final Examiners' meetings at which marks and classifications are confirmed and finalised, for the Part (A or B) to which they are appointed.

In pursuance of their roles, as outlined below (Role of External Examiners), the External Examiner for Part B will interview Part B students for the purposes of collecting student feedback on the course.

Degree classification

The marks for each unit of assessment (Exam Paper, Mapping Report, Essay, and Dissertation) will be given the relative weights shown in the Table in Appendix 1. The aggregate mark will be expressed as a percentage to be used in assigning the degree classification.

Because of the small class size, no re-normalization of the marks will be carried out to account for unexpectedly low or high average marks in individual papers. However, the Examiners monitor the distribution of marks assigned for each paper to ensure, among other considerations, that there is a fair balance between the optional sections of Part A, and between the different papers in Part B, and to ensure that no candidate is disadvantaged purely as a result of their choice of topic.

The boundaries between degree classes will follow closely the University conventions shown in the table below, but will not lie exactly on the class divisions shown in the table. In defining class boundaries, the Examiners will take into account the distribution of candidates' marks over the papers, together with submitted practical materials and assessments by the External Examiner which will, in Part B, be informed by interviews with the candidates.

First Class	70 and above
Upper Second	60 to 69
Lower Second	50 to 59
Third	40 to 49
Pass Degree	30 to 39
Fail	Less than 30

Students graduating at the end of their third year will be awarded a classified degree based on their Part A marks, as described above (note that that these candidates will not be interviewed by the External Examiner). Students who intend to proceed to the MEarthSci will not be awarded a degree classification; their marks will be carried over for use in the classification procedure in combination with their Part B marks, at the end of their fourth year. In the case of a student who leaves after taking Part A exams, but before completing Part B, the Examiners will revisit the student's Part A marks, and will assign a degree classification following the procedure outlined in this appendix.

Role of External Examiners

External examiners will be used primarily for the purposes of moderation and arbitration.

National guidance requires external examiners to report on three major areas:

1. whether the standards set are appropriate for the award;
2. the standards and comparability of student performance in the programme;

3. the extent to which procedures for assessment, examination and the determination of awards are sound and have been fairly conducted.

The department will allow external examiners to:

(a) have opportunity to comment on all examination papers in draft form;
(b) have access to all scripts and other material submitted by candidates;
(c) see a sample of scripts including scripts at the borderlines of classes;
(d) see a sufficient sample of dissertations, extended essays and course work to be able to comment on the marks awarded;
(e) be in a position to comment on the fairness of any procedures for the reconciliation of marks, moderation, scaling and adjustments arising out of medical or other evidence.

In relation to (e), the University does not regard this as requiring the external examiner to give a definitive final mark where there is initial disagreement between first markers (although examining boards may choose to ask the external examiner(s) to act in this way) but to be in a position to report on the soundness of the procedures used to reach a final agreed mark.

The Honours School of Earth Sciences appoints a Part A External Examiner each year, and this examiner's duties continue the following year when they become Part B External Examiner for the same cohort of students. In addition to previewing papers, the department will also send the mapping projects to the Part A external examiner following internal marking, for the purposes of independently considering the projects before seeing internal marks. The department will also send the 4th year projects to the Part B external examiner, for the purposes of providing a suggested nominal mark to compare to the two internal marks.

The external examiners will have the opportunity to interview students for the purposes of collecting student feedback on the course (following Part B). They will be present at, and contribute to, the final examiners meetings where marks and classifications are confirmed and finalised.

Preliminary Examination

These usually take place in Week 7 of Trinity Term. You will sit the following three hour compulsory examination papers:

- Chemistry, Physics & Biology for Earth Sciences
(Candidates must answer four questions in total; one question from each of Sections A, B & C, plus one more from either Section A or B.)

- Planet Earth
(Candidates must answer four questions in total; one question from each of Sections A, B & C, plus one more from either Section A or B.)

- Fundamentals of Geology (Theory)
(Candidates should answer one question from each of Sections A, B, C and D.)

- Mathematics
(Candidates should attempt all questions in Section A and any four questions in Section B.)

- Fundamentals of Geology (Practical Coursework)/Mathematics
Coursework to be submitted at regular points throughout the academic year – details below.

1st year Earth Sciences practical assessments

Fundamentals of Geology I

Crystals and Minerals
*[A****S1 - 2.5% of preliminary examinations grade]*
Due by 12pm, Thursday of Week 7 Michaelmas Term

Igneous and Metamorphic Petrology and Processes
*[A****S1 - 2.5% of preliminary examinations grade]*
Due by 12pm, Thursday of Week 7 Michaelmas Term

Practical assessments for Fundamentals of Geology I in Michaelmas Term (Crystals and Minerals + Igneous and Metamorphic Petrology and Processes) will take the form of a workbook, completed continuously throughout the term, and **submitted to Earth Sciences reception.**

An Introduction to Geological Processes:
*[A****S1 - 2.5% of preliminary examinations grade]*
Due by 12pm, Friday of Week 5 Hilary Term

Invertebrate Palaeobiology:
*[A****S1 - 2.5% of preliminary examinations grade]*
Due by 4pm, Friday of Week 8 Hilary Term

Practical assessments for Fundamentals of Geology I in Hilary Term (An Introduction to Geological Processes + Invertebrate Palaeobiology) will take the form of a workbook based on work completed in the final practical of both parts of the course.

An Introduction to Geological Processes **should be submitted to Earth Sciences reception.**

Invertebrate Palaeobiology **should be submitted at the end of the practical session.**

Fundamentals of Geology II

Geological Maps
*[A****S1 - 2.5% of preliminary examinations grade]*
Due by 12pm, Thursday of Week 7 Michaelmas Term

Practical assessments for Fundamentals of Geology II (Geological Maps) in Michaelmas Term will take the form of an assessed workbook during Michaelmas Term, which should be **submitted to Earth Sciences reception.**

Structural Geology:
*[A****S1 - 2.5% of preliminary examinations grade]*
Due by 4pm, Tuesday of Week 2 Trinity Term

Practical assessments for Fundamentals of Geology II (Structural Geology) in Hilary Term will take the form of an assessed practical during Week 2 of Trinity Term. **The completed practical work must be submitted to the course instructor when leaving the room at the end of the class.**

Mathematics: Statistics and Scientific Computing
[A18355S1 - 5% of preliminary examinations grade]
Due by 2pm, Friday of Week 1 Trinity Term

Practical assessment for Statistics/Scientific Computing will take the form of an assessed practical during 1st week of Trinity Term. **Completed work must be submitted digitally by 2.00pm** on the day after the assessment.

Use of AI in Preliminary Examinations (1st year) coursework practical assessments

- *Crystals and Minerals*
- *Igneous and Metamorphic Petrology and Processes*
- *An introduction to geological processes (Sedimentary rocks and sedimentary processes)*
- *Invertebrate Palaeobiology*
- *Geological Maps*
- *Structural Geology*
- *Mathematics: Statistics and Scientific Computing*

The use of AI is **not** authorised.

Second Year Examination, (BA Geology; MEarthSci Part A1)

The 2nd year examination consists of three written papers and practical coursework. The written papers will be held in the Examination Schools, probably in Week 6 of Trinity Term (to be confirmed). The paper structure will be:

Paper 1 (3 hours):
Section A: Planetary Materials & Meteorites, Igneous Petrology, Metamorphic Petrology
Section B: Sedimentary Generation & Diagenesis, Stratigraphy & Environment and Sedimentary Basins
On Paper 1, candidates should answer two questions from each section (four overall).

Paper 2 (3 hours):
Section A: Stable Isotopes
Section B: Radiogenic Isotopes
Section C: Climate Change
Section D: Carbon Cycle
Section E: Evolution
On Paper 2, candidates should answer one questions from each section (five overall).

Paper 3 (3 hours):
Section A: Geophysical Methods
Section B: Earthquakes, Seismology & Active Tectonics
Section C: Remote Sensing
Section D: Maths: Series Analysis & Scientific Computing
Section E: Thermodynamics
On Paper 3, candidates should answer one question from each section (five overall).

2nd year Practical Coursework
Coursework to be submitted at regular points throughout the academic year in the following areas

- Maths/Scientific Computing
- Structural Geology & Map Interpretation
- Igneous Petrology
- Metamorphic Petrology
- Sedimentary *Petrology*

Submission: Unless otherwise stated, work should be submitted by the deadline via the white wooden box which will be made available on Reception. Only your candidate number should be written on all submitted pieces of work

Specific details of each task will be provided during the courses. An outline and timeline of assessments, with deadlines where confirmed is provided below. ***All submissions are to the white box behind reception.***

Michaelmas Term practical coursework

Igneous Petrology
[A18820S1 - 17% of total practical assessment mark, 2 thin sections*]*
Teaching MT weeks 1 to 4
Due 12pm, Thursday of Week 5 Michaelmas Term

Series Analysis and Scientific Computing
[A18821S1 - 17% of total practical assessment mark]
Practical set on Monday of week 7 MT
Due 12pm, Monday of Week 8 Michaelmas Term

Hilary Term practical coursework

Metamorphic Petrology
[A18822S1 - 17% of total practical assessment mark, 2 thin sections*]*
Teaching HT weeks 1 to 4
Due 12pm, Thursday of Week 5 Hilary Term

Sedimentary Petrology
[A18823S1 - 17% of total practical assessment mark]
Teaching HT weeks 1 to 8 (teaching relevant to assessment will be in weeks 1 to 6)

Due 12pm, Thursday of Week 8 Hilary Term

Trinity Term practical coursework

Structural Geology and Map Interpretation
[A18824S1 - 32% of total practical assessment mark]
Practical set on Wednesday of week 2 TT
Due 12pm, Friday of Week 2 Trinity Term

Use of AI in Part A1 (2nd year) coursework practical assessments

- *Igneous Petrology*
- *Series Analysis and Scientific Computing*
- *Metamorphic Petrology*
- *Sedimentary Petrology*
- *Structural Geology and Map Interpretation*

The use of AI is **not** authorised.

Third Year Examination (BA Geology; MEarthSci Part A2)

The third year course will allow a degree of specialization within Earth Sciences sub-disciplines, and at the same time will continue to develop core skills and knowledge. There are also two substantial pieces of formally assessed independent work – a literature review and a field-mapping project.

Subject matter will be grouped into options. Students choose six options overall across Michaelmas and Hilary Term. In addition, the Spanish Field course and associated short lecture course will be compulsory. Options will be timetabled in either Michaelmas Term or Hilary Term to allow students to pursue a programme of study that covers a coherent grouping of subjects.

The third-year (Part A) examination consists of six written papers (six out of ten options) and two pieces of independent work. In addition, marks from the second-year examinations are carried forward. Entry to the Part A examination is handled through the colleges.

Examinations
The examinations will probably be scheduled for Weeks 4-5 of Trinity Term (dates to be confirmed, and possibly running into week 6). All papers will be in person. Further details of the topics to be examined in each paper are published by the Finals Examiners during the year.

You will sit six out of ten optional papers:

Paper 1 – Analytical Methods
Paper 2 - Natural Resources and the Energy Transition
Paper 3 - Biological & Physical Oceanography
Paper 4 – Biogeochemistry of the Earth's Surface
Paper 5 – Vector Calculus and Continuum Mechanics
Paper 6 - Volcanology, Igneous Processes & Petrogenesis
Paper 7 - Quantitative Palaeobiology
Paper 8 – Plate Tectonics
Paper 9 – Geophysics of the Deep Earth
Paper 10 – Chemistry of the Earth's Interior

For all papers candidates answer two out of three questions.

Submission of Practical Materials

Candidates in Part A may be required to submit their practical notes and field notebooks relating to courses undertaken in the second and third years of study for consultation by the examiners. If the examiners wish to see this material they will request it during Wednesday to Friday of week 7 of Trinity Term.

Publication of Results
Public lists of exam results are no longer formally published by the University, but marks are made available to tutors as soon as possible after the final meeting of the examiners. This is normally towards the end of week 7. Those intending to graduate with the BA (Geology) are given a classified result at this stage. Those continuing to Part B of the MEarthSci are only nominally classified, and may obtain their nominal classification from their tutor.

Please note that questions may also assume knowledge of relevant information from 1st and 2nd year courses.

Students must achieve a nominal classification of at least a 2.2 to proceed to 4th year.

HANDING IN THE INDEPENDENT ("MAPPING") PROJECT

The completed independent ("mapping") project should be submitted digitally via Inspera by 12 noon on TUESDAY OF WEEK 1, Hilary Term.

Hard copy materials must be submitted to the Academic Office (10.33) by 12 noon on THURSDAY OF WEEK 1, Hilary Term.

All your physical materials should be submitted in a box file with your name and college clearly stated on it.

PLEASE NOTE THAT THIS IS THE DEFINITIVE LIST OF ITEMS TO BE HANDED IN. NOTE THAT FAILURE TO SUBMIT ONE OR MORE OF THE COMPONENTS LISTED BELOW WILL RESULT IN FAILURE OF THE ENTIRE PROJECT.

DO NOT PUT YOUR CANDIDATE NUMBER ON ANY OF THE MATERIAL YOU HAND IN.

Geological field mapping projects:

The main report should be submitted digitally via Inspera.

The submitted hard copy material should at least consist of:

(a) one paper copy of a final map poster (see notes below)
(b) field note books, field slips, fair-copy maps (if you made one), any field cross sections or stratigraphic logs;
(c) the GeolSoc questionnaire and map; and
(d) the thin sections you had prepared and an associated sample datasheet

Geochemical field mapping project:

The main report should be submitted digitally via Inspera.

The submitted hard copy material should at least consist of:

(a) one paper copy of a final map poster(see notes below)
(b) field notebooks, field slips, fair-copy maps (if you made one), *any field cross sections or stratigraphic logs and;*
(c) the GeolSoc questionnaire and map

Geophysical data analysis projects:

The following materials will be submitted electronically via Inspera:

(a) the final report;

(b) A catalogue of signals you have identified or described, in a well organised and accessible format. The
format should be chosen to be appropriate for the signals of interest.
(c) The code that was written as part of the project that was used to analyse the data shown in the report and on the poster.

The submitted hard copy material should at least consist of:

(a) One paper copy of a poster outlining the quantitative analysis of the dataset(s) (see notes below)

Requirements for references and report length for ALL independent project types:

References should be cited in the text using the standard 'Name-Date' referencing style, with in-text citations of the author(s) name and date of publication (e.g. Smith, 2009); and references listed in alphabetical order of authors surname in a reference list at the end of the report.

https://libguides.bodleian.ox.ac.uk/reference-management/referencing-styles

Students must adhere to a 6000-word limit for the project (excluding the declaration of authorship and word count, contents page, references, bibliography, figure captions, table captions, text in tables, text in diagrams, headers, footers, acknowledgements, disclaimers and appendices). Note that figure and table captions should only include directly relevant explanatory text. Inclusion of marginally relevant figures and tables should be avoided. Lithological and petrological descriptions, where appropriate, should be integrated into the body of the report, not attached in appendices. **In-text citations should be included in the word count. An accurate word count must be included, along with a signed statement that the project is your own work.**

Word count includes: abstract, main text of report, including in-text citations.
Not included in word count: contents, figure captions, tables, acknowledgements, bibliography, appendices.

Requirements for A0 posters

For geological mapping projects the poster should include the final map, a key, a stratigraphic column and representative cross sections illustrating the sub-surface geology

For geochemical mapping projects the poster should include the final map of the bedrock geology and key geochemical parameters measured in streams, a key, a stratigraphic column and representative plots of data which show key geochemical attributes across the study area.

For the geophysical data analysis projects the poster should include: an abstract (no more than 200 words long), a location map of the stations analysed, example(s) of the signals analysed, an illustration of the catalogue (e.g. examples of event signals, histograms of events through time); an illustration of the data analysis/comparison; Conclusions. These components can be presented in isolation or in combination. There should be no more than 10 sentences on the poster (excluding the abstract and any subtitles used).

Use of AI for the Independent project ("mapping project")

A declaration of any AI use must be included (this does not count for the word limit of the exercise):

"Generative Artificial Intelligence tools have been used in the production of this piece of work.

I acknowledge the use of *[List tools used, e.g., ChatGPT Edu*] to *[List uses, e.g., improving spelling and grammar throughout the essay; plotting data in Figure X, Y; debugging code presented in Appendix A]"*

Gen AI **may be** used:

- to search for literature. However, we strongly recommend using the tools provided through Library Services (e.g. Scopus, Web of Science, Georef); GenAI should not be the main tool you use. If you do use Gen AI, you must verify the relevance, correctness and unbiasedness of the references (and always check the original source);
- to format lists or bibliographies, although we strongly recommend using dedicated reference management software (e.g. Endnote, Zotero, RefWorks);
- to improve your grammar by an AI tool specifically designed and intended for that purpose;
- to assist with graphing your own data, provided this is explained in the caption and declared correctly;

- to assist with writing of code, including generation of new code and translation of existing code into a different programming language, provided this is explained in the submitted materials and declared correctly. We caution against the generation of code by Gen AI.

Gen AI **may not** be used:

- for generating original writing (i.e. copying, or paraphrasing, partial or complete sentences from Gen AI into your submitted work);
- to improve original writing, beyond spelling, grammar and rephrasing of original writing.

HANDING IN THE EXTENDED ESSAY

References should be cited in the text using the standard 'Name-Date' referencing style, with in-text citations of the author(s) name and date of publication (e.g. Smith, 2009); and references listed in alphabetical order of authors surname in a reference list at the end of the report.

https://libguides.bodleian.ox.ac.uk/reference-management/referencing-styles

Students must adhere to a 4000-word limit for the essay (excluding the declaration of authorship and word count, contents page, references, bibliography, figure captions, table captions, text in tables, text in diagrams, headers, footers, acknowledgements, disclaimers and appendices). Note that figure and table captions should only include directly relevant explanatory text. Inclusion of marginally relevant figures and tables should be avoided. **In-text citations should be included in the word count. An accurate word count must be included, along with a signed statement that the project is your own work.**

Word count includes: abstract, main text of report, including in-text citations.
Not included in word count: figure captions, tables, bibliography.

The essay should be submitted by **12 noon on Thursday of Week 0, Trinity Term via Inspera** (guidance will be sent out near the deadline).

Please note ONLY YOUR CANDIDATE NUMBER SHOULD BE ON THE ESSAY. Your name should NOT be on the essay.

Use of AI for the 3rd year extended essay

A declaration of any AI use must be included (this does not count for the word limit of the exercise):

"Generative Artificial Intelligence tools have been used in the production of this piece of work.

I acknowledge the use of *[List tools used, e.g., ChatGPT Edu]* to *[List uses, e.g., improving spelling and grammar throughout the essay; plotting data in Figure X, Y; debugging code presented in Appendix A]*"

Gen AI **may be** used:

- to search for literature. However, we strongly recommend using the tools provided through Library Services (e.g. Scopus, Web of Science, Georef); GenAI should not be the main tool you use. If you do use Gen AI, you must verify the relevance, correctness and unbiasedness of the references (and always check the original source);
- to format lists or bibliographies, although we strongly recommend using dedicated reference management software (e.g. Endnote, Zotero, RefWorks);
- to improve your grammar by an AI tool specifically designed and intended for that purpose.

Gen AI **may not** be used:

- for generating original writing (i.e. copying, or paraphrasing, partial or complete sentences from Gen AI into your submitted work);
- to improve original writing, beyond spelling, grammar and rephrasing of original writing.

Fourth Year Examinations (MEarthSci Part B)

Candidates must have achieved the equivalent of a minimum 2.2 classification in Part A in order to proceed into 4th year and Part B.

The fourth-year examination (Part B) consists of four theory papers, normally chosen from eight optional subjects, and an advanced practical project or extended essay, written up as a dissertation. The deadline for examination entry is set in the middle of Hilary Term, to allow candidates to make a considered selection of the options offered in Hilary Term.

Written Examinations
The written part of the Part B examination consists of eight two-hour papers, of which candidates have chosen four. They will probably take place during Week 7 of Trinity Term (dates to be confirmed), and will be in person.

Candidates sit four out of eight of the following papers:

Paper 1 - Palaeobiology
Paper 2 - Planetary Science
Paper 3 – Structure & Dynamics of the Earth's Mantle
Paper 4 – Coevolution of Earth and Life
Paper 5 - Rock & Palaeo-magnetism
Paper 6 – Environmental Geophysics
Paper 7 - Topics in Volcanology
Paper 8 - Topics in Climate Science

For all papers candidates answer two out of three questions.

Viva
All candidates have a compulsory viva of about 15 minutes with the External Examiner during their visit to the department, normally early in week 9. The examiner will speak to the student regarding their 4th year project and examination papers. This provides additional information for assessing the overall achievement of each candidate. The viva is also used by the External Examiner to gather information, perspectives and feedback from students that can be used to inform their report to the University on our course and procedures. Academic dress should be worn.

This interview is distinct from the project viva, which the student has with the two internal markers of their 4th year project. Further details of this may be found below in the section on the 4th year project.

Publication of Results
Results are published, and marks made available to tutors, as soon as possible after the final meeting of the examiners. This is normally towards the end of week 9.

HANDING IN THE FOURTH YEAR PROJECT

The essay/project, should be double-spaced with a font size no smaller than 12 pt, should be accompanied by relevant references, tables and illustrations. This report should accurately and comprehensively describe the project, and normally would include the following (not necessarily as independent sections – aspects may be merged or split-up as appropriate. Supervisors can provide project-specific guidance):

- an abstract;
- a concise description of the scientific background to the project;
- aims and objectives;
- experimental and data-collection procedures;
- description of results;
- interpretations of the results and analysis of their implications;
- a statement of conclusions;
- identification of any information or data used as part of the project but originating from other individuals or organizations; and
- a reference list.

Appendices should be used principally for presenting supplementary information that does not form a central aspect of the project.

References should be cited in the text using the standard 'Name-Date' referencing style, with in-text citations of the author(s) name and date of publication (e.g. Smith, 2009); and references listed in alphabetical order of authors surname in a reference list at the end of the report.

https://libguides.bodleian.ox.ac.uk/reference-management/referencing-styles

Students must adhere to an 8000-word limit for the project (excluding the declaration of authorship and word count, contents page, references, bibliography, figure captions, table captions, text in tables, text in diagrams, headers, footers, acknowledgements, disclaimers and appendices). Note that figure and table captions should only include directly relevant explanatory text. Inclusion of marginally relevant figures and tables should be avoided. **In-text citations should be included in the word count. An accurate word count must be included, along with a signed statement that the project is your own work.**

Word count includes: abstract, main text of report, including in-text citations.
Not included in word count: contents, figure captions, tables, acknowledgements, bibliography, appendices.

Please note ONLY YOUR NAME SHOULD BE ON THE PROJECT. Your candidate number should NOT be on the project.

Students should submit an 8-page report on their project to their supervisor by 12.00pm on Friday of Week 1 in Hilary Term. The progress report will not be marked or count in any way towards your final degree result. It is designed merely to be helpful in crystallizing your thoughts and to give you feedback on your progress and your writing skills.

A complete draft of the project must be handed to the lead supervisor for formal feedback by the end of Week 0 of Trinity Term at the latest. The supervisor will return comments by the end of Week 1. Comments will be restricted to one A4 page, 12-point font. This page is also provided to the project assessors and Examiners. If the supervisor is likely to be away/on leave during Week 1, the student and supervisor should make alternative arrangements well in advance. The lead supervisor will also submit to the examiners a one page report on the amount and nature of supervision given to the student, by the end of 1st week.

Supervisors or co-supervisors should not comment on written drafts (other than the material handed in after Christmas) until the formal draft is handed in at the end of week 0, and then the lead supervisor (or a designated supervisor) provides one page of feedback by the end of week 1. Discussion on data, diagrams, or plots of data etc, forms part of the normal supervision process.

The fourth-year project is double marked by two internal assessors, neither of whom were involved in supervising the project, and moderated by the Examiners.

The two internal markers will be allocated after submission of the project. A viva, conducted by the two markers, will be a formal part of the process of marking the dissertation. This viva will take place between Weeks 2 and 6 of Trinity Term, that is after the final project report has been submitted, and before commencement of the written examinations. The viva will usually last between 30 minutes and 1 hour, and will be a discussion of the project material by the candidate and the two markers. It will be an opportunity for the markers to explore the depth of a student's knowledge of their project, and also to discuss the conduct, science, any use of Generative AI, and background of the work. Sub fusc is not required for the project viva.

Please note that the project viva is distinct from the interview with the external examiner.

The final version of the project must be submitted by 12.00pm on Thursday of 2nd Week of Trinity Term of the 4th year.

Use of AI for the Independent Research Project

A declaration of any AI use must be included (this does not count for the word limit of the exercise):

"Generative Artificial Intelligence tools have been used in the production of this piece of work.

I acknowledge the use of *[List tools used, e.g., ChatGPT Edu*] to *[List uses, e.g., improving spelling and grammar throughout the essay; plotting data in Figure X, Y; debugging code presented in Appendix A]"*

Gen AI **may be** used:

- to search for literature. However, we strongly recommend using the tools provided through Library Services (e.g. Scopus, Web of Science, Georef); GenAI should not be the main tool you use. If you do use Gen AI, you must verify the relevance, correctness and unbiasedness of the references (and always check the original source).
- to format lists or bibliographies, although we strongly recommend using dedicated reference management software (e.g. Endnote, Zotero, RefWorks);
- to improve your grammar by an AI tool specifically designed and intended for that purpose
- to assist with graphing your own data, provided this is explained in the caption and declared correctly
- to assist with writing of code, including generation of new code and translation of existing code into a different programming language, provided this is explained in the submitted materials and declared correctly. We caution against the generation of code by Gen AI.

Gen AI **may not** be used:
- for generating original writing (i.e. copying, or paraphrasing, partial or complete sentences from Gen AI into your submitted work);
- to improve original writing, beyond spelling, grammar and rephrasing of original writing.

Weighting for students who started the course before 2022-3

Weighting of Papers and Marks in Part A and Part B

Year	**Exam**	**Weighting**	**Percentage of Final degree classification**
Part A1 (2nd year)	Paper 1	40	
	Paper 2	40	
	Paper 3	40	
Subtotal		120	12%
Part A2 (3rd year)	Paper 1 (Fieldwork)	40	
	Paper 2	40	
	Paper 3	40	
	Paper 4	40	
	Paper 5	40	
	Paper 6	40	
	Paper 7	40	
Subtotal		280	28%
	Independent Essay	50	5%
	Mapping Project	100	10%
Subtotal (A2)		430	43%
TOTAL:		**550**	**55%**

The marks from the second-year examination are brought forward from the previous year. Those taking the three-year B.A. (Hons) will have their degree awarded on the basis of the above marks.

The weightings for Part B are as follows:

Year	**Exam**	**Weighting**	**Percentage of Final degree classification**
4th	Theory 1	50	
	Theory 2	50	
	Theory 3	50	
	Theory 4	50	
Subtotal		200	20%
	4th Year Project	250	25%

TOTAL:		**450**	**45%**

The final MEarthSci degree is based on a final mark derived by summing the final percentages of Part A and Part B. Classification of the degree is guided by the class divisions summarised below, but also takes into account the interview conducted with the External Examiner, and the practical work deposited by the candidates.

Weighting for students who started the course from 2022-23 onwards

Weighting of Papers and Marks in Part A and Part B

Year	**Exam**	**Weighting**	**Percentage of Final degree classification**
Part A1 (2nd year)	Paper 1	50	
	Paper 2	50	
	Paper 3	50	
	Assessed Practical Work	50	
Subtotal (A1)		200	33.3% of BA, 20% of MEarthSci
Part A2 (3rd year)	1st option paper	35	
	2nd option paper	35	
	3rd option paper	35	
	4th option paper	35	
	5th option paper	35	
	6th option paper	35	
	Independent Essay	75	
	Mapping Project	115	
Subtotal (A2)		400	66.7% of BA, 40% of MEarthSci

The marks from the second-year examination are brought forward from the previous year. Those taking the three-year B.A. (Hons) will have their degree awarded on the basis of the above marks.

The weightings for Part B are as follows:

Year	**Exam**	**Weighting**	**Percentage of Final degree classification**
4th	Theory 1	40	
	Theory 2	40	
	Theory 3	40	
	Theory 4	40	
	4th Year Project	240	
TOTAL:		**400**	**40% of MEarthSci**

The final MEarthSci degree is based on a final mark derived by summing the final percentages of Part A and Part B. Classification of the degree is guided by the class divisions summarised below, but also takes into account the interview conducted with the External Examiner, and the practical work deposited by the candidates.

Examination script marking form

EARTH SCIENCES – EXAM SCRIPT MARKING

Marker: 1st / 2nd ______________________________

Year of course: ________________________________

Paper: ____

Question: _____________________________________

Marking required by: ___________________________

Please assess and provide a mark for the accompanying scripts according to the standard scheme for the Final Honours School. You will no doubt use the full range of marks available to you if the work so merits.

Please enter your marks on the enclosed form, and return this with the scripts to Emma. Do not mark on the scripts themselves.

Education Committee policy requires that comment sheets are used for all substantial assessment items. All undergraduate and postgraduate taught examination boards are strongly encouraged to use comment sheets for all papers (whether submitted work or written examinations).

Please note that comment sheets will be provided to students who make a subject access request to the University's Information Compliance Team for personal data relating to their examinations/assessment.

Please refer to the marking criteria provided overleaf, and provide comments, referring to individual candidates if appropriate.

For information: Where 1st and 2nd marks deviate by more than 10%, 1st and 2nd markers will be asked to discuss the script and adjust their marks so that they are within 10% of one another.

Comments:

Mark Scheme for FHS Geology/ Earth Sciences

Marks	Descriptor for WRITTEN ANSWERS	Descriptor for PROBLEMS
90-100	**1**. Outstanding answer; full of insight; exceptional command of material. **2**. Well organized with introduction, critical discussion, illustrations, and conclusions. **3.** Reference to key connections across the course and the literature. **4**. No errors.	**1.** Formulation of the problem and choice (or derivation) of relevant equations show complete understanding, including background, limitations of approach, comparison with alternatives. **2.** All assumptions and logical steps are clearly explained and fully justified. **3.** Algebraic manipulation and/or calculations are without errors.
80-90	**1**. Excellent answer; evidence for both wide knowledge, and understanding of subject. Effective critical analysis. **2**. Structure reflects full clarity of thought, fully illustrated as necessary. **3**. Goes well beyond lectures; effective grasp of literature/debate. Insightful connections and comparisons across the course. **4**. No errors.	**1.** Formulation of problem, choice (or derivation) of relevant equations show excellent understanding, including some background, limitations of approach, comparison with alternatives. **2.** All assumptions and logical steps are clearly explained and justified. **3.** Algebraic manipulation and/or calculations have no errors.
70-80	**1**. Very good understanding of all essential presented course material, inclusion of relevant details. Integration of outside reading; some critical analysis. **2**. Good structure, well written and well- illustrated. **3**. Clear ability to make relevant connections across the course (including background, field observations). **4**. No errors.	**1.** Formulation of problem, choice (or derivation) of relevant equations show very good understanding, and justifications are clearly explained. **2.** The principal assumptions and logical steps are clearly explained and justified. **3.** Algebraic manipulation and/or calculations are without substantial error.
60-70	**1.** Sound understanding of all essential presented course material. **2.** Coherent, clearly annotated and labeled illustrations as necessary. Reasonable organization reflecting clear understanding. **3.** Includes essential connections across the course. **4.** Small factual errors and /or omissions may be present.	**1.** Formulation of the problem and choice (or derivation) of relevant equations show good understanding and are justified. **2.** The principal assumptions and logical steps are explained. **3.** There may be small errors in algebraic manipulation and/or calculations.
50-60	**1**. Some key information from lectures or coursework missing. Demonstrates understanding of only part of answer. **2**. Some structure. **3**. No connections across coursework. Little signs of originality. **4**. Large and small factual errors.	**1.** Formulation of the problem and choice (or derivation) of relevant equations are not justified and do not show full understanding. **2.** Some assumptions are not stated, and there are gaps in the logic of the calculation. **3.** Errors in algebraic manipulation or calculation lead to incorrect or incomplete answers.
40-50	**1**. Most of relevant information in lectures missing. Concepts disordered or flawed. Demonstrates inadequate understanding. **2**. Incompletely structured answers. **3**. No connections across coursework. **4**. Many significant factual errors.	**1.** Formulation of problem and choice (or derivation) of relevant equations show inadequate understanding. **2.** Assumptions are not stated, and there is little or no logic to the calculation. **3.** Errors in algebraic manipulation or calculation lead to unrealistic answers, or to no answer.
0-40	**1**. Significant inability to tackle question. **2**. Incoherent structure, disconnected information. **3**. Inclusion of information irrelevant to the question. **4**. Minimal correct information.	**1.** Significant inability to tackle the question. **2.** Problem approach not formulated. Incorrect or irrelevant formulae used. **3.** Little or no relevant calculation.

3rd year Geochemical Mapping Project marking form

GEOCHEMICAL MAPPING PROJECT MARKING SHEET FOR EXAMINERS

Deadlines: XXXX for 1st marking, XXXXX for 2nd marking

Assessment is subdivided into the three main aspects of the project, with equal marks for each. There are obviously links between the different aspects, so the purpose is to ensure that all three have been factored into the final mark. A final section is for any general comments you may wish to make.

The text you provide on this form will be anonymised and returned to students as feedback.

With this in mind, please keep your comments factual, to the point, and relating to the marking descriptors. Do not comment on the suitability of the area, as the area has already been approved by the Department. Any concerns about use of particular areas should be relayed to the Chair of the Mapping Panel and Head of Teaching.

Additionally, please include specific suggestions for how the scientific writing style, presentation and structure of the report could be improved in the box provided. Our aim is to provide useful feedback of a generic nature that will help with the 4th year project write-up. This feedback will be provided to the student.

Please provide a separate mark for each of the sections A, B and C, plus a combined overall mark.

TOTAL MARK/100:

Additionally, has the candidate filled out the survey for the Undergraduate Geological Society?
YES/NO

WHEN PROVIDING MARKS FOR EACH COMPONENT, PLEASE REFER EXPLICITLY TO THE MARKING CRITERIA FOR EACH AND THE OVERALL GUIDANCE. THE TOTAL MARK SHOULD BE CONSISTENT WITH THE OVERALL MARKING CRITERIA FOR EACH CLASSIFICATION.

A) QUALITY OF THE FIELD NOTES.

SECTION MARK/34

B) QUALITY OF THE FINAL MAP, STRATIGRAPHIC COLUMN, AND CROSS-SECTION (MAPPING POSTER).

SECTION MARK/33

C) THE PROJECT WRITE UP

SECTION MARK/33

Summary of general feedback on the scientific writing style, presentation and structure that will help with 4th year project write-up (this will be shared with students):
This should be a few key points of constructive commentary. Include recognition of good practice as well as areas for improvement. You may copy and paste relevant comments from your mark justification.

Guidance Criteria for awarding marks to Geochemical mapping projects.

The marking criteria refer to the **Requisite Components** of the project, which are:

Field notes including location information, outcrop and lithological descriptions, primary geochemical data observations, sample collection, structural data, field sketches. The total number of field days should be consistent with the guidance (28 to 35 days), unless there are extenuating circumstances.

Field slips including delimited outcrops, structural measurements, location of geochemical sampling locations, some summary of measured values, contacts, annotations, and key. The total area mapped should be consistent with guidance (~7 to 10 km^2), unless there are extenuating circumstances.

Map poster including final map of the bedrock geology and key geochemical parameters measured in streams, a key, a stratigraphic column and representative plots of data which show key geochemical attributes across the study area.

Report including an introduction and should cover descriptions of geochemical methods, geochemical results (including a clear summary of the main findings), bedrock geology (including lithologies, stratigraphy, structural geology (if relevant) and geological history) and a geochemical data discussion. The discussion should explain how field measurements (e.g. pH, conductivity) are linked to analytical data (e.g. ion concentrations) and discuss the key processes controlling the spatial patterns in stream geochemistry. The geochemical data should be submitted in a well organised spreadsheet or data file, and some summary plots of patterns through the mapping area (e.g. geochemical cross sections).

Mark	Descriptor
90-100%	**Overall:** Demonstrates an exceptional understanding of the geology and river geochemistry of the region. Insightful, with effective critical thought, hypothesis generation and/or independent analysis throughout the field notes, map, geochemical data and the final report. Superb presentation of all elements. All elements (observations, interpretations and final presentation) should be fully consistent with each other. The area mapped and duration of mapping is consistent with guidance. All requisite components are present. Publication-level quality for almost all elements of both the report and final map. **Field observations:** Notebooks are detailed, comprehensive, clearly-laid out, and outstandingly well-illustrated. They are appropriate for use by another geologist working in the area and are of an extremely high-standard. Interpretations are extremely plausible and well-supported by the data. Difficult geological and/or geochemical problems have been addressed, and successfully resolved, in the field. Diverse forms of high-quality data collection in the field (e.g. structural measurements of different types, stratigraphic data, lithological data, geomorphological observations). **Map poster:** Geochemical plots illustrate the patterns through the mapping area very well. Stratigraphic column is consistent with map and any cross-sections. All interpretations are extremely plausible, geometrically and geochemically realistic and well-supported by the data. The poster is extremely well-presented and well-laid out. Any additional components including on the poster (e.g. geographical information, stereonets, etc) are informative and enrich the geological and geochemical interpretation of the area. **Project write-up:** Interpretations are extremely plausible, clearly explained, and well-supported by the data. Novel features and challenges are well handled and explained in the report. Outstanding use of field data, geochemical data and published literature in the report to support the documentation and interpretation of the geology of the area and its relationship to river chemistry. Overall the write-up amplifies, explains and/or justifies the map, stratigraphic column and geochemical data. No errors in presentation or style of referencing.
80-90%	**Overall:** Demonstrates an excellent understanding of the geology and river geochemistry of the region. Excellent use of field data, geochemical data and published literature, demonstrating some degree of critical thinking, hypothesis generation and independent analysis. All elements (observations, interpretations and final

	presentation) should be fully consistent with each other. The area mapped and duration of mapping is consistent with guidance. All requisite components are present. Elements of the project may be of publication-level quality but there may be minor errors in presentation (e.g. small number of typographical errors). **Field observations:** Notebooks are detailed, comprehensive, clearly-laid out, and very well-illustrated. They are appropriate for use by another geologist working in the area and are of an extremely high-standard. Interpretations are extremely plausible and well-supported by the data. Difficult geological and/or geochemical problems have been identified in the field, but may not be fully resolved. Diverse forms of high-quality data collection in the field (e.g. structural measurements of different types, stratigraphic data, lithological data, geomorphological observations). **Map poster:** Geochemical plots illustrate the patterns through the mapping area very well. Stratigraphic column is consistent with map and cross-sections. All interpretations are extremely plausible, geometrically and geochemically realistic and well-supported by the data. The poster is very well-presented and well-laid out. Any additional components (e.g. geographical information, stereonets, etc) are informative and enrich the geological and geochemical interpretation of the area. **Project write-up:** Interpretations are extremely plausible, clearly explained, and well-supported by the data. Novel features and challenges are well handled and explained in the report. Very good use of field data, geochemical data and published literature in the report to support the documentation and interpretation of the geology of the area and its relationship to river chemistry. Overall the write-up amplifies, explains and/or justifies the map, stratigraphic column and geochemical data. Published literature is cited according to standard convention and the reference list is error free.
70-80%	**Overall:** Demonstrates a thorough and accurate grasp of geology and river geochemistry in the area, supported by very good use of field data, geochemical data and some examples from the published literature to illustrate points and to justify arguments. Major geological and geochemical features and lithological units will be well supported by the field observations. There should be some inclusion of critical analysis, hypothesis generation and independent thinking. All elements (observations, interpretations and final presentation) should be fully consistent with each other. The area mapped and duration of mapping is consistent with guidance. All requisite components are present. Overall the project is very well-presented but there may be a small number of minor errors (e.g. small number of typographical errors). **Field notes:** Notebooks are detailed, well-laid out, informative and well-illustrated; They could be used by another geologist working in the area. Interpretations are plausible and well-supported by the data. Difficult geological and/or geochemical problems have been identified in the field, but may be only partially resolved. The field notes show consistent effort to collect diverse forms of data collection in the field (e.g. structural measurements of different types, stratigraphic data, lithological data, geomorphological observations). **Map poster:** Geochemical plots illustrate the patterns through the mapping area very well. Stratigraphic column is consistent with map and cross-sections. The interpretations of major geological features and geochemical patterns are very plausible, geometrically and geochemically realistic and well-supported by the data. The poster is very well-presented and well-laid out. Any additional components (e.g. geographical information, stereonets, etc) are informative and support the geological and geochemical interpretation of the area. **Project write-up:** Interpretations are extremely plausible, clearly explained, and well-supported by the data. Novel features and challenges are well handled and explained in the report. Good use of field data, geochemical data and published literature in the report to support the documentation and interpretation of the geology of the area. Overall the report demonstrates a good organization of information, with an appropriate structure that explains and/or justifies the map, stratigraphic column and geochemical data.

	Published literature is cited according to standard convention and the reference list is error free.
60-70%	**Overall:** Demonstrates competence and a sound to good grasp of the major features of the geology and river geochemistry of the region. The area mapped and duration of mapping is consistent with guidance. All requisite components are present. There may be minor inconsistencies between notebooks, maps, geochemical data and report. Overall the project makes an appropriate to good use of field data, geochemical data and published literature to support arguments. **Field notes:** Fieldnote books and field slips are sound and well-organised but may lack clarity in aspects of presentation, detailed descriptions and/or justification of major geological features and/or geochemical patterns. Field note books should be reasonably well-illustrated with a diversity of good sketches. There may be some limited efforts to collect additional data in the field (e.g. structural measurements of different types, stratigraphic data, lithological data, geomorphological observations). Most aspects of the final map can be reconstructed from the field observations. **Map poster:** Geochemical plots illustrate the patterns through the area well. Stratigraphic column is consistent with map and any cross-sections. The interpretations of major geological structures and geochemical patterns are plausible, geometrically and geochemically realistic and well-supported by the data. The poster is reasonably well-presented and well-laid out. **Project write-up:** The report has a coherent writing style, a good structure and good presentation. There is sound to good use of field data, geochemical data and published literature in the report to support the documentation and interpretation of the geology and river geochemistry of the area. Overall the report demonstrates a good organization of information, with an appropriate structure but may not fully justify all aspects and interpretations of the map, stratigraphic column and geochemical data. Published literature is cited according to standard convention and the reference list is mostly error free.
50-60%	**Overall:** Demonstrates a basic grasp of geology and river geochemistry of the area. The area mapped and duration of mapping is consistent with guidance. All requisite components are present in some form. There are a number of inconsistencies between notebooks, maps, geochemical data and/or report. Presentation is sound but there may be a number of minor errors in many components. **Field notes:** fieldnote books and field slips contain the basic required elements but omissions are common in sketches, detailed descriptions and/or justification of major features; presentation of the field notes is generally good but some field sketches may be uninterpretable. It might be difficult to fully reconstruct some more minor details of the final map and sampling from the field observations. **Map poster:** Minor parts of the map and/or geochemical plots may be untenable or inconsistent with field notes and/or report. The geochemical plots may suggest a lack of appreciation of geological implications arising from map. There may be very minor errors or inconsistencies between the stratigraphic column and the map/cross-sections. **Project write-up:** The report has a basic structure and is generally coherently written. Presentation is sound. Report includes minor aspects that are poorly argued or irrelevant. The report shows a lack of appreciation of the geological and geochemical implications arising from map/sections. Some appropriate use of published literature but there may be aspects that are insufficiently or inappropriately referenced. There may be minor errors in the style of referencing and/or the reference list.

40-50%	**Overall:** Marginally competent with only a partial grasp of the geology and river geochemistry of the area. The area mapped and duration of mapping may be less than the guidance. All requisite components are submitted but may be deficient in content and/or poorly completed. There are a many inconsistencies between notebooks, maps, geochemical plots and/or report. Presentation is poor. **Field notes:** Field notes and slips poor but do document where localities are (i.e. grid references) and the type of rock at each locality. Field illustrations may be largely uninterpretable or significantly lacking. It might be very difficult to reconstruct the final map from the field observations. **Map poster:** Significant flaws in map and/or geochemical plots. Major parts of the map and/or geochemical plots may be untenable or inconsistent with field notes and/or report. The geochemical plots suggest a lack of appreciation of geological implications arising from map. A number of errors or inconsistencies between the stratigraphic column and the map/cross-sections. **Project write-up:** Report includes a number of aspects that are poorly argued, inaccurate or irrelevant, with insufficient and/or inappropriate referencing throughout. There may be minor errors style of referencing and/or the reference list.
0-40%	**Overall:** Incompetent and demonstrating a very limited understanding of the geology and river geochemistry of the area. The area mapped and duration of mapping may be less than the guidance and may demonstrate an overall lack of effort. There may be significant requisite components missing. . **Field notes:** Field notes and slips poor and missing many required basic aspects. Field illustrations are largely uninterpretable and/or lacking. It would be impossible to reconstruct the map from the data. **Map poster:** Major parts of map and/or sections untenable or completely inconsistent with report and field data. Errors and inconsistencies between all components. Poor presentation. **Project write-up:** Dissertation seriously deficient in content and/or organization, demonstrating a very limited understanding of the geology and river geochemistry of the area. There may be a significant lack of referencing and/or use of inappropriate references. Presentation, including of references, may be very poor.

3rd year Geological Mapping Project marking form

GEOLOGICAL MAPPING PROJECT MARKING SHEET FOR EXAMINERS

Deadlines: XXXXX for 1st marking, XXXXX for 2nd marking

Assessment is subdivided into the three main aspects of the project, with equal marks for each. There are obviously links between the different aspects, so the purpose is to ensure that all three have been factored into the final mark.

The text you provide on this form will be anonymised and returned to students as feedback.

With this in mind, please keep your comments factual, to the point, and relating to the marking descriptors. Do not comment on the suitability of the area, as the area has already been approved by the Department. Any concerns about use of particular areas should be relayed to the Chair of the Mapping Panel and Head of Teaching.

Additionally, please include specific suggestions for how the scientific writing style, presentation and structure of the report could be improved in the box provided. Our aim is to provide useful feedback of a generic nature that will help with the 4th year project write-up. This feedback will be provided to the student.

Please provide a separate mark for each of the sections A, B and C, plus a combined overall mark.

TOTAL MARK/100:

Has the candidate filled out the survey for the Undergraduate Geological Society?
YES/NO

WHEN PROVIDING MARKS FOR EACH COMPONENT, PLEASE REFER EXPLICITLY TO THE MARKING CRITERIA FOR EACH AND THE OVERALL GUIDANCE. THE TOTAL MARK SHOULD BE CONSISTENT WITH THE OVERALL MARKING CRITERIA FOR EACH CLASSIFICATION.

A) QUALITY OF THE FIELD NOTES.

SECTION MARK/34

B) QUALITY OF THE FINAL MAP, STRATIGRAPHIC COLUMN, AND CROSS-SECTION (MAPPING POSTER).

SECTION MARK/33

C) THE PROJECT WRITE UP

SECTION MARK/33

Summary of general feedback on the scientific writing style, presentation and structure that will help with 4th year project write-up (this will be shared with students):
This should be a few key points of constructive commentary. Include recognition of good practice as well as areas for improvement. You may copy and paste relevant comments from your mark justification. You may copy and paste relevant comments from your mark justification.

Guidance Criteria for awarding marks to mapping projects.

The marking criteria refer to the **Requisite Components** of the project, which are:

Field notes including location information, outcrop and lithological descriptions, structural data, field sketches. The total number of field days should be consistent with the guidance (28 to 35 days), unless there are extenuating circumstances.

Field slips including delimited outcrops, structural measurements, contacts, annotations, and key. The total area mapped should be consistent with guidance (12-15 km^2), unless there are extenuating circumstances.

Map poster including final map, key, stratigraphic column, and representative cross-sections.

Report including an introduction, lithological descriptions of lithologies (including effective and appropriate incorporation of thin section data), an interpretation of environments of formation, a description of the structure, and a synthesis of the geological history of the area.

Mark	Descriptor
90-100%	**Overall:** Demonstrates an exceptional understanding of the geology of the region. Insightful, with effective critical thought, hypothesis generation and/or independent analysis throughout the field notes, map and the final report. Superb presentation of all elements. All elements (observations, interpretations and final presentation) should be fully consistent with each other. The area mapped and duration of mapping is consistent with guidance. All requisite components are present. Publication-level quality for almost all elements of both the report and final map. **Field observations:** Notebooks are detailed, comprehensive, clearly-laid out, and outstandingly well-illustrated. They are appropriate for use by another geologist working in the area and are of an extremely high-standard. Interpretations are extremely plausible and well-supported by the data. Difficult geological problems have been addressed, and successfully resolved, in the field. Diverse forms of high-quality data collection in the field (e.g. structural measurements of different types, stratigraphic data, lithological data). **Final map, stratigraphic column and cross section:** Cross-sections illustrate the sub-surface geology very well and are geologically reasonable. Stratigraphic column is consistent with map and cross-sections. All interpretations are extremely plausible, geometrically realistic and well-supported by the data. The poster is extremely well-presented and well-laid out. Any additional components including on the poster (e.g. geographical information, stereonets, etc) are informative and enrich the geological interpretation of the area. **Project write-up:** Interpretations are extremely plausible, clearly explained, and well-supported by the data. Novel features and challenges are well handled and explained in the report. Outstanding use of field data, thin sections and published literature in the report to support the documentation and interpretation of the geology of the area. Overall the write-up amplifies, explains and/or justifies the map, stratigraphic column and cross-sections. No errors in presentation or style of referencing.
80-90%	**Overall:** Demonstrates an excellent understanding of the geology of the region. Excellent use of field data, thin sections and published literature, demonstrating some degree of critical thinking, hypothesis generation and independent analysis. All elements (observations, interpretations and final presentation) should be fully consistent with each other. The area mapped and duration of mapping is consistent with guidance. All requisite components are present. Elements of the project may be of publication-level quality but there may be minor errors in presentation (e.g. small number of typographical errors).

	Field observations: Notebooks are detailed, comprehensive, clearly-laid out, and very well-illustrated. They are appropriate for use by another geologist working in the area and are of an extremely high-standard. Interpretations are extremely plausible and well-supported by the data. Difficult geological problems have been identified in the field, but may not be fully resolved. Diverse forms of high-quality data collection in the field (e.g. structural measurements of different types, stratigraphic data, lithological data). **Final map, stratigraphic column and cross section:** Cross-sections illustrate the sub-surface geology very well and are geologically reasonable. Stratigraphic column is consistent with map and cross-sections. All interpretations are extremely plausible, geometrically realistic and well-supported by the data. The poster is very well-presented and well-laid out. Any additional components (e.g. geographical information, stereonets, etc) are informative and enrich the geological interpretation of the area. **Project write-up:** Interpretations are extremely plausible, clearly explained, and well-supported by the data. Novel features and challenges are well handled and explained in the report. Very good use of field data, thin sections and published literature in the report to support the documentation and interpretation of the geology of the area. Overall the write-up amplifies, explains and/or justifies the map, stratigraphic column and cross-sections. Published literature is cited according to standard convention and the reference list is error free.
70-80%	**Overall:** Demonstrates a thorough and accurate grasp of geology in the area, supported by very good use of field data, thin sections and some examples from the published literature to illustrate points and to justify arguments. Major geological features and lithological units will be well supported by the field observations. There should be some inclusion of critical analysis, hypothesis generation and independent thinking. All elements (observations, interpretations and final presentation) should be fully consistent with each other. The area mapped and duration of mapping is consistent with guidance. All requisite components are present. Overall the project is very well-presented but there may be a small number of minor errors (e.g. small number of typographical errors). **Field notes:** Notebooks are detailed, well-laid out, informative and well-illustrated; They could be used by another geologist working in the area. Interpretations are plausible and well-supported by the data. Difficult geological problems have been identified in the field, but may not be only partially resolved. The field notes show consistent effort to collect diverse forms of data collection in the field (e.g. structural measurements of different types, stratigraphic data, lithological data). **Final map, stratigraphic column and cross section:** Cross-sections illustrate the sub-surface geology very well and are geologically reasonable. Stratigraphic column is consistent with map and cross-sections. The interpretations of major geological structures are very plausible, geometrically realistic and well-supported by the data. The poster is very well-presented and well-laid out. Any additional components (e.g. geographical information, stereonets, etc) are informative and support the geological interpretation of the area. **Project write-up:** Interpretations are extremely plausible, clearly explained, and well-supported by the data. Novel features and challenges are well handled and explained in the report. Good use of field data, thin sections and published literature in the report to support the documentation and interpretation of the geology of the area. Overall the report demonstrates a good organization of information, with an appropriate structure that explains and/or justifies the map, stratigraphic column and cross-sections. Published literature is cited according to standard convention and the reference list is error free.

60-70%	**Overall:** Demonstrates competence and a sound to good grasp of the major features of the geology of the region. The area mapped and duration of mapping is consistent with guidance. All requisite components are present. There may be minor inconsistencies between notebooks, maps, cross sections and report. Overall the project makes an appropriate to good use of field data, thin sections and published literature to support arguments. **Field notes:** Fieldnote books and field slips are sound and well-organised but may lack clarity in aspects of presentation, detailed descriptions and/or justification of major geological features. Field note books should be reasonably well-illustrated with a diversity of good sketches. There may be some limited efforts to collect additional data in the field (e.g. structural measurements of different types, stratigraphic data, lithological data). Most aspects of the final map can be reconstructed from the field observations. **Final map, stratigraphic column and cross section:** Cross-sections illustrate the sub-surface geology well and are largely geologically reasonable. Stratigraphic column is consistent with map and cross-sections. The interpretations of major geological structures are plausible, geometrically realistic and well-supported by the data. The poster is reasonably well-presented and well-laid out. **Project write-up:** The report has a coherent writing style, a good structure and good presentation. There is sound to good use of field data, thin sections and published literature in the report to support the documentation and interpretation of the geology of the area. Overall the report demonstrates a good organization of information, with an appropriate structure but may not fully justify all aspects and interpretations of the map, stratigraphic column and cross-sections. Published literature is cited according to standard convention and the reference list is mostly error free.
50-60%	**Overall:** Demonstrates a basic grasp of geology of the area. The area mapped and duration of mapping is consistent with guidance. All requisite components are present in some form. There are a number of inconsistencies between notebooks, maps, cross sections and/or report. Presentation is sound but there may be a number of minor errors in many components. **Field notes:** fieldnote books and field slips contain the basic required elements but omissions are common in sketches, detailed descriptions and/or justification of major features; presentation of the field notes is generally good but some field sketches may be uninterpretable. It might be difficult to fully reconstruct some more minor details of the final map from the field observations. **Final map, stratigraphic column and cross section:** Minor parts of the map and/or cross sections may be untenable or inconsistent with field notes and/or report. The cross-section(s) suggest a lack of appreciation of geological implications arising from map. There may be very minor errors or inconsistencies between the stratigraphic column and the map/cross-sections. **Project write-up:** The report has a basic structure and is generally coherently written. Presentation is sound. Report includes minor aspects that are poorly argued or irrelevant. The report shows a lack of appreciation of the geological implications arising from map/sections. Some appropriate use of published literature but there may be aspects that are insufficiently or inappropriately referenced. There may be minor errors in the style of referencing and/or the reference list.

40-50%	**Overall:** Marginally competent with only a partial grasp of the geology of the area. The area mapped and duration of mapping may be less than the guidance. All requisite components are submitted but may be deficient in content and/or poorly completed.. There are a many inconsistencies between notebooks, maps, cross sections and/or report. Presentation is poor. **Field notes:** Field notes and slips poor but do document where localities are (i.e. grid references) and the type of rock at each locality. Field illustrations may be largely uninterpretable or significantly lacking. It might be very difficult to reconstruct the final map from the field observations. **Final map, stratigraphic column and cross section:** Significant flaws in map and/or sections. Major parts of the map and/or cross sections may be untenable or inconsistent with field notes and/or report. The cross-section(s) suggest a lack of appreciation of geological implications arising from map. A number of errors or inconsistencies between the stratigraphic column and the map/cross-sections. **Project write-up:** Report includes a number of aspects that are poorly argued, inaccurate or irrelevant, with insufficient and/or inappropriate referencing throughout. There may be minor errors style of referencing and/or the reference list.
0-40%	**Overall:** Incompetent and demonstrating a very limited understanding of the geology of the area. The area mapped and duration of mapping may be less than the guidance and may demonstrate an overall lack of effort. There may be significant requisite components missing. . **Field notes:** Field notes and slips poor and missing many required basic aspects. Field illustrations are largely uninterpretable and/or lacking. It would be impossible to reconstruct the map from the data. **Final map, stratigraphic column and cross section:** Major parts of map and/or sections untenable or completely inconsistent with report and field data. Errors and inconsistencies between all components. Poor presentation. **Project write-up:** Dissertation seriously deficient in content and/or organization, demonstrating a very limited understanding of the geology of the area. There may be a significant lack of referencing and/or use of inappropriate references. Presentation, including of references, may be very poor.

3rd year Geophysical Data Analysis Project marking form

GEOPHYSICAL DATA ANALYSIS PROJECT MARKING SHEET FOR EXAMINERS

Deadlines: XXXXX for 1st marking, XXXXX for 2nd marking

Assessment is subdivided into the three main aspects of the project, with equal marks for each. There are obviously links between the different aspects, so the purpose is to ensure that all three have been factored into the final mark. A final section is for any general comments you may wish to make.

The text you provide on this form will be anonymised and returned to students as feedback.

With this in mind, please keep your comments factual, to the point, and relating to the marking descriptors.

Additionally, please include specific suggestions for how the scientific writing style, presentation and structure of the report could be improved in the box provided. Our aim is to provide useful feedback of a generic nature that will help with the 4th year project write-up. This feedback will be provided to the student.

Please provide a separate mark for each of the sections A, B and C, plus a combined overall mark.

TOTAL MARK/100: ☐

Additionally, has the candidate filled out the survey for the Undergraduate Geological Society?
YES/NO

A) QUALITY OF THE CATALOGUE AND CODE

SECTION MARK/34 ☐

B) QUALITY OF THE POSTER

SECTION MARK/33 ☐

C) THE PROJECT WRITE UP

SECTION MARK/33 ☐

Summary of general feedback on the scientific writing style, presentation and structure that will help with 4th year project write-up (this will be shared with students):
This should be a few key points of constructive commentary. Include recognition of good practice as well as areas for improvement. You may copy and paste relevant comments from your mark justification.

Guidance Criteria for awarding marks to geophysical data analysis projects.

The marking criteria refer to the **Requisite Components** of the project, which are:

A catalogue of signals that have been identified or described, in a well organised and accessible format. The format should be chosen to be appropriate for the signals of interest.

Representative, readable **samples of codes** that have been used to analyse the data.

A poster outlining the quantitative analysis of the dataset(s) that should include an abstract (no more than 200 words long), a location map of the stations analysed, example(s) of the signals analysed, an illustration of the catalogue (e.g. examples of event signals, histograms of events through time), an illustration of the data analysis/comparison to other data types, and conclusions. These components can be presented in isolation or in combination. There should be no more than 10 sentences on the poster (excluding the abstract and any subtitles or captions used).

A Report containing an introduction, a methodology (describing the processing workflow) and a presentation of the catalogues in a suitable format (covering descriptions of the signals analysed), quantitative comparison with other data set(s), a discussion including the interpretations and any additional analyses conducted.

Mark	Descriptor
90-100%	**Overall:** Reveals outstanding ability and demonstrates an exceptional understanding of the geophysical signals. Insightful, with effective critical and independent analysis thought throughout the documentation, poster and the final report. Superb presentation of all elements. All elements (observations, interpretations and final presentation) should be fully consistent with each other. All requisite components are present. Publication-level quality for almost all elements of both the report and final poster. **Code and catalogue:** Are detailed, comprehensive and extremely well-documented. They are appropriate for use by another geophysicist. The catalogue of signals is provided in a well-organised and accessible format that is appropriate for the signals of interest. Representative, readable and commented samples of codes that have been written and used to analyse the data are provided and are of outstanding quality. **Poster:** The poster is extremely informative regarding the scope and findings of the project. It contains all the requisite components. All interpretations of signals are extremely plausible and well-supported by the data and analysis. The poster is extremely well-presented and well-laid out. Any additional components included on the poster are informative and enrich the geophysical interpretations. **Project write-up:** Interpretations of signals are extremely plausible and well-supported by the data and analysis. Novel features and challenges are outstandingly well handled and explained in the report. Outstanding use of available signals, their data analysis and published literature in the report. No errors in presentation or style of referencing.
80-90%	**Overall:** Reveals a high-level of ability and demonstrates an excellent understanding of the geophysical signals, data analysis and published literature. Insightful, with some effective critical and independent analysis throughout. Excellent presentation of all elements. All elements (observations, interpretations and final presentation) should be fully consistent with each other. All requisite components are present. Publication-level quality for almost all elements of both the report and final poster. **Code and catalogue:** Are detailed, comprehensive and appropriate for use by another geophysicist. The catalogue of signals is provided in a well-organised and accessible format that is appropriate for the signals of interest. Representative, readable and commented samples of codes that have been written and used to analyse the data are provided and are of extremely high quality.

	Poster: The poster is extremely informative regarding the scope and findings of the project. It contains all the requisite components. All interpretations of signals are plausible and well-supported by the data and analysis. The poster is well-presented and well-laid out. Any additional components included on the poster are informative and enrich the geophysical interpretations. **Project write-up:** Interpretations of signals are plausible and well-supported by the data and analysis. Novel features and challenges are well handled with some explaination in the report. Very good use of available signals, data analysis and published literature in the report. No errors in presentation or style of referencing.
70-80%	**Overall:** Demonstrates a thorough and accurate grasp of the geophysical signals analysed, supported by very good use of data analysis and comparison to published examples to illustrate points and to justify arguments. Some inclusion of critical and independent analysis. All elements (observations, interpretations and final presentation) should be fully consistent with each other. All requisite components are present. Overall, the project is very well-presented, but there may be a small number of minor errors (e.g. small number of typographical errors). **Code and catalogue:** Are detailed, well-laid out and informative. The catalogue of signals is provided in a well-organised and accessible format that is appropriate for the signals of interest. Representative, readable and commented samples of codes that have been written and used to analyse the data are provided and are of good quality. **Poster:** The poster is informative regarding the scope and findings of the project. It contains all the requisite components. Major interpretations of signals are plausible and well-supported by the data and analysis. The poster is well-presented and well-laid out. Any additional components included on the poster are informative and enrich the geophysical interpretations. **Project write-up:** Major conclusions and interpretations of the signals are plausible and well-supported by analyses. There has been some attempt to address novel features and challenges. Good use of available signals, data analysis and published literature in the report. A good organization of information, with an appropriate structure. No errors in presentation or style of referencing.
60-70%	**Overall:** Demonstrates competence and a sound to good grasp of the major features of the geophysical signals; major conclusions broadly supported by appropriate to good use of the signals, with some data analysis and use of the published literature to support arguments. There may be some minor inconsistencies between some elements. All requisite components are present. Overall, the project is well-presented, but there may be a number of minor errors (e.g. typographical errors). **Code and catalogue:** Are sound and well-organised, but may lack clarity in aspects of presentation, detailed descriptions and/or justification of major interpretations. The format is broadly appropriate for the signals of interest. Some representative, readable and commented samples of codes have been written and used to analyse the data. **Poster:** The poster provides a satisfactory overview of the scope and findings of the project. It contains all the requisite components. Major interpretations of signals are satisfactory but there may be a lack of clarity in their justification. The poster is well-presented and well-laid out. **Project write-up:** The report has a coherent writing style, a good structure and good presentation. There is appropriate to good use of signals, some data analysis and published literature to support arguments. Major interpretations of signals are satisfactory but there may be a lack of clarity in their justification. Published literature is cited according to standard convention and the reference list is mostly error free.

50-60%	**Overall:** Demonstrates a basic grasp of the geophysical signals. The submitted materials are in line with guidance and all requisite components are present in some form. There are a number of inconsistencies between components. Presentation is sound but there may be a number of minor errors in many components. Lacks appreciation of geophysical implications arising from the signal catalogue. **Code and catalogue:** Catalogue and code contain the basic required elements, but omissions are common. Samples of code and only partially commented. Limited attempts at data analysis. **Poster:** Poster provides a basic outline of the scope of the report and contains most required elements in some form. Minor parts of the poster may be untenable or inconsistent with report. Elements suggest only a very basic appreciation of the geophysical implications arising from signals investigated. Presentation is sound but there may be a number of minor errors. **Project write-up:** Report has a basic structure and is generally coherently written but also includes minor aspects that are poorly argued or irrelevant. The report shows only a basic appreciation of the geophysical implications arising from signals investigated. Some appropriate use of published literature, but there may be minor aspects that are insufficiently or inappropriately referenced. There may be minor errors style of referencing and/or the reference list. Presentation is generally sound but there may be a number of minor errors throughout.
40-50%	**Overall:** Marginally competent with only a basic understanding of the geophysical signals and a lack of their implications. The project may show insufficient content compared to guidance.All requisite components are submitted but may be deficient in content and/or poorly completed. There are many inconsistencies between components and/or aspects that are flawed, poorly argued, inaccurate or irrelevant. Presentation is poor. **Catalogue and code:** Catalogue and code are poor and could not be used by another geophysicist with ease. Significant flaws in data analysis. Inconsistencies between components (e.g. catalogue, poster and/or report) and poor documentation of code and data analysis. **Poster:** Poster provides a very basic outline of the scope of the report but may be missing some required elements in any form. Parts of the poster may be untenable or inconsistent with report, flawed, poorly argued, inaccurate or irrelevant. Elements suggest only a lack of the geophysical implications arising from signals investigated. Presentation is generally poor with a number of minor errors. **Project write-up:** Report has a basic structure but is poorly presented with a number of errors. Report includes a number of aspects that are poorly argued, inaccurate or irrelevant, with insufficient and/or inappropriate referencing throughout. Significant flaws in data analysis. There may be minor errors style of referencing and/or the reference list. The report shows a lack of the geophysical implications arising from signals investigated but demonstrates a basic understanding of the signals themselves.

0-40%	**Overall:** Incompetent. The project has insufficient content compared to guidance and is seriously deficient in content and/or organization. There are many inconsistencies between components and/or aspects that are flawed, poorly argued, inaccurate or irrelevant. Presentation is poor. Very limited understanding of the geophysical signals. There may be requisite components missing. **Catalogue and code:** Catalogue and code are very poor and/or absent and would be impossible for another geophysicist to use. Major flaws in cataloguing, coding and /or data analysis. Inconsistencies between components (e.g. catalogue, poster and/or report) and poor documentation of code and data analysis. **Poster:** Major parts of poster are untenable or inconsistent with the report. Elements suggest only a very limited understanding of the geophysical signals and/or a flawed understanding of the geophysical implications. Presentation is poor with many errors. **Project write-up:** Report is seriously deficient in content and/or organization and poorly presented with many errors. Report is untenable or inconsistent with aspects of the project. The report demonstrates a very limited understanding of the geophysical signals themselves and a flawed understanding of the geophysical implications.

3rd year Extended Essay marking form

EARTH SCIENCES – THIRD YEAR ESSAY MARK

CANDIDATE NUMBER………………………………………………………………....

ESSAY TITLE…………………………………………………………………………

……………………………………………………………………………………………

ASSESSOR NAME…………………..…………………………………

Education Committee policy requires that comment sheets are used for all substantial assessment items. All undergraduate and postgraduate taught examination boards are strongly encouraged to use comment sheets for all papers (whether submitted work or written examinations).

Please note that comment sheets will be provided to students who make a subject access request to the University's Information Compliance Team for personal data relating to their examinations/assessment.

Please refer to the marking criteria provided overleaf when writing your comments. You should use the full range of marks available to you, and write any comments on this sheet rather than the essay itself.

The text you provide on this form as summary feedback will be anonymised and returned to students. With this in mind, please keep all your comments constructive, factual, and informative. Marks should be justified by linking your comments to the marking descriptors overleaf.

Please provide a separate mark for each of the sections A and B, plus a combined overall mark.

Additionally, please include specific suggestions for how the scientific writing style, presentation and structure of the document could be improved in the box provided. Our aim is to provide useful feedback of a generic nature that will help with the 4th year project write-up. This feedback will be provided to the student.

Please could you complete this task by **xxx** at the latest.

OVERALL MARK/100: ☐

A) Quality of the synthesis or critical analysis of the topic.

SECTION MARK/50 ☐

B) Quality of writing, presentation, illustration and appropriateness of the cited literature.

SECTION MARK/50 ☐

y of general feedback on the scientific writing style, presentation and structure that will help them with 4th year project write-up (this will be shared with students):
This should be a few key points of constructive commentary. Where appropriate include recognition of good practice as well as areas for improvement. You may copy and paste relevant comments from your mark justification.

Mark Scheme for FHS Geology/Earth Sciences

Marks	Descriptor for 3rd YEAR ESSAYS
90% - 100%	Outstanding and original review and synthesis. Outstanding organization and clarity of writing with clearly stated aims that are wholly realized. The development of the essay is clear and logical. There is insightful and critical analysis of the appropriate literature, with abundant evidence for independent thinking (e.g. in the synthesis, or use of tables or figures which have been created for this purpose), and no obvious gaps that haven't been addressed. Excellent presentation throughout. Published literature is cited according to standard conventions and the reference list is error free, and complete. Publication-level quality.
80% - 89%	Original review and synthesis. Very well written and illustrated showing a thorough command of the published literature, and no obvious gaps or oversights. Effective critical analysis and evidence for independent thinking. Very good presentation throughout. Published literature is cited according to standard conventions and the reference list is error free, and complete. Approaching publication-level quality.
70% - 79%	Well written and clearly structured review and synthesis. Shows a good to very good understanding of the arguments and an efficient use of the relevant literature. Some evidence for critical analysis and independent thinking. Good to very good presentation throughout. Published literature is cited according to standard conventions and the reference list is mostly error free, and complete.
60% - 69%	Competent review and good attempt at synthesis. Literature base is good. The overall structure is good, with coherent writing and good presentation. Some omissions in discussion and/or minor errors in understanding. Published literature is mostly cited according to standard conventions and the reference list is mostly error free.
50% - 59%	Pedestrian treatment of a wide literature; or an inadequate treatment of incomplete literature. Writing competent but lacking critical appraisal. Little attempt to synthesise or clarify the issues under discussion. Published literature is generally cited according to standard conventions and the reference list is generally error free.
40% - 49%	The approach is basic, or shallow, or narrow. Writing lacks clarity throughout, and presentation is poor. Lack of understanding. Misguided selection of material. Lack of background material, or explanation. Flawed arguments. Conclusions flawed or lacking. Cited literature may have obvious gaps, and reference list may be incomplete or poorly structured.
0% - 39%	No adherence to essay outline or title. Little evidence of understanding of the topic, and little evidence of efforts to review the literature, or to cite the literature adequately.

4th yr Project marking form

EARTH SCIENCES – FOURTH YEAR PROJECT MARK

CANDIDATE NAME… …………………………………………………………….......

ESSAY TITLE…………………………………………………………………………

………………………………………………………………………………………….

EXAMINER/ASSESSOR NAME… ………………..…………………………………

Education Committee policy requires that comment sheets are used for all substantial assessment items. All undergraduate and postgraduate taught examination boards are strongly encouraged to use comment sheets for all papers (whether submitted work or written examinations).

Please note that comment sheets will be provided to students who make a subject access request to the University's Information Compliance Team for personal data relating to their examinations/assessment.

Students carry out their 4th year research project under the supervision of a member of staff. The purpose of the scheme is to introduce students to scientific research first hand. In most cases, students work as part of a team on a topic that may involve laboratory work, computation or fieldwork. Projects may be of a theoretical or an observational nature.

The supervisor will read the first draft, and complete a written report of limited length, which is provided to the student and to the examiners. The final version of the project is marked by two members of the academic staff in the Department, neither of whom is the supervisor. **Each internal examiner provides a separate mark and completes/submits this form prior to the viva. After completion of the viva, the examiners should together complete one additional form, documenting the agreed mark and the rationale behind that mark.** Further advice will also be sought from the External Examiner.

The two internal markers are allocated after submission of the project. A viva, conducted by the two markers, is a formal part of the process of marking the dissertation. This viva should take place between Weeks 3 and 6 of Trinity Term, after the final project report has been submitted and before commencement of the written examinations. The viva will be of 30-60 minutes duration and will be a discussion of the project material by the candidate and the two markers. It is an opportunity for the markers to explore the depth of a student's knowledge of their project, and to discuss the conduct, science, and background of the work

Please refer to the marking criteria provided overleaf when writing your comments. You should use the full range of marks available to you, and write any comments on this sheet rather than the project itself.

Please provide a joint mark out of 100 overleaf, and relate your comments to the mark scheme and descriptors overleaf.

PLEASE PROVIDE JUSTIFICATION FOR YOUR FINAL MARK, RELATING TO THE CLASS DESCRIPTORS BELOW. THIS SECTION MAY BE AS LONG AS NECESSARY.

OVERALL MARK/100:

Mark Scheme for FHS Geology/ Earth Sciences

Marks	Descriptor for PROJECT	Additional Descriptor for QUANTITATIVE APPROACHES (AS APPROPRIATE)
90-100	**1**. Outstanding project; full of insight; exceptional command of material and evidence of original thinking. **2**. Exceptional organization with insightful introduction, critical discussion, and well-argued conclusions. **3.** Effective grasp of literature/debate. Insightful connections and comparisons across the course	**1.** Formulation and choice (or derivation) of relevant equations show complete understanding, including background, limitations of approach, comparison with alternatives.**2.** Algebraic manipulation and/or calculations are without error. **3.** Significant development of code.
80-90	**1**. Excellent project; evidence for wide knowledge, some original thinking and understanding, of subject. Effective critical analysis. **2**. Structure reflects full clarity of thought, fully illustrated as necessary. **3**. Full reference to key connections across the subject and the literature.	**1.** Formulation, and choice (or derivation) of relevant equations show excellent understanding, including background, limitations of approach, comparison with alternatives. **2.** Algebraic manipulation and/or calculations are without error. **3.** Significant development of code.
70-80	**1**. Very good understanding of all essential literature, inclusion of relevant details. Integration of extensive reading; some critical analysis. **2**. Good structure, well written and well illustrated. **3**. Clear ability to make relevant connections across the subject and literature.	**1.** Formulation, and choice (or derivation) of relevant equations show very good understanding, and justifications are clearly explained. **2.** Algebraic manipulation and/or calculations are without substantial error. **3.** Minor development of code (e.g. adding a module to an existing code).
60-70	**1.** Sound understanding of all essential literature. **2.** Structure reflects clear understanding. Clearly annotated and labelled illustrations as necessary. **3.** Includes essential connections across the subject. **4.** Small factual errors and /or omissions may be present.	**1.** Formulation and choice (or derivation) of relevant equations show good understanding and are justified. **2.** There may be small errors in algebraic manipulation and/or calculations. **3.** Routine use of existing packages, with understanding of their methods.
50-60	**1**. Some key information from the subject and literature missing. Demonstrates understanding of only part of the research. **2**. Some structure. **3**. Few connections across the subject. Few signs of originality. **4**. Large and small factual errors.	**1.** Formulation and choice (or derivation) of relevant equations are poorly justified and do not show full understanding, assumptions are not stated.**2.** Errors in algebraic manipulation or calculation lead to incorrect or incomplete results. **3.** Routine use of existing packages, with little understanding.
40-50	**1**. Most of relevant information in literature missing. Concepts disordered or flawed. Demonstrates inadequate understanding. **2**. Incompletely structured arguments. **3**. No connections across subject. No sign of originality. **4**. Many significant factual errors.	**1.** Formulation and choice (or derivation) of relevant equations show inadequate understanding. **2.** Little or no understanding of the problem. **3.** Errors in algebraic manipulation or calculation lead to unrealistic results. **4.** Routine use of existing packages, with no understanding.
0-40	**1**. Significant inability to tackle research. **2**. Incoherent structure, disconnected information. **3**. Inclusion of information irrelevant to the problem. **4**. Minimal correct information.	**1.** Significant inability to tackle the problem. **2.** Problem approach not formulated. Incorrect or irrelevant formulae used. **3.** Little or no relevant calculation.

Appendix 2 – PROGRAMME SPECIFICATIONS

EARTH SCIENCES BA/Geol and MESc/ES
Programme Specification

1. Awarding institution/body	University of Oxford
2. Teaching institution	University of Oxford
3. Final award	MEarthSci (4-year) or BA (Geology) (3-year)
4. Programme	Earth Sciences
5. UCAS code	F644 (MESc/ES) or F642 (BA/Geol)
6. Relevant subject benchmark statement	Earth Sciences, Environmental Sciences and Environmental Studies
7. Accreditation	Geological Society of London

9. Educational aims of the programme

These are built around the QAA framework for higher education qualification and the QAA Subject Benchmark statements.

- To provide a course of the highest academic quality in Earth Sciences in a challenging and supportive learning environment that attracts the very best students from the UK and elsewhere.
- To provide Bachelor's degree students with a systematic understanding of core areas and advanced topics in the Earth Sciences; the ability to evaluate primary evidence critically; and the conceptual understanding to marshal and present arguments and solutions based on primary data, theory, and the application of sound reasoning.
- To provide Master's degree students also with a critical awareness of current problems and new insights, much of which is at, or informed by, the forefront of Earth Sciences research, together with a comprehensive understanding of techniques applicable to their own research project, originality and conceptual understanding.
- To develop transferable skills related to problem solving, communication, practical fieldwork, and computing.
- To bring students to a position on graduation that allows them to choose confidently from many different careers, whether within Earth Sciences or not, and enables them to contribute rapidly to their chosen employment.
- In addition those completing the 4-year MEarthSci will:
    - Build on the core knowledge and training of the BA course and develop a more advanced understanding.
    - Undertake a research project that will further develop research skills;
    - Be in a position to start graduate study for a research degree at a leading university either in the UK or overseas or pursue a scientifically based career.

10. Programme outcomes

These are built around the QAA Subject benchmark statements.

A. Students will develop a knowledge and understanding of:

- Fundamental principles of physics, chemistry and biology of relevance to the Earth Sciences
- The general holistic, multidisciplinary and interdisciplinary nature of the Earth Sciences
- The integration of field based, experimental and theoretical principles needed for the Earth Sciences
- Mathematical, quantitative and qualitative approaches and their application to problem solving
- Basic computer programming and numerical methods as applied in the earth sciences

Related teaching/learning methods and strategies

- Lectures are the principal means by which the course content is delivered to the students. Lecturers will generally use lectures to outline the areas of knowledge they wish the student to be familiar with, and to emphasise particularly important concepts.
- Practicals supplement and extend the lecture course, and allow the students to determine whether they really understand the content of the lectures. They also give an opportunity to develop key skills.
- Tutorials provide a flexible forum for small-group teaching. A principal function of tutorials is to develop intellectual skills and allow exploration of a subject beyond the confines set in lectures. This can be tailored to the specific interests of the students and the tutor.
- Fieldwork is an integral part of the course structure. The field courses are designed to build upon theoretical and practical knowledge gained in all aspects of the course.
- Mapping Projects allow students to undertake geological mapping of an area, and develop initiative and self-reliance regarding field observations.
- Independent Research introduces students to scientific research first hand, working with a Faculty member.
- Computing involves the manipulation of numerical datasets and interactive comparisons of observation with models.
- Private study particularly during the vacations is both necessary and expected, as it provides opportunities for consolidation and for reading beyond and around the syllabus.

Assessment

Public (university) examinations are taken in the summer term of each year of the course.

The Preliminary Examination is a pass/fail examination covering the foundation topics of the first year in Earth Sciences. The examination comprises four theory papers and a timed practical. It must be passed (a resit is allowed in September) to proceed further on either of the 3- or 4-year courses. The marks do not count towards the degree classification.

There are two Final Honours Schools – the 3 year BA (Hons) and the 4-year MEarthSci (Hons). Both schools share the same examinations in years 2 and 3.

The Final Examination for the 3-year Honour School in Geology is taken at the end of years 2 and 3. At the end of Year 2 students are required to satisfy the examiners in three papers, including practical components. At the end of Year 3 students must satisfy the examiner in a further seven papers, plus two pieces of independent work. They are required to attend such field courses during each year of study as are approved annually by the Faculty of Earth Sciences, and make available to the examiners practical notebooks containing records of both field and laboratory courses. Marks from the Second Year examination are carried forward to Third Year.

The Final Examination for the 4-year Honour School in Earth Sciences is taken is in two parts. Part A of the examination is taken at the end of Years 2 and 3 and is the same as that for the three-year course in Geology above. Part B of the examination is be taken at a time not less than three terms after Part A, and consists of written papers on four subjects chosen from a list published by the Faculty of Earth Sciences, a report on an advanced practical project or other advanced work.

Formative assessments are carried out within the college context through tutorials, classes and termly examinations (collections) and within the context of the teaching laboratories through practicals.

B. Skills and other attributes

These are built around the QAA Subject benchmark statements.

Students will have the opportunity to develop the following skills during the course:

2. Intellectual skills

- Appreciation of the holistic, multidisciplinary and interdisciplinary nature of the Earth Sciences
- Appreciation of the unity of underlying physical, chemical and biological principles of the Earth Sciences and their interactions in Earth systems processes
- Ability to recognise and use subject-specific theories, paradigms, concepts and principles (such as plate tectonic theory, evolutionary theory, the principle of uniformity)
- Ability to apply knowledge and understanding to address familiar or unresolved and more open-ended problems using fundamental principles
- Ability to collect, analyse, synthesise, summarise and inter-relate a wide range of phenomena and facts, including unresolved observational and complex information, to formulate and test hypotheses and reach conclusions, using both quantitative and qualitative approaches
- Ability to apply appropriate mathematical or numerical techniques to model geological and geophysical phenomena
- Ability to conduct a logical discussion
- Ability to précis scientific arguments and facts and give succinct and written presentations, using IT based methods where appropriate
- Awareness of the importance of creativity and the scientific imagination in formulating hypotheses from careful observations and analyses

3. Practical skills

These are built around the QAA Subject benchmark statements.

- Appreciation of the paramount importance of high quality field observation and practical skills to Earth systems analysis
- Ability to make and record accurate observations of field phenomena at a range of scales from maps to hand specimens, and to be able to analyse and make scientifically rigorous or testable conclusions from these observations
- Ability to make appropriate use of the terminology, nomenclature and classification systems used in the Earth Sciences (such as crystallography, mineralogy, petrography, biological taxonomy and the Linnean system).
- Ability to carry out accurate measurements using a range of techniques and data acquisition systems
- Ability to integrate field work, experimental and theoretical data
- Awareness of the need for safety in the field and practical laboratories, and ability to ensure safe conduct through risk assessment, awareness of rights of access, relevant health and safety regulations and sensitivity of the investigations on the environment and stakeholders
- Ability to plan, conduct and report on an open ended project, including the use of secondary data
- Ability to reference work in an appropriate manner

III. Transferable skills

These are built around the QAA Subject benchmark statements.

A. Communication skills

- Receiving and responding to a variety of information sources (e.g. textual, numerical, verbal, graphical) [LTC] [Tt] (U) (C)
- Communicating effectively and appropriately to a variety of audiences in written, verbal and graphical forms [LTC] [Tt] [M] (U) (C)

B. Problem solving, numeracy and IT skills

- Problem solving in a variety of contexts, and the ability to relate problems to first principles [LTC] [Tt] (U) (C)
- Appreciation of the issue of sample selection, accuracy, precision and uncertainty, including the collection, recording and analysis of data in the field and the laboratory [LTC] [Tt] [M] (P)
- Ability to prepare, process, interpret and present data using appropriate qualitative and quantitative techniques and packages [LTC] [Tt] [M] (U) (C) (P)
- Ability to solve numerical problems using computer and non-computer based techniques [LTC] [Tt] (U) (C) (P)
- Ability to devise and manipulate mathematical and numerical models [LTC] [Tt] (U) (C) (P)
- Familiarity with IT for documentation production and information retrieval [LTC] [Tt] [M] (U) (C) (P)
- Ability to use the Internet critically as a means of communication and a source of information [LTC] [Tt] (C) (P)

C. Interpersonal/Teamwork skills

- Development of organisational skills for practical tasks [LTC] [Tt] [M] (C) (P)
- Ability to identify individual and collective goals and responsibilities and perform in a manner appropriate for these roles [LTC] [Tt] [M] (C) (P)
- Ability to recognise and respect the views and opinions of other team members [LTC] [Tt] (C) [M] (P)
- Ability to evaluate performance as an individual and as a team member [LTC] [Tt] (C) [M] (P)

.D Self management and professional development skills

- Development of the skills necessary for self-managed and lifelong learning (e.g. working independently, time management and organisational skills) [LTC] [Tt] ([M] C) (P)
- Ability to identify and work towards targets for personal, academic and career development [Tt] [M] (C) (P)
- Development of an adaptable and flexible approach to study and work [Tt] [M] (C) (P)
- Foreign language ability (optional for those who wish to maintain or improve a language) [F]

Teaching/Learning methods and strategies

These are built around the QAA Subject benchmark statements

The teaching and learning skills are acquired through the following methods and strategies. Each symbol is shown in brackets in the list above.

LTC: Lectures, tutorials and classes. Most teaching is in the form of lectures and associated practicals. These may be supported by tutorials and classes according to the needs and interests of the student and the tutor.

Tt: Tutorials and writing up in practicals. Tutorials at Oxford hold a very special place in the expansion of personal Graduate Key Skills (such as intellectual development, self-management, powers of communication).

M: writing up of field work, independent mapping project, 3rd year essay, 4th year project. Field-based studies allow students to develop and enhance many of the Graduate Key Skills (such as teamworking, problem-solving, self-management, interpersonal relationships), which are of value to employers and for life-long learning, as do the essay and projects.

F: Foreign language tuition is an option that can be taken in the second and third year and is taught by the University Language Teaching Centre. These skills are not assessed by us.

Assessment

These are built around the QAA Subject benchmark statements.

The teaching and learning skills are assessed by a combination of the following. Each symbol is shown in brackets in the list above.

U: Unseen written examinations and specific practicals in the computer teaching laboratory. Examinations are rigorously overseen by the Examination Schools, where some of the written examinations may be taken.

College examinations (organised centrally as departmental collections) are arranged after the Summer vacation and Christmas vacation for those students not sitting a formal examination that term or year. These marks are for assessment of progress and do not count towards the degree.

C: Tutorial collections at the end of each term and written feedback on field notebooks. Each student will receive or hear written feedback on their tutorial work during the term at end of term collections. At Oxford, the reports are for the assessment of progress and do not count towards the final degree class.

P: Fourth year project and assessed short talks in the department and on field courses. The projects are marked formally. The talks are assessed informally.

11. Programme Structures and Features

These are built around the QAA Subject benchmark statements.

- A four year course leading to the degree of Master of Earth Sciences with honours or a three year course leading to the BA (Hons). The first three years are common to both courses.

- The first year covers multidisciplinary, foundation material in Planet Earth, Crystallography, Mineralogy and Petrology, Sedimentology, Palaeontology, Maps and Practical Skills, Chemistry, Physics and Biology and Mathematics. The five Programme Outcomes are introduced here (A1 through lectures, tutorials, practicals and classes, A2-A5 also through field courses). The Preliminary Examination in Earth Sciences (First Public Examination) is taken at the end of the year (with a resit in September) and must be passed to continue on the course.

- The course leading to MEarthSci occupies the remaining three years leading to examinations at the end of each year. The multidisciplinary and interdisciplinary Programme Outcomes are developed here (A1 through lectures, tutorials, practicals and classes, A2-A5 also through field courses).

- The BA (Hons) course takes two years with exams at the end of the year. The multidisciplinary and interdisciplinary Programme Outcomes are developed here (A1 through lectures, tutorials, practicals and classes, A2-A5 also through field courses).

- The programme is enhanced throughout by tutorial teaching, arranged in association with the colleges. Tutorials reinforce understanding of the fundamental principles in physics, chemistry, biology, mathematics, and in Earth Systems Science. They contribute markedly to the development of personal Graduate Key Skills (such as intellectual development, self-management, powers of communication).

Learning: Year 1

Subjects
Planet Earth
Fundamentals of Geology
Chemistry, Physics & Biology
Mathematics & Computing

Practicals
Problem Classes
Field Programme

Assessment (Preliminary Examination in Earth Sciences
The four written papers, each of 3 hours, must be passed (pass mark 40%) in one examination. Students failing up to two papers may retake these in September. Failure on more than two papers requires all four to be taken again. Practical work is assessed via regular coursework throughout the academic year. The examiners may award a distinction to those who show special merit across all the tests and have passed all papers at one sitting. The first field course takes place in Michaelmas Term and the second at Easter, plus day excursions in Trinity Term.

Year 2

Subjects
Sedimentary Geology
Structural Geology and Maps
Igneous and Metamorphic Petrology
Geophysical Methods
Mathematics & Scientific Computing
Isotope Geology
Thermodynamics
The Carbon Cycle
Climate Change
Evolution
Remote Sensing and Active Tectonics
Earthquakes & Faulting
Planetary Materials and Meeorites

Problem Classes
Practical Work
Field Programme
Independent Mapping Project

Assessment (both MEarthSci and BA)
Three papers, combining theory and practical elements, are taken at the end of the summer term. Practical work is assessed via regular coursework throughout the academic year. Two field courses take place, one in Michaelmas Term and one at Easter. A report on an individual mapping project is undertaken during the summer break and the report submitted at the beginning of Hilary Term of year 3.

Year 3

Subjects *(students chose six courses from the following options)*
Chemistry of Earth's Interior
Natural Resources and the Energy Transition
Biological & Physical Oceanography
Volcanology, Igneous Processes & Petrogenesis
Quantitative Palaeobiology
Vector Calculus and Continuum Mechanics
Geophysics of the Deep Earth
Plate Tectonics
Analytical Methods
Biogeochemistry of the Earth's Surface

Essay
Practical Work
Field Programme

Assessment (both MEarthSci and BA)
Students have an element of choice as to which major subjects to take this year. An extended essay is to be undertaken in Hilary Term of the third year. Six (chosen out of ten) two-hour theory papers are taken at the end of the summer term. The Spanish field course takes place at Easter each year.

Year 4
Subjects (students choose four courses from the following options)
Environmental Geophsyics
Planetary Sciences
Structure and Dynamics of the Earth's Mantle
Palaeobiology
Coevolution of Earth and Life
Rock, and Palaeo-magnetism
Topics in Climate Science
Topics in Volcanology

Project

Assessment (*MEarthSci)*
Four two hour written papers are taken at the end of Trinity (summer) term. The project is undertaken during Michaelmas, Hilary, and Trinity terms of the 4^{th} year and written up for submission to the examiners on Friday of week 4 of Trinity Term.

There are two field courses at the beginning of the 4^{th} year. Students may go to Bermuda or Greece.

12. Support for Students and their learning

- All undergraduates reading Earth Sciences have a college tutor responsible for their academic welfare. This person will normally also hold a university teaching post in the Earth Sciences department. In addition to college tutors, College Deans provide more general welfare support and liaise with the University Counselling Service. Most Colleges are able to house most of their undergraduates throughout the course and provide social and sports facilities.

- During the first three years of the Earth Sciences courses, college tutors are responsible for organising the tutorial and class teaching that complements and exercises the material covered in lectures.

- The department has teaching laboratories and collections for Palaeobiology, Mineralogy and Petrology, and computing; these are available to students at all times. Students on projects will also have access to the research laboratories, under strict supervision.

- All colleges have good library provision and at university level, the Hooke library provides a lending service for science subjects. Undergraduates are also entitled to make use of the Radcliffe Science Library (non-lending research library). The department also has its own library, with open access, and it is a valuable resource for the students.

- The department has a Computing Officer and use of IT and the web is continually expanding. Students have access to computers in college and in the teaching laboratories. Many college rooms have internet access. The network of IT resources and support is extensive, especially the Oxford University IT Services, which provides facilities for undergraduates and graduates, plus an extensive range of training programmes.

- Information about the courses is provided in the Undergraduate Course Handbook (distributed at the start of each year to all Earth Science undergraduates in residence) and more information and links to Earth Science sites worldwide are provided by the Earth Science department website (www.earth.ox.ac.uk).

- Advice on course content/options for undergraduates is provided by college tutors.

- Extensive facilities for language development for personal purposes are available through the University Language Centre.

- Regular personal contact between students and tutors ensures that problems are addressed promptly. The University Counselling Service offers a range of assistance.

13. Criteria for Admission

- A-Level Mathematics plus either Physics or Chemistry at A-level are required. All three are useful, but candidates lacking one of these core subjects but with an A-level or additional AS-level in Geology, Biology, Further Mathematics, or Geography are also encouraged to apply, as of course are candidates with other qualifications such as the International Baccalaureate, Scottish Highers, etc.

- Applications are made to colleges of the University (undergraduates) or the department (graduates). Two meetings of all those involved in college interviewing are held in the department to arrange second round interviews and to ensure that the best qualified candidates overall are offered places.

- Tutors are looking for enthusiastic and highly motivated students with the ability to apply basic principles to unfamiliar situations. Offers are made on the basis of a student's academic record, the recommendations of their teachers, and their performance in interviews in December.

- The purpose of the interviews is to determine those students, from an excellent calibre of applicants, who might be seen to benefit from the intensive, multidisciplinary, interdisciplinary and tutorial-based learning of the course.

- The courses require a good level of mathematical competence, but the key requirement is the ability to formulate a problem quantitatively and to be able to extract the consequences from the solution.

- Applicants are expected to meet the University's English Language criteria.

14. Methods for evaluating and improving the quality and standards of learning

- The Mathematical, Physical and Life Sciences divisional committees ensure the dissemination of best practice between departments.

- The quality of the course is monitored on a regular basis by the Earth Science Faculty (essentially all staff involved in teaching in any capacity) and the Academic Committee. Input to these bodies comes from:

    - Internal Examiner's reports
    - External Examiner's reports
    - Earth Science Joint Consultative Committee (staff-student)
    - Termly student feedback on quality of lectures.

- Student comment on tutorial provision is requested by their colleges and is reviewed by Senior Tutors.

- The External Examiner's Reports and the response of the department to any issues raised are also considered by the Academic Audit Sub-Committee of the Division of Mathematical, Physical and Life Sciences.

- University reviews of the department are carried out jointly by the division and Education Committee every six years.

- Issues relating to the improvement of teaching can be raised by the processes of mentoring of new lecturers during the five year probation, by feedback during their Oxford Learning Institute (OLI) training, through the divisional academic advisor, and by the appraisal process. Mentoring and arranging training in OLI are the responsibility of the department; the appraisal process is the responsibility of the Divisional Board.

- Accreditation report by the Geological Society of London.

15. Regulation of assessment

Final Examination

- The final examinations are each conducted by a team of 3 internal examiners plus one external examiner. Examiners are currently nominated by the departmental Academic Committee. Acceptance of these examiners is the responsibility of Faculty. The normal term of duty is two years. Examiners are guided by conventions agreed by the Faculty, endorsed by the division, and made available to students in the Course Handbook. Oversight of all public university examinations is carried out by the Junior Proctor and staff. Any complaint or application for mitigation must be made through the Proctor.

- Candidate anonymity is provided by random candidate numbers, known only by Examinations Schools until the final examinations meeting. Dispensation from anonymity has been agreed for the Independent Mapping Project and 4th year Research Project, for practical reasons.

- All Part A and Part B Finals examination material is double marked. Assessors and examiners carefully consider any cases where there is a notable difference between the marks awarded by the two assessors.

- There is an opportunity for candidates who fail any Prelims examinations to resit those papers over the long summer vacation. Part A candidates who fail may be permitted to resit the examination in the following academic year.

The department has adopted the divisional template for class descriptors, as outlined below, but also provides its own more detailed guidance to assessors.

Divisional Template for Qualitative Descriptors of Classes

Class I	The candidate shows excellent problem-solving skills and excellent knowledge of the material over a wide range of topics, and is able to use that knowledge innovatively and/or in unfamiliar contexts.
Class IIi	The candidate shows good or very good problem-solving skills, and good or very good knowledge of much of the material over a wide range of topics.
Class IIii	The candidate shows basic problem-solving skills and adequate knowledge of most of the material.
Class III	The candidate shows reasonable understanding of at least part of the basic material and some problem solving skills. Although there may be a few good answers, the majority of answers will contain errors in calculations and/or show incomplete understanding of the topics.
Pass	The candidate shows some limited grasp of basic material over a restricted range of topics, but with large gaps in understanding. There need not be any good quality answers, but there will be indications of some competence.
Fail	The candidate shows inadequate grasp of the basic material. The work is likely to show major misunderstanding and confusion, and/or inaccurate calculations; the answers to most of the questions attempted are likely to be fragmentary only.

16. Indicators of quality and standards

- External Examiners Reports

- Reports of external review bodies (see Sec.13)

- Student feedback

- Review jointly by the division and Education Committee

- The department topped the ranking for research quality in the 2014 Research Excellent Framework with a score of 3.4.

Appendix 3 – STANDING ORDERS

1. Name of Board:
MEarthSci and BA Geology:
Preliminary Examinations ("Prelims")
Finals examinations ("Finals"), which includes Part A (Part A1 – 2nd year, Part A2 – 3rd year) and Part B (4th year)

2. Principal contact for nominations/appointments:
Professor Stuart Robinson/Ms Emma Brown

3. Number of internal examiners:
One Chair plus two internal examiners are required from the Faculty of Earth Sciences for Finals examinations.

One Chair plus two internal examiners are required from the Faculty of Earth Sciences for Prelims examinations.

4. Term of office for internal examiners: The term of office for internal examiners shall be **three** years, with a maximum of two consecutive terms on the same board of examiners.

5. Term of office for the chair of examiners: The term of office for the chair of examiners shall be **one** year, which may be renewed once.

6. Number of external examiners and term of office:
One external examiner is required for Part A and one external examiner is required for Part B. The period of office of each external examiner is usually two years with the Part A examiner becoming the Part B examiner in the succeeding year.

No external examiner is required for the Prelims examination.

7. B.A. and M. Earth Sciences
All matters relating to teaching and content of the courses are reviewed by the Teaching Committee which reports to the Faculty.

The Teaching Committee shall ensure that the Course Handbook and the Examination Conventions are reviewed and published annually and will report to the Faculty of Earth Sciences for approval.

8. Nomination of Examiners
The Teaching Committee will consult and recommend to the Faculty on the appointment of internal and examiners.

9. Examiners' Report
The Teaching Committee shall receive and consider the internal and external examiners' reports on the examinations at the Michaelmas Term meeting. The examiners' reports and a draft response to the comments made by the external examiners will be forwarded in consultation with the internal examiners to the Faculty for approval.

The Teaching Committee also considers the following matters and recommends to the Faculty for discussion and approval:

(i) Quality assurance matters (review of course questionnaires and feedback (monitored by the Chairman) from students
(ii) Reports of the Joint Consultative Committees for Undergraduate (JCCU) and Graduate (JCCG) Studies.

The Teaching Committee will also consider examination conventions and examination regulations and pass these annually to Faculty for approval.

10. Reporting to the MPLS Division
Reports to the MPLS Division are sought at various times of the year, as set out in the EdC/MPLS Quality Assurance and Quality Enhancement Calendar. For example, reports on examination reports are provided at the start of Hilary Term, and are considered by the MPLS Academic Audit Sub-Committee. The Chairman of the Faculty of Earth Sciences attends meetings of the MPLS Education committee and academic audit sub-committee to ensure good communication, feedback, and sharing good practice.

Appendix 4 – TRAVEL INSURANCE

Travel insurance cover is available to University employees, students and volunteers travelling on University business.

The travel insurance application form must be completed at the time of booking the trip and presented to the appropriate Departmental Administrator to enable travel insurance cover to be arranged.

Please refer to the University website https://finance.admin.ox.ac.uk/travel-insurance in order to check your eligibility for cover, countries requiring specific referral, cover details, and how to apply.

Please note:

1. You will be required to prepare a full risk assessment for your travel: see details at https://safety.admin.ox.ac.uk/travel-and-fieldwork for details, in order for cover to apply

2. All travel insurance claims are settled net of a standard excess of £50.

3. Please list on this form all personal items over £500 in value for which you require cover. We strongly advise you not to take valuable items with you while travelling.

4. All theft claims must be supported by a local police/security report.

5. All property damage claims must be supported by an estimate for repair, detailing the extent of the damage and the cost of repair. If the item is beyond economical repair a quotation for replacement must be supplied with the claim. You may also be asked to supply a receipt for the original item.

6. Pre-existing medical conditions
   The University's travel policy includes cover for emergency medical expenses resulting from a pre-existing medical condition, however, cover will not operate in respect of journeys taken against the advice of a Qualified Medical Practitioner or where any existing medical condition is not under control and it is foreseeable that medical assistance may be needed on a journey
   It is strongly recommended that if you suffer from a pre-existing medical condition you visit your GP prior to travelling in order to check that you are fit to travel and undertake the duties intended. This will ensure that in the event of a claim, evidence is available to confirm you were not travelling against medical advice and that any existing medical conditions were considered under control at the start of your Journey.

7. Personal Medical Information: Travellers are advised that, in the event of a claim for medical expenses, you will be required to provide personal medical information (by way of the claim form) to the University Insurance Team. This is required by the Insurer in order to settle the claim. In the event that the traveller wishes to keep this information confidential from the University Insurance Team, arrangements can be made for the information to be sent direct to the Insurer.

8. Emergency contact details are available at https://finance.admin.ox.ac.uk/travel-claims-and-emergency-contact and should be taken with you when you travel. The Emergency Assistance Provider MUST be contacted in the event that emergency repatriation is required.

Appendix 5 - DEPARTMENTAL STAFF

A list of key contact contacts for undergraduate students can be found below.

For a full list of staff and researchers, please see the website:

www.earth.ox.ac.uk/people

Name	Post	Rm	Email
Hannah Lingard	Head of Administration and Finance	20.10	hannah.lingard@earth.ox.ac.uk
Conall MacNiocaill	Head of Department	20.11	conall.macniocaill@earth.ox.ac.uk
David Pyle	Undergraduate Advisor	30.04	david.pyle@earth.ox.ac.uk
Stuart Robinson	Associate Head of Department for Teaching	30.07	stuart.robinson@earth.ox.ac.uk
Emma Brown	Academic Administrator	10.33	emma.brown@earth.ox.ac.uk
Liz Crabbe	Academic Administrative Assistant	10.33	elisabeth.crabbe@earth.ox.ac.uk
Elizabeth Crowley	Librarian	10.07	elizabeth.crowley@earth.ox.ac.uk library@earth.ox.ac.uk
Jason Dowsing	Facilities Technician	10.32	jason.dowsing@earth.ox.ac.uk
Ashleigh Hewson	Building & Facilities Manager	10.32	ashleigh.hewson@earth.ox.ac.uk
Jack Hollifield	IT Officer	50.14	itsupport@earth.ox.ac.uk
Nigel Perrin	Administrative Officer (Academic)	10.33	nigel.perrin@earth.ox.ac.uk
Charlie Rex	Outreach and Communications Manager	10.31	charlie.rex@earth.ox.ac.uk
Jeanette Stimpson	Receptionist	-	reception@earth.ox.ac.uk

Appendix 6 – LIBRARY INFORMATION

This guide gives an overview of the Departmental Library and introduces some of the other libraries that cover Earth Science subjects. The librarian is here to help you find the resources you need, so please do not hesitate to ask. There are also web pages, which can be found here:

https://www.earth.ox.ac.uk/library

Opening Hours

Members of the Department have 24-hour swipe access to the Library. The librarian's working hours are variable but the library is usually staffed between 9am and 1pm each day, and until 2.30pm on Tuesdays. She will be working from home on most Wednesdays.

Books

Books can be found by searching **SOLO**, which can be found at:

https://solo.bodleian.ox.ac.uk/primo-explore/search?vid=SOLO&lang=en_US&sortby=rank

This discovery tool gives details of the resources held throughout the libraries of the university (some colleges are not included e.g. University College).

It will indicate:

- the library (for example, books in this library will have the location EAR Main Libr or EAR Basement).
- the shelfmark, which indicates where the book can be found within each library
- the loan status, e.g. 'Confined' (when a book is for library use only) or 'Available' (when a book can be borrowed).

Borrowing

To borrow from the library, use the self-check machine.

- Choose 'Borrow'
- Scan the barcode on your university card
- Place books on the lit area
- A list of books will appear in green once they have been issued
- Select 'finish'

Incorrectly issued books will set off the alarm.

If you set of the alarm:

- Try issuing the book again
- Check if it is a reference book or a confined book - these books **must not** be taken out of the library.
- If it continues to set off the alarm, leave it on the desk for investigation when the librarian is next available

Returns

You can return books using the self-check machine

- Select 'return'
- Place books on the lit area
- A list of books will appear when they have been returned correctly
- Press 'finish'
- Place books on the trolley

If a hold is activated, put the book in the Returns Box on the librarian's desk.

If you encounter any problems, enter your university card barcode and the barcode of the book in the notebook provided.

Hold Requests

To ensure a book is held for you when it is returned by another reader:

- Sign on to SOLO
- Click 'Hold'

The librarian will email you when it becomes available.
You will need to scan it out as usual when you collect it.

Renewals

Renew your books as soon as you receive a 'Library Reminder' email.
Sign in to your account on SOLO for:

- A list of books you have on loan
- The date they are due back
- Renewal functions

Books can be renewed 9 times. After that they need to be returned to the library and re-issued (if the book isn't needed by another reader).

Fines

Fines are not currently charged – if loans are not returned promptly this will be revised.

Lost Books

You remain responsible for a book until it is returned.
Do not give books to another reader unless they have been returned and re-issued.
In cases of loss or damage you will be asked to buy a replacement.

One week before the end of each term all outstanding loans must be returned to the Library. Books may then be borrowed for the vacation.

Confined Cupboard

Books kept in the Confined Cupboard must not be taken out of the library.
There is a card at the front of each book:

- Fill in your name and the date borrowed
- Leave the card in the gap on the shelf

Return the book to the librarian's desk at the end of each day.

Material in the Basement

Access to the basement material is available on request.
It houses:

- British Geological Survey Memoirs, Regional Guides, Bulletins
- Departmental DPhil Theses
- Ocean Drilling Programme Reports
- Decade of North American Geology
- Departmental Reprints
- Palaeontographical Society Monographs
- Journals

Journals

Several journals are held in the library, but the majority of journals are held in the basement - these can be fetched on request.

Electronic journals are available via SOLO:

https://solo.bodleian.ox.ac.uk/primo-explore/search?vid=SOLO&lang=en_US&sortby=rank

Borrowing journals:
NO periodicals may be borrowed but can be photocopied. (See Photocopying)

Maps

The library holds a good collection of topographical and geological maps as follows:

- Ordnance Survey and foreign topographical maps are kept in the Confined Cupboard
- BGS folded maps are kept in the Confined Cupboard
- Flat BGS maps are in map cabinets in the library (please ask the librarian for keys)
- Foreign geological maps are kept in a variety of map cabinets and drawers (please ask the librarian for access).

The maps are not catalogued on SOLO but the librarian has a database of what is held. Undergraduates are not allowed to borrow them but may use them during the librarian's working hours. If they are required for longer, they may be used within the library by arrangement.

Mapping Reports and Projects

These can be found in a collection of files on bookcase L-20. They contain a collection of questionnaires about areas mapped in previous years by 2nd year undergraduates. These are arranged by country, and include maps as well as practical hints and tips that are invaluable for planning mapping projects. **These are the only copies and must not be taken out of the library.**

We have a number of example projects on the shelves, and as posters on the walls.

4th Year Projects

Copies of **pre-2018** 4th year projects are kept in the Confined Cupboard – these must **not** be taken out of the library. There is a card at the front of each project:

- Fill in your name and the date borrowed
- Leave the card in the gap on the shelf Return the book to the librarian's desk at the end of each day.

Copies of **post-2018** 4th year projects are available electronically – please contact the librarian via email. You will then be given access to a spreadsheet with details of titles, supervisors, and the year the project was carried out and, if you specify which ones you need to see, these can share projects via OneDrive. Please note: you will not be able to download or edit them.

Inter-library Loans

These are arranged through the Radcliffe Science Library. Please ask the librarian for forms.

There are few rules for the library but they are intended for the benefit of everyone. Guidelines for using the library are as follows:

- The library is a quiet study area.
- Please do not bring any food or milky/sugary drinks into the library at any time.
- Please do not leave any personal belongings on the desks. They will be collected on a regular basis so that all users have free access. There are slots by the Atlases/Outsize material if storage space is needed during lectures.
- If you think you are the last person to leave the library, please switch off the lights!

The Bodleian Libraries

Students also have access to the Bodleian Libraries, including the Radcliffe Sciences Library, and will also have access to college library facilities.

Above all else, please do not hesitate to ask the librarian for help if you require it.

Elizabeth Crowley
Departmental Librarian

Telephone: (2)72050
Email: *library@earth.ox.ac.uk*

Appendix 7 - ACADEMIC INTEGRITY: PLAGIARISM AND GOOD PRACTICE IN CITATION

Plagiarism is presenting work or ideas from another source as your own, with or without consent of the original author, or by incorporating it into your work without full acknowledgement. All published and unpublished material, whether in manuscript, printed or electronic form, is covered under this definition, as is the use of material generated wholly or in part through use of artificial intelligence (save when use of AI for assessment has received prior authorisation e.g. as a reasonable adjustment for a student's disability). Plagiarism can also include re-using your own work without citation. Under the regulations for examinations, "intentional or reckless plagiarism is a disciplinary offence."

The necessity to acknowledge others' work or ideas applies not only to text, but also to other media, such as computer code, illustrations, graphs etc. It applies equally to published text and data drawn from books and journals, and to unpublished text and data, whether from lectures, theses or other students' essays. You must also attribute text, data, or other resources downloaded from websites.
Please note that artificial intelligence (AI) can only be used within assessments where specific prior authorisation has been given, or when technology that uses AI has been agreed as reasonable adjustment for a student's disability (such as voice recognition software for transcriptions, or spelling and grammar checkers).

The best way of avoiding plagiarism is to learn and employ the principles of good academic practice from the beginning of your university career. Avoiding plagiarism is not simply a matter of making sure your references are all correct, or changing enough words so the examiner will not notice your paraphrase; it is about deploying your academic skills to make your work as good as it can be.

Students will benefit from taking an online course which has been developed to provide a useful overview of the issues surrounding plagiarism and practical ways to avoid it.

Plagiarism can take the following forms:

a) Verbatim quotation of other people's intellectual work without clear acknowledgement. Quotations must always be identified as such by the use of either quotation marks or indentation, with adequate citation. It must always be apparent to the reader which parts are your own independent work and where you have drawn on someone else's ideas and language.

b) Paraphrasing the work of others by altering a few words and changing their order, or by closely following the structure of their argument, is plagiarism because you are deriving your words and ideas from their work without giving due acknowledgement. Even if you include a reference to the original author in your own text you are still creating a misleading impression that the paraphrased wording is entirely your own. It is better to write a brief summary of the author's overall argument in your own words than to paraphrase particular sections of their writing. This will ensure you have a genuine grasp of the argument and will avoid the difficulty of paraphrasing without plagiarising. You must also properly attribute all material you derive from lectures.

c) Cutting and pasting from the Internet. Information derived from the Internet must be adequately referenced and included in the bibliography. It is important to evaluate carefully all material found on the Internet, as it is less likely to have been through the same process of scholarly peer review as published sources.

d) Professional agencies. You must neither make use of professional agencies in the production of your work, nor submit material that has been written for you. This course of action would be one of the most serious breaches possible of the rules on plagiarism. It is also vital to your intellectual training and development that you should undertake the research process unaided.

e) Collusion. This can involve unauthorised collaboration between students, failure to attribute assistance received, or failure to follow precisely regulations on group work projects. It is your responsibility to ensure that you are entirely clear about the extent of collaboration permitted, and which parts of the work must be your own.

f) Inaccurate citation. It is important to cite correctly, according to the conventions of your discipline. Additionally, you should not include anything in a footnote or bibliography that you have not actually consulted. If you cannot gain access to a primary source you must make it clear in your citation that your knowledge of the work has been derived from a secondary text (e.g. Bradshaw, D. *Title of book*, discussed in Wilson, E., *Title of book* (London, 2004), p. 189).

g) Failure to acknowledge. You must clearly acknowledge all assistance that has contributed to the production of your work, such as advice from fellow students, laboratory technicians, and other external sources.

h) Autoplagiarism. You must not submit work for assessment which you have already submitted (partially or in full) to fulfil the requirements of another degree course or examination.

The necessity to reference applies not only to text, but also to other media, such as computer code, illustrations, graphs, etc. It applies equally to published text drawn from books and journals, and to unpublished text, whether from lecture handouts, theses or other students' essays. You must also attribute text or other resources downloaded from web sites.

The University employs a series of sophisticated software applications to detect plagiarism in submitted examination work, both in terms of copying and collusion. It regularly monitors on-line essay banks, essay-writing services, and other potential sources of material. It reserves the right to check samples of submitted essays for *plagiarism*. Although the University strongly encourages the use of electronic resources by students in their academic work, any attempt to draw on third-party material without proper attribution may well attract severe disciplinary sanctions.

Online Reading List:
EARTH_MEarthSci_Referencing, Citation and Academic Writing
http://readinglists.bodleian.ox.ac.uk/lists/002A6FF2-DBF2-569B-0DC7-307FAE738C7D

For further information see:

http://www.ox.ac.uk/students/academic/guidance/skills/plagiarism

http://www.ox.ac.uk/students/academic/guidance/skills

Appendix 8 - UNIVERSITY COMPLAINTS AND APPEALS PROCEDURE

Complaints and academic appeals within the Department of Earth Sciences

The University, the Division of Mathematics, Physical and Life Sciences and the Department of Earth Sciences all hope that provision made for students at all stages of their course of study will result in no need for complaints (about that provision) or appeals (against the outcomes of any form of assessment).

Where such a need arises, an informal discussion with the person immediately responsible for the issue that you wish to complain about (and who may not be one of the individuals identified below) is often the simplest way to achieve a satisfactory resolution.

Many sources of advice are available from colleges, faculties/departments and bodies like the Counselling Service or the Oxford SU Student Advice Service, which have extensive experience in advising students. You may wish to take advice from one of those sources before pursuing your complaint.

General areas of concern about provision affecting students as a whole should be raised through Joint Consultative Committees or via student representation on the faculty/department's committees.

Complaints

If your concern or complaint relates to teaching or other provision made by the faculty/department, then you should raise it with Director of Undergraduate Studies (Professor David Pyle) or with the Chair of Faculty (Professor Stuart Robinson). Complaints about departmental facilities should be made to the Head of Administration and Finance (Hannah Lingard). If you feel unable to approach one of those individuals, you may contact the Head of Department (Professor Mike Kendall). The officer concerned will attempt to resolve your concern/complaint informally.

If you are dissatisfied with the outcome, you may take your concern further by making a formal complaint to the Proctors under the University Student Complaints Procedure (https://www.ox.ac.uk/students/academic/complaints).

If your concern or complaint relates to teaching or other provision made by your college, you should raise it either with your tutor or with one of the college officers, Senior Tutor, Tutor for Graduates (as appropriate). Your college will also be able to explain how to take your complaint further if you are dissatisfied with the outcome of its consideration.

Academic appeals

An academic appeal is an appeal against the decision of an academic body (e.g. boards of examiners, transfer and confirmation decisions etc.), on grounds such as procedural error or evidence of bias. There is no right of appeal against academic judgement.

If you have any concerns about your assessment process or outcome it is advisable to discuss these first informally with your subject or college tutor, Senior Tutor, course director, director of studies, supervisor or college or departmental administrator as appropriate. They will be able to explain the assessment process that was undertaken and may be able to address your concerns. Queries must not be raised directly with the examiners.

If you still have concerns you can make a formal appeal to the Proctors who will consider appeals under the University Academic Appeals Procedure (https://www.ox.ac.uk/students/academic/complaints).

Appendix 9 – Oxford Against Sexual Violence

Oxford Against Sexual Violence is a joint campaign between the University and Oxford University's student union, Oxford SU, sending a clear message that sexual harassment and violence of any form is never acceptable:

https://www.ox.ac.uk/againstsexualviolence

We are working with students to prevent sexual harassment and violence, and are taking steps to gain a better understanding of the issues at Oxford. Our Consent Matters online training programme is available to all students; and we are in the process of reviewing our consent workshop provision across the institution. We are also exploring how we can learn from student experiences to change our culture.

Sexual harassment and violence is any unwanted sexual behaviour which takes place without consent, whether someone knows the person or not. It can happen regardless of gender, sexual orientation, race, religion or age. It does not always happen in person. It may happen online, for example on social media, via email or messaging.

Sexual harassment and violence can include:

- Catcalling, wolf-whistling, leering, unwanted comments or jokes about a person's body, clothing or sex life;
- Stalking someone or following them (in person or online);
- Unwanted physical contact, such as groping, sexual assault, abuse or rape;
- Relationship abuse;
- Unwelcome sexual requests; and
- Non-consensual photos like up-skirting or sharing of explicit material.

The Sexual Harassment and Violence Support Service is a safe place for all students to be heard, regardless of age or gender, who have been affected by sexual harassment or violence at any time.

Our team of highly trained Specialist Advisors and an Independent Sexual Violence Advisor (ISVA) provide free and confidential support and advice that is independent of your college or department. From practical support to keep you safe and feeling safe, help with managing the any impact on your studies, and emotional support, we are here to support you at your pace, whatever you choose to do. The University has separate dedicated advisors to support students accused of sexual misconduct.

Current students looking to speak to one of our advisors should email: supportservice@admin.ox.ac.uk.

For further information, see ox.ac.uk/supportservice.

Consent for Students is a free online, interactive consent programme for all students and staff at the University of Oxford. The course covers sexual consent, including the law, myths, and different factors which may affect someone's understanding and experience of consent. It will also support you to talk about consent with others and provides advice on what to do if you or a friend experiences harassment or violence.

Appendix 10 – Safety

Statement of Safety

DEPARTMENT OF EARTH SCIENCES
STATEMENT OF HEALTH AND SAFETY ORGANISATION

As Head of the Department, I am responsible for ensuring compliance with the University Health and Safety Policy. My responsibilities are set out in Annex A. I have delegated some of these responsibilities to others, as set out in Section 1.

1. EXECUTIVE RESPONSIBILITY

Every employee with a supervisory role is responsible for ensuring the health and safety of staff, students, and other persons within their area of responsibility; and of anyone else (e.g. contractors and other visitors) who might be affected by their work activities. In particular, the responsibilities listed in Annex A are delegated to supervisors for areas under their control.

As it is my duty to ensure adherence to the University's Health and Safety Policy, I instruct every employee with a supervisory role and the Departmental Safety Officer and the Area Safety Officer to report to me any breach of the Policy.

All those with executive responsibility should notify me and the Departmental Safety Officers and the Area Safety Officer of any planned, new, or newly identified significant hazards in their areas and also of the control measures needed to avert any risks identified.

Where supervisors or others in charge of areas or with specific duties are to be absent for significant periods, adequate substitution must be made in writing to me and such employees and other persons as are affected. Deputising arrangements must be in accordance with University Policy.

The following employees have executive responsibility throughout the Department for ensuring compliance with the relevant part of University Safety Policy:

- The Building & Facilities Manager, **Ashleigh Hewson** and his Deputy, **Jason Dowsing**, are responsible for making arrangements for visitors, including contractors, and for ensuring the necessary risk assessments have been made.

The Chemical and Departmental Safety Officer is **Zheyu Tian** (**Jerry**) Jerry is based in office 20.35 and is responsible for the storage of flammable liquids.

- Only **Security Services** are authorised to carry out emergency rescue operations to free people trapped in lifts. If you are trapped in a lift press the alarm button. This will contact Security Services directly who will arrange for a rescue.

- The person authorised to train and certify individuals for work with hydrofluoric acid is **TBC.**

In the following parts of the department, the persons named below have executive authority for safety:

Offices, Public Areas, Compactor & Stores	**Ashleigh Hewson Deputy: Jason Dowsing** Meeting Rooms,

Basement:		
Optical Lab (00.05)	Emily Donald	
Lab (00.06)	**Hauke Marquardt**	
Lab (00.07)	**Hauke Marquardt**	
Rock Crushing (00.11)	Emily Donald	
Thin Sectioning/Rock Polishing/ Cutting (00.12/14/15)	Emily Donald	
Workshop (00.17)	**James King**	Deputy: Dave Beer
Water Storage (00.22)	**Don Porcelli**	
Cold Storage (00.25)	**Ros Rickaby / Ashleigh Hewson**	
Lab (00.26)	**Mike Kendall**	
Central IT/Server Rooms (00.27/30.02/50.02)	**Steve Usher**	Deputy: May Chung
Palaeomagnetism (00.29)	**Conall MacNiocaill & James Bryson**	
Dept. Plant Room (00.33)	**Ashleigh Hewson** Deputy: Jason Dowsing	
Ground Floor:		
Library (10.07)	**James Bryson**	Deputy: Elizabeth Crowley
Teaching Labs and Lecture Theatre (10.09/12/15/10.35/35)	**Ashleigh Hewson** Deputy: Jason Dowsing	
First Floor:		
Lab (20.26)	**Ros Rickaby**	
Fluid Dynamics (20.27)	**Hauke Marquardt**	
Volcanology 1 (20.28)	**David Pyle & Tamsin Mather**	
Lab (20.30)	**Tamsin Mather**	
Sedimentary Mineral Separation (20.37)	Emily Donald	
Wet Chem/Chem Store (20.35/36)	**Steve Wyatt**	
Experimental Petrology (20.40)	**John Blundy**	Deputy: Bernie Wood
Support Lab (20.41)	**Heather Bouman / Ros Rickaby**	
Mudrock Observatory (20.42)	**S Robinson**	
Algal Lab (20.43)	**Ros Rickaby**	Deputy: Luke Williams
Second Floor:		
Stable Isotopes (30.28)	**Chris Day**	
ICP Quad/Element (30.30/30.44)	**Phil Holdship**	
Ex-Noble Gases Lab (30.32)	Ashleigh Hewson	
SEM/XRD Lab (30.37)	**Jon Wade**	
Noble Gas Lab (30.38)	Chris Ballentine	**Deputy: Darren Hillegonds**
Water Chemistry (30.41)	**Bob Hilton**	
TIMS (30.40)	**Don Porcelli**	
NU Plasma 2 (30.42)	**Gideon Henderson**	
NU Plasma 5 (30.43)	Gideon Henderson	
Microanalysis SRF (30.45)	**Jon Wade**	
Third Floor:		
Shell Geoscience Lab (40.27)	**Joe Cartright**	
Labs (40.30 & 40.53)	**Julie Cosmidis**	
Picking Lab (40.31)	**Gideon Henderson**	
Metal Free Laboratories (40.35 – 40.51)	**TBC**	
Small Equipment Lab (40.54)	**TBC**	
Rickaby Geochemistry (40.56)	**Ros Rickaby**	Deputies: Luke Williams
Henderson/Porcelli Lab (40.57)	**Don Porcelli**	

The radiation protection supervisor (RPS - TBC) is responsible for the day to day coordination of radiation protection arrangements within the Department and supervision or work with ionising radiation, in accordance with the requirements of the Ionising Radiations Regulations 2017. The purpose of this supervision is to ensure compliance with the requirements of the Department's local rules for work with ionising radiation and the University's general radiation protection arrangements. The RPS is also responsible for supervising the keeping and use of radioactive materials and the accumulation and disposal of radioactive waste, in accordance with the conditions of the University's permits under the Environmental Permitting (England and Wales) Regs 2010.

2. ADVISORY RESPONSIBILITY FOR SAFETY

I have appointed those listed overleaf to advise me on matters of health and safety within the Department. If any member of the Department does not take their advice, I must be informed. If they discover danger that requires immediate action, they are authorised to take the necessary action and inform me subsequently.

* **DEPARTMENTAL SAFETY OFFICERS (DSO)**
  are responsible for advising me on the measures needed to carry out the work of the Department without risks to health and safety; coordinating any safety advice given in the Department by specialist advisors and the University Safety Office; monitoring health and safety within the Department and reporting any breaches of the Health and Safety Policy to me; informing me and the Director of the University Safety Office if any significant new hazards are to be introduced to the Department.

  DSO (Buildings) - Ashleigh Hewson
  is the contact for all safety issues related to the building, its services and facilities. This also relates to services within the laboratories.

  DSO (Labs) - Jerry Tian
  is the contact for all safety issues relating to the use of chemicals and other hazardous substances, machinery and general safety issues.
  Further duties of the DSOs are described in the University Policy Statement S1/01. To assist in this work the Department has the following specialist advisors:

* **AREA SAFETY OFFICER (ASO)**
  Holly Bratcher
  has been appointed to support the DSOs in their administrative, monitoring and advisory roles. She can be contacted for advice on all safety issues.
* **DEPARTMENTAL FIRE OFFICER**
  Ashleigh Hewson
  is responsible for advising on all matters relating to fire precautions and fire prevention in compliance with University Health and Safety Policy.
* **DEPARTMENTAL BIOLOGICAL SAFETY OFFICER (BSO) Luke Williams**
  is responsible for advice on all matters relating to biological safety and in particular for the implementation of University Policy Statement S5/09. More specific duties of a BSO are described in University Policy Statement S5/09.
* **DEPARTMENTAL ELECTRICAL SAFETY OFFICERS (DESO)**
  Nick Belshaw **TBC**
  are responsible for advice on all matters relating to electrical safety to ensure compliance with University Health and Safety Policy. They are responsible for approving all electrical designs prior to construction. They are also responsible for designating competent persons to carry out electrical work in a safe manner. More specific duties of DESO are described in UPS S4/10.
* **DEPARTMENTAL LASER SUPERVISOR (DLS)**
  Nick Belshaw
  is responsible for giving advice on the use of laser systems and in particular for the implementation of University Policy statement S2/09, which also outlines the other duties of a DLS.
* **DEPARTMENTAL FIELDWORK SUPERVISOR (DFS)**
  Joe Cartwright Deputy**: Richard Palin**
  is responsible for giving advice on safety in fieldwork activities and for ensuring compliance with UPS S5/07 – Safety in Fieldwork.

DEPARTMENTAL SAFETY ADVISORY COMMITTEE
In addition to the above arrangements I have set up a **Departmental Safety Advisory Committee** whose functions are set out in University Policy Statement S2/01 and whose membership comprises:

Mike Kendall, Chairman	**Holly Bratcher, ASO**
Joe Cartwright	
James King	**Jerry Tian, DSO**
Hannah Lingard	
Ashleigh Hewson	**Luke Williams**
Sharon Cornwell (Secretary)	

The purpose of the Committee is to review safety policy for the Department of Earth Sciences and to introduce safety measures relevant to the Department. It meets at least once per term. Its members are empowered to carry out inspections of laboratories and workshops, to identify actual or potential safety hazards and draw them to the attention of those with the executive responsibility for safety in the appropriate area, and to provide advice and assistance in rectifying matters where necessary.

3. TRADES UNIONS AND APPOINTED SAFETY REPRESENTATIVES

University Policy Statement S2/13 sets out the arrangements for dealing with trade unions and their appointed safety representatives. Employees who wish to consult their safety representatives should contact the senior safety representative of the appropriate trade union.
UCU: http://www.oxforducu.org.uk
Unite:
http://users.ox.ac.uk/~unite
UNISON: http://users.ox.ac.uk/~unison

4. OTHER FUNCTIONS

First Aid

The following persons are certified first aiders:

Ashleigh Hewson	**Claire Rylatt**	**Conall MacNiocaill**
Andrew Walker	**James King**	
Jeanette Stimpson		

First aid boxes are available in Reception, the Researcher's Common Room (5th floor) and outside all laboratory corridor entrance doors.

Manual Handling

The authorised assessor under the Manual Handling Operations Regulations is: **Ashleigh Hewson**

Display Screen Equipment Regulations

The authorised assessor under the Health and Safety (Display Screen Equipment) Regulations is:
Ashleigh Hewson

Accident and Incident Reporting

The person responsible for keeping the accident/ incident report forms and for ensuring accidents are promptly reported to the University Safety Office is:
Ashleigh Hewson Jerry Tian

5. INDIVIDUAL RESPONSIBILITY

All Departmental employees, students and all other persons entering onto the Department's premises or who are involved in Departmental activities have a duty to exercise care in relation to themselves and others who may be affected by their actions. Those in immediate charge of visitors and contractors should ensure that those persons adhere to the requirements of University Health and Safety Policy.

(i) Laboratory Supervisors must -

a) The ensure routine administration of the departmental rules governing laboratories which is the responsibility of each Laboratory Supervisor. Laboratory risk assessments and COSHH assessments must be made and displayed (see Departmental Safety Policy).

b) The Laboratory Supervisor must ensure that their laboratories are properly organised and operated; that proper instructions and training is given in the use of specialist equipment and that staff, students and visitors conduct themselves in a safe and sensible manner when using the facilities.

c) The Laboratory Supervisor must ensure that the Department's Laboratory Safety Policy, the University Policy Statements on laboratory safety and the Standards and Code of Conduct are properly applied and understood by everyone using laboratories under their control. In particular, where there is a risk of exposure to hazardous chemicals, laboratory safety rules must be posted in accordance with University Policy Statement S3/01.

d) Ensure that when the operation of laboratories or is completed at change of use or laboratory closure that chemical and general waste is managed correctly.

e) Be responsible for the decommissioning of labs when moving out of a lab space to leave the area safe for contractors or the next occupiers (please speak to the Building Manager or DSO if you need advice):

- The removal of hazardous substances, stored chemicals, prepared solutions, etc. All should be correctly labelled with appropriate identification and any hazard warning labels.
- The removal of any gas cylinders, regulators and associated equipment. The Building Manager should be notified, who will arrange for removal.

- The removal of electrical items, either personal or Department-owned. Any faulty or non-working items should be identified and kept separate.
- The removal of personal belongings including clothing, bags, sports gear, etc. Any items not claimed within a reasonable period will be disposed of.

(ii) Individuals must –

a) Make sure that their work is carried out in accordance with University Safety Policy and with departmental policy as detailed in the Statement.

b) Protect themselves and others by wearing the personal protective equipment provided, and by using any guards or safety devices provided.

c) Obey all instruction emanating from the Head of Department in respect of health and safety, or from a DSO or ASO when acting in his name.

d) Warn me, through a DSO or ASO, of any significant new hazards to be introduced or of newly identified significant risks found in existing procedures.

e) Ensure that their visitors, including contractors, have a named contact within the Department with whom to liaise.

f) Report all fires, incidents and accidents immediately to **Ashleigh Hewson** or **Jerry Tian.**

g) Familiarise yourself with the location of firefighting equipment, alarm points and escape routes, and with the associated fire alarm and evacuation procedures.

h) Register and attend for health surveillance with the Occupational Health Service when required by University policy.

i) Attend training where managers identify it as necessary for health and safety.

(iii) Individuals should:

a) Report any conditions, or defects in equipment or procedures, that they believe might present a risk to their health and safety (or that of others) so that suitable remedial actions can be taken.

b) Offer any advice and suggestions that you think may improve health and safety.

Note that University Policy Statements are available on the web at http://www.admin.ox.ac.uk/safety/policy-statements/.

6. SPECIFIC SIGNIFICANT RISKS

Several activities have been identified as presenting significant risks within the Department. The Department has produced a series of safety policies and guidance, set out over the following pages, which are to be followed by all members of the Department, along with visitors, contractors and others under the control of the Department.

RESPONSIBILITIES OF HEAD OF DEPARTMENT

It is my responsibility, as Head of Department, directly or through written delegation -

A. To ensure adherence to the Health and Safety Policy and to ensure that sufficient resources are made available for this.

B. To plan, organise, control, monitor and review the arrangements for health and safety, including the arrangements for students, contractors and other visitors, and to strive for continuous improvements in performance.

C. To carry out general and specific risk assessments as required by health and safety legislation and University Safety Policy.

D. To ensure that all work procedures under my control are, as far as is reasonably practical, safe and without risk to health.

E. To ensure that training and instruction have been given in all relevant procedures including emergency procedures.

F. To inform the University Safety Office before any significant hazards are introduced or when significant hazards are newly identified.

To keep a record of all cases of work related ill health, accidents, hazardous incidents and fires, to report them to the University Safety Office, and to ensure any serious or potentially serious accidents, incidents or fires are reported without delay.

Driving Policy

Departmental Driving Policy

All Departmental personnel who drive vehicles in the course of their duties are to read, understand, sign for and abide by the advice in this Policy. Always remember that you are not only responsible for your own safety and that of other road users, but also of any passengers.

At all times obey traffic laws and drive according to the conditions.

Drugs, Medicines and Alcohol. Drivers taking prescribed drugs/medicines are to ascertain any likely effects on driving ability and are not to drive if impaired. Drivers should not drink any alcohol within 10 hours before starting driving, and must not drive with alcohol in excess of the national limit, nor drink alcohol whilst on driving duties.

Eyesight. Drivers are to ensure that their eyesight conforms to the minimum legal requirement and should ensure that they wear any spectacles or contact lenses required to meet that standard

Distractions. Drivers are required by law to exercise proper control of the vehicle at all times, and should note that it is illegal to use hand-held mobile phones whilst driving - even hands-free devices constitute a significant distraction and should not be used. Drivers should not attempt to reprogramme Satnavs whilst driving. Smoking is not permitted whilst driving on Departmental business. Excessive audio system volume reduces driver concentration and prevents the hearing of audible warnings, and similarly personal headphones are not to be used whilst driving.

Driving Hours. Plan your journey to ensure that you have enough time to reach your destination, and remain aware to changing road or weather conditions that may demand a re-plan. Drivers are advised to take a 15 minute break every 2 hours, but should not drive continuously for more than $4^1/_2$ hours without a 45 minute break away from the vehicle. A driver should normally not drive for a total of more than 10 hours in a day, should not be on duty (including call-out responsibilities) for more than 12 hours when they are required to drive, and should ensure that they get at 8 hours uninterrupted rest in between periods of driving duty. When a driver is also required as a demonstrator on a field trip, these duties are exclusive and individuals must not undertake both roles at the same time. Furthermore, should the total day's driving be long or arduous, then the individual should only be expected to drive, and not to do any demonstrating that day; it is left to the discretion of the field trip leader to determine if an individual could safely drive a short distance to a location and then demonstrate on location. Ultimately, any decision rests with the driver.

Driver Fatigue. Driving when tired greatly increases accident risk. To minimise this risk:

- Make sure you are fit to drive: get a good night's sleep before embarking on a long journey, do not set out if you are tired, and avoid a long drive after having worked a full day.
- Avoid undertaking long journeys between midnight and 6am, when you are naturally less alert.
- Plan your journey carefully and incorporate sufficient breaks, especially when on long journeys involving driving on motorways or other monotonous roads. An effective emergency measure to counter sleepiness is to drink a strong coffee or caffeinated drink and to take a short nap of no longer than 15 minutes.

Further information can be found in the RoSPA guide on Driver ⊥ Fatigue and Road Accidents: http://www.rospa.com/roadsafety/adviceandinformation/driving/driverfatigue/factsheet.aspx

Seatbelts

All drivers and all passengers are to wear seatbelts when travelling in vehicles.

Routine Checks

Carry out routine vehicle checks before embarking on a journey and daily thereafter: check oil and coolant levels, windscreen wipers and washer water, tyres' condition and pressure, and lights for serviceability - if a vehicle is unsafe, do not proceed. Make sure you have enough fuel for the journey, and that you have a means to pay for refuels (a fuel card is available for departmental business). Maintain the vehicle cleanliness inside and out, paying especial attention to windows, mirrors, numberplates and lights. In snow and ice conditions ensure that all windows are fully cleared before setting off and that any accumulations of snow are removed from all surfaces of the vehicle. Ensure that seats, mirrors and controls are adjusted before setting off.

Driving Minibuses

No-one is permitted to drive a minibus on Departmental business unless they have first completed the University of Oxford Minibus Driving Assessment. The following restrictions apply to driving minibuses:

- Those who passed their full car driving licence before 1 January 1997 should have retained Category D1 as an automatic entitlement, which allows them to drive any minibus; however such drivers should check your licence, as Category D1 is not always automatically included on any reissue.
- Drivers who obtained their full car driving licence after the 1 January 1997 are only normally permitted to drive a vehicle with up to 8 seats (in addition to the driver); however, volunteers driving for the University are exempt from this requirement and are allowed to drive a minibus with up to 16 passenger seats (in addition to the driver) if:
  - The driver is aged between 21 and 70, and has held a full B licence for at least 2 years.
  - The vehicle has a gross weight of no more than 3500kg (4250kg including any specialised equipment for carriage of disabled passengers)[1]. All standard 17-seater minibuses will exceed this limit, as will some 14-15 seat minibuses - ensure you check.
  - There is no trailer attached.

Drivers should be aware that, especially when loaded, a minibus is a heavy vehicle, and therefore braking instability. In addition, UK minibuses will have a speed-limiter fitted which restricts the maximum speed to 62mph (100 kph); minibuses fitted with a limiter cannot therefore use the outside lane of a motorway that has three or more lanes. When reversing you should engage assistance from outside the vehicle if in any doubt - beware the large size and reduced visibility. Drivers should also be aware of the increased possibility of distractions, and should ensure that passengers behave themselves accordingly - as driver, <u>you</u> are the senior person in the vehicle!

Driving Vehicles Off-Road

Vehicles, including the Departmental Land Rover, are not to be driven off road unless appropriate training has been undertaken; this is a statutory responsibility under the Provision and Use of Work Equipment Regulations 1998.

- Appropriate training means a structured off-road driving course of at least one full day's duration certified by a recognized accrediting body, eg the Sector Skills Council for Land-based and Environmental (LANTRA), the British Off-Road Driving Association (BORDA), or the Royal Society for the Prevention of Accidents (RoSPA). An 'off-road experience' is not appropriate training.
- Off-road is defined as driving on anything other than a well-found, surfaced road or track; note that a road does not necessarily have to be surfaced in asphalt or concrete, but should not, eg be severely rutted nor

have excessive gradients. Clearly this is a subjective judgement and will be dependent on conditions - the individual therefore has to take responsibility for their actions. Other than on snow and ice, if you need to engage 4WD, then you are off-road!

Evidence of appropriate training is to be evidenced to the Building Manager in advance should an individual wish to use the Department Land Rover or hire vehicle off-road.

Users should be aware that even on-road, 4x4 vehicles have a higher centre of gravity and do not handle like a car, braking distances will be longer and acceleration less brisk, and controls and steering heavier and less precise with a much larger turning circle; drivers should therefore adapt their driving style accordingly. Unless they have previous experience, drivers of the Departmental Land Rover must have first carried out a familiarization drive with the Building Manager.

Breakdown. In the event of a breakdown:

- Get your vehicle off the road if possible and warn other traffic by using your hazard warning lights, particularly if your vehicle is causing an obstruction.
- Put on available reflective jackets/vests.
- If on a motorway or if you have any fear that your vehicle may be struck by other traffic, get all passengers out on the nearside, and wait well away from the traffic, preferably behind a barrier. Only attempt to fix a vehicle if safe and within your ability; otherwise call out the breakdown service. Do not attempt to fix your vehicle on a motorway.
- Unless on a motorway, if it is safe and you have one, put a warning triangle or other warning device on the road at least 45 m behind your vehicle on the same side of the road.
- Keep your sidelights on if it is dark or visibility is poor.
- Do not stand (or let anybody else stand) between your vehicle and oncoming traffic, or where you will prevent other road users seeing your lights.
- If you have used a warning triangle or device, retrieve it if safe to do so when appropriate.

Accidents. If you have an accident or damage occurs to the vehicle, then your first actions are to ensure the safety of you and your passengers. You must also complete a University of Oxford Vehicle Claim Form, a hard copy of which is in hire vehicle pack-ups or it can be found at:http://www.admin.ox.ac.uk/media/global/wwwadminoxacuk/localsites/finance/documents/forms/insurance/motorclaim.doc . It should be submitted ASAP to Reception@earth.ox.ac.uk or by Fax on 01865 272072. A photographic record should be taken whenever possible as well as obtaining any witness statements or police reports.

Driving Overseas

Driving overseas can be very different to driving in the UK, eg: road and weather conditions; signposting and hazard warnings; adherence to traffic rules, and enforcement thereof; and standards of driving and attitude to risk. Ensure that you are familiar with and obey appropriate traffic rules and procedures, and research the driving conditions, customs and expectations in the country you are visiting - a good start is the FCO advice at https://www.gov.uk/foreign-travel-advice which includes sections on Road Travel in the Safety and Security sections of the individual country pages.

Whilst a UK licence will be valid in EU/EEA nations and in Switzerland, different minimum age limits apply, and you may need an International Driving Permit for driving elsewhere - check at http://www.theaa.com/getaway/idp/ - holders of other national licences should check applicability. You may have to carry additional items of safety or breakdown equipment depending on the country in which you are driving - guidance can be found on the FCO website or at:

http://www.theaa.com/motoring_advice/touring_tips/compulsory_equipment.pdf - if you are required to carry additional items then these should be arranged through Reception at least 10 working days in advance.

For the main overseas Undergraduate Field Trips locations, we offer the following driving advice:

Greek Field Course. The Mainland Greece section of the Field Trip travels some long distances over varying standards of road, including some tracks and narrow roads in mountainous areas; however, road conditions are generally good and roads well maintained, although roadworks are often not well signposted and are less well regulated than in the UK, with interesting diversions. Local driving standards can be variable, and traffic laws are not always widely observed; furthermore, local customs (eg use of hard shoulder as an additional lane) can be confusing and should be observed with caution. Driving and navigating in towns and cities can be chaotic. Due to the more challenging nature of the driving, drivers selected for the Greek field trip should either have already driven on the Spanish trip, or already have significant experience both driving overseas and driving minibuses or larger vehicles. Specific advice can be found at: https://www.gov.uk/foreign-travel-advice/greece/safety-and-security http://www.rac.co.uk/travel/driving-abroad/countries/greece http://www.theaa.com/motoring_advice/touring_tips/greece.pdf http://ec.europa.eu/transport/road_safety/going_abroad/greece/index_en.htm

Confirmation of Understanding

All drivers of vehicles owned or hired by the Department are to read and sign as having understood this policy before driving. Signed forms are to be forwarded to, and will be held by, HR.

I confirm that I have read and understood the above Driving Policy:

Signed: Name: Date:

Copy to be filed with HR

Appendix 11 – The Links Between Research and Teaching

The Department of Earth Sciences has an international reputation for its research profile, and there are many benefits to the processes of teaching and learning that follow from this high level of research activity. All of the tutors and lecturers with whom you will interact over the duration of your course t are also actively engaged in research. Many of the individual academic staff in the department are known internationally as leaders in their own specialist fields.

The impact that this research has on teaching takes many forms, ranging from the introduction of new ideas into lectures, practical and field classes and tutorials, to creating research opportunities that you will engage with in the fourth year of the course. In turn, teaching also has an impact on our research. Nothing exposes the weakness of an idea or an argument quite as much as when you have to explain it to an audience, as you will find out in tutorials and seminars throughout the course.

The article below, which was written by Philip England, explains the way that field work, in particular, helps to build the relationships between students and lecturers in the department.

Earth Science students particularly benefit from the informal social and working relationships they build with academics, which are rooted in the field work that gradually introduces them to the scholarly community.

The core aspect of Oxford undergraduate teaching is close contact between the student and people engaged in research at the highest international level, and that contact is often identified with the traditional one-on-one or two-on-one tutorial. The purpose of this article is to describe the interactions within a small science department, and to suggest that there are additional routes towards the same quality of experience.

Earth Science isgenerally not taught in schools, and most applicants to our undergraduate course have been attracted to the subject through their individual curiosity about some aspect of geology, such as earthquakes, volcanoes, the evolution of life, and the origin of the solar system. The goal of our course is to provide students with the analytical and observational skills to convert that curiosity into an effective tool to investigate the physical, chemical, and biological processes that govern the evolution and present state of our planet. When we discuss how we try to achieve this goal we rarely discuss teaching strategies or learning outcomes, because we regard the undergraduate experience as more akin to an apprenticeship than to four years of formal teaching.

Fieldwork is a central aspect of Geology that heavily influences our methods of teaching. In a tutorial, even with the most able students, the tutor always has some element of control: topics can be specified, limits of discussion can be defined and, if all else fails, one can escape at the end of the hour. A day in the field typically involves more than 12 hours of close-contact teaching, in which the agenda is set by the observations that the students make, and the questions that they pose. Frequently, those questions have no known answer. Even if one wished to claim Olympian omniscience, that bubble would be pricked by the unexpected or inexplicable observation; there is no place to hide. The nature of field teaching forces the teacher to treat the experience as a collaborative enterprise in interpretation of the aftermath of Nature's experiments, rather than as the transfer of received wisdom from the old to the young.

It is also the case that ties between students and their college tutors remain strong. Earth Sciences is a very diverse discipline, and undergraduates reflect the interests of their tutors to a greater degree than is explicable by pure chance. However, because the undergraduates know the personalities and interests of the academic staff they can make informed choices about the route through their education and by the time they embark on their 4th-year research project, they are usually grappling with a problem in which they have a close personal interest. We believe that an environment that minimizes the barriers between staff and students is essential if our students are to effect the transition from the memory-driven toils of A-level to free-standing members of the research community.

Appendix 12 – Earth Sciences Committee Structure