THE UNIVERSITY OF NEW SOUTH WALES

FACULTY OF SCIENCE

School of Biological, Earth and Environmental Sciences

GEOS1111

Investigating Earth and Its Evolution

Term 3
2022

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Faculty of Science - Course Outline

1. Information about the Course
NB: Additional course information can be found in the UNSW Handbook: https://www.handbook.unsw.edu.au

Year of Delivery	2022
Course Code	GEOS1111
Course Name	Investigating Earth and Its Evolution
Academic Unit	Biological, Earth and Environmental Science
Level of Course	UG
Units of Credit	6UOC
Term(s) Offered	T3
Assumed Knowledge, Prerequisites or Co-requisites	*No set prerequisites.* *Recommended but not required. One of BIOS1301, GEOS1111, GEOS1211, GEOS1701, and any 1st year chemistry course.* *There are no co-requisites*
Hours per Week	Up to 7 hours per week
Number of Weeks	10
Commencement Date	T3 Week 1

Summary of Course Structure (for details see 'Course Schedule')

Component	HPW	Time	Day	Location
Lectures Both live and pre-recorded All live lectures are recorded	3	See Timetable	See Timetable	See Timetable
Laboratories and Tutorials Face-to-face	4	See Timetable	See Timetable	See Timetable
Field Trip Australian Museum behind-the-scenes tour One laboratory timeslot		See Timetable	See Timetable	Australian Museum
TOTAL	7			

2. Staff Involved in the Course

Staff	Role	Name	Contact Details	Consultation Times
Course Convenor and Lecturer		A/Prof. Bryce Kelly	bryce.kelly@unsw.edu.au	Arrange via email
Additional Teaching Staff	Lecturer	Dr Heather Haines	h.haines@unsw.edu.au	Arrange via email
	Lecturer	Prof. Martin van Kranendonk	m.vankranendonk@unsw.edu.au	Arrange via email
	Lecturer	A/Prof. Stuart Clark	stuart.clark@unsw.edu.au	Arrange via email
	Lecturer	Dr Matthew McCurry	m.mccurry@unsw.edu.au	Arrange via email
	Lecturer	Prof. Mike Archer	m.archer@unsw.edu.au	Arrange via email
	Lecturer	Dr Ian Graham	i.graham@unsw.edu.au	Arrange via email
	Lecturer	Prof. David Cohen	d.cohen@unsw.edu.au	Arrange via email
	Laboratory Assistant	Dr Mira van der Ley	m.vanderley@unsw.edu.au	Arrange via email

3. Course Details

Course Description (Handbook Entry)	Investigating Earth and Its Evolution (GEOS1111) provides a sound basis in geology, paleontology, and biogeochemistry to those wishing to pursue professional careers as geologists, geoscientists, mining and petroleum engineers, and environmental scientists. It will be of interest to those who wish to understand more about the nature and origin of the Earth and its evolution, plate tectonics, the formation of rocks and minerals, geological processes, biogeochemical cycles, and life through time. The fundamental properties of minerals and rocks and the processes by which they form are described. Methods for the analysis, description and definition of geological materials, fossils and resources are provided. The importance and role of geologists for the development of sustainable societies, sourcing materials for modern technologies and economic growth, while maintaining healthy ecosystems is discussed.
Course Aims	This course develops your understanding of Earth materials and processes and introduces students to a wide range of minerals, rocks, and fossils through hands-on investigations. Students learn how to interpret geological maps and develop a deep understanding of past and future geological and evolutionary processes. Students also learn about finding geological resources required to sustain our modern societies, and geological solutions for environmental management.

Student Learning Outcomes	1. At the successful completion of this course students should be able to: 2. Describe, classify, and identify common rock-forming minerals, and igneous, sedimentary, and metamorphic rocks, both theoretically and in mineral and rock samples. 3. Construct basic geological cross-sections and maps and interpret common geological structures from these. 4. Describe the main processes forming common ore deposits, their tectonic setting, and their mineralogy, including the economics driving mineral exploration. 5. Observe and describe geological features (common structures and rock types) of different landscapes and interpret changes over time and tectonic context. 6. Understand how knowledge of the evolution of life and extinction on Earth provides insights for: stratigraphic dating; environmental changes and their impacts on life, biodiversity, and ecosystem function; and environmental management. 7. Collate geological and hydrogeological data required for environmental impact assessments. 8. Integrate geoscience knowledge into your view of the world and assess competing claims regarding the geosciences within the media.
Relationship between course and program learning outcomes and assessments	Science program learning outcomes: 1. Develop and sustain an interest in and knowledge of science. 2. Develop a working knowledge of scientific methods of investigation. 3. Encourage curiosity, creative imagination, and an appreciation of the role of speculation in the selection and solution of problems, the construction of hypotheses, and the design of experiments. 4. Develop an appreciation of scientific criteria and a concern for objectivity and precision. 5. Develop confidence and skill in formulating problems and in treating both qualitative and quantitative data. 6. Develop the ability and disposition to think logically, to communicate clearly by written and oral means, and to read critically and with understanding. 7. Develop the habit of seeking and recognising relationships between phenomena, principles, theories, conceptual frameworks, and problems. 8. Promote understanding of the significance of science, technology, economics, and social factors in modern society, and of the contributions they can make in improving material conditions. 9. Provide opportunities for the development of students' motivations and social maturity, and an awareness of their capabilities in relation to a choice of career which will be fruitful to themselves and to society. 10. Provide opportunities to study science in combination with other disciplines.

4. Rationale and Strategies Underpinning the Course

Teaching Strategies	This course utilises lectures, laboratory practicals and online exercises. These different learning activities are directly linked with each other. The lectures are designed to explain the basic elements of geology and biogeochemistry and give a background to the practical exercises. Most of the course practical component involves working in teams to characterise minerals and rocks and to understand geological maps. There is emphasis on visualising rocks and fossils in three dimensions.

5. Expectations of students

An integral part of this course is engagement in class activities as well as the online component. You may fail the course if you do not attend regularly, even if you complete all assignments. You must attend 80% of laboratory classes. You are expected to watch all pre-recorded videos for the week before the laboratories. From the university guidelines (https://student.unsw.edu.au/uoc): “The normal workload expectations of a student are approximately 25 hours per term for each UOC, including class contact hours, other learning activities, preparation and time spent on all assessable work.”

6. Course Timetable

Some of this information is available on the Virtual Handbook and the UNSW Timetable.
UNSW Virtual Handbook: https://ww.handbook.unsw.edu.au
UNSW Timetable: http://www.timetable.unsw.edu.au/
Refer to the timetable spreadsheet at the end of this outline.

This course consists of 3 hours of online learning material and 4 hours of laboratory (either face-to-face or online) each week. You are expected to spend additional time outside of class contact hours to complete assignment 2, do additional reading and prepare for the final examination.

7. Australian Museum – behind-the-scenes tour

The Australian Museum behind-the-scenes tour will replace the laboratory in week 5. Students are expected to make their own way to the museum (public transport is recommended, as there is no free parking onsite).

It is important that you attend, as there is an assignment aligned with the Australian Museum visit. If you cannot make the tour, you will have to use the Australian Museum online resources for your assignment.

8. Assessment Tasks and Feedback

Assignment 1 - worth 25% - 5 quizzes due at the end of laboratory sessions
Topic: Mineral and rock hand specimen quizzes
Description:
There will be 5 laboratories focusing on the identification of minerals, metamorphic rocks, igneous rocks, sedimentary rocks, and economic minerals. The quizzes will be held at the end of each laboratory session and aim to reinforce rock identification skills, knowledge of mineral and rock formation processes, and uses of the rock materials.
When:
Week 2 – Minerals (5%); Igneous Rocks, Week 7 (5%); Metamorphic Rocks, Week 8 (5%); Sedimentary Rocks, Week 9 (5%); Economic Minerals, Week 10 (5%).
Grading: Correct answers to a multiple choice and short answer quizzes
Student Learning Outcomes: 1 and 3
Feedback: Group feedback given in laboratory time, and individual feedback given via Moodle Gradebook.

Assignment 2 - worth 15% - 3 quizzes due at the end of laboratory sessions
Topic: Mapping geological features and interpreting geological processes
Description:
Students are required to calculate and interpret geological structures in traditional geological maps, Google Earth, and interactive Earth models.
When:
Week 1 – Exploring Earth (5%); Week 3 – Mantle Convection Modelling (5%); Week 4 – Google Earth for Geological Mapping (5%).
Grading: Correct answers to multiple choice and short answer quizzes
Student Learning Outcomes: 2 and 4
Feedback: Group feedback given in laboratory time, and individual feedback given via Moodle Gradebook.

Assignment 3 - worth 20% - due Friday Week 7, 5pm
Topic: Science Communication Video
Background:
Students will be taken on a behind-the-scenes field trip to the Australian Museum to learn how the collection is used for scientific studies that advance our understanding of Earth's formation and processes and yield insights into the evolution of life.
Description:
The video will be on interpreting and placing in geological and evolutionary context a subset of the Australian Museum fossil collection.
Grading:
Students will be graded considering:

- background and introduction of the topic
- selection of an appropriate fossil site and appropriate references (web links should be added to the transcript)
- visuals used to help convey insights about the evolutionary and geological content discussed
- the scientific rigour of the discussion and conclusions
- continuity of the storyline throughout the video
- transcript and supporting information

Student Learning Outcomes: 1,3, 4, and 5
Feedback: Written feedback will be provided within two weeks (provided all students have submitted in a timely manner).

Assessment 4 - worth 40% - Examination Period
Topic: Final Examination
Description:
A comprehensive assessment of each student's knowledge about Earth's evolution and understanding geological processes
Grading: Multiple-choice questions (60% of exam), Short-answer questions (40% of exam).
Student Learning Outcomes: 1, 2, 3, 4, 5, 6 & 7
Feedback: Students can request individual general feedback.

Late report submission
"For assignments submitted up to seven (7) days late a 10% per day penalty applies.
Assignments submitted more than seven (7) days late will not be marked.
If medical grounds preclude submission of report by due date, contact should be made with subject authority as soon as possible. A medical certificate will be required for late submission on medical grounds and must be appropriate for extension period."

9. Additional Resources and Support

Recommended Textbooks	Fletcher, C. (2014) Physical Geology – The Science of Earth. Wiley, (Available online via UNSW Library) Wilkerson, S.C., Wilkerson, M.B., Marshak, S. (2017) GeoTours Workbook: A Guide for Exploring Geology using Google Earth. 2nd Edition, W.W. Norton & Company. *Exercises will be selected from this book in Week 4. You do not need to purchase, but it is a great resource for exploring Earth.*
Course Manual	All lectures will be uploaded to Moodle
Required Readings	Web links to required reading will be provided at the end of each set of lecture slides.
Additional Readings	Web links to additional reading will be given on the lecture slides.
Recommended Internet Sites	Links to internet sites will be provided in the lecture slides.
Societies	- American Geophysical Union (AGU; http://sites.agu.org) - European Geosciences Union (EGU; https://www.egu.eu) - Geological Society of Australia (GSA: https://www.gsa.org.au) - International Association of Hydrogeology (IAH; http://www.iah.org.au)
Laboratories or Study Spaces	Face-to-face labs are held in the Geological Teaching Laboratory, Biological Science Building, Ground Floor, Lab 2 (K-D26-G01 - TchLab 2)

10. Required Equipment, Training and Enabling Skills

Equipment Required	**Lab Equipment Needed: hand lens, magnet, and pocketknife.** Students in first year geology should have purchased one 10x hand lens before Week 2. You will also need a small pocketknife to test the hardness of rocks [however note that you are only allowed to carry the pocketknife when you are going to the lab] and a magnet to test the magnetic properties of minerals and rocks. These items are available for purchase from the Pharmacy Shop G039, Quadrangle Building (Map Reference E15, Phone 9385 7617).
Enabling Skills Training Required to Complete this Course	Any first-year science course. A background in chemistry, physics, biology, or the environmental sciences is helpful.

11. Course Evaluation and Development

Student feedback is gathered periodically by various means. Such feedback is considered carefully, and course changes are made where appropriate. This course outline conveys how feedback has helped to shape and develop this course.

Mechanisms of Review	Last Review Date	Comments or Changes Resulting from Reviews
Major Course Review	*N/A*	The course has not been reviewed in its current format
myExperience	*N/A*	The course has not been reviewed in its current format
Student Comments	*N/A*	Please assist with the development of the course by providing constructive feedback via the student surveys

12. Administrative Matters

Expectations of Students	Attendance at 80% of lectures and laboratories is expected. Both Moodle and MS Teams keep a log of student access.	
Assignment Submissions	Assignments will need to be submitted via Moodle, MS Teams or email as directed on the assignment handout.	
Occupational Health and Safety[1]	The School of BEES recognises its obligations to provide a safe working environment for all persons involved in School-related activities. To achieve this goal with regards to teaching and learning, the School adopts the UNSW Occupational Health and Safety Policy (2001) and the UNSW OH&S Responsibility and Accountability Document (2001). These documents stipulate that everyone attending a UNSW workplace must ensure their actions do not adversely affect the health and safety of others. This outcome is achieved through the establishment of a documented chain of responsibility and accountability for all persons in the workplace, extending from the Head of School through to the students undertaking courses offered by the School of BEES. As part of this chain of responsibility and accountability, the Course Authority is responsible for ensuring all activities associated with this course are safe. The Course Authority has undertaken detailed risk assessments of all course activities and identified all associated potential hazards. These hazards have been minimised and appropriate steps taken to ensure your health and safety. For each activity, clear written instructions are given, and appropriate hazard warnings or risk minimisation procedures included for your protection. It is the student's responsibility to prepare for all practical work. Students should be familiar with the written procedures scheduled for the practical class and identify all personal protection requirements needed to complete the exercise in a safe manner. Students must comply with all safety instructions given by the Course Authority and/or Laboratory / Field Demonstrator, and observe the Safety Information located outside or within teaching rooms. If you are unsure of any safe operating procedures or written instruction regarding safety, you should seek further information from the Course Authority and/or Laboratory / Field Demonstrator before attempting the task. **NOTE: Students should discuss OHS matters in Labs and Field work as part of their research with their supervisor. These activities do not fall under the OH&S requirements of BEES 4511/4521/9011** Failure to comply with safety instructions may, in the first instance, be considered as a form of academic misconduct. If the outcome of a student's failure to comply with safety instructions results in personal injury, or endangers the health and safety of others, then the matter may be dealt with by WorkCover as a breach of the NSW OH&S Act (2000). For more information on OHS and Safety at UNSW visit the following site: www.ohs.unsw.edu.au/ or the relevant pages on the BEES website at: https://www.bees.unsw.edu.au/health-and-safety	
Assessment Procedures	*Please Read the UNSW Assessment Policy* *https://my.unsw.edu.au/student/academiclife/assessment/AssessmentPolicyNew.html*	
Equity and Diversity	Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course Convenor prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equity and Diversity Unit (phone: 9385 4734) https://www.edi.unsw.edu.au Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made. Information on designing courses and course outlines that take into account the needs of students with disabilities can be found at: https://www.hr.unsw.edu.au/diversity/uploads/unsw-disability-inclusion-action-plan.pdf	
Grievance Policy	In all cases you should first try to resolve any issues with the course convener (SM). If this is unsatisfactory, you should contact the Director of Teaching in BEES (A/Prof Stephen Bonser s.bonser@unsw.edu.au) or the Head of School, School of BEES (Prof Alistair Poore, a.poore@unsw.edu.au). UNSW has formal policies about the resolution of grievances that can be reviewed in MyUNSW A to Z Guide (see https://student.unsw.edu.au/complaints).	**BEES Student Advisor** Faye Mo Tel: +61 (2) 9385 2961 https://www.bees.unsw.edu.au/biosciences-student-office

13. UNSW Academic Honesty and Plagiarism

What is Plagiarism?

Plagiarism is the presentation of the thoughts or work of another as one's own.
*Examples include:

- direct duplication of the thoughts or work of another, including by copying material, ideas or concepts from a book, article, report or other written document (whether published or unpublished), composition, artwork, design, drawing, circuitry, computer program or software, web site, Internet, other electronic resource, or another person's assignment without appropriate acknowledgement;
- paraphrasing another person's work with very minor changes keeping the meaning, form and/or progression of ideas of the original;
- piecing together sections of the work of others into a new whole;
- presenting an assessment item as independent work when it has been produced in whole or part in collusion with other people, for example, another student or a tutor; and
- claiming credit for a proportion a work contributed to a group assessment item that is greater than that actually contributed.†

For the purposes of this policy, submitting an assessment item that has already been submitted for academic credit elsewhere may be considered plagiarism.

Knowingly permitting your work to be copied by another student may also be considered to be plagiarism.

Note that an assessment item produced in oral, not written, form, or involving live presentation, may similarly contain plagiarised material.

The inclusion of the thoughts or work of another with attribution appropriate to the academic discipline does *not* amount to plagiarism.

The Learning Centre website is main repository for resources for staff and students on plagiarism and academic honesty. These resources can be located via:

https://student.unsw.edu.au/plagiarism

The Learning Centre also provides substantial educational written materials, workshops, and tutorials to aid students, for example, in:

- correct referencing practices;
- paraphrasing, summarising, essay writing, and time management;
- appropriate use of, and attribution for, a range of materials including text, images, formulae and concepts.

Individual assistance is available on request from The Learning Centre.

Students are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting, and the proper referencing of sources in preparing all assessment items.

* Based on that proposed to the University of Newcastle by the St James Ethics Centre. Used with kind permission from the University of Newcastle
† Adapted with kind permission from the University of Melbourne

Timetable

GEOS1111 Investigating Earth and Its Evolution

		Lecture 1 - online	Lecturer	Lecture 2 - online	Lecturer	Lecture 3 - online	Lecturer	Laboratory (4 Hours), online option	Lab Staff	Online Timed Test	Assessment
Week 1	12 to 16 Sep	Introduction Course Aims The Earth Science Community Careers Geology for Sustainable Societies	BK	Earth's Systems Biogeochemical Interconnections Carbon Through Time	BK & HH	The Big Earth Science Questions	MVK	Google Earth Exploring Our World	BK & MVDL	Google Earth Quiz	5
Week 2	19 to 23 Sep	Plate Tectonics 1	MVK	Plate Tectonics 2	MVK	Minerals	IG	Minerals Lab	BK & MVDL	Minerals Quiz	5
Week 3	26 to 20 Sep	Thermodynamics	SC	Mantle Convection	SC	Crustal Cooling	SC	Mantle Convection Lab	SC	Mantle Convection Quiz	5
Week 4	3 to 7 Oct	Earth Structures 1	MVK	Earth Structures 2	MVK	Mapping	MVK	Structures and Mapping Lab	BK & MVDL	Mapping Quiz	5
Week 5	10 to 14 Oct	Geological Time Scale	MMcC	Life Through Time	MA	Life Through Time	MA	Australian Museum behind-the-scenes	MMcC	Australian Museum Science Communication Video	20
Week 6	17 to 21 Oct	No Lecture		No Lecture		No Lecture		No Laboratory			
Week 7	24 to 28 Oct	Geological Evolution of Australia	MVK	Igneous Rocks	IG	Igneous Processes	IG	Igneous Rocks Lab	BK & MVDL	Igneous Rocks Quiz	5
Week 8	31 Oct to 4 Nov	Metamorphic Rocks	IG	Metamorphic Processes	IG	Sedimentary Rocks and Processes Terrestrial Settings	BK	Metamorphic Rocks Lab	BK & MVDL	Metamorphic Rocks Quiz	5
Week 9	7 to 11 Nov	Sedimentary Rocks and Processes - Coastal and Oceanic	BK	History of Economic Geology	DC	Economic Minerals	DC	Sedimentary Rocks Lab	BK & MVDL	Sedimentary Rocks Quiz	5
Week 10	14 to 18 Nov	Ore Deposits	DC	Mineral Exploration for Sustainable Societies	DC	Environmental Geology Soil Evolution and Health	BK	Economic Minerals Lab	BK & MVDL	Economic Minerals Quiz	5
										Final Exam	**40**

Lecturers: Bryce Kelly, BK; Heather Haines, HH; Martin van Kranendonk, MVK; Ian Graham, IG; Matthew McCurry, MMcC; Mike Archer, MA; Stuart Clark, SC; David Cohen, DC
Support Staff: Mira van der Ley, MVDL