Course Outline

GEOS2181

Earth Materials

SCHOOL OF BIOLOGICAL, EARTH
AND ENVIRONMENTAL SCIENCES

FACULTY OF SCIENCE

T2, 2019

1. **Staff**

Position	Name	Email	Contact details & Consultation times
Course Convenor	Ian Graham 	i.graham@unsw.edu.au	Room 131, Samuels Building Extension 58720 Consultation by appointment
Lab Demonstrator	Hongyan Quan 	Hongyan.quan@student.unsw.edu.au	

2. Course information

Units of credit: 6UOC

Pre-requisite(s): GEOS1111 or GEOS1211

Appropriate footwear ***MUST*** be worn at all times while in the lab and during the fieldtrip.

Teaching times and locations:

Laboratory:	**Thu 9-11**	**Teaching Lab 02, Ground Floor D26**
	Fri 10-12	**Teaching Lab 02, Ground Floor D26**
		(only weeks 3-4, 10)
Lecture:	**Tue 9-10**	**Mathews 310**
	Wed 12-1	**Mathews 310**
	Thu 2-3	**Mathews 310**
		(only weeks 1-4)
Field Tutorial:	**Sat 13 July, NSW South Coast**	
	8 am (leave UNSW) – 4 pm (return UNSW)	

http://www.timetable.unsw.edu.au/2019/GEOS2181

2.1 Course summary

An introduction to the identification, classification, formation and analysis of minerals, rocks, meteorites, gems and sediments. Crystal growth, atomic structure, composition, properties and classification of minerals, with special reference to the rock-forming and clay minerals. Mineral analysis techniques including chemical methods and X-ray diffraction; application of geochemical studies including introduction to radiometric dating. Genesis, analysis and classification of igneous, metamorphic and sedimentary rock types. Optical properties of minerals and rocks under the polarising microscope.

2.2 Course aims

To provide a theoretical and practical introduction to the scientific study of minerals (mineralogy) and rocks (petrology), and to the principal techniques for mineralogical, petrological and geochemical analysis. To provide an understanding of the nature and origin of minerals, rocks and sediments, as a basis for further studies in the Earth and Environmental Sciences.

2.3 Course learning outcomes (CLO)

At the successful completion of this course you (the student) should be able to:

1. Identify common rock-forming minerals in both hand-specimen and thin-section.
2. Given an unknown mineral, have the knowledge to know what analyses to use to be able to positively identify it.
3. Identify common igneous and sedimentary rocks in hand-specimen and thin-section.
4. Using field relationships, petrographic analysis and geochemical analyses, be able to determine the broad evolutionary history and environment of formation of igneous and sedimentary rocks and be able to apply this knowledge to the broader regional scale.

3. Strategies and approaches to learning

3.1 Learning and teaching activities

The structure of the course is built around the lectures and associated readings indicated by the staff. This content will be supplemented by the student seminars on diverse mineralogical and petrological topics. The concepts discussed in the lectures are then reinforced through both the laboratory and fieldwork

3.2 Expectations of students

Attendance at lectures, laboratories and the field tutorial is compulsory for this course.

4. Course schedule and structure

This course consists of 7 hours of class contact hours per week. You are expected to take additional hours of non-class contact hours to complete assessments, readings and exam preparation.

Week (Date mon)	Lecture 1 (1h) Mathews 310/9-10	Staff	Lecture 2 (1h) Mathews 310/12-1	Staff	Lecture 3 (1h) Mathews 310/2-3	Staff	Lab 1 (2h) Lab 02 D26 Ground Floor/9-11	Lab 2 (2h) Lab 02 D26 Ground Floor/10-12	Assessments due
1 June 3	Getting to know you activity Course overview	ITG	Mineral properties in hand specimen	ITG	Intro to geochemistry	ITG	Minerals I		Quiz 1
2 June 10	Intro to mineralogy	ITG	Mineral groups	ITG	Optical mineralogy	ITG	Minerals II		Quiz 2
3 June 17	Intro to geochronology	ITG	Extra terrestrial materials	ITG	Igneous processes I	ITG	Intro to petrography/ thin sections I	Thin sections II	Quiz 3
4 June 24	Igneous processes II	ITG	Classification and naming of igneous rocks	ITG	Cenozoic intraplate volcanism in eastern Australia	ITG	Igneous rocks I	Igneous rocks II	Quiz 4
5 July 1	No classes								
6 July 8	Clays and clay minerals I	DB	Clays and clay minerals II	DB			X-ray diffraction analysis		Quiz 5
7 July 15	Analytical techniques	ITG	Gem minerals	ITG			Using geochemical data		Quiz 6
8 July 22	Sedimentary processes I	ITG	Sedimentary processes II	ITG			Sedimentary rocks I		Quiz 7
9 July 29	Sedimentary processes III	ITG	Sedimentary processes IV	ITG			Sedimentary rocks II		Quiz 8 Fieldtrip report
10 August 5	Metamorphic rocks & processes	ITG	Course and final exam overview	ITG			Metamorphic rocks	Lab Test	Quiz 9 Lab Test

ITG, Ian Graham; DB, Dane Burkett

5. Assessment

5.1 Assessment tasks

			Feedback	
Assessment task	**Weight**	**Due date (normally midnight on due date)**	**When**	**How**
Assessment 1: Weekly quizzes [Answer 15-20 multiple choice questions]	20%	Beginning of every lab class	1 week after submission	Grades
Assessment 2: Fieldtrip report [Write in less than 1500 words a properly formatted and well-illustrated fieldtrip report outlining the key geological relationships and features seen during the fieldtrip and related these to the broader regional scale.]	10%	Thursday 1st August	2 weeks after submission	Grades and comments
Assessment 3: Lab test [Fill-in provided answer sheets which relate to the specific hand-specimens and thin-sections provided]	20%	Friday 9 August	1 week after submission	Grades
Assessment 4: Final Exam [Answer all of Sections A and B and any three questions From Sections C and D]	50%	TBC		

LIST OF QUIZZES

Quiz	Topic	Day
1	**Properties of minerals in hand-specimen**	**6/6**
2	**Intro to Geochem/Intro to Mineralogy**	**13/6**
3	**Mineral Groups/Optical Mineralogy**	**20/6**
4	**Properties of minerals in thin-section**	**27/6**
5	**Intro to Geochronology/Extraterrestrial Materials**	**11/7**
6	**Igneous Processes/Classifying and Naming igneous rocks**	**18/7**
7	**Analytical techniques/Gem minerals/clays and clay minerals**	**25/7**
8	**Sedimentary processes/Fieldtrip**	**1/8**
9	**Review of whole course (lectures and practicals)**	**8/8**

Further information

UNSW grading system: https://student.unsw.edu.au/grades

UNSW assessment policy: https://student.unsw.edu.au/assessment

5.2 Assessment criteria and standards

Component	***Pass / Credit***	***Distinction / High Distinction***
Field Trip Report	Adequate description of work done including presentation of observations. Basic data interpretation and the drawing of key conclusions from results. Use of relevant literature. Use of clear technical English and effective structure	Detailed description of all key aspects of work done in field, including presentation of observations, with some explanation of their significance in the study. Superior skills in presentation of results. Detailed interpretation of results drawing out most of the key features of the data and extending beyond the directions of course staff. Reference to key literature to support interpretation. Use of clear technical English and effective structure in reports.

5.3 Submission of assessment tasks

Submission of assignments will be done in class (quizzes) or submitted through the school office.

Medical certificate presented within 7 days of lecture, laboratory or assessable exercise. Late assignments will receive a penalty of 5% per day overdue.

5.4. Feedback on assessment

See Assessment tasks section 5.1 for information on feedback for each assessment

6. Academic integrity, referencing and plagiarism

Referencing is a way of acknowledging the sources of information that you use to research your assignments. You need to provide a reference whenever you draw on someone else's words, ideas or research. Not referencing other people's work can constitute plagiarism.

Further information about referencing styles can be located at https://student.unsw.edu.au/referencing

Academic integrity is fundamental to success at university. Academic integrity can be defined as a commitment to six fundamental values in academic pursuits**:** honesty, trust, fairness, respect, responsibility and courage.[1] At UNSW, this means that your work must be your own, and others' ideas should be appropriately acknowledged. If you don't follow these rules, plagiarism may be detected in your work.

Further information about academic integrity and **plagiarism** can be located at:

- The *Current Students* site https://student.unsw.edu.au/plagiarism**,** and
- The *ELISE* training site http://subjectguides.library.unsw.edu.au/elise/presenting

The *Conduct and Integrity Unit* provides further resources to assist you to understand your conduct obligations as a student: https://student.unsw.edu.au/conduct.

7. Readings and resources

Mineralogy	**Klein, C., and Dutrow, B., 2008.** *The Manual of Mineral Science* (23rd Edition). John Wiley and Sons.
	Klein, C., 2008. *Minerals and Rocks* (3rd Edition). John Wiley and Sons**.**
	Deer, W.A, Howie, R.A. and Zussman, J., 1992. *Introduction to the Rock Forming Minerals*. Longman.
	Wenk, H-R., and Bulakh, A., 2004. *Minerals: their constitution and origin.* Cambridge University Press.
Optical Mineralogy	**Nesse, W.D., 2004.** *Introduction to Optical Mineralogy* (3rd Edition). Oxford University Press.

[1] International Center for Academic Integrity, 'The Fundamental Values of Academic Integrity', T. Fishman (ed), Clemson University, 2013.

	Gribble, C.D., and Hall, A.J., 1985. *A Practical Introduction to Optical Mineralogy*. George Allen and Unwin. **MacKenzie, W.S. and Guildford, C., 1980**. *Atlas of Rock-forming Minerals in Thin Section,* Longman **MacKenzie, W.S. and Adams, A.E., 2000**. *A Colour Atlas of Rocks and Minerals in Thin Section*. Manson Publishing. **Perkins, D. and Henke, K.R., 2004.** *Minerals in Thin Section* (Second Edition). Pearson Education Inc.
Crystals	**Sunagawa, I., 2005.** *Crystals: growth, morphology and perfection*. Cambridge University Press.
Clay Mineralogy	**Velde, B., 1992**. *Introduction to Clay Minerals*. Chapman and Hall.
Earth Materials	**Klein, C., and Philpotts, A., 2013**. Earth materials: Introduction to Mineralogy and Petrology. Cambridge University Press.
Sediment. Petrology	**Tucker, M.E., 1981.** *Sedimentary Petrology: an introduction.* Blackwells Scientific. **Boggs, S., 1992**. *Petrology of sedimentary rocks*. Macmillan Press.
Igneous Petrology	**McBirney, A.R., 2007.** *Igneous Petrology* (3rd Edition). Jones and Bartlett.
General Petrology	**Blatt, H., Tracey, R.J. and Owens, B.E., 2006**. *Petrology: Igneous, Sedimentary and Metamorphic* (Third Edition). W.H. Freeman
Geochemistry	**Dickin, A.P., 2000**. *Radiogenic Isotope Geology*. Cambridge University Press. **Faure, G., 2001**. *Origin of Igneous Rocks: the isotopic evidence*. Springer. **Faure, G., 2003**. *Principles and Applications of Isotope Geochemistry*. Macmillan. **Rollinson, H., 1993**. *Using Geochemical Data: evaluation, presentation and interpretation*. Longman Scientific.

Useful Web Sites:

Links for Mineralogists, University of Wurzburg:

http://www.uni-wuerzburg.de/mineralogie/links.html

University of Oxford (Dave Waters), Mineralogy Links:

http://www.earth.ox.ac.uk/~davewa/minerals.html

Mineralogical data base:

http://www.mindat.org

Interested in Minerals? Join the **Mineralogical Society of New South Wales**. It's an amateur society for people interested in collecting and learning more about minerals. Meetings are held the first Friday of every month at the Parramatta Campus of the University of Western Sydney. Details can be found at http://www.minsocnsw.org.au.

8. Administrative matters

School information	School website: http://www.bees.unsw.edu.au/ School office – The Biosciences Student Office is where to go for administrative matters relating to BEES courses. It is located on the ground floor of the biological sciences building, room G27. BEESinfo@unsw.edu.au
Occupational Health and Safety	Information on relevant Occupational Health and Safety policies and can be found on the following website: http://www.bees.unsw.edu.au/health-and-safety UNSW OHS Home page: http://safety.unsw.edu.au/
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 (9385 4734 or http://www.studentequity.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.
Student complaint procedure	http://student.unsw.edu.au/complaints **School contact** Dr Jes Sammut j.sammut@unsw.edu.au **Faculty contact** A/Prof Chris Tisdell, Associate Dean (Education) cct@unsw.edu.au, Tel: 9385 6792 **University contact** Student Conduct and Appeals Officer (SCAO) within the Office of the Pro-Vice-Chancellor (Students) and Registrar. Telephone 02 9385 8515, email studentcomplaints@unsw.edu.au

9. Additional support for students

- The Current Students Gateway: https://student.unsw.edu.au/
- Academic Skills and Support: https://student.unsw.edu.au/academic-skills
- Student Wellbeing, Health and Safety: https://student.unsw.edu.au/wellbeing
- Disability Support Services: https://student.unsw.edu.au/disability-services
- UNSW IT Service Centre: https://www.it.unsw.edu.au/students/index.html