MACQUARIE UNIVERSITY
DEPARTMENT OF EARTH AND PLANETARY SCIENCES

GEOS125/GEOS821
Earth Dynamics, Materials and the Environment

Unit Outline – Semester 2: D2/X2

Unit Coordinator: Dr. Juan Carlos Afonso
TE: 9850-8298
juan.afonso@mq.edu.au
Room 523, E7A

Tutors: Dr. Heather Handley
Mr. Chris Firth
Mr. Edward Saunders

Credit Points: 3 (GEOS125)
4 (GEOS 821)

Contact hours: Laboratory Exercises and Case Studies – 3 hours per week (Monday-Thurs)
Lectures – 1 hour/week Monday 11-12

Pre-requisites: None

Website: http://learn.mq.edu.au

INTRODUCTION

Earth Dynamics, Materials and the Environment, as the name suggests, is a "hands on" unit of study, that sets out to acquaint you with the essential features of the materials that constitute the Earth, processes that mould the Earth's surface, and the interaction of people and the geologic environment. The unit is an **introduction to geology** and not only forms the vital stepping stone for future studies in geology, but also sets out to give students from other disciplines a basic understanding of the physical Earth that will be helpful in studies and careers in environmental science, geomorphology, geophysics, palaeontology, biology, museum studies, education and economics.

We aim to help you develop the skills necessary for study of the physical Earth. By the end of the unit, you should have the skills to:

- Make critical observations for yourself in the field
- Identify common minerals and rocks
- Determine geometric relationships between rock units, as depicted on simple geological maps
- Use geological information to better understand the physical Earth

These different threads come together via an understanding of the cyclic nature of rock-forming and rock degrading processes of our planet, in terms of the Plate Tectonic Theory.

Geology is a vital, living science that touches our everyday lives. For example, materials such as ore deposits, diamonds, coal and petroleum are essential to our modern civilisation, and precious stones add to our appreciation of nature's beauty. Also, processes such as volcanism, earthquakes, landslides and erosion may dramatically affect our wellbeing. Knowledge you gain of these materials and processes, based on scientific approaches of observation, testing and evaluation, will assist you towards a better understanding of this planet, Earth.

KEY LEARNING OBJECTIVES

At the completion of this unit, you will have developed:

- Understanding of the tools and methods that are used in the geosciences; these are organised in three modules:
  - Tools of the geoscientist
  - Hot rocks
  - Rocks under stress
- Competence in applying geo-scientific principles to understanding the world around you
- Capacity to employ appropriate geo-scientific tools to solve problems and to interpret the results
- Understanding scientific methodology
- Competence in accessing, using and synthesising appropriate information
- Application of knowledge to solving problems and evaluating ideas and information
- Capacity to present ideas clearly with supporting evidence

STUDY PROGRAM

Students coming into this unit have a variety of backgrounds, since there are no set pre-requisites. Some of you will have no geology or physical geography at all in your previous studies, others will have taken these subjects at HSC level, and still others will have completed GEOS112 Planet Earth here at Macquarie. However, previous studies in geology and related subjects are not necessary and in terms of your geological knowledge, by the end of this unit it should not matter what background you had before you started. In spite of this, inevitably in the early stages some of you might find many more new concepts to come to grips with than others. **DO NOT BE DISCOURAGED**, as by persevering into the unit of study, you will gain the satisfaction of seeing how the pieces of the overall Earth puzzle start to come together.

This unit concentrates on five major themes that will be explored and revisited in various ways throughout the unit. These themes include:

- Deep time
- Plate tectonics
- The rock cycle
- Geological skills e.g. mapping and rock recognition
- How geoscience can be used to solve some of the problems of the 21st century

There are three modules that investigate different aspects of geoscience. The main ideas and objectives for the three modules are:

Module 1: Tools of Geoscience (3 weeks)

By the end of this unit students should be able to:

- Understand that the rocks we see today have undergone change through geologic time and are still undergoing change (this is known as the rock-cycle)
- Recognise that there are 3 main groups of rocks (igneous, sedimentary and metamorphic) and be able to distinguish typical hand specimen examples of each type (Note: this skill will be reinforced throughout the unit)
- Understand the basic concepts of the plate tectonic theory and appreciate that it is the major unifying idea of geoscience
- Describe the main tools of geoscience and give examples of how they are used: e.g. mapping, satellite imagery, air photos, geophysical investigations, Geographic Information Systems (GIS)
- Read and interpret topographic maps, and understand how contours are constructed and how to interpret them
- Confidently use geological maps including legends, scales, grid references, etc. to solve simple problems
- Understand that maps are two dimensional representations of a three dimensional world, and the graphical techniques that are used to illustrate what is under the surface (e.g. making and interpreting geological cross sections)

- Be able to explain the sequence of events that led to the geological configuration of an area (stratigraphy)
- Understand where sediment comes from (weathering and erosion)
- Be aware of the changes that occur in making a sedimentary rock from loose sediment
- Comprehend how water moves underground and how water can form an economic resource
- Understand how geophysics can be used in making geological maps

Module 2: Hot Rocks (3 weeks)

By the end of this unit students should be able to:

- Analyse volcanic processes, the landforms produced, and volcanic hazards
- Understand how geophysics can be used to monitor volcanoes and predict volcanic activity
- Account for differences between volcanoes in terms of lava type (chemistry, appearance, explosiveness, etc) and their geographic position in relation to plate tectonic theory (e.g. boundary, intra-plate, etc)
- Examine intrusive igneous processes (e.g. magma composition and behaviour), and the features these processes produce
- Recognise common volcanic and intrusive igneous rocks and be able to use a classification scheme to identify them; interpret the origin of igneous rocks from hand specimens and field relations
- Describe and appreciate the significance of deeper Earth processes (e.g. mantle plumes)
- Understand the impact of plate tectonic theory on igneous processes
- Identify the common silicate rock-forming minerals
- Comprehend the basic chemical structure of the main groups of minerals (e.g. silica tetrahedra) and how this structure determines their appearance and physical properties
- Illustrate how knowledge of igneous processes can be useful to people (e.g. creation of ore minerals, “hot dry rock” as a source of energy; building materials)

Module 3: Rocks Under Stress (3 weeks)

By the end of this unit students should be able to:

- Comprehend that metamorphism causes change to existing rocks by the application of heat and pressure
- Comprehend that rocks slowly change form and shape under the application of forces
- Match parent rocks (protolith) with metamorphic equivalents
- Establish that rock microstructure and the existence of particular minerals indicate that rocks have undergone change
- Discern the difference between contact and regional metamorphism and be able to distinguish this difference in hand specimens showing a visible difference
- Understand the concept of metamorphic grade
- Use and interpret geological maps with intrusive rock bodies and simple structural features
- Describe how knowledge of metamorphic processes can be of benefit to people
- Understand the relationship between metamorphism, deformation and plate tectonic theory
- Comprehend how geophysics can be used to interpret earthquakes and discover hidden geology

STUDENT LEARNING EXPERIENCES

This unit can be seen as two interconnected streams. A lecture stream (Monday 11-12 am) that will give a broad overview of the topic, provide background information and introduce new ideas and concepts that link in with the other stream. Parallel to the lecture stream are a series of laboratory and field-based activities and case study workshops (Monday, Tuesday, Wednesday and Thursday 2-5 pm).

There will be *three case studies*, one for each module. These case studies will be extended enquiries into real geo-scientific problems, extending over 4 weeks. These problems are different to the ones that you would typically find in textbooks, and more closely resemble the investigations that scientists face in the real world, with many interacting factors and a number of possible solutions.

Each of the case studies will allow you to explore the ideas in depth and will provide an effective and, we hope, enjoyable method of learning. There is also the added benefit of providing you with opportunities to develop *generic skills* such as problem solving, teamwork, communication, accessing and evaluating information and in using scientific approaches to solve problems.

You will be working individually or in small teams for each case study, both in attempting to solve the problem and to produce a final report. The reports will be awarded marks both for your individual synthesis and/or group work. You will be expected to do substantial research outside of the scheduled time (e.g. library and/or web-based literature search).

Excursions
During this unit of study you will be required to participate in several excursions. These excursions form an essential part of the unit and give you an introduction to field geology. You should take special note of the following:

- *Equipment*
  The basic requirements are a hand lens and some method of testing mineral hardness (e.g. a pocket knife, nickel-alloy coin, etc.). Buy a geological hammer and magnet only if you intend to continue in a geological field. As the weather is not always kind, note taking can be a problem if ballpoint or ink pens are used. Pencils are recommended. Bring several, and keep them sharp. Learn to be neat and tidy in these initial stages, and form a good habit early. It is much easier to discipline yourself now than to change habits later.

- *Clothing*
  Everyone has their own idea of comfort, but some common features of field clothing are obvious. Wear sensible, tough footwear, such as boots or strong sneakers. Thongs, fashion shoes and street shoes are not appropriate. We will be walking over some irregular rock outcrops and may be in snake-infested areas. We cannot guarantee good quality weather; so you should have waterproof clothing. Long trousers, such as jeans, are safer than shorts. Bring a hat and sunscreen.

Time Allocation
According to Macquarie University guidelines, you are required to spend 39 hours of study per credit point. All 100 courses are now 3 credits, so for GEOS125 this works out to approximately one to two hours per week at lectures, approximately three hours per week at the practical/tutorial session, one day the field trip to Hartley and approximately ***four to five hours per week studying at home***. Conscientious use of this time, particularly if it is spread over the whole semester will provide its reward.

ASSESSMENT

The assessment consists of several components, listed below. A satisfactory standard is required in all components.

Weekly quiz	10%
Case studies (includes Hartley quiz + field notes 5%; Mt. Todd, 15%; Volcanoes, 10%, Hartley 15%)	45%
Final examination	45%

Weekly Quiz
The weekly quiz will begin in week 2 and will be a 5-minute quiz at the start of the practical class that examines the lecture topics of the previous week.

Case studies
The case studies are worth 15% each, except for case study 2, which is worth 10%. For each case study you will either hand in a group component (marked P+,P,P- and F), an individual component or both. You will be given specific details of what is expected for both the group and/or individual components when you begin each case study. Generally, each case study will involve a written report

and your use of English and referencing the source of your ideas is important. Details of the required formatting of reports are given at the end of this unit outline.

Final examination
The final exam will cover material from the lectures, text-book readings, class exercises and case studies. Questions will draw on information and ideas from different modules to give an integrated view of the unit. The exam will include questions that ask you to apply your knowledge to interpret and solve problems. A practice/past exam will be made available via webCT later in the semester.

Your grade
The marks you are given for assessment tasks are totalled by the percentages given above. According to Macquarie University guidelines, your total mark may be scaled at the end of semester in order for the class to fit a grade distribution outlined by the University.

For GEOS 821
For the Masters coursework program, GEOS821 requires additional work to that listed above. You will be asked to turn in at the end of the semester a 5-7 pages (excluding figures and references) research paper on a topic to be decided with the Unit Coordinator.

ASSESSMENT TASKS

The dates for submission of assessment tasks are listed on the last page of the unit outline.

Feedback
Feedback on assessment tasks is given in this unit in the following ways:
1) Our primary mode of assessment feedback: the assessment marker will present overall feedback to the class, at either a lecture or in a tutorial, on what aspects of the assignment were done best and where improvement is needed in general.
2) Students are strongly encouraged to seek further feedback (at the time it is given or by making an appointment with the assessment marker) if they are unsure of any aspect of the feedback or if they want further feedback.
3) We provide you with assignment cover pages in the unit of study booklet that, on the reverse side, have a checklist of what is asked in the assignment and a detailed breakdown of the marks awarded for each component. Scoring full marks for a given component indicates that you did exceptionally well. Alternatively, scoring poorly in a component strongly suggests it required further work.
4) In the instance of scoring very poorly overall, you will be provided with written feedback on the assignment indicating where you could improve.

Presentation of Case Study Reports
You are required to research, prepare and write the case study reports at the standard expected at tertiary level. Since most of what you learn is tested in written form, it is essential that you learn to write effectively. Organisation is the key to achieving this, and the following steps should assist you.

Preparation
(i) Determine what is required in the case study report. Make sure you understand each word used to ensure that you are writing to the topic set, not to one of your own invention.
(ii) Read the relevant unit material and generate a list of key words, which will help you locate other references in the Library. Do this early. Remember that reference books may be hard to find if you leave your library research too late.
(iii) When taking notes from a reference always note the bibliographical information and Call Number. If you write down a quotation, take a note of the page it was on. There is nothing more frustrating than having to look back through a book for one sentence.

The Outline
(i) Introduction. Define terms and outline your approach to the topic.
(ii) Discussion. This section is for explanation and discussion of the topic. It may help to write down a list of major points that will become your paragraphs, so that you can arrange your notes under each point.
(iii) Conclusion. This is not a reiteration of the discussion, but a summary statement that rounds off the report.

The Drafts (at least one — more probably two or three)

(i) Keep referring back to the question — have you strayed from the topic?

(ii) Single sentences or paragraphs should not express too many ideas. A logical development of your theme should be the aim throughout the essay.

(iii) In your initial draft, do not worry too much about the word limit. It is a simple matter to cut extraneous or repetitive material in subsequent rewrites — in fact this should be your aim.

(iv) Support your statements with facts and references.

(v) References: quotations should be used only if the point being made is vital to your argument and if you could not express it better yourself. If you paraphrase, you must acknowledge your authority as you would when quoting directly – after the paraphrased section or quotation, i.e. (Smith, 1981, p.132). Make sure you document this reference in your Bibliography or list of References. Remember, plagiarism is cheating! All references must be clearly documented at the end of your assignment. For more details on referencing of material see Appendix 2 of your Unit of Study Booklet.

The Final Product

(i) If possible, allow a few days between writing your final draft and the finished report, to allow you to critically read and edit it. There is a danger that if it is too fresh in your mind, you will read what you think is there, rather than what you have actually written. Read your final draft through several times — once for fluency and clarity of ideas, once for punctuation and once for spelling. For clarification of problems, refer to an authority such as the Australian Government Publishing Service Style Manual.

(ii) Write (or type — learn now if you are an untidy writer) your assignment for submission, and then check it again. Is there a title, your name on each page, page numbers, etc.?

(iii) Submit your case study report on or before the due date to the GEOS125 assignment box in the Science Centre (level 1, E7A), and keep a digital copy or photocopy. Assignment boxes are located in the reception area of the Science Centre (Room 101), which is on the ground floor at the western end of building E7A. Campus maps are available at http://www.bgo.mq.edu.au/campus.htm. The Centre opens from 8.30am to 5.30pm on Monday to Friday. An after hours submission box is located at the entrance to E7A, (a labelled slot in the door nearest to E5A). All assignments are to be submitted **with** a completed and signed coversheet stapled to the front cover. The Assignment Cover Sheets are partly filled out for you at the end of the unit outline or alternatively, these can be downloaded from the web (FoS Assignment Cover Sheet).

Formatting

(i) All typed text submitted for case studies is to be 12 point font at 1.5 line spacing. Margins should be approximately 2cm. Place your name and student number in the header and number each page.

(ii) Page limits should be strictly adhered to.

(iii) In all that you hand in, marks will be given for “communication”; that is how effectively you communicate your ideas. This will include how well your text/maps/profiles/sketches convey your concepts, and how well written your report is (including correct use of English and of referencing procedures – see Appendix 2).

Now, perhaps, you can see how important it is to start the whole process early if you are to do a good job. If you are having problems along the way, consult your tutor, and consult a how-to-do-it text.

Case Study One-Page Reports: Suggested Layout

Step 1: The first sentence should succinctly state your answer to the problem. This shows upfront that you know what you are talking about (or not!). After all, you only have one page to get your point across. For example, if the question asked you to “Discuss the relationship between contact metamorphic rocks and plutonic igneous rocks in central NSW”, your first sentence might be: “Contact metamorphic rocks are spatially related to plutonic igneous rocks with the highest temperature contact metamorphic rocks located directly adjacent to plutons.” It is unnecessary in a short report to go into length discussing definitions or background. The types of problems you examine in GEOS125 are really aimed to get your interpretation of a problem, not what someone else found 20 years ago, so focus on your observations and interpretations.

Step 2: The rest of the first paragraph should list your key arguments for your statement in the first sentence. It is these arguments that you will expand on in the next few paragraphs. In the above example, you might add the following to your first paragraph: “The map of central NSW shows that (i) every pluton has contact metamorphic rocks located adjacent to it, and (ii) the contact metamorphic rocks are zoned from the highest temperature mineral assemblages directly adjacent to each pluton and the lower temperature mineral assemblages further away from each pluton.” End this paragraph with a sentence that says that you will expand on these points in the rest of this report.
Step 3: Write a short paragraph that expands on each of your key arguments, giving short definitions or background if needed, making sure you reference your sources of this information.
Step 4: The final paragraph should reiterate the first paragraph and succinctly state your answer to the problem again, briefly giving the key reasons again.

Hints: Don’t be afraid to focus on the strongest arguments for your ideas and leave weaker arguments behind – you only have one page. Plan out your report in point form, before you try to fill it out. This will ensure you get the main points in there before you fill up one page and leave it at that. Try to write short, punchy sentences, as these are easier to formulate and read. Be clear about what observations you have based your interpretations on. For example, “On the basis of [insert your observations], [state interpretation]”.

Extensions
Extensions for case study report submission will be given only for illness or misadventure, which must be supported by documentation and a written request. This request should also indicate the extension period required. Case study reports submitted late without approval will be penalised 10% of the potential total mark per day late. Students must keep a photocopy of their reports.

Queries and appeals
In the first instance, contact your tutor if there are any questions about the assessment tasks themselves, or about the comments and grades that you receive for your assignments or reports. You are permitted to appeal against your final grade in any of your units. Before initiating an appeal, discuss your unit grade fully with the Unit convenor. More details of the Faculty of Science appeals procedures are available in the Science Centre, ground floor E7A (phone: 9850 6000).

The Dangers of Plagiarism and how to avoid it
The integrity of learning and scholarship depends on a code of conduct governing good practice and acceptable academic behaviour. One of the most important elements of good practice involves acknowledging carefully the people whose ideas we have used, borrowed, or developed. All students and scholars are bound by these rules because all scholarly work depends in one way or another on the work of others.

Therefore, there is nothing wrong in using the work of others as a basis for your own work, nor is it evidence of inadequacy on your part, provided you do not attempt to pass off someone else's work as your own.

To maintain good academic practice, so that you may be given credit for your own efforts, and so that your own contribution can be properly appreciated and evaluated, you should acknowledge your sources and you should ALWAYS:

1. State clearly in the appropriate form where you found the material on which you have based your work.
2. Acknowledge the people whose concepts, experiments, or results you have extracted, developed, or summarised, even if you put these ideas into your own words.
3. Avoid excessive copying of passages by another author, even where the source is acknowledged. Find another form of words to show that you have thought about the material and understood it, but remember to state clearly where you found the ideas.

If you take and use the work of another person without clearly stating or acknowledging your source, you are falsely claiming that material as your own work and committing an act of PLAGIARISM. This is a very serious violation of good practice and an offence for which you will be penalised.

YOU WILL BE GUILTY OF PLAGIARISM if you do any of the following in an assignment, or in any piece of work which is to be assessed, without clearly acknowledging your source(s) for each quotation or piece of borrowed material:

1. Copy out part(s) of any document or audio-visual material, including computer-based material.
2. Use or extract someone else's concepts or experimental results or conclusions, even if you put them in your own words.
3. Copy out or take ideas from the work of another student, even if you put the borrowed material in your own words.
4. Submit substantially the same final version of any material as a fellow student. On occasions, you may be encouraged to prepare your work with someone else, but the final form of the assignment you hand in must be your own independent endeavour.

EVALUATION

We are interested in your ideas about how the unit is progressing and how it can be improved. If you have any particular comments (good and bad) or ideas on how to make the unit better please let your tutor know.

TEXTS AND REFERENCES

Unit booklet
This contains diagrams that will be referred to in lectures and the laboratory exercises. It is available through the University Co-Operative Bookshop. The completed worksheets are invaluable as an aid during revision for the examination. The booklet is essential for the laboratory exercises, but it is not intended to serve as a formal guide to the lectures. You will have to take your own explanatory notes and complement them with extra reading.

Textbook (available in the Bookshop)
The recommended text is:

Tarbuck, E. J., Lutgens, F. K. and Tasa, D. (2010). Earth: An introduction to Physical Geology (10th ed.). Pearson - Prentice Hall, New Jersey.

This gives more background information, often written from a different perspective from the lectures. It also contains photographs and diagrams for use in the lectures and laboratory exercises. In the library you may find several other basic textbooks on Physical Geology that will be of use to you.

IMPORTANT INFORMATION FOR EXTERNAL STUDENTS

Field trip and on-campus sessions

- The Hartley field trip for external students is on Saturday 8th October. There will be a bus leaving from MQ campus.

- The first on-campus session is on Saturday 3rd and Sunday 4th September.

- The second on-campus session is on Sunday 9th October.

Reading List

You may find the following books helpful for reference. They should provide useful supportive material to the lectures, case studies and laboratory exercises, and supplement the prescribed textbook and the Unit of Study booklet.

Earth Dynamics, Materials and the Environment is a subject relying heavily on observation, so it will be of great help to look at a variety of illustrations of the features that are covered in the unit of study. The books listed below are generally well illustrated, with striking colour photographs and diagrams.

** indicates a book in Special Reserve in the Library; * indicates a book on 3-day loan.

**Branagan, D.F. and Packham, G.H., 2000. Field geology of NSW. NSW Dept of Mineral Resources. Sydney. QE45.B7
*Busch, R.M., Tarbuck, E.J. and Lutgens, F.K, 1993. A study guide to accompany "The earth — an introduction to physical geology". Merrill. QE28.2.T37
*Cattermole, P., 2000. Building Planet Earth. Cambridge University Press. QE26.2.C384
*Hamblin, W.K. 1998. Earth's Dynamic Systems. Macmillan (8th Ed.) QE28.2.H35
*Hamblin, W.K. and Howard, J.D. 1995. Exercises in Physical Geology. QE28.2.H36
**Herbert, C. and Helby, R., 1980. A Guide to the Sydney Basin. Geological Survey of NSW Bulletin 26. QE341.N4
**Kimberley, M.M and Kimberley, S.J. 1995. Study guide to Skinner/Porter's The Dynamic Earth: an introduction to physical geology. Third Edition. Wiley (3rd Ed) QE28.2K56
*Merritts, D.J., De Wet, A., and Menking, K., 1998. Environmental Geology: an earth system science approach. Freeman, New York. QE38.M47
*Monroe, J.S. and Wicander, R. 1992 Physical Geology — exploring the earth. Harper Educational Publ.; West Publ. Co St. Paul. QE28.2.M655
*Montgomery, C.W., 1993. Physical Geology. Wm C. Brown (3rd Ed.) QE28.2.M66
*Morrison, R., 1988. Voyage of the Great Southern Ark. Ure Smith Press. QE340.M67
*Morton, R.D., 1995. Student’s Companion to Skinner and Porter’s The Dynamic Earth; an introduction to Physical Geology, Third Edition. Wiley QE28.2.S552
*Murck, B.W., Skinner, B.J. and Porter, S.C., 1996. Environmental Geology. Wiley and Sons, New York. QE38.M87/1996
*Plummer, C.C. and McGeary, D., 1999. Physical Geology. Wm C. Brown Publ., Iowa (8th Ed.). QE28.2.P58
*Press, F. and Siever, R. 1998. Understanding Earth. Freeman, New York (2nd Ed.) (replaces Earth, 4th Ed.). QE28.P9
**Scheibner, E., 1999. The geological evolution of New South Wales. Dept of Mineral Resources. QE341.S296
**Skinner, B.J. and Porter, S.C., 2000. The Dynamic Earth: an introduction to physical geology. Wiley , 4th Ed. QE28.2.S55
**Skinner, B.J., Porter, S.C. and Botkin, D.B., 1999. The Blue Planet. Wiley , 2nd Ed. QB631.S57
*Smith, D.G., 1981. The Cambridge Encyclopedia of Earth Sciences Cambridge Univ. Press, Cambridge. QE26.2.C35
*Stanley, S.M., 1989. Earth and life through time. W.H. Freeman and Company, N.Y. QE28.3.S73
*Tarbuck, E.J. and Lutgens, F.K., 1999. The earth — an introduction to physical geology. Merrill (6th Ed.). QE28.2.T37
**Van Andel, T.H., 1994. New views of an old planet: continental drift and the history of the earth. Cambridge Univ. Press, Cambridge (2nd Ed.). QE26.2.V36
*Veevers, J.J., 2000. Billion-year earth history of Australia and neighbours in Gondwanaland. GEMOC Press, Sydney. QE340.B55

CD-ROMS

**Dunning, J and Onesti, L.J., 1998. Earth Matters. Freeman and Co., New York. QE38.D8
**Tasa, D., 1999. Illustrated dictionary of earth science. Tasa Graphic Arts. QE5.I45

Library Loans

The Library at Macquarie will have provided you with information on library loans. The procedures differ for metropolitan and country students. Please familiarise yourself with the procedures appropriate in your case. If you have any enquiries contact the Library on (02) 9850-7500.

LECTURE SCHEDULE:

Days	Week	Lecture Mon 11-12	Lectures available on-line * (Blackboard/iLecture)	Laboratory Mon-Thurs 2-5 pm	
1 August	**1**	Introduction – Meet Planet Earth (1E - 1VES) [JCA]	Geoscience Tools (1 E ; 1 VES) [RF]	Practical 1: Introduction to Maps	
8 August	**2**	Plate Tectonics: The Unifying Theme (2E - 7 VES) [JCA]	Geology of the Landscape (6,15E - 4 VES) [RF]	Practical 2: Campus Excursion	
15 August	**3**	Atoms, Elements, Minerals, Rocks (3E -2, 3 VES [JCA]	New Minerals from Old (6E - 4 VES) [KD]	Practical 3: Geological Maps	Mt Todd Case Study
22 August	**4**	Plate Tectonics and Igneous Rocks (4, 13,14 E - 9 VES) [JCA]	Sediments to Rocks (7E - 4 VES) [KD]	Practical 4: Minerals and Mineral Properties	
29 August	**5**	Volcanoes and Volcanic Hazards (5E - 9 VES) [HH]	Exploration Technology [ML]	Practical 5: Volcanic (Extrusive) Rocks	
5 Sept.	**6**	Plutons and Intrusive Activity (4,14E - 9 VES) [HH]	Dating the Earth with Zircon [EB]	Practical 6: Plutonic (Intrusive) Rocks	
12 Sept.	**7**	Metamorphism and Metamorphic Rocks (8E - 3 VES) [ND]	Oceans (12 VES) [KD]	Practical 7: Metamorphic Minerals and Rocks	Volcanoes Case Study
	8	Public Holiday	Rivers (14) [KD]		
10 Oct	**9**	Changing Rocks and Crustal Deformation (8,10E - 3 VES) [ND]	Groundwater (5 VES) [KD]	Practical 8: Minerals of Economic Significance	
17 Oct	**10**	Earthquakes and Earthquake Hazards (11E - 8 VES) [JCA]	Sydney Basin and Beyond [RF]	Practical 9: Earthquakes and Seismology	
24 Oct	**11**	Earth's Interior (11,12E - 8 VES) [JCA]	Exploration Technology [ML]	Practical 10: Exam Revision - Maps	Hartley Case Study
31 Oct	**12**	Geochemical Tools and Dating the Earth (9E - 10 VES) [TR]	Fossils and time (10 VES) [SG]	Practical 11: Exam Revision - Rocks	
7 Nov	**13**	Hydrocarbons and other fuels (23E) [SG]		Hartley Case Study Quiz and Exam Revision	

- Numbers in brackets represent chapters from Earth: An introduction to Physical Geology (E) and Visualizing Earth Science (VES), which should be reviewed at approximately two per week.
- Initials in square brackets are the names of the lecturers: JCA = Juan Carlos Afonso; TR = Tracy Rushmer; ND = Nathan Daczko, SG = Simon George; ML = Mark Lackie; KD = Kelsie Dadd; RF = Richard Flood; HH = Heather Handley; TF = Tim Flannery; EB = Elena Belussova

***** These are complementary Power Point presentations that students need to review every week.

IMPORTANT DATES:

Week 5 – Monday August 29th: Report for Mt Todd Case Study is due
Week 9 – Friday October 7th : Report for Volcanoes Case Study is due
Week 9 – Saturday October 8th or Sunday October 9th: Full-day fieldtrip to Hartley (Externals see p. viii)
Week 12 – Thursday 3rd November: Report for Hartley Case Study is due
Week 13 – Hartley Case Study Quiz during Practicals
Exam: To be advised once the examinations timetable is drawn up

Good studying and much success in Earth Dynamics, Materials and the Environment