GEOS 3102 Global Energy & Resources
GEOS 3902 Global Energy & Resources Advanced

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Session: Semester 1
Prerequisites 16 credit points of Intermediate Science or CIVL 2409
Prohibitions: May not be counted with GEOS 3006 or GEOS 3906.
Classes Thursday 10-12 noon lectures and 1-4 pm practicals

GEOS 3102 Global Energy & Resources

Energy Section: This unit is aimed at geoscientists, environmental and marine scientists who are interested in energy resources. The course aims to give students a basic introduction to disciplines relevant to hydrocarbon exploration and production. We aim to give students a geological understanding of petroleum, including its origin, its migration, the reservoir rocks in which it is found, the mechanisms by which it is trapped in the subsurface, the techniques by which it is found and extracted, and its geochemical and physical properties. The unit is recommended for students enrolling in GEOS 3104. Geophysical Methods in semester 2.

Minerals Section: Mineral Deposits will be examined in terms of their spatial distribution and related exploration strategies, their links to igneous rocks and hydrothermal processes, and the impact of ore-forming processes on mines and mining techniques. Representative ore deposits from New South Wales, Australia, and overseas will be included in case studies for a wide array of mineralisation types and ores including base metals, precious metals, high-tech commodities and gemstones. An integrated approach will relate tectonic processes through time to the formation of mineral provinces, and the economic and environmental viability of ore extraction and processing. Practical components of the course will introduce specimens of ore deposits and associated rocks and the spatial analysis of geological data at the global to district scale.

GEOS 3902 Global Energy & Resources Advanced

This unit has the same objectives as GEOS 3902 and is suitable for students who wish to pursue the subjects of either petroleum resources or mineral deposits in greater depth through more challenging projects and independent studies.

Objectives
The objectives of this course are to enable students to:

1. Effectively integrate geology, geophysics, geochemistry and economics in the context of the petroleum and mineral resource industries.
2. Use skills learnt to solve real-life exploration problems
3. work effectively in efficient teams to develop communication and organizational skills
4. Develop skills with the necessary knowledge to be work-ready and fully productive in an industrial environment.

**Course Content Outline**

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<tr>
<th>Week</th>
<th>Lecture title</th>
<th>Practical title</th>
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<tbody>
<tr>
<td>1</td>
<td>Overview of petroleum and seismic imaging of basins</td>
<td>Global energy mapping of resources</td>
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<td>2</td>
<td>Seismic stratigraphy, interpretation and well logs</td>
<td>Basic seismic data analysis</td>
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<td>3</td>
<td>Basin forming mechanisms - tectonics</td>
<td>Seismic stratigraphy and interpretation</td>
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<td>4</td>
<td>Basin forming mechanisms – surface processes</td>
<td>Surface processes and sea level</td>
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<td>5</td>
<td>Basin forming mechanisms – surface processes</td>
<td>Modelling sedimentary basin tectonic subsidence, Part 1</td>
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<tr>
<td>6</td>
<td>Basin modelling case study</td>
<td>Modelling sedimentary basin tectonic subsidence, Part 2</td>
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<td>7</td>
<td>Tectonics vs Ore Deposits</td>
<td>Introduction to Reflected Light Microscopy</td>
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<td>Hydrothermal Ore Deposits</td>
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<td>8</td>
<td>Volcanogenic massive sulphides &amp; SEDEX</td>
<td>Volcanic Hosted Massive Sulphide</td>
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<td></td>
<td></td>
<td>SEDEX Deposits</td>
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<tr>
<td>9</td>
<td>Convergent Margins, Granites &amp; Porphyries</td>
<td>Porphyries, Skarns, &amp; Epithermal Deposits;</td>
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<td>10</td>
<td>Orogens, Vein Gold Deposits, and gold placers</td>
<td>Orogenic (Lode) Gold</td>
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<tr>
<td>11</td>
<td>Mississippi Valley, Irish, and Cobar Deposits</td>
<td>MVT, Irish &amp; Cobar Deposits</td>
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<tr>
<td>12</td>
<td>Iron Formation U-Pyrite placers</td>
<td>BIF, Witwatersrand</td>
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**Assessment:**

The sections are of equal weight with respect to the final mark obtained for the unit.

**Energy Section:** 3 written practical assessments (25%), presentations (15%), Final Exam (60%)
Practicals are due at the start of the following practical class.
Presentations take place in Week 6

**Minerals Section:** Practical on ore deposit specimens (15%), written report on a selected ore deposit type (25%) and final exam (60%).
Practicals are due at the start of the following week’s practical.
Written reports are due at the end of Week 8 via email.

Late practicals cannot be submitted once answers are reviewed in class. If a valid reason exists for non-submission, then an alternative practical assignment will be given.

Late submission of other assignments will result in a 10% per day penalty.

Special Consideration forms will be considered as a basis for extension of assignment deadlines.
Reference style: Written assignments will employ the reference style of the Australian Journal of Earth Sciences, available online from the library. The appropriate endnote file can be obtained from:

http://endnote.com/downloads/style/australian-journal-earth-science

Late practicals cannot be submitted once answers are reviewed in class. If a valid reason exists for non-submission, then an alternative practical assignment will be given.

Late submission of other assignments will result in a 10% per day penalty.

Special Consideration forms will be considered as a basis for extension of assignment deadlines.

LEARNING RESOURCES

Some materials will be provided in class. An eLearning site will also be used to support the learning and teaching activities in this course. It is important to note that any material provided through eLearning is designed to support, rather than replace, face-to-face activities.

To access the eLearning site follow the instructions below:

1. Open a browser window
2. Go to the University of Sydney home page (http://sydney.edu.au/)
3. Select the 'Current Students' link
4. Choose ‘Learning Management System (LMS)' from the menu far right
5. Enter your UniKey login name and password
6. Select the link of the Subject you wish to look at from your 'My eLearning sites' home page.

Independent assessment is required for the Advanced unit if study.

Marks for the assessment tasks and grades awarded for the unit will conform to the University’s assessment policies and procedures. A recent change to this policy requires that marks be awarded relative to a set of standards that describe a graduated hierarchy of the levels of achievement. The marks assigned to the various grades pass, credit, distinction, high distinction remain as they were prior to the change in the policy. The grades* are described below along with the criteria that will be used to identify the various levels of achievement. Note the acknowledgement of the several sources (e.g. SLS 2014) from which these grade descriptors were modified; given below, see section on plagiarism).

In reference to these grades students should note that:

a) all marked assessment tasks, with the possible exception of some practicals, will normally contain at least one item that will enable the full range of achievement levels to be demonstrated, although students should note that some, and perhaps the majority of the
individual items, activities or questions presented in each of the assessment tasks will be intended to establish that students have achieved a pass or credit level of achievement.

b) that distinctions and high distinctions would normally only be awarded to students who have performed at a high level in all assessment tasks – in this context ‘performed at a high level in all assessment tasks’ means that distinction students will have achieved a credit minimum in all individual items of assessed work and will have achieved a distinction level of achievement (or better) for the majority (>75%) of the assessment tasks. High distinction students will have achieved a distinction minimum in all individual items of assessed work and will have achieved a high distinction level of achievement for the majority (>75%) of the assessment tasks.

Fail (Below 50%)
Work may fail for any or all of the following criteria
☐ No answer or response is provided
☐ Does not address or otherwise answer the question
☐ Contains numerous minor errors or presents a significant misconception
☐ Presents irrelevant material
☐ No evidence of research or analysis
☐ Presents a significantly inaccurate or flawed argument
☐ The answer is incomprehensible or difficult to understand due to significant problems with grammar, expression or structure

Pass (Between 50% and 64%)
Work awarded a passing grade will usually achieve the following minimum standards or present the described characteristics
☐ An appropriate but superficial answer or response is provided
☐ Presents relevant material in a superficial manner or in a simplistic descriptive style
☐ Correctly identifies key point or points (facts) but does not develop an appropriate explanation or argument if this is required
☐ Contains some minor errors or presents minor inaccuracies and misconceptions
☐ Little or no evidence of in-depth analysis or deep understanding of the concept
☐ Answers can be understood but may be poorly worded or somewhat flawed due to poor grammar, expression or structure

Credit (Between 65% and 74%)
Work awarded a credit grade will usually achieve the following minimum standards or present the described characteristics
☐ An appropriate, accurate and reasonable detailed answer or response is provided
☐ Appropriate key point or points (facts) and/or concepts clearly presented without significant errors or misconceptions
☐ Presents relevant material concisely with facts clearly integrated into the explanation
☐ Accurate quotation and/or source identification when appropriate.
Evidence of some independent research or critical analysis of concept or problem

Answers are easily understood with both clear expression and structure if appropriate

**Distinction (Between 75% and 84%)**

Work awarded a distinction grade will usually achieve the following minimum standards or present the described characteristics

- Accurately answers the question in a convincing, confident manner
- Presents relevant material accurately in a concise manner or with the facts well integrated into a comprehensive explanation or argument
- Accurate quotation and/or source identification when appropriate.
- Evidence of extensive independent research
- Evidence of extensive critical analysis of concept, and/or innovative perspective on the topic, and/or deep understanding of problem
- Answers are well written, with clear structure and cogent expression

**High Distinction (Above 85%)**

Work awarded a distinction grade will usually achieve the following minimum standards or present the described characteristics

- Accurately answers the question in an impressive, compelling, or highly persuasive manner
- Presents relevant material accurately in a thoroughly convincing or forceful manner or with the facts well integrated into an extended and comprehensive explanation or argument
- Accurate quotation and/or source identification when appropriate.
- Evidence of exhaustive independent research
- Evidence of extensive critical analysis of concept, and/or innovative perspective on the topic, and/or deep understanding of problem
- Answers demonstrate striking originality, an innovative approach, or impressive analytical skill
- Answers are exceptionally well written, with excellent structure expression
- Is otherwise exceptional in some way

The completion of all of the assignments in this unit of study will contribute to the **Graduate Attributes** set by the University of Sydney:

Graduates of the Faculty of Science will be able to create new knowledge and understanding through the process of research and inquiry, use information effectively in a range of contexts, work independently and sustainably, in a way that is informed by openness, curiosity and a desire to meet new challenges, hold personal values and beliefs consistent with their role as responsible members of local, national, international and professional communities, recognise and value communication as a tool for negotiating and creating new understanding, interacting with others, and furthering their own learning.

With the exception of values and beliefs, which are mainly addressed in a lecture relating to codes of conduct, the assessment tasks of this unit are intended to collectively enhance the above graduate attributes.
Policies:
Academic dishonesty is discussed in the University’s Policy for Academic Honesty in Coursework and you are responsible for upholding all components of the policy. There are some components that need clarification for this unit, due to the nature of the written assignments. Specifically:

Section 3. Academic dishonesty
(1) The University procedures relating to academic dishonesty must be invoked where an examiner considers that the student has presented another person’s ideas, findings or written work as his or her own by copying or reproducing them without due acknowledgment of the source and with the intent to deceive the examiner.

By way of an example of how such acknowledgment should be indicated, the grade descriptors on the previous page are modified from a number of University sources including the University of Sydney Faculty of Science, Academic Board, Sydney Law School and Sydney Business School websites http://sydney.edu.au and in particular Unit of Study Outlines e.g. LAWS5000 Foundations of Law, Semester One, 2014, Unit of Study Outline which would be properly cited using the standard Harvard format Sydney Law School 2014 (SLS 2014): LAWS5000 Foundations of Law, Semester One, 2014, Unit of Study Outline. Sydney Law School, University of Sydney. Sydney, NSW, Australia. 38 pp.

(2) It is reasonable to consider that the student has intended to deceive the examiner where:
(a) substantial portions of the work submitted for assessment were copied from another student, or from the work of a former student, in a manner which clearly exceeds the boundaries of legitimate co-operation or group work. It is acceptable, and encouraged, to work with other students. Sometimes we learn things best from our peers. However, it is not acceptable to (1) submit work that is identical to that of another student who is currently or was previously enrolled in this unit of study and/or (2) use previously marked exercises to create your work. While the intellectual ideas that underlie your answers may be garnered as part of a group, you must independently create your own tables, graphs, and wording when answering questions for submitted work. You are advised that if you utilise old assignments from students who are enrolled in this unit or have previously taken this unit for assistance in their own work you will be "submitting another student's work". For the purposes of this course, students who use old assignments and the students who provide them violate the policy and will be disciplined to the full extent of the policy, which can include expulsion from the University. All other components of the policy are applicable as stated in the Policy on Academic Honesty in Coursework.

Note that under new University policy, all written work must be submitted to “Turnitin” text matching software that “checks submitted assignments for originality against other students' assignments, against current and archived Internet content, and against the content of major
professional journals, periodicals and business publications, and can create an originality report for submitted assignments”.