



The University of Sydney

GEOS3102

Global Energy and Resources

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Classes: Lectures Fridays 10-12
Practical: Fridays 2-5pm

Course Synopsis & Aims

Energy Section: This unit is aimed at geoscientists, environmental and marine scientists who are interested in energy resources. This interdisciplinary unit provides an introduction to offshore energy in relation to geology, geophysics, geochemistry and economics. The unit acquaints students with tools currently being used in the industry, e. g. basin architecture, source rock evaluation and reservoir quality assessment. The course is underpinned by modern concepts of petroleum economics and economic risk assessment which controls resource development and hydrocarbon production. The theoretical base developed in course work will be used to solve a real-world exploration case study, using petroleum industry techniques and by simulating an economic competitive environment. The unit will include a section on energy resource depletion and how this will affect all the inhabitants of the globe.

Resource 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.

Objectives

The objectives of this course are to:

Closely integrate geology, geophysics, geochemistry and economics, with a particular emphasis on the tectonic settings of hydrocarbon and mineral resources.

Develop the knowledge base and skills necessary to equip students for a fully productive roles in an industrial environment.

Use skills learnt to solve a real-life exploration problem

To integrate students into efficient teams to develop communication and organizational skills

Assessment:

Energy Section: Students are evaluated by written examination of theoretical work (50%) and by written report and oral presentation of the results of their project work (50%). Oral presentations are assessed individually (20%), whereas only one written report is required per group, but individual contributions must be identified, e. g. separate chapters or Sections of the Report with student's name provided (30%).

Resource Section: Practical work (30%), a 1 hour of a 2-hour final exam (50%) and written assignment (20%)

Fieldwork

Energy Section : None

Resource Section: A two-day trip to the Orange NSW area to visit the Cadia Au-Cu mine (one of Australia's largest)

Lecture Outline

Week 1	Introduction, Principals of exploration, Hydrocarbon habitat
Week 2	The trap
Week 3	Easter
Week 4	Source rocks and Maturation
Week 5	The Reservoir
Week 6	Petroleum economics
Week 7	Virtual Exploration Exercise, Bidding exercise
Week 8	Volcanic-Hosted and SEDEX Massive Sulphides
Week 9	Lode Gold Deposits, Continental Margins & Granites
Week 10	Porphyries and Skarns
Week 11	Mississippi Valley, Irish, and Cobar Deposits
Week 12	Clastic-Hosted Deposits
Week 13	Iron deposits & Mineral

Practical Outline

Week 1	Seismic interpretation of basins
Week 2	Interpretation of seismic traps
Week 3	Easter
Week 4	Interpretation of data from virtual exercise
Week 5	Interpretation of reservoir data from virtual exercise
Week 6	Evaluate virtual exercise production economics
Week 7	Class presentation and submission of report
Week 8	Reflected Light Microscopy
Week 9	Volcanic –Hosted Massive Sulphides
Week 10	SEDEX
Week 11	Lode Gold
Week 12	Porphyries and Skarns
Week 13	Fe-ores, Cobar, & MVT

Reading List

Reading lists are provided at the end of each chapter in the Course Notes published by the University Press. Separate course notes for the Resources section will be available at the copy centre in week 7.