

***SW-241 Gold, Oil, Gems, and Soil:
The Science of Mineral and Energy Resources***

DePaul University
School for New Learning
Fall Quarter 2009

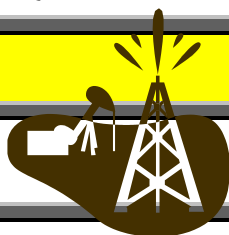
O'Hare
Campus

Thursday

Dates:
9/10-
11/12

6:30-9:30
PM

Faculty: Kevin F. Downing Ph.D.



Contact Information:



Office hours: By appointment.
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Note: E-mail is my primary means of communication with students. Phone messages will not be reviewed everyday.

COURSE DESCRIPTION: From the oil, coal, and nuclear materials that supply us energy to the metallic minerals and soils that make available building materials, electronics, jewelry and food, modern civilization is dependent on an assortment of non-renewable resources. This course will introduce you to the geologic processes that generate society's principal mineral and energy resources including oil, natural gas, coal, nuclear materials, gold, industrial metals, gems, and soils. We will investigate how geological circumstances result in the geographic distribution and scarcity of mineral and energy resources, the historic interdependence to and competition of societies for these resources, and the geopolitical and economic consequences of resource depletion due to population growth and global industrialization. Topics investigated will include: oil formation and peak oil; coal/natural gas formation and cap and trade policies; nuclear fuels and enviro-statism; gold formation, gold as money, and gold as a cultural

artifact; gem formation, crystallography and gem use in jewelry; metallic mineral formation, industrial use, and scarcity trends; soil formation, farming and soil depletion; and the global outlook on mineral and energy resources.

LEARNING EXPERIENCE: This course makes use of the robust information resources available online regarding mineral and energy resources. Students will be introduced to key geological and natural resource principles and issues through readings, links to internet resources, structured discussions and lecture, labs, a self-guided fieldtrip to an institution associated with a mineral or energy resource, and an original research paper structured around a scientific format.

Competencies Offered	Competence Statement
S-1-B	Can use public or private institutions as resources for learning science.
S-2-C	Can describe, categorize and explain development or change within physical or biological systems.
S-3-C	Can understand the scientific and social dimensions of an environmental issue.
S-4	Can describe and explain connections among diverse aspects of nature.

RELATIONSHIP OF THIS COURSE TO THE OFFERED COMPETENCIES

S-1-B : Museums and other institutions/organizations have a wealth of information concerning mineral and energy resources. This course will provide opportunities for students to learn experientially about their chosen natural resource research topic at an institution.

S-2-C : Physical and chemical changes promoted by geological processes such as plate tectonics are responsible for the development of the mineral and energy resources used by human civilizations. This course will explore and differentiate the geological characteristics of major mineral and energy deposits on earth. This will include investigation of how resources form and change over geologic time.

S-3-C : Scientists and engineers play the central role in producing the mineral and energy resources that civilization requires to endure. Students in this course will examine the social dimension of mineral and energy use (e.g., wealth and scarcity) through investigation of the pertinent scientific literature on trends in the abundance and utilization of these resources.

S4: The stability and quality of human life in a technologically advanced world depends on a variety of interrelated factors including mineral and energy

resources. This course will examine the important interconnections of mineral and energy resource formation to the long term geological processes of earth particularly as they relate to the availability and use of these resources to the functioning of a prosperous society.

LEARNING RESOURCES:

Required Textbook: (Note: This book is regularly available as a used text at online sites)

Resources of the Earth: Origin, Use, and Environmental Impact (3rd Edition) (Paperback) by James R. Craig (Author), David J. Vaughan (Author), Brian J. Skinner (Author) Paperback: 520 pages Publisher: Prentice Hall; 3rd edition (January 8, 2001) ISBN-10: 0130834106 ISBN-13: 978-0130834102.

Additional Useful Online Resources:

Mineral Resources of the World

<http://pubs.usgs.gov/of/2005/1294/>



Minerals Down Under

http://www.australianminesatlas.gov.au/education/down_under/index.html

Natural Resources Canada

http://gsc.nrcan.gc.ca/mindep/synth_dep/gold/vms/index_e.php

(Additional Readings and Handouts will be supplied in class or at the Blackboard site)

LEARNING STRATEGIES:

Each Session the instructor will introduce new concepts and examples through lecture and discussion. Students will be responsible for weekly readings and active participation in discussions. In many sessions, students will work in groups on laboratory exercises that apply the principles learned in that session. Students will conduct independent research into a mineral and/or energy resource topic. Class will include:

Lectures/Blackboard Website	Online Resources from institutions
Discussions	Multimedia
Readings (Text and Supplementary)	Original Inquiry (Research Paper & Take home Practical Exam)
Laboratory Exercises and Geological	A Natural Resource Field Trip (self-

GENERAL COURSE OUTCOMES: Upon successful completion of this course, all students are expected to have demonstrated:

- ❑ A basic working definition and description of the chief mineral and energy resources.
- ❑ An understanding and assessment of humanity's dependence and impact on mineral and energy resources.
- ❑ An understanding and evaluation of the connections between the formation of mineral and energy resources and geological processes.
- ❑ An ability to critically synthesize the scientific literature on how mineral and energy resources impact the ability of a modern society to prosper (i.e., the social dimension).

COMPETENCE-SPECIFIC LEARNING OUTCOMES: Upon successful completion of the selected competence, a student will be able to:

S-1-B : Analyze the information provided at a selected science institution on a mineral or energy resource topic. Demonstrate in a written report the underlying scientific principles that explain the origin of the resource, its production for human use, societal issues pertaining to the resource (i.e., environmental), and trends in its abundance.

S-2-C : Select, explore, and differentiate the geological characteristics of a major mineral and energy deposit on earth. This will include investigation of how resources form and change over geologic time (physical and chemical changes) promoted by geological processes such as plate tectonics.

S-3-C : Analyze and synthesize scholarly literature on an energy or mineral resource. Student will be able to select a current debate/issue in the area of mineral and energy resources. Student will be able to then research, compare and contrast both the scientific side of "what is known" and the social side of "what is the impact on society". A student will analyze the ongoing interplay between scientific information and societal action and change. Students are expected to critically review information and provide a history and analysis of the natural resource topic.

S4: Demonstrate in a written report a detailed examination of the important interconnections of mineral and energy resource formation to the long term geological processes of earth particularly as they relate to the availability and use of these resources to the functioning of a prosperous society. Student will discuss the large scale geological processes such as plate tectonics and the rock cycle that serve to connect the formation of natural resources to their eventual use by


humans.

LEARNING ASSESSMENT:

Gold, Gems, Oil & Soil is a graded course. Your final grade in will be based on your progress towards completing the activities and deliverables listed below. You will be provided opportunities to improve your learning/scores through resubmission of work where a reasonable first attempt was made.

For all competencies, students need to demonstrate an understanding and application of concepts, theories and factual information concerning the science of mineral and energy resources, by successful completion of: 1) a practical examination (take-home), 2) a science-formatted Research Paper focusing on a natural resource issue in one or both of your competence areas, 3) a short (5-7 minutes) oral presentation of research findings, 4) participation in in-class lab exercises, 5) preparation for and participation in class discussions, and 6) completion of a self-directed field trip to a natural resource-related institution.

Evaluation Weighting:

Attendance/Participation		10%
5 Lab Reports (2.0% each)		10%
Self-directed Field trip and Report		15%
Original research paper	a) written portion....	45%
	b) oral portion.....	5%
4. Take-home practical examination for respective competencies		15%

Anticipated Grading Scale

Grading Scale	Percentage	Verbal Descriptor
A	100-93%	Excellent
A-	92-90%	Very Good
B+ -> B-	89-80%	Good
C+-> C-	79-70%	Average
D+->D-	69-60%	Weak (acceptable)
F	<60%	Unacceptable

DISCUSSION ACTIVITIES:

The instructor expects that student will contribute to discussions each week. For onsite discussions, the instructor uses the Rubric described by Pelz, 2004 summarized below. Take this into consideration as you prepare and participate in class discussions.

Discussion Rubric

Level	Interpretation	Character of the Contribution
4	Excellent	The comment is 1) accurate, 2) original, 3) relevant, 4) teaches us something, and 5) is well written (where posted online). Four point comments add substantial teaching presence to a course and stimulate additional thought about the under discussion
3	Above Average	The comment lacks at least one of the above qualities, but is above average in quality. A level 3 comment makes a significant contribution to our understanding of the issue being discussed.
2	Average	The comment lacks two or three of the required qualities. Comments which are based on personal opinion or personal experience are often within this category.
1	Minimal	The comment presents little or no new information. However, level 1 comment may provide important social presence and contribute to a collegial atmosphere.
0	Unacceptable	The comment adds no value to the discussion.

Lab and Fieldtrip Report Rubric

Level	Interpretation	
4	Excellent	The report summarizes addresses and/or has the following qualities: 1) Your observations (what you observed and/or read about during your learning activity). 2) Specific examples of what you observed (e.g., species, habitats etc.) 3) How this learning helped you to gain a better understanding of the course topic. 4) The theories, principles and information reviewed. 5) and information is accurately communicated and report is well written.
3	Above Average	The report lacks at least one of the above qualities, but is above average in quality. A level 3 report demonstrates a strong understanding of the issue being discussed.
2	Average	The report lacks two or three of the required qualities. A level 2 report demonstrates a reasonable understanding of the issue being discussed.
1	Minimal	The report presents little evidence of the above qualities. A level 1 report demonstrates a nominal understanding of the issue being discussed.
0	Unacceptable	The report does not demonstrate understanding of the fieldtrip topics.

Research Paper Rubric

Level	Interpretation	
4	Excellent	Research question is original and relevant Paper adheres to the required scientific format Resources are scholarly and relevant Scholarly information is integrated and synthesized Citations were of proper format and used consistently Information is evaluated reasonably and critically Corresponding conclusions are consistent with preceding information and arguments Report is well written (grammar, flow and spelling)
3	Above Average	The paper lacks at least one of the above qualities, but is above average in quality. A level 3 report demonstrates a strong understanding of the issue being discussed.
2	Average	The paper lacks two or three of the required qualities. . A level 2 report demonstrates a reasonable understanding of the issue being discussed.
1	Minimal	The paper presents little evidence of the above qualities. A level 1 report demonstrates a nominal understanding of the issue being discussed.
0	Unacceptable	The paper does not demonstrate understanding of the topic.

ATTENDANCE POLICY

Attendance is mandatory and essential. Two or more sessions missed will result in a "fail" grade for this course, not an "incomplete". I should be notified of the circumstances for all absences prior to the class session or offsite activity. Each week's materials will be available at the course's website. It is ultimately your responsibility to obtain class materials for sessions missed and raise follow-up questions.. No graded work or handouts will be FAXed to students.

ACADEMIC INTEGRITY POLICY

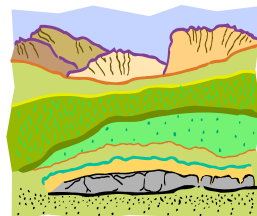
I follow DePaul's policy on Academic Integrity on matters of student conduct including issues of plagiarism. (Please see the DePaul website and student handbook for details). Avoiding plagiarism is particularly important in this course because of the extensive use of other peoples research and ideas. The instructor may use the Turnitin© Website to evaluate whether your written work has characteristics of plagiarism.

ELECTRONIC SUBMISSIONS POLICY

It is acceptable to submit drafts of work as e-mail attachments. Submissions should be sent in the Word format. The final draft of your research paper must be turned in both as a hard copy and an electronic copy.

INCOMPLETE GRADE POLICY

Students are expected to finish the assignments of their courses in a timely manner. It is at the full discretion of the instructor whether a student shall be granted an incomplete grade with the possibility extended time (determined by the instructor) for completion of class work. In order for a student to have an incomplete grade granted in this course, there must be a significant extenuating circumstance evidenced by the student (e.g., medical and or significant personal issues). The student will need to initiate and file an SNL Incomplete grade contract at or before the 9th session to receive an incomplete grade. Students are strongly advised to review the university deadlines for withdrawal without financial penalty and/or grade implications.



About the Instructor:

Kevin F. Downing, Professor – DePaul University



*Dr. Downing is a Professor at DePaul University's college for adult learners, the School for New Learning. His research interests include the investigation of Miocene fossil mammals, the record of stratigraphic and paleogeographic change during the Himalayan Orogeny, and online science learning practices. He is the co-author of the recently published book, *Online Science Learning: Best Practices and Technologies*.*

Degrees: *B.S. degrees in Astronomy and Geology (University of Illinois-Champaign), M.S.T. in Geology (University of Florida-Gainesville), and Ph.D in Geosciences/Evolutionary Biology and Ecology (University of Arizona, Tucson)*

Areas of Specialization and Research: *Paleobiology, Geology, Science Education.*

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SCHEDULE OF ACTIVITIES

NOTE: Readings and assignments should be completed before the respective class session for which they are listed. (Chapters refer to the Textbook; Other Readings as indicated)

<i>Sessions Topic</i>	<i>Readings & Activities</i>	<i>Assignments</i>
<i>Session 1 Minerals and Energy: The foundation of society</i>		
<i>Session 2 The Origins of Earth's Resources</i>	<i>Chapters 1 & 2 Rocks & Rock Cycle Lab</i>	<i>Begin Research Paper</i>
<i>Session 3 Earth's Resources Through History</i>	<i>Chapter 3</i>	<i>Turn in for your Research Paper: 1) Topic Area 2) Brief description of your research question 3) Several scholarly references relevant to your topic</i>
<i>Session 4 Energy Resources: Fossil Fuels</i>	<i>Chapter 5 Peak Oil Lab</i>	<i>Begin the Self-Directed Fieldtrip (Due Session 9 or sooner)</i>
<i>Session 5 Energy Resources: Nuclear Fuels</i>	<i>Chapter 6</i>	<i>Turn in a Detailed Outline and (8) Scholarly References for the Research Paper</i>

<p><i>Session 6</i> <i>Gold and Steel: Scarce and Abundant Metals</i></p>	<p><i>Chapters 7 & 8</i> Gold Lab & Report</p>	<p><i>Begin Take-Home Practical Exam</i></p>
<p><i>Session 7</i> <i>Gemstones and Crystallography</i></p>	<p><i>Review Website:</i> http://amonline.net.au/geoscience/research/gallery_gemstone.cfm <i>Additional Resources:</i> http://www.farlang.com/museums-and-exhibits http://www.rockhounds.com/rockshop/xtal/index.html Gemstone Lab & Report</p>	
<p><i>Session 8</i> <i>Soils and Fertilizer</i></p>	<p><u><i>Chapters 9 & 12</i></u> Soils Lab & Report</p>	<p><i>Take-Home Practical Exam DUE at beginning of session</i></p>
<p><i>Session 9</i> <i>Environmental Impacts of Resource Use and Future Resources</i></p>	<p><i>Chapter 4 & 13</i></p>	<p><i>Self-directed Fieldtrip Report Due</i></p>
<p><i>Session 10</i> <i>Summary and Student Presentations</i></p>		<p><i>Research Paper Final Draft Due</i> <i>Student Presentations</i></p>