# GEOL463- Economic Geology

## Instructor

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**Office Hours:** by appointment or WED 2-4

## Lectures

Location: Geol 2117
Time: T,Th 11-12:15.

## Course description:

This course will cover the geological setting and mineralogy of ore bodies, as well as the chemical and physical factors affecting the source, transport and deposition of metallic ores, petroleum and natural gas. The economics of mineral resources will also be discussed.

## Prerequisites

GEOL322, and CHEM131 or CHEM135, CHEM132 or CHEM136

## Communication

We will use Canvas

## Academic integrity

The University of Maryland, College Park has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit http://www.shc.umd.edu.

To further exhibit your commitment to academic integrity, remember to sign the Honor Pledge on all examinations and assignments: "***I pledge on my honor that I have not given or received any unauthorized assistance on this examination (assignment)***."

## Attendance

Participation in class sessions is essential for satisfactory completion of the course. Quizzes will be given: University Policy provides several cases for which student absence is excused (www.testudo.umd.edu/soc/atedasse.html). Note that the student must request to be excused in writing and supply appropriate documentation.

If the campus is closed for any reason during a scheduled activity, the material of that day will be made up by rescheduling, or by special assignment.

## Special needs

I will make every possible effort to accommodate your request for special accommodations, when justified. However, any requests must be submitted as soon as possible but no later than the end of the schedule adjustment period. *Do not wait!*

## Students with disabilities

If you have a documented disability, you should contact Disability Support Services 0126 Shoemaker Hall. Each semester students with documented disabilities should apply to DSS for accommodation request forms, which you can provide to your professors as proof of your eligibility for accommodations. The rules for eligibility and the types of accommodations a student may request can be reviewed on the DSS web site. If you have a disability documented by DSS that may affect your work in Geology 393 or 393H, you should discuss this with Dr. Candela by the second week class.

## Religious observances

The University System of Maryland policy provides that students should not be penalized because of observances of their religious beliefs, students shall be given an opportunity, whenever feasible, to make up within a reasonable time any academic assignment that is missed due to individual participation in religious observances. *It is the responsibility of the student to inform the instructor of any intended absences for religious observances* ***in advance***.

## Grading

The final grade will be based equally upon five problem sets (50%), 3 quizzes given on fundamental topics (30%), one lab report (10%), and a presentation to the class, on an approved topic (10%).

## Course evaluation

CourseEvalUM will be open for students to complete their evaluations for Spring 2009 courses between Tuesday, April 28, and Sunday, May 10. Students can go directly to the "http://www.courseevalum.umd.edu" website to complete their evaluations, beginning April 28. You will be alerted about these dates and provided more information closer to that time, and students will be alerted via their official university e-mail account.

Students who complete evaluations for all of their courses in the previous semester (excluding summer), can access the posted results via Testudo's CourseEvalUM, reporting link for any course on campus that has at least a 70% response rate. You can find more information, including periodic updates, at the "https://www.irpa.umd.edu/Assessment/CourseEval/fac_faq.shtml" course evaluation website.

The expectation is that all students will complete these. This is YOUR chance to anonymously evaluate this class: please use this opportunity!

## Text:

Readings from on-line Notes in Canvass

## Learning outcomes:

Students who successfully complete the course should be able to:

• develop a general plan for the exploration of a given geological resource

•For Ore Systems: give a general account of the formation of a given ore deposit class, in terms of geological environment, process of concentration, and the general temperatures, depths, and thermodynamic environment of formation

• For Fossil Fuel Systems: give a general account of the formation of a given fuel resource, in terms of geological environment, and the process of formation; further, the such student should be able to discuss energy demand in terms of price, quantity demanded, and type and composition of the resource

• articulate the endogenous and exogenous human, economic, and geological factors that affect the profitability of mining a given resource (or mining in general at any given time), including an understanding that the abundance and availability of a given geological resource at any time depends at least as much on human innovation as on geological factors

Week 1: Introduction to Economic Geology and and the Basic Concepts of Ores, Profit, Mining, and the Periodic Table.

Week 2: Thermodynamics and Ores. Problem Set on the Periodic Table.
Numerical Tools for Thermodynamic Calculations: http://geopig.asu.edu/?q=tools

Week 3: Hydrothermal Processes and Ore Fluids. Quiz 1 on Mineral Formulae.
Properties of salt-water systems: http://calc.geochem-model.org/Pages/H2ONaCl.aspx
Reading - Kelser: Ore Fluids **http://tinyurl.com/c2cv52f**

Week 4,5: Mineral Economics: Keynesian vs. Non-Keynesian Models; The Business Cycle; Supply and Demand; Shale Gas and the Failure of the Neo-Malthusian "Peak Model" for Earth Resources. Problem Set on the stability of oxide and sulfide minerals in fugacity of sulfur-fugacity of oxygen space (see appended).
Reading - Radetski: Peak Oil as Chimera **http://tinyurl.com/c7q83pu**

Week 7,8,9: Magmatic and Magmatic Hydrothermal Deposits: Cr, Pt, Cu, Mo, Ag and Au. Problem Set on Gold Mining (see Appended); Quiz 2 on Economics.
Reading – Candela: Granites and Ores **http://tinyurl.com/bnh3lu6**

Week 10: Ore Specimens Laboratory: Lab Report due in 1 week.

Week 11 Massive Sulfide Deposits and Epithermal deposits Problem Set on ore Fluids
Reading: Singer On World Class Ores
http://econgeol.geoscienceworld.org/content/90/1/88.abstract

Week 12 Iron Ores and Industrial Minerals. Special Guest Lecture by Professor and Former Provost Ann Wylie on Problems involving Regulation of Asbestos and Related Substances

Week 13 Oil and Gas. Quiz 3: Phase Diagrams and Ore Deposits

Week 14, 15 Student Presentations. Problem Set on Oil and Gas.

Last Day of Class: Learning Outcome Assessment Questions

Grades will be determined by the average score for the Problem Sets, Lab Report, Quizzes, and Presentation, all equally weighted.