Earth Resources
GEOL 205

Instructor: Dr. Michael Bizimis
Office: PSC 519
Phone: (803) 777-5565
Email: mbizimis@geol.sc.edu
Office Hours: Monday, Wednesday 1 pm-2 pm (after class), or by appointment. Best to catch me after class.

Teaching Assistant: Mr. Paul Beguelin
Contact information
Office: PSC 518
Email:pbeguelin@geol.sc.edu
Office Hours: TBD

IMPORTANT: If you are going to email either of us a question related to the class, please put in front of your message subject the phrase “GEOL 205”. This ensures a quicker response. Example: “GEOL 205: Question on Lecture 3”.

Class meets at: M,W,F 12PM-12:50PM, Close-Hipp Building 002

Textbook: Environmental Geology, by Carla W. Montgomery, McGraw-Hill, (various versions between 2009 and 2014 are acceptable). Digital versions or book versions are both acceptable. Textbook is recommended but not required. Slides from the lectures will be available on Blackboard in advance of the lecture.

Other Required resources:
We will be using the Top Hat (www.tophat.com) classroom response system in class. You will be able to submit answers to in-class questions using Apple or Android smartphones and tablets, laptops, or through text message.

You can visit tinyurl.com/TopHatStudentGuide for the Student Quick Start Guide which outlines how you will register for a Top Hat account, as well as providing a brief overview to get you up and running on the system. An email invitation will also be sent to your school email account (if you don't receive this email, you can register by visiting our course website tophat.com/e/679465).

Top Hat will require a paid subscription, and the standard pricing for the cheapest option is $24 for 4-months of unlimited access. For a full breakdown of all subscription options available please visit www.tophat.com/pricing.
Course Description:
This three-hour course satisfies the University of South Carolina Core Scientific Literacy requirement for a 3-credit Science Course. This 3-hour course is intended for non-science majors. The course will discuss mineral, energy, and water resources with emphasis on the geological processes governing their distribution and their usage by society.

The course introduces the basic principles and fundamentals of geology, with a focus on Earth Resources formation, energy related resources, and the impacts of resource and energy use on the environment and society. Some of the subjects to be covered:

- Basic geological processes and earth formation: All resources we use come from the Earth.
- Rock, carbon, and water cycles.
- Mineral resources: Geological formation and global distribution, usage and environmental impacts of exploration and use.
- Energy resources and availability, including fossil fuels (oil, natural gas, coal), nuclear, and renewable energy sources, including environmental impacts of different energy sources.
- Climate.
- Water resources, pollution, and remediation.

The ultimate goal of this course is to become a better-informed citizen on how different resources are formed on earth and the impact of their use on the environment, so as to become a better future user and manager of these resources.

Learning Outcomes:
Upon the completion of this course the student will:

- Understand and explain the fundamentals of plate tectonics, rock, carbon and water cycles. (Carolina Core Scientific Literacy LO1).
- Understand and explain how fundamental geological, physical and chemical processes form usable resources (minerals, metals, hydrocarbons, drinking water). (Carolina Core Scientific Literacy LO1).
- Use basic geology principles to develop first order hypotheses on the location and distribution of specific natural resources (for example oil or copper deposits) on the planet, for exploration purposes. (Carolina Core Scientific Literacy LO2).
- Understand and explain how changes in societal needs, for example population growth, affluence and technology, change the use and needs for different natural resources and energy. (Carolina Core Scientific Literacy LO3).
- Understand and explain the environmental and societal impacts of mineral resource use, and possible means of remediation for varying types of pollution as related to earth resource use. (Carolina Core Scientific Literacy LO1, LO3).
- Evaluate and compare the pros and cons of the different types of energy generation, including their impacts (positive and negative) on the environment and society. (Carolina Core Scientific Literacy LO2, LO3).
- Understand and explain the natural processes that form fresh water resources and how overuse can impact inexpensive access to fresh water (Carolina Core Scientific Literacy LO1, LO3).
• Evaluate, discuss and propose solutions on the issues associated with the distribution of surface waters between the Southeastern United States, as a result of the increased demand for fresh water resources. (Carolina Core Scientific Literacy LO2, LO3).

• In the most fundamental way, the student will learn how to apply the principles of Geology and Earth Sciences to understand the formation, usage and future availability of natural resources (Carolina Core Scientific Literacy LO1), in a changing society (Carolina Core Scientific Literacy LO3), and to formulate basic hypotheses, evaluate data and develop defensible conclusions related to the use of natural resources and energy (Carolina Core Scientific Literacy LO2).

**Evaluation and grading policy:**

The class includes the following three means of evaluating student performance and comprehension of the material:

• There will be three (3) mid-term exams and a final exam. The exams will be multiple choice questions designed to evaluate student understanding of the basic terminology and principles covered in the lectures (Carolina Core Scientific Literacy LO1).

  NOTE: The lowest grade of the three (3) mid term exams will be dropped from your overall grade calculation. Each of the remaining two (2) midterms are worth 20 points and final worth 25 points, for a total of 65 points.

• There will be a series of unannounced in-class quizzes / questions to be answered through the TopHat interface (see above: Other Required resources), or through written answers (paper for these answers will be provided by the Instructor). These questions / quizzes are designed to simulate the scientific method of inquiry, hypothesis, data collection and conclusion. These quizzes / questions will be based on concepts presented in the class during that lecture, and the students will be asked to formulate hypotheses, present scientific facts in a logical manner and / or reach conclusions based on available data / facts (Carolina Core Scientific Literacy LO2). The quizzes / questions are also a way of judge student participation, material comprehension and attendance. The quizzes will be worth a total of 20 points of your grade. If a Student participates in 80% or more of the total number of quizzes / questions given during the semester, then the student will receive all 20 points. If the Student participates in a percentage less than 80% then the points will be awarded according to the formula:

  Points = %participation X 25

  Example: 58% participation: Points = 58% X 12.5 = 14.5 points

• There will be one group paper, where students in teams of 3 are asked to discuss a subject related to resource use and its relationship to societal or environmental issues. The paper should present facts in a logical manner, a discussion of the problem and present solutions that you think are possible (Carolina Core Scientific Literacy LO1, LO2, LO3). A series of topics will be suggested in class, but students are encouraged to select a project of their choice, in consultation with the instructor. The paper is worth 15 points.

Grading summary:
• 3 Midterm exams (lowest score of the three is dropped), so 2 midterms x 25% = 40 points
• Final Exam = 25 points
• Class quizzes / questions = 20 points
• Group paper = 15 points

Total = 100 points

Letter grading:
90 or more = A
87 or more = B+
80 or more = B
77 or more = C+
70 or more = C
55 or more = D
Below 55% = F

<<<Extra credit of 5 points will be given to those who have quiz participation greater than 90% >>>
(this could be the difference between A and B, of D and C!)

Student Responsibilities:
Students expected to display appropriate conduct in accordance with the USC Student Code of Conduct (See University of South Carolina Policies and Procedures http://www.sc.edu/policies/policiesbydivision.php and http://www.sc.edu/policies/ppm/staf626.pdf). Cheating and/or plagiarism will result in an F and a letter to the Dean. Appropriate classroom etiquette is expected – turn off cell phones, be on time, and do not disturb your classmates. Serious violations are grounds for expulsion.
Finally, ask questions in class! There is no better way to learn than ask questions.

American with Disabilities Acts (ADA) statement: This University and its faculty will make every effort to accommodate any and all students with special needs. http://www.sc.edu/policies/ppm/staf600.pdf

Attendance Policy: Attending the classes is highly recommended, and rewarded, but not mandatory or enforced. PDF slides for each lecture will be posted on Blackboard, but not everything (e.g. discussion, possible hints to exam questions) will make it into the slides. Remember: extra credit is only available in class through participation in the quizzes / questions.

Tentative Lecture Schedule, Fall 2016.
Week 1 (8/19-8/26): Introduction, Basic Scientific principles, Earth Formation.
Week 2 (8/29-9/2): Earth Formation (cont.), Plate tectonics.
Week 3 (9/7-9/11): 9/5 No class, Labor day. (9/7-9/9): Plate tectonics (cont.).
Week 4 (9/12-9/16): Mid Term 1 on Wednesday, Sept 14th. Rock Cycle,
Week 5 (9/19-9/23): Ore formation and resources: (Copper, Zinc, Lead, Gold)
Week 6 (9/26-9/30): Copper, Zinc, Lead (cont.), Sulfides, Aluminum.
Week 7 (10/3-10/7): Iron, Review, **Mid term 2 on Friday Oct. 7th**.
Week 8 (10/10-10/12): Placer deposits, Gold,
(10/14) Fall Break, no class.
Week 9 (10/17-10/21): Mining Environmental Impacts, Intro to Energy
Week 10 (10/24-10/28): Energy, Fossil Fuels, Oil, Gas, Coal.
Week 11 (10/31-11/4): Fossil Fuels, Oil, Gas, Review. **Mid TERM 3 Friday Nov 4th**
Week 12 (11/7-11/11): Coal (cont.), Renewable energy
Week 13 (11/14-11/18): Nuclear energy, Water resources
Week 14 (11/23): Water resources (cont.). **PAPER IS DUE on SUNDAY, 11/20 at midnight!!!**
Week 15 (11/28-12/2): Climate, Final exam review.

**FINAL EXAM:** Monday December 5th, 12:30 pm.