Physics of the Earth
GEOPH 300
Spring, 2008

Course Information: Physics of the Earth, GEOPH 300, TuTh 9:15 – 10:30, 3 Credit hours, Room MG 129.

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Office hours: I am available in my office, MG206B most of the time except during exercise (11:30-2:00). I will have office hours between 9 to 10:30 AM Monday and Friday. But do not hesitate to stop by anytime.

I am a geophysicist – a geoscientist that uses physical principles to understand the structure and processes of the Earth. Mostly, I use FM frequency radio signals to produce images of the upper 20 meters of the Earth. I have been a research professor at Boise State University since 1997.

Text: Fundamentals of Geophysics, by William Lowrie.

Additional Text Resources On Reserve at the Library:
The Solid Earth, an Introduction to Global Geophysics, C.M.R. Fowler.
Looking into the Earth: An introduction to Geological Geophysics, A. E. Mussett and M. A. Khan.
Principles of Geophysics, N. Sleep and K. Fujita.
The Inaccessible Earth, An Integrated View of its Structure and Composition, G. C. Brown and A. E. Mussett.
Geodynamics, D. Turcotte and G. Schubert.
Introduction to Geophysics: Mantle, Core and Crust, G. D. Garland.
Plate Tectonics, How it Works, A. Cox and B. R. Hart.
Earth: An Introduction to Physical Geology, E. J. Tarbuck, F. K. Lutgens, D. Tasa.
Earth, F. Press and R. Siever.

Readings:
Learning to Learn, by Karl Wirth and Dexter Perkins, both Geologists, provides a summary of different learning styles and learning philosophies.
Liberal Education Is Not a Luxury, an opinion piece by Marshall Gregory printed in The Chronicle of Higher Education, September 12, 2003. An excellent justification for a liberal education.
Islamic Science, several articles from Nature and Physics Today

Introducing Groundwater Physics, by Mary Anderson

Additional required reading:

A Whole New Mind: Why Right-Brainers Will Rule the Future by Daniel Pink. The right side of your brain is where "creative" activity occurs. The left side of your brain is the "analytical" side.

Einstein's Heroes: Imagining the World through the Language of Mathematics by Robyn Arianrhod. As the Library Journal writes, "An intriguing blend of science, history, and biography.... Arianrhod's well-written, fascinating discussion of intertwined topics not usually presented in one book aimed at general readers. Highly recommended."

Writing assignment:

You will write **critical** book reviews of the books that you read. These reviews will be short, 1000-1500 words, and you will be required to re-write them. Only the final review will be graded. The purpose of these writing assignments is to improve your writing and to have you critically read these books. An important aspect of writing is rewriting. "There are no good writers, only good rewriters." So, the reviews will be written several times.

Reading is more than just looking at the words. More important is to evaluate what you are reading. The Critical Review web page (link on the class website) has several links to writing critical book reviews. I also have a web page dedicated to writing. It too is linked from the course web page. To make your writing better, use the active voice. Also, do not use phrases such as, "it is obvious that", "This is…". I think these phrases make the reading harder to understand and more wordy. Keep the number of words to a minimum. Focus on your choice of verbs when writing.

Another important aspect of writing is to know your audience. To write a well-written and understandable paper, you must know who is going to read your paper. For this class, you will write the paper so that your peers and your parents can understand it. You must choose your words carefully. This aspect of writing is crucial, yet difficult.

An outline will help you organize your thoughts and determine any possible gaps in your information. Once you have written an outline, the writing processes is easier and your writing will be more clearly organized and easier to understand. An outline is an important pre-writing step.

I will grade your paper on your effort to produce a polished product. Factors such as turning the assignment in on time and improving your writing/editing will be important. I will give you a grade on your final review, not on the drafts. However, effort will be judged on all the drafts, so do your best.

The format for the review will be double spaced, 12-point type, using Times or some serif format font. Include your name, this class title, draft number and the date on your

title page. Place your name and the date in the header on all pages. Also, include the page number at the bottom of the page.

My goal is to have you feel proud about a piece of work you have written. Writing is difficult, but persistence and effort payoff. I hope this assignment will be challenging, yet I hope you will find the effort worthwhile and even satisfying.

Course Description:
GEOPH 300 PHYSICS OF THE EARTH (3-0-3)(S). Introduction to the Earth's gravity, magnetism, electricity, seismicity, heat, and radioactivity, with a discussion of the significance of these properties to geological processes. PREREQ: GEOS 100, PHYS 112 or PHYS 212.

Class website:
http://cgiss.boisestate.edu/~billc/GEOPH300/geoph300.html. I also have a link to this page from my homepage.

We will use Blackboard for much class communication and assignments. The web page has lots of good information, but it is just one resource for the course. The Blackboard site will have up-to-date information. You should check there often. Several assignments will be to reflect on the readings. You will write your reflection and submit it through Blackboard.

We will also develop a wiki in this class. I will discuss that more in the class and during the semester. The wiki will be a collaborative project that looks further into some aspect of this course.

Course aims and objectives:
Course goals:
Students should:

- understand the theory behind geophysical equations and understand the physical meaning of those equations;
- be familiar with sources of scientific information and be able to utilize scientific data to answer questions;
- be able to apply geophysical knowledge and critical thinking skills to address a range of problems in the geosciences;
- be able to apply physics and mathematics to understand geological processes.

Learning goals:

- Increased quantitative skills;
- Improved written communication;
- Improved critical thinking skills.

You need to determine how you learn best, for example, by seeing the information, hearing the information, or reading the information. You might do best with a combination of different methods. What is important is that you **learn how to learn** and you **learn how to enjoy learning.**

Processing information is the key to learning. I can transfer lots of information to you (tell you the information), but until you process it, until you work with it, you will not develop a deep understanding the information.

Format and procedures:
I expect you to attend class and to participate by being actively involved in class. The simplest way to be involved is to think about why a topic or method is being presented. What is the purpose of posing or solving the problem this way. Ask questions if you do not understand something. **Do not be afraid to ask a question. If you do not know the answer, many other students will not know the answer too!** If someone is brave enough to ask a question, I expect you to honor their bravery by showing **respect** to your classmate.

Grading:
Class participation – 10%
Quizzes and reflections – 25%
Problem sets – 20%
Critical book reviews – only final reviews – 20%
Group Wiki – 25%

Academic Integrity/Honesty:
Academic integrity is expected of every student. The Student Code of Conduct states, "Cheating or plagiarism in any form is unacceptable. The University functions to promote the cognitive and psychological development of all students. Therefore, all work submitted by a student must represent her/his own ideas, concepts, and current understanding. Academic dishonesty also includes submitting substantial portions of the same academic course work to more than one course for credit without prior permission of the instructor(s)." A range of acts can be considered academic dishonesty or misconduct. I will evaluate each case of academic misconduct on its own basis and appropriate sanctions will be applied. Such sanctions may be, but are not limited to, a zero for the assignment or a reduced grade for the course. All instances of misconduct will be reported to the Student Conduct Office – **no exceptions**! Furthermore, students who cheat on an examination will receive a zero for the exam, fail the course, and be reported to the Conduct Office. *(modified from Lisa Brady, History, Boise State University)*

Boise State University Student Code of Conduct:
The Office of Student Rights & Responsibilities has a web site, www.boisestate.edu/osrr, that links to the Student Code of Conduct.

Resources for study help:
Work together! Most students find that working with other students is an effective way to learn new material and prepare for exams. I strongly recommend that you form study groups. Academic Support Services, academicsupport.boisestate.edu, provides lots of good ideas and information to improve your study habits.