Earth Sciences 4421B: Physics of the Earth II
Course Outline – Winter 2014

Course Instructors: Dr. Rick Secco (office: B&GS 0178; e-mail: secco@uwo.ca)
Tim Officer (email: tofficer@uwo.ca)
Lectures: Tuesday/Thursday/Friday 10:30 a.m. – 11:30 a.m., B&GS 1084
Office Hours: by appointment
Course TA's: TBA

Course description:

This course provides an advanced overview of fundamental processes responsible for the evolution and the current dynamic state of the Earth and other planets. It introduces concepts and topics of physics of the Earth providing a way to study the inner workings of our planet at different temporal and spatial scales. During the course students will be given an introduction into several fundamental physical concepts such as magnetism, radioactivity, elasticity, and elements of continuum mechanics which play a key role in understanding and studying various phenomena on the Earth and planets.

> **Prerequisites:** Earth Sciences 3321A/B, completion of second year of any Geophysics program or special permission. *(Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you will be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.)*

Summary of Lecture Topics (*approximate and subject to change*!):

1. Magnetism of the Earth and planets.
2. The physics of magnetism.
3. Rock magnetism, paleomagnetism, and the geomagnetic timescale.
4. Geochronology and the geological timescale.
5. Radioactivity and Earth's age.
6. Elasticity and flexure of plates.
7. Deformation, stress, strain, and linear elasticity.
8. Elastic properties of the Earth's lithosphere.
9. Principles of isostasy.

Recommended Textbooks:

- Lowrie, W., ***Fundamentals of Geophysics***, Cambridge University Press, 2007.
- Turcotte, D.L. and Schubert G., ***Geodynamics***, Cambridge University Press, 2002.
- Fowler, C.M.R., ***The Solid Earth: An Introduction to Global Geophysics***, Cambridge University Press, 2nd Edition, 2005.

- Stacey F. and Davis P., ***Physics of the Earth***, Cambridge University Press, 2008.
- Pollard D. and Fletcher R., ***Fundamentals of Structural Geology***, Cambridge University Press, 2005.
- Ranalli, G., ***Rheology of the Earth***, 2nd Edition, Chapman and Hall, London, 1995.
- Anderson, D.L., ***New Theory of the Earth***, Cambridge University Press, 2007.

Course Work

Assignments will consist of examination-style answer questions, and require no formal write-up. Late submissions will be accepted with a **5% per day penalty**. Under exceptional circumstances, late submissions will be accepted with no penalty, provided that adequate documentation is given. With a few exceptions, only SI units should be used to report any physical quantities.

The project will involve a written report (5 pages + figures) and a brief oral presentation (10-15 minutes). The topic will be chosen by the student and approved by the instructor. Research topics must be in any area of the physics of the Earth covered during the course. The project must include references to the scientific literature. Projects are due in April (date TBD), and oral presentations will be given during the last week of the term. *(**Plagiarism:** Students must write their essays and assignments in their own words. Whenever students take an idea, or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence (see Scholastic Offence Policy in the Western Academic Calendar).)*

The midterm exam will be held in mid-February (date TBD). The final exam will be **two hours** in length and will take place during the April examination period. For both exams, a **single-sided hand-written crib sheet** and a non-programmable calculator may be used.

Method of Evaluation

Assignments	Project	Midterm Exam	Final Exam
20%	25%	25%	30%

Statement on Academic Offences: "Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site: http://www.uwo.ca/univsec/handbook/appeals/scholoff.pdf ."

Statements on special circumstances:

If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or other supporting documentation to the Dean's office as soon as possible and contact your instructor immediately. It is the student's responsibility to make alternative arrangements with their instructor once the accommodation has been approved and the instructor has been informed. In the event of a missed final exam, a "Recommendation of Special Examination" form must be obtained from the Dean's Office immediately. For further information please see:
http://www.uwo.ca/univsec/handbook/appeals/medical.pdf

A student requiring academic accommodation due to illness, should use the Student Medical Certificate when visiting an off-campus medical facility or request a Records Release Form (located in the Dean's Office) for visits to Student Health Services. The form can be found here: https://studentservices.uwo.ca/secure/medical_document.pdf

Accessibility Statement: Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x 82147 for any specific question regarding an accommodation.