

GEO 365P (27578) and GEO 383P Spring 2013
Potential Field Applications in Geophysics

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Office hours: Monday-Thursday 9-10 AM, and other times by appointment.

Class Meets: TTh 2-330

Meeting Room: EPS 1.126

Text and Web Site: Blackboard is used to post homework, schedules and other files. The required course text is *Fundamentals of Geophysics* (Lowrie, second edition, Cambridge). Wikipedia has many useful discussions of topics covered in the course. New textbooks on this subject have been announced by two publishers (Cambridge Univ. Press and the Society of Exploration Geophysicists), but are not yet available.

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Course Work and Grades: Grades (plus minus grades are assigned): Examinations (2 in-class, and possibly a final): 60%; Written homework and article summary reports 40%

Prerequisites: Physics and math required of the undergraduate geophysics degree (3 semesters of calculus-based physics, 4 semesters of calculus)

Course Topics: The course covers the science and practice of using gravity and magnetic fields of Earth to learn about its interior. Spatial scales of gravity and magnetic studies range from thousands of kilometers) down to meters or centimeters. Applications include understanding fundamental properties of the Earth (its strength, dynamics of plate tectonics,...), exploration (for oil, gas and minerals), and archeological and engineering problems (at the scale of meters and smaller). The physical principles are the same at any scale, so the starting point for both gravity and magnetics will include: theory of gravity and magnetic fields, description of the fields for spherical and flat earth geometries, and observational methods and instruments. These topics will be followed by review of applications to global, regional, and exploration scale problems. There will be occasional field and computer lab exercises and possibly also field trips. The text (*Fundamentals of Geophysics*) has good coverage of most topics, including paleomagnetism. Applications to exploration-scale problems will be covered via readings from the recent literature, including SEG journals *Geophysics* and *The Leading Edge*.