SAW Course # WH.421
Geological Oceanography

Fall, 2019

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Class Times: TBD
Places: TBD

Class Website: http://www.whoi.edu/sites/12.710

Course Description: This course provides a survey of a broad range of active topics in Geological Oceanography. The course presents background material to graduate students with interests in various aspects of geology, including solid-earth geophysics, geochemistry, sedimentology and stratigraphy, coastal processes, paleo-oceanography, and paleo-climatology. The course relies on the scientific material described in textbooks, important papers from the peer-reviewed literature, and the most recent contributions in these different disciplines. Broad topics include the formation of the Earth, petrogenesis, volcanism, plate tectonics, geodynamics, sedimentation in the oceans, coastal morphodynamics, the Pleistocene ice ages and astronomical theory of climate change, Last Glacial Maximum, and sub-orbital climatic variability. The interconnectedness of and feedbacks between processes discussed under various topics are emphasized throughout the course in order to stress the coherence of the research field of geological oceanography.

The course is taught in four sections, representing the four core disciplines of the WHOI G&G department: Solid Earth, Geochemistry, Coastal Processes, and Paleoclimate.

There will be two 1 1/2 hour-long lectures each week and a total number of 36 hours for this course. Problem sets will be regularly assigned. Class size is typically small, and so class participation is an important component of learning in this course.

Text/Readings: Because of the breadth of topics covered, there is no single textbook that is adequate for the purpose. Material will be available online for each class along with reading assignments. Several relevant textbooks will also be placed on reserve. Examples of relevant textbooks are referenced at the end of this document.

Grading: Mid-term exam - 25%
Class participation - 25%
Problem Sets/writing assignments - 25%
Final exam - 25%
FORMATION OF THE EARTH, PETROGENESIS AND VOLCANISM
09/05  (Soule)  Cosmochemistry & Earth Formation
09/10  (Soule)  Isotope Geochemistry & Geochronology
09/12  (Soule)  Igneous Petrogenesis
09/17  (Soule)  Mid-Ocean Ridges
09/19  (Soule)  Ocean Islands and Mantle Plumes
09/24  (Soule)  Arcs

PALEO-OCEANOGRAPHY AND PALEO-CLIMATOLOGY
09/26  (Marchal)  Climate System & Climatic Indicators
10/01  (Marchal)  Astronomical Theory of Climate Change
10/03  (Marchal)  Pleistocene Ice Ages
10/08  (Marchal)  Last Glacial Maximum
10/10  (Marchal)  Abrupt Climate Changes: Dansgaard-Oeschger Events
10/15  Holiday
10/17  (Marchal)  Abrupt Climate Changes: Heinrich Events

10/22  Mid Term Exam

SEDIMENTATION IN THE OCEANS AND COASTAL PROCESSES
10/24  (Giosan)  Shaping the Earth: Nature and/or Humans
10/29  (Giosan)  The Sediment Factory: From Source to Sink
10/31  (Giosan)  Flowing Water: Sediment Transport
11/05  (Giosan)  Continental Margins: Sedimentology and Sequence Stratigraphy
11/07  (Giosan)  The Coast: Landscapes and Seascapes
11/12  (Giosan)  Waves and Coastal Morphodynamics

SOLID EARTH GEOPHYSICS
11/14  (Lizarralde)  Whole Earth Structure
11/19  (Lizarralde)  Earth’s Lithosphere: Formation and Evolution
11/21  (Lizarralde)  Plate Boundary Processes
11/26  (Lizarralde)  Seismology: Earthquakes and Earth imaging
11/28  Holiday
12/03  (Lizarralde)  Potential fields, electro-magnetics, linear inverse theory
12/05  (Lizarralde)  Whole Earth Tomography/Geodynamics

12/17  Final Exam
Recommended Textbooks
(on reserve in Lindgren Library, Building 54, MIT, and in Clark 237, WHOI)


