## Course Schedule—Fall 2007

### Earth & Planetary Sciences

- **Note:** Text highlighted in red indicates that a change has been made to the course listing. The red text indicates the current, updated information.

#### EARTH & PLANETARY SCIENCES

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Instructor(s)</th>
<th>Limit</th>
<th>Prerequisites/Comments</th>
<th>Section</th>
<th>Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>270.102 (N)</td>
<td>FRESHMAN SEMINAR: CONVERSATION WITH THE EARTH</td>
<td>Marsh</td>
<td>55 per section</td>
<td>Freshmen only&lt;br&gt;Sec. 01: 2 credits (normal participation)&lt;br&gt;Sec. 02: 3 credits (requires term paper)&lt;br&gt;A discussion of current topics on Earth's origin, evolution, and habitability. Topics will include extinction of life from meteorite impact, global warming, ozone depletion, volcanism, ice ages, and catastrophic floods, among others.</td>
<td>Sec. 01</td>
<td>ThF 11</td>
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<tr>
<td>270.103 (N)</td>
<td>OUR CHANGING PLANET (3)</td>
<td>Olson/Szlavecz</td>
<td>110</td>
<td>Limit 110&lt;br&gt;A broad survey of the Earth as a planet, with emphasis on the processes that control global changes. Topics include: the structure, formation, and evolution of the Earth, the atmosphere, oceans, continents, and biosphere. Special attention is given to present-day issues, such as global climate change, natural hazards, air pollution, resource depletion, human population growth, habitat destruction, and loss of biodiversity. Open to all undergraduates; no pre-requisites.</td>
<td>Sec. 01</td>
<td>MTW 11</td>
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<tr>
<td>270.104 (N)</td>
<td>HISTORY OF THE EARTH AND ITS BIOTA (3)</td>
<td>Hinnov</td>
<td>110</td>
<td>Limit 110&lt;br&gt;The history of the earth and life as understood through the geologic record. The evolution and extinction of major life forms will be examined from the perspective of interactions among the solid earth, ocean, atmosphere, and biosphere.</td>
<td>Sec. 01</td>
<td>MTW 11</td>
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<tr>
<td>270.220 (N)</td>
<td>THE DYNAMIC EARTH: AN INTRODUCTION TO GEOLOGY (3)</td>
<td>Ferry/Veblen</td>
<td>30</td>
<td>Prereqs: 030.101 or 171.101-102 or equivalent&lt;br&gt;Coreq (for EPS Majors): 270.221; optional for others. Basic concepts in geology, including plate tectonics; Earth’s internal structure; geologic time; minerals; formation of igneous, sedimentary, and metamorphic rocks; development of faults, folds and earthquakes; geomagnetism.</td>
<td>Sec. 01</td>
<td>MTW 11</td>
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<tr>
<td>270.221 (N)</td>
<td>THE DYNAMIC EARTH LABORATORY (2) (4)</td>
<td>Olsen</td>
<td>12</td>
<td>Coreq: 270.220&lt;br&gt;This course is a hands-on learning experience for introductory geological concepts and techniques using geological tools, such as mineral/rock samples, microscopes, and maps. Field trips are its essential part.</td>
<td>Sec. 01</td>
<td>T 1:30-4</td>
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<tr>
<td>270.311 (N)</td>
<td>GEOBIOLOGY (3)</td>
<td>Jahren</td>
<td>30</td>
<td>Limit 30&lt;br&gt;Study of the interface between the biological and geological earth.</td>
<td>Sec. 01</td>
<td>ThF 10:30-12</td>
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<tr>
<td>270.332 (N)</td>
<td>SOIL ECOLOGY (3)</td>
<td>Szlavecz</td>
<td>10</td>
<td>Limit 10&lt;br&gt;Prerequisites: Population and Community Ecology, Geobiology or Instructor's permission&lt;br&gt;This course introduces basic aspects of cycles and flows in the soil ecosystem, and provides students with an overview of the higher groups of soil organisms, focusing on their identification characters and ecological roles. The course is intended for upper level undergraduates or graduate students who are interested in soils and soil ecology. The course provides basic laboratory and field surveying skills in the discipline. Laboratory and field surveying methods are also covered.</td>
<td>Sec. 01</td>
<td>F 1-3</td>
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<tr>
<td>270.369 (N)</td>
<td>GEOCHEMISTRY OF THE EARTH &amp; ENVIRONMENT (3)</td>
<td>Sverjensky</td>
<td>30</td>
<td>Limit 30&lt;br&gt;Prereqs: 270.103, 270.114, 270.220, or 270.222&lt;br&gt;The chemical principles needed to understand and predict how the elements migrate through the Earth and the subsurface environment. Applications to metallic resources and nuclear waste migration.</td>
<td>Sec. 01</td>
<td>TTh 3-4:30</td>
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<tr>
<td>270.375 (E,N)</td>
<td>GROUNDWATER (3)</td>
<td>Garven</td>
<td>20</td>
<td>Limit 20&lt;br&gt;Cross-listed with Geography and Environmental Engineering&lt;br&gt;Course canceled 5/22/07</td>
<td>Sec. 01</td>
<td>MTW 10</td>
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<tr>
<td>270.425 (N)</td>
<td>EARTH AND PLANETARY FLUIDS (3)</td>
<td>Waugh/Olson</td>
<td>20</td>
<td>Limit 20&lt;br&gt;Prereq: Basic Physics, Calculus, and familiarity with ordinary differential</td>
<td>Sec. 01</td>
<td>MTW 2</td>
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An introductory course on the properties, flow, and transport characteristics of fluids throughout the Earth and planets. Topics covered include: constitutive relationships, fluid rheology, hydrostatics, dimensional analysis, low Reynolds number flow, porous media, waves, stratified and rotating fluids, plus heat, mass, and tracer transport. Illustrative examples and problems are drawn from the atmosphere, ocean, crust, mantle, and core of the Earth and other Planets. Open to graduate and advanced undergraduate students.

270.495 (N) (W)  **SENIOR THESIS**  Staff
Preparation of a substantial thesis based upon independent student research, supervised by at least one faculty member in Earth and Planetary Sciences. Open to Sr. departmental majors only. Required for department honors.

270.501  **INDEPENDENT STUDY**
270.503  **INDEPENDENT RESEARCH**
270.507  **INTERNSHIP**

270.602  **SEMINAR IN ENVIRONMENTAL & HEALTH GEO SCIENCES**  Jahren
Sverjensky  Limit 20  Perm. Req’d.
An introduction to topics of current interest in the environmental and health geosciences.  Course canceled 9/07/07

270.603  **GEOCHEMISTRY SEMINAR**  Sverjensky
Limit 20  Course added 9/18/07

270.604  **SEMINAR IN GEOPHYSICAL PETROLOGY**  Marsh
Limit 15  Discussion of present research topics in geophysics and igneous petrology.

270.605  **JOURNAL CLUB**  Conrad
Limit 50  Review and discussion of new geologic literature and current research.  All geology students participate and deliver at least one paper a year.

270.607  **SOIL ECOLOGY**  Szlavecz
Limit 10  Prerequisites: Population and Community Ecology, Geobiology or Instructor's permission  (See 270.332 for description)

270.608  **SEMINAR IN ATMOSPHERIC SCIENCES**  Waugh
Limit 20  Discussion of current research topics in atmospheric science.

270.611  **GEOBIOLOGY**  Jahren
Limit 30  Study of the interface between the biological and geological earth.

270.612  **THE NATURE OF SCIENCE AND THE CONDUCT OF SCIENTIFIC RESEARCH**  Wright
Limit 20

270.616  **PLATE TECTONICS & MANTLE CONVECTION**  Conrad
Limit 20  An examination of the interaction between Earth’s tectonic plates and mantle convection.  Topics include plate-driving forces, plate deformation, the role of continents, requirements for plate tectonics, and plate-tectonic history.

270.652  **PHYSICS OF MAGMA**  Marsh
Limit 10  The principles of viscous fluid flow, heat conduction and convection are treated in reference to all aspects of the mechanics of magma.  Emphasis is placed on understanding petrologic processes as observed in rocks and rock sequences.

270.661  **PLANETARY FLUID DYNAMICS**  Strobel
Limit 20  Prereqs: 270.646 or equivalent highly desirable This is a self-contained one-semester course in the applications of basic fluid dynamics concepts to the study of planetary atmospheres.  Topics include equations of motion on a rotating planet, the Boussinesq approximation, conservation properties, hydrodynamic instability, convection, turbulence and planetary boundary layers, quasi-geostrophic theory, baroclinic instability, general circulation, and linear wave propagation.

270.662  **SEMINAR IN PLANETARY SCIENCE**  Strobel
Limit 15  Major problems of current interest in planetary science are critically discussed in depth.

500.602  **SEMINAR: ENVIRONMENT AND APPLIED FLUID MECHANICS**
Meneveau  Cross-listed with Geography and Environmental Engineering, Interdepartmental, and Mechanical Engineering

270.807  **RESEARCH**