Geology 160 – introduction to Geosystems
Units: 4 units
Fall Term 2024, 9-9:50 AM MWF

Location: Taper Hall of Humanities (THH) 301

Instructor: Steve P. Lund
Office: Zumberge Hall of Sciences (ZHS) 273
Office Hours: 10-11 AM MWF are my formal office hours. Actually, I am available any time. Come to my office (ZHS 273), call me (office: 213-740-5835; cell: 323-663-3620), or email me (slund@usc.edu) if you need a special meeting time.
Contact Info: slund@usc.edu

Course Description
This course introduces students to natural geological/environmental processes (systems) active at the Earth’s surface. It will also assess the relationships between these physical processes and biological processes (ecosystems). This course will focus on the behavior of natural systems at a regional scale independent of human intervention; but it will identify key points where humans affect or are affected by the natural environment. Each topic should develop a systems level perspective that considers intrinsic interacting processes, their variability, and the potential for sustainability. The laboratory associated with the course employs a multi-media approach to illustrate the methods that Earth scientists use to develop an understanding of how the world’s surface environments work. The long-term objective is that students can use this information to understand the environmental conditions wherever they might be in the World and have the science concepts (building blocks) necessary to understand their surroundings and explain what they see. They can also use the information from this course to evaluate legislative/policy issues that they may be called upon to vote on or decide upon.

Learning Objectives
This course describes and explains specific observable components of the World’s surface environments and the organisms that live there. Each component (or building block, puzzle piece) can be combined with other components to explain more and more complicated aspects of surface Earth behavior. This hierarchical structure of combining science concepts (building blocks or puzzle pieces) to explain observed overall Earth behavior is called ‘Earth System Science or Geosystems’. We use this approach in scientific research on all aspects of the Earth and to predict future planetary behavior. Tests will assess knowledge of individual specific components and evaluate whether students can combine simple components to describe more complicated aspects of the way surface Earth works.

Prerequisite(s): None. But a high-school understanding of basic science and mathematics is expected.

Course Notes
This is an in-person course. Required class material will be available on Brightspace (lecture PPTs, lab materials, grades). Students will need a computer with internet access to assess the course quizzes. Students must have access to a word processing program that will provide output as XXX.doc or XXX.pdf without linkage to a web browser.

Technological Proficiency and Hardware/Software Required
Required Readings and Supplementary Materials
There are no required readings other than the PPT presentations associated with the lectures. Students learn in different ways. For students who want a textbook for this course, I recommend ‘Earth Science’ by Tarbuck and Lutgens, 14th ed. Pearson Publ. (I will provide an announcement on how to purchase the book before the start of class). (Elements of Ecology: Smith and Smith, 9th Ed., Pearson Publ. is a good extra reference for those with more significant biological interests.)

Description and Assessment of Assignments
The primary course assessment will be three 50-min in-person exams (multiple choice). Each exam will cover about 1/3 of the course. There will be short quizzes associated with each lecture. There will be nine laboratory activities plus two final PPT presentations (REAs – see below). There will be a final project/essay – Regional Ecosystem Assessments due the last day of class – Dec 6.

Participation
On-line quizzes (Brightspace) will follow each lecture. The quizzes can be taken any time after class until midnight of the class day. This is my means of taking attendance and making students stay up to date with the course material. The quizzes will be 4 questions on the day’s lecture. The student will have 4 minutes to complete the quiz.

Grading Breakdown

Table 1 Grading Breakdown

<table>
<thead>
<tr>
<th>Assessment Tool (assignments)</th>
<th>Points</th>
<th>% of Grade</th>
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</thead>
<tbody>
<tr>
<td>3 50-min exams</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Laboratory activities</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Daily quizzes</td>
<td>10</td>
<td>10</td>
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<tr>
<td>Regional ecosystem assessments</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>100</strong></td>
<td><strong>100</strong></td>
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Grading Scale
Total grades will be assigned on a curve with ~1/3 A, ~1/3 B, and ~1/3 C. A total grade of 50% or better is required to pass the course and get a C. Students not completing quizzes and lab activities could end up with a score below 50% and receive a D/F. Students must pass the laboratory component to pass the course.

Course Schedule:

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture</th>
<th>Book Chapters</th>
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<tbody>
<tr>
<td>1</td>
<td>Aug 26</td>
<td>01: Introduction: Earth as a Planet  EAR-1</td>
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<tr>
<td>1</td>
<td>Aug 28</td>
<td>02: Geosystems Approach to Studying the Earth  EAR-1</td>
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<tr>
<td>1</td>
<td>Aug 30</td>
<td>03: The Earth’s Interior/Nature of Earth Materials  EAR-2,3</td>
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<tr>
<td>2</td>
<td>Sep 02</td>
<td>HOLIDAY</td>
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<td>2</td>
<td>Sep 04</td>
<td>04: Plate Tectonics/Mantle Convection  EAR-7,10</td>
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<tr>
<td>2</td>
<td>Sep 06</td>
<td>05: Plate Interactions I – earthquakes  EAR-8,10</td>
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<tr>
<td>3</td>
<td>Sep 09</td>
<td>06: Plate Interactions II – volcanism  EAR-9</td>
</tr>
<tr>
<td>3</td>
<td>Sep 11</td>
<td>07: Atmosphere Structure/Global Heat Budget  EAR-16</td>
</tr>
<tr>
<td>3</td>
<td>Sep 13</td>
<td>08: Atmospheric Circulation  EAR-17,18</td>
</tr>
<tr>
<td>4</td>
<td>Sep 16</td>
<td>09: Troposphere Weather  EAR-19</td>
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Each student will write two short term papers, which are due on the last day of class (Dec 6). They will count for 10% of the total class grade. Each paper will be a regional ecosystem assessment (REA) for some specified location on the Earth’s surface. One REA will be for a marine location and the other REA for a terrestrial location. Each term paper will have at least 4 pages of text (double-spaced), at least 3 extra pages of relevant figures, and a list of references (standard references and web-based resources). (All term papers need to be in electronic format – X.DOC or X.PDF). Each student will make two 5-minute Powerpoint presentations on these REAs during the last two laboratory periods for the course (one lab session will focus on marine REAs and the second on terrestrial REAs). Lab points will be given for the quality and content of the presentations.

Each REA will summarize the current environmental conditions, as discussed in this course, at each location and the primary organisms that live there. Key questions to answer are: 1) what are the most important environmental factors that control the ecosystem, 2) what aspects of the environment are variable (and on what time scales), 3) what are the most distinctive species in the ecosystem, 4) are there keystone species, 5) is there evidence for selected species population variability beyond a seasonal scale? Two additional
questions to consider are 1) how might the ecosystem change in the next 100 years with global warming and
2) are humans playing an important role in ecosystem stability now or in the future?

Each person will be given a set of geographic coordinates for each REA. Consider this ‘location’ to be at the
center of the ecosystem under consideration, but the actual ecosystem might extend significantly beyond
that location. I will try to focus on places that are ‘special’ in the sense that they have been previously studied
more than the average random location on Earth. They may be regions where human activity is located or
where humans significantly interact with their environment (coastal fisheries, for example); they may also be
‘National Parks’ for various countries. The point of preferentially using such REAs is that more has been
published on these ecosystems. Inevitably, some people will get locations for which almost nothing is known.
In such cases, use your general understanding gained from this class and reading to provide as much baseline-
understanding for the REA as is possible.

Academic Integrity
The University of Southern California is foremost a learning community committed to fostering successful
scholars and researchers dedicated to the pursuit of knowledge and the transmission of ideas. Academic
misconduct is in contrast to the university’s mission to educate students through a broad array of first-rank
academic, professional, and extracurricular programs and includes any act of dishonesty in the submission
of academic work (either in draft or final form).

This course will follow the expectations for academic integrity as stated in the USC Student Handbook. All
students are expected to submit assignments that are original work and prepared specifically for the
course/section in this academic term. You may not submit work written by others or “recycle” work
prepared for other courses without obtaining written permission from the instructor(s). Students suspected
of engaging in academic misconduct will be reported to the Office of Academic Integrity.

Other violations of academic misconduct include, but are not limited to, cheating, plagiarism, fabrication
(e.g., falsifying data), knowingly assisting others in acts of academic dishonesty, and any act that gains or is
intended to gain an unfair academic advantage.

Academic dishonesty has a far-reaching impact and is considered a serious offense against the university.
Violations will result in a grade penalty, such as a failing grade on the assignment or in the course, and
disciplinary action from the university itself, such as suspension or even expulsion.

For more information about academic integrity see the student handbook or the Office of Academic
Integrity’s website, and university policies on Research and Scholarship Misconduct.

Please ask your instructor if you are unsure what constitutes unauthorized assistance on an exam or
assignment or what information requires citation and/or attribution.

Statement on University Academic and Support Systems

Students and Disability Accommodations:
USC welcomes students with disabilities into all of the University’s educational programs. The Office of
Student Accessibility Services (OSAS) is responsible for the determination of appropriate accommodations
for students who encounter disability-related barriers. Once a student has completed the OSAS process
(registration, initial appointment, and submitted documentation) and accommodations are determined to
be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each
course. The LOA must be given to each course instructor by the student and followed up with a discussion.
This should be done as early in the semester as possible as accommodations are not retroactive. More
information can be found at osas.usc.edu. You may contact OSAS at (213) 740-0776 or via email at osasfrontdesk@usc.edu.

**Student Financial Aid and Satisfactory Academic Progress:**
To be eligible for certain kinds of financial aid, students are required to maintain Satisfactory Academic Progress (SAP) toward their degree objectives. Visit the Financial Aid Office webpage for undergraduate and graduate-level SAP eligibility requirements and the appeals process.

**Support Systems:**
- **Counseling and Mental Health** - (213) 740-9355 – 24/7 on call
  Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

- **988 Suicide and Crisis Lifeline** - 988 for both calls and text messages – 24/7 on call
  The 988 Suicide and Crisis Lifeline (formerly known as the National Suicide Prevention Lifeline) provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week, across the United States. The Lifeline consists of a national network of over 200 local crisis centers, combining custom local care and resources with national standards and best practices. The new, shorter phone number makes it easier for people to remember and access mental health crisis services (though the previous 1 (800) 273-8255 number will continue to function indefinitely) and represents a continued commitment to those in crisis.

- **Relationship and Sexual Violence Prevention Services (RSVP)** - (213) 740-9355(WELL) – 24/7 on call
  Free and confidential therapy services, workshops, and training for situations related to gender- and power-based harm (including sexual assault, intimate partner violence, and stalking).

- **Office for Equity, Equal Opportunity, and Title IX (EOO-TIX)** - (213) 740-5086
  Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

- **Reporting Incidents of Bias or Harassment** - (213) 740-2500
  Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

- **The Office of Student Accessibility Services (OSAS)** - (213) 740-0776
  OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

- **USC Campus Support and Intervention** - (213) 740-0411
  Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

- **Diversity, Equity and Inclusion** - (213) 740-2101
  Information on events, programs and training, the Provost’s Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

- **USC Emergency** - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call
  Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

- **USC Department of Public Safety** - UPC: (213) 740-6000, HSC: (323) 442-1200 – 24/7 on call
  Non-emergency assistance or information.
Office of the Ombuds - (213) 821-9556 (UPC) / (323-442-0382 (HSC)
A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

Occupational Therapy Faculty Practice - (323) 442-2850 or oftp@med.usc.edu
Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.