4.10.2017 v.1c

SYLLABUS
GEL 198: TECTONIC SYSTEMS
SPRING, 2017

PROFESSOR:
Eric Cowgill — Office Hours: W 3-4, Th 2-3,
EPS 3121 — escowgill@ucdavis.edu

TEACHING ASSISTANTS:
Office Hours: Tu 1:30-2:30 & Th 9-10 in Durrell room (EPS 3120).
Trevor Waldien tswaldien@ucdavis.edu EPS1205
Alex Morelan aemorelan@ucdavis.edu EPS2236

LECTURE:
EPS 1190, M 11:00 – 11:50; F 10:00-11:50
No class 5/29 & 6/9. We'll reschedule as the time approaches.

PREREQUISITES: GEL101 & GEL101L (or permission from me).

TEXTBOOKS:
Condie, 2016, *Earth as an Evolving Planetary System*, 3rd ed., Elsevier, Oxford UK, 418 p. (PDF available from the UCD library).
Moores & Twiss, 1995, *Tectonics*, Freeman, New York, 415 p (reissued in 2014 by Waveland Press, Long Grove IL).
Kearey, Klepeis, & Vine, 2009, *Global Tectonics*, 3d Ed., Wiley – Blackwell, Chichester, 482 p.
Cox & Hart, 1986, *Plate Tectonics How it Works*, Blackwell Scientific, Boston, 392 p. (PDF available on Canvas site).
Reading will be assigned/recommended as needed.

OBJECTIVES:
- Provide synoptic view of tectonic processes and systems.
- Exercise problem-solving and analytical thinking.
- Conduct an in-depth analysis of a tectonic setting, process, or problem by integrating primary research literature.
- Hone your ability to present your work clearly, succinctly, and systematically.

FORMAT:
Components of the class include:
- Two weekly lectures/discussions
- Problems sets and/or weekly activities
- A term paper
- An AGU/GSA style talk on your term paper

SUBMITTING WORK: Problem sets and paper components should be submitted via email. Assignments will specify due dates and file-naming conventions.

TOPICS & SCHEDULE:

This will evolve. Numbers below indicate weeks in the quarter.

I. Some tools of the trade
   1. Plate Motions in 2D
   2. Plate Motions on a Sphere
   3. Isostacy & Flexure

II. Plate Settings
   4. Divergent Boundaries & Passive Margins (e.g., Red Sea, Atlantic)
   5. Transform Boundaries (e.g., San Andreas, New Zealand)
   6. Convergent Boundaries (e.g., Andes, Aleutians, SW Pacific)
   7. Collision & Orogeny (e.g., Alpine-Himalayan Belt & Demise of NeoTethys)

III. Plate reconstructions
   8. In 3D
   9. In 4D (linking mantle tomography with surface deformation)

IV. Climate & Tectonics
   10. Critical Taper Wedges

GRADING:

40% Problem Sets & Weekly Activities (~1 per week)
35% Paper
15% Talk
10% Participation

PROBLEM SETS:

- Problem sets are due before the start of Friday discussion. We will then review & discuss the problems (be sure to bring questions) during the discussion. If you would like, you can then submit a self-review before the start of class on the following Monday.
- Your work should be explained clearly and presented systematically.
- All calculations should be shown and thoroughly explained.
- Grading will focus on your approach and thought process.

PAPER:

Topic: The paper is on a topic in tectonics of your choice. You are free to discuss ideas with me or ask for suggestions. Use this as an opportunity to follow a question that piques your curiosity, learn more about an interesting area, technique, process, or interval of Earth history. If you are doing a research project, this is a chance to read papers that are related to your work that you need to read but somehow never get to

Approach: The paper should be motivated by a question. That question can be focused on a specific tectonic setting or location (e.g., what is the tectonic history of the Oman ophiolite?), process (e.g., how are ophiolites obducted and what are examples of each type of obduction mechanism), or problem (e.g., do ophiolites form in mid-ocean ridge or suprasubduction settings, or both?). You can write a review paper, synthesize data to investigate a question, or conduct your own calculations/analysis.

References: You must read and synthesize a large number of papers (e.g., at least 30) from the primary research literature.
Figures: are required, with your own captions.
Format: Standard journal article (Title, Abstract, Introduction, Background, "Results" (i.e., observations drawn from literature), Discussion (i.e., your comments on those observations), Conclusions, References (GSA format), Figures with Captions.
Length: no more than 10 pages, double-spaced, not including figures, tables, or references. Feel free to include supplemental material to support your work, if needed. Include continuous line numbers (in MS word: format > document > layout > line numbers > continuous).
Due Dates: Components of the paper are due at intermediate times in the quarter (via email as a PDF to me by 10 AM start of class).

- 4/10 proposed paper topic (½ page max, with a clear statement of the topic).
- 4/24 organized bibliography (list of papers you plan to work with, sorted into topical threads).
- 5/8 Figures, your captions, and a detailed outline of the paper due.
- 5/22 Complete draft of the paper (all components present).
- 5/29 Final paper submitted. I will then distribute for peer review.
- 6/5 Peer review due.
- 6/8 Revised paper due

TALKS:
During finals week, we will hold a session of talks in standard GSA/AGU format (12 minutes for presentation, 3 minutes for questions/transition). Talks should be in powerpoint or similar format that can be projected and must be sent to me at least 1 hour before the start of the talks.

HONOR CODE:
As is the case for all of your courses, you are expected to follow the UCD Code of Academic Conduct (http://sja.ucdavis.edu/cac.htm).