NEW COURSE PROPOSAL
GEL 3440  Tectonics

1. Course description
3440 GEL  Tectonics. (3-0-3) S-odd-numbered years. This course will evaluate the plate tectonic paradigm in terms of its historical evolution and modern application to understanding earth processes. Focus will be placed on defining the geometric, kinematic, and dynamic framework of the three types of plate boundaries, existing problems with rigid plate theory, and the evidence for the plate tectonic approximation. Field work is required. Prerequisites: GEL 3430 or permission of instructor.

2. Objectives of the Course
The first half of the course will be devoted to analyzing the geometry, kinematics, and dynamics of tectonics on a sphere and the contribution of various Earth science disciplines to the plate tectonic paradigm. The second half of the course will be devoted to the study of major orogenies on Earth including the Himalayan, Alpine, U.S. Cordillera, Andean, western Pacific island arcs, and the San Andreas Fault. The course will be "writing-active" with several brief writing exercises as well as a term paper.

3. Outline of the Course.
Classes will meet three times per week for fifteen weeks for 50 minutes each session.

Week 1  Introduction to plate tectonics and its evolution from continental drift. Each student must research a journal article that describes a pre-plate tectonic hypothesis for the evolution of the Earth. Students must present the results of their readings to the class in discussion format. Students will also write a short review of the paper.

Week 2  Continued history of plate tectonics. Synopsis of various theories such as flat Earth, round Earth; expanding; contracting; fixists to mobilists and the final "birth" of the modern plate tectonic theory. Students will be grouped to defend or refute the theory of plate tectonics. Students choose term paper topic. Problem handout.

Week 3/4  Sea-floor spreading; marine geology and geophysics, paleomagnetism. Students will discuss and reply to questions posed in class. Students' replies will be oral and written.


Week 6  Spherical tectonics: triple junction migration - an example from the western United States. Students will discuss and reply to questions posed in class. Students' replies will be oral and written. Problem handout.

Week 7/8  Convergent margins: subduction zones and magmatic/volcanic arcs. Students will discuss and reply to questions posed in class. Students' replies will be oral and written.

Week 8/9  Convergent margins: subduction zones and continental collisions.

Week 10  Continental rifting and extensional tectonics. Problem handout.

Week 11  Problems with the paradigm; intraplate tectonics.

Week 12  Plate tectonics and its connection to the mantle.

Week 13  Student presentation of term research papers as oral presentation or poster presentation.

Week 14  Summary - the plate tectonic approximation.

Week 15  Extraterrestrial plate tectonics.

Grading: Problem sets 15%
Discussion and replies 15%
Research Paper 30%
Field trip 10%
Midterm examination 10%
Final Examination 20%

4. Implementation
(a) All faculty members of the Department of Geology/Geography who are qualified may teach this course.
(b) Students may be required to duplicate articles, provide transportation to the field, and prepare posters.
   Supplementary material: Additional papers will be on reserve in the instructor's office; from a master list of
   74 articles, 11 will be required reading. They are listed separately. The additional articles are for
   background information for the students as well as possible primary sources for their term papers.
(d) This course will be first offered: Fall, 2002.

5. Rationale
   (a) This course will enhance the student's background in the central idea in geology. Student's critical thinking
   skills will also be enhanced during the discussion and oral reply as well as their written work.
   (b) The course is designed for students at the junior or senior level in the Department of Geology/Geography.
   The prerequisite structural geology (GEL 3430) ensures a solid background and good analytical skills.
   (c) There are no similar courses in the University and this course will not affect existing programs in other
   departments; therefore no courses need to be modified or deleted.
   (d) This course will be an elective for the Geology (GEL) major.

6. Community College Transfer
   Transfer credit from a community college will not be accepted.

7. Date approved by the department 12-8-00

8. Date approved by the College of Sciences curriculum committee 1-26-01

9. Date approved by CAA 2-15-01