Syllabus: GEOL 601 / GGS 657: The Lithosphere – Fall 2020

Instructor: Dr. Paul Betka
Email: pbetka@gmu.edu
Office hours: virtual, by appointment

Class meetings will be held via Zoom: MW 9-10:15a.

Required Textbook: Global Tectonics, 3rd edition. Kearey, Klepeis, and Vine
Recommended textbooks: Any introductory physical geology text will be a helpful reference.

Course Description: An introduction to global tectonics with an emphasis on lithospheric processes at active plate margins.

Course Objectives: The surface of the planet we live on has been shaped by global tectonics for most of its ~4.6 billion-year history. The Lithosphere (rock-sphere), Earth's outermost shell, presently comprises 7 major tectonic plates and numerous smaller plates. Movement of these plates results in their formation, accretion, deformation, and destruction at active plate margins. This graduate course will cover the structure and composition of the lithosphere, mechanisms and driving forces for plate tectonics, and the processes that occur at different types of plate margins. The class will proceed by a combination of instructor-led lectures and student-led discussions and presentations. By the end of this course students will have some in-depth understanding of 1) global tectonics and lithospheric processes at various plate margins, 2) the implications of plate tectonics for society and global climate, 3) how to distill scientific literature into short presentations and lead scientific discussions.

Assessment: The final grade for this class will be a combination of problem sets, discussion questions, a discussion lead, and a final project with a presentation and peer review.

Problem sets (4)……..…….……..20%
Discussion questions (7)……..…….30%
Discussion lead (1)……..…..……20%
Final Project (1)……..……30%

Grade scale:
A+ = 97 - 100%, A = 94 – 97%, A- = 90 – 94%, B+ = 87 – 90%, B = 84 - 87%, B- = 80 - 84%, C+ = 77 - 80%, C = 74 - 77%, C- = 70-74%, D = 60 - 70%, F = 0 - 60%
Please note: Late work will <u>not</u> be accepted, no extra credit.

DISABILITIES: Students with disabilities or medical conditions that affect classroom performance should contact GMU Disability Support Services immediately at 993-2474. NOTE: Students will not receive any disability accommodations unless official GMU paperwork from Disability Resource Office is provided for and signed by Dr. Paul Betka.

HONOR CODE: Adherence to the GMU honor code is expected of all students. Lab exercises are expected to be individual efforts, unless teams are specifically assigned. Students are encouraged to discuss the concepts and procedures among themselves, but each student is expected to complete the lab assignment individually using their own words.

To promote a stronger sense of mutual responsibility, respect, trust, and fairness among all members of the George Mason University Community and with the desire for greater academic and personal achievement, we, the student members of the university community, have set forth this Honor Code: Student Members of the George Mason University community pledge not to cheat, plagiarize, steal, or lie in matters related to academic work.
[http://academicintegrity.gmu.edu/honorcode]

Week	Monday	Wednesday	Assigned Reading	Homework
1: Aug. 24, 26	Syllabus, assign projects. **Lect. 1.** Introduction to plate tectonics	**Lect. 2.** General structure of Earth	Ch. 1	Select projects, due: Sept. 2
2: Aug. 31, Sept. 2	**Lect. 3.** Earthquake seismology and velocity structure of earth	**Lect. 4.** Composition of crust, mantle and core,	Ch; 2.1-2.2; 2.3-2.9	Exercise 1: Due Sept. 9
3: Sept. 7, 9	**Labor Day Holiday**	**Lect. 5.** Rheology	Ch. 2.3-2.9	
4: Sept. 14, 16	**Lect. 6.** Isostacy, lithosphere and asthenosphere, heat flow	**Lect. 7.** Continental drift and Sea floor spreading	Ch. 2.10-2.13; 3, 4;	Exercise 2: Due Sept. 23
5: Sept. 21, 23	**Lect. 8.** Plate tectonics framework	**Lect. 9.** Ocean ridges	Ch. 5, 6	Exercise 3: Due Sept. 30
6: Sept. 28, 30	**Discussion 1:** Ocean ridges **-Rutledge**	**Lect. 10**. Continental Rifts	Ch. 7	Discussion questions
7: Oct. 5, 7	**Discussion 2:** Continental Rifts **- Glass**	**Lect. 11.** Continental transforms and strike-slip faults	Ch. 8	Discussion questions
8: Oct. 13, 14	**Monday, Fall Break; class meets Tuesday, 13th: Discussion 3:** Continental transforms and strike-slip faults **- Njocke**	**Lect. 12.** Subduction zones	Ch. 9	Exercise 4: Due Oct. 28. Discussion questions
9: Oct 19, 21	**Discussion 4:** Subduction zones **- Matthews**	**Lect. 13:** Orogenic belts	Ch. 10	Discussion questions
10: Oct. 26, 28	**Discussion 5:** Orogenic belts **- Kulenguski**	**Lect. 14:** Precambrian tectonics and supercontinents	Ch. 11	Discussion questions
11: Nov. 2, 4	**Discussion 6:** Precambrian tectonics and supercontinents **- Cherry**	**Lect. 15:** Implications of plate tectonics	Ch. 13	Discussion questions
12: Nov. 9, 11	**Discussion 7a:** Implications: Economic - **Hueper**	**Discussion 7b:** Implications: Climate - **Makkaroon**	Ch. 13	Discussion questions. **Review draft due Nov 9.**
13: Nov. 16, 18	**Lect. 16:** Mechanisms of plate tectonics	**Discussion 8:** Mechanisms of plate tectonics **- Sun**	Ch. 12	**Peer Review Due Nov. 16**
14: Nov. 23, 25	**TERM PAPERS DUE**	**Thanksgiving Holiday**		
15: Nov 30, 2	**Final Presentations 1**	**Final Presentations 2**		