

Geology and Geophysics 620 – Geodynamics

Instructor: Dr. Jeff Freymueller
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Office Hours: By appointment

Class Hours: 15:40 - 17:10 TTh

Location: 306 NSF

Textbook:
Turcotte and Schubert, 2002, Geodynamics 2nd edition, Cambridge, 456 p.

Supplementary Texts (on reserve in library):
Scholz, 2002, The Mechanics of Earthquakes and Faulting, Cambridge, 471 p.
Watts, 2001, Isostasy and Flexure of the Lithosphere, Cambridge, 458 p.

Course Objectives;

Grading: 80% problem sets (due 1 week after hand out)
20% take home final

Lecture Schedule

Reading Assignments

September

	Reading on your own	Chapter 1
T 05	1. Stress; concept of a continuum; Description of stress: tensor	2-1 to 2-5
Th 07	2. Mathematical tools: vectors, Tensors, Einstein notation, coordinate systems, sign conventions, rotations	Set #1
T 12	NO CLASS	Finish Chapter 1
Th 14	3. Pressure/Stress/Strain; Principal stresses/strains;	2-6 to 2-8
T 19	4. Continuity and compatibility relations	Set #2
Th 21	5. Linear Elasticity	3-1 to 3-8
T 26	6. Types of non-elastic behavior; State of Stress within the earth;	7-1 to 7-4
Th 28	7. Strength of earth materials – “jelly sandwich” or “crème brulee”	Set #3 7-6, 7-10 to 7-12

October

T 03	8. Friction, Fault processes	Chapter 8 & Scholz
Th 06	9. Fault processes II, creep	

09/14/2006; version 1

T 10	10. (sub) Plate Flexure		3-9 to 3-13
Th 12	11. (sub) Flexure, loading/unloading Basins, subduction zones	Set #4	3-14 to 3-18
T 17	12. (sub) Flexure III		
Th 19	13. (sub) Mountain-building; Critical Taper of Accretionary Prisms		Davis et al (1983)
T 24	14. Flow of a Newtonian viscous fluid; Power-law fluid flow	Set #5	6-1 to 6-6
Th 26	15. Navier-Stokes equation; Stream function		6-7 to 6-9
T 31	16. Diapirism, folding, Stokes Flow	Set #6	6-12 to 6-15

November

Th 02	NO CLASS		
T 07	17. Love's Problem; Global-scale loading		
Th 09	18. Post-glacial Rebound I	Set #7	
T 14	19. Post-glacial rebound II		
Th 16	20. Correspondence Principle		
T 21	21. TBD		
Th 23	NO CLASS – Happy Thanksgiving!		
T 28	22. Ice Flow I		
Th 30	23. Ice Flow II	Set #8	

December

T 05	24. Porous Flow I		9-1 to 9-6
Th 07	25. Porous Flow II		9-7 to 9-11

Hand out take-home Final Exam due 18 December (Monday after AGU)