SIOG225_FA	23_A00 > Syllabus		107 10		6d Studen
Fall 2023	SIOG 225 - F	Physics of Earth Materials - Fia	alko [FA Jump	p to Today	Course Status
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Syllabus					• Published
Modules Ø					⑦ Import Existing Content
Assignments	An introduction to t	💋 Add TAs			
Grades	and viscoelasticity , Prerequisite: some f	Course Start Che			
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LockDown	Instructor: <u>Yuri Fialk</u>	0 40 50	© Choose Home Pa		
Academic Support	AM, 303 IGPP - Mu	nits, letter grade or S/O grade,nomework, final nk Conference Room	exam.1 Ime: Mon Wed Fri, 10:0	00-10:50	L View Course Stre
Academic Integrity	Office hours: MWF	11 am - 12 pm			다 New Announcem
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Files					< September 202
Pages Ø	Date	Торіс	Reading/Homework	Lecturer	27 28 29 30 31
Outcomes Ø	20 SED	Introduction	Read: Class notes; Segall,	VE	3 4 5 0 7 10 11 12 13 14 17 18 10 20 21
Collaborations Ø	Z/ JLr		Origins (pp xvii-xxi); Malvern, Chapter 1		24 25 26 27 28
Library Resources	02 OCT	Vectors and scalars	Read: Notes	YF	1 2 3 4 5
Settings	04 OCT	Tensors	Read: Notes	YF	weighted.
	06 OCT	Elements of tensor algebra	Homework 1 Read: Notes	YF	
	09 OCT	Elements of tensor calculus: Differentiation	Read: Notes	YF	
		Elements of tensor calculus: Integration	Read:Malvern, Chapter 2	YF	
	13 OCT	Coordinate transformations	Read: Notes	YF	
	16 OCT	Deformation and rigid body motion	Read: <u>notes</u> ; Malvern, Chapter	YF	
			2		
	Stress and strain; Conservation laws				
	18 OCT	Strain and rotation	Read:class notes; <i>Ranalli Ch.</i> 1.4-1.6	YF	
	20 OCT	Conservation of mass and the continuity	Roadi Notos	YF	
	23 OCT	Conservation of linear momentum	Read: Notes	VE	
			Read: Notes		
	25 001	Stress; Principal axes and principal values	Read: Notes	YF	
	27 OCT	Equilibrium equations	Homework 3	YF	
	30 OCT	Conservation of energy	Read: Ranalli, Ch. 2; Malvern, 3.2-3.3; Class notes	YF	
	Failure				
	01 NOV	Anderson's faulting theory	Read: Suppe, pp. 289-294	YF	
	03 NOV	Rate and state friction	Read: Class notes Homework 4	YF	
	Elasticity				
	06 NOV	Generalized Hooke's Law	Read: Malvern Ch. 6.1-6.2	YF	
	08 NOV	Generalized Hooke's Law cont'd Compatibility equations	Read: Notes	YF	
	10 NOV	No class: Veteran's Day holiday			
	13 NOV	Linear elastic solutions for homogeneous			
	15 NOV	deformation Navier-Cauchy equations of motion	Read: Malvern Ch. 8.1-8.2 Read: Malvern Ch. 8.3-8.4	YF	
	17 NOV	Waves in elastic media	Read: Class notes Homework 5	YF	
	20 NOV	Theory of dislocations	Read: Class notes	YF	
	22 NOV	Stress concentration; Brittle failure; Elements of fracture mechanics	Read: Class notes	YF	
	24 NOV	No class: Thanksgiving Holiday			
	Γιυια mechanics		Homework 6		
	27 NOV	Navier-Stokes equations	Read: notes: Malvern Ch. 7.1	YF	
	29 NOV	Poiseuille flows	7.4	YF	
	01 DEC	Some analytic solutions: Stokes flow	Read:Class notes Homework 7	YF	
	04 DEC Viscoelasticity and	magma flow)	Read:Class notes	YF	
	plasticity	Constitutive equations for the barrier in	Dood: Donalli Ch. 4.4. Ch		
	06 DEC	standard linear solids	notes	YF	
	08 DEC	Deformation of rocks in the ductile regime; Power-law rheology; Dislocation and	Read: Class notes	YF	
		diffusion creep			
	15 DEC	Final exam	08:00-11:00 am		
	1				

SIO 225 SUGGESTED BOOKS (some on reserve at SIO Library):

Textbooks:

Earthquake and Volcano Deformation, P. Segall, Princeton University Press, 458 pp., 2010.

Introduction to the mechanics of a continuous medium, L. E. Malvern, Prentice-Hall, Englewood Cliffs, NJ, 1969.

Reference Books:

Rheology of the Earth. Deformation and flow processes in geophysics and geodynamics Ranalli, G., Allen & Unwin, Boston, MA, 1986.

Theory of Elasticity, Landau, L., and E. Lifshitz, Oxford University Press, 1986; (Chapters 1, 3)

Principles of structural geology, J. Suppe, Prentice-Hall, Englewood Cliffs, NJ, 1985.

An introduction to fluid dynamics, Batchelor, G.K., Cambridge University Press

Course Summary:

Date	Details	Due
Fri Oct 13, 2023	homework 1	due by 11:59pm
Fri Oct 20, 2023	🖻 homework 2	due by 11:59pm
Fri Nov 3, 2023	🖻 homework 3	due by 11:59pm
Mon Nov 13, 2023	homework 4	due by 11:59pm
Fri Nov 24, 2023	🖻 homework 5	due by 11:59pm
Mon Dec 4, 2023	🖻 homework 6	due by 11:59pm
Mon Dec 11, 2023	homework 7	due by 11:59pm
	📴 final exam	