GEOLOGY 291 - STRUCTURAL GEOLOGY
FALL, 2011

SYLLABUS

GENERAL INFORMATION

Location: Beneski Building Room 303 (Min/Pet Room)

Lectures (attendance mandatory) MWF 11:00 am / Lab (attendance mandatory) M 1:30-5:30 pm

Instructor: Tekla Harms, Beneski Room 320, taharms@amherst.edu

Text: *Structural Geology* - by Haakon Fossen, Cambridge University Press, NY, 2010
Structural Geology of Rocks and Regions, Second Edition – by Davis & Reynolds, John Wiley & Sons, NY, 1996
Both are available on reserve in Keefe Science Library and in Room 303
Additional sources: Alternative structural geology texts are available in Room 303

Grading:	2 Within-term exams	15% each
	Final exam (3 hr take home during finals period)	30%
	Labs	30%
	Field Trip	10%

FIELD TRIP

One all-day field trip is scheduled as an integral and required part of this course:
Sunday, October 30 - Hudson Valley thrust belt, Catskill, New York

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GEOLOGY 291

LAB EQUIPMENT: (To be brought to every lab)

Personal gear:
sunscreen
rain gear, warm clothing
boots or other sturdy footwear. (No sandals or ugg boots, ever)
water

Field gear: (available for purchase in Department Office)
pocket sized, bound notebook

Field & Lab Geek Pack:
2 sharp (preferably mechanical) pencils
eraser
6" ruler
protractor
colored pencils – at least 6 different colors
clipboard

Lab Supplies:
pad of graph paper (10 boxes to the inch)
one 8.5 x 11" piece of cardboard

DATE	LECTURE SCHEDULE	READING
Sept. 7 – W(=M)	Introduction to Structural Geology	HF-Chapter 1
Sept. 9 - F	Primary sedimentary and igneous structures	D&R-p. 656-662
Sept. 12 - M	Contacts; the geologic unit; geometrical measurements	D&R-p. 645-655
Sept. 14 - W	Folds I: Fold types and their description	HF-Chapter 11
Sept. 16 - F	Folded and tilted beds on maps	
Sept. 19 - M	Folds II: How do folds form?	
Sept. 21 - W	How do rocks flow?	HF-Chapter 10
Sept. 23 - F	Folds III: Fold related structures	HF-Chapters 12 and 14
Sept. 26 - M	Introduction to the stereonet	D&R-p. 691-720; Chapter 7, p. 389-391
Sept. 28 - W	More stereonets	HF-Appendix B
Sept. 30 - F	Fabrics I: Fabric types and their description	HF-Chapters 12 and 13; D&R p. 424-479
	EXAM I - WEEK OF OCT 3 TO OCT 7 - COVERS SEPT 7 TO SEPT 28	
Oct. 3 - M	Fabrics II: More on fabric	HF-Chapter 21
Oct. 5 - W	Strain I: Introduction to strain; translation, rotation & shear	HF-Chapter 2
Oct. 7 - F	Strain II: The strain ellipse	
Oct. 10 - M	**MID SEMESTER BREAK**	
Oct. 12 - W	Strain III: Pure and simple shear; subsimple shear	
Oct. 14 - F	Strain IV: Strain analysis	HF-Chapter 3
Oct. 17 - M	Strain V: 3D Strain & Progressive deformation	
Oct. 19 - W	Fault geometries	HF-Chapter 8
Oct. 21 - F	Thrust fault geometries	HF-Chapter 16
Oct. 24 - M	Thrust faults in map and cross section	
Oct. 26 - W	Thrust belts	
Oct. 28 - F	Balancing cross sections	HF-Chapter 20
	******** FIELD TRIP SUNDAY, OCTOBER 30 ********	

DATE	LECTURE SCHEDULE	READING
	EXAM II - WEEK OF OCT 31 TO NOV 4 - COVERS SEPT 30 TO OCT 28	
Oct. 31 - M	Reverse faults	
Nov. 2 - W	Normal faults	HF-Chapter 17
Nov. 4 - F	Tectonic setting of normal faults	
Nov. 7 - M	Low angle normal faults; collapse structures	HF-Chapter 19
Nov. 9 - W	Strike-slip faults	HF-Chapter 18
Nov. 11 - F	Transpression and transtension	
Nov. 14 - M	Tectonic setting of strike-slip faults	
Nov. 16 - W	Ductile faults; shear zones	HF-Chapter 15
Nov. 18 - F	Introduction to stress, dynamics, and rock mechanics	
Nov. 21 - Nov. 25	**THANKSGIVING VACATION**	
Nov. 28 - M	Strain and stress; rheologies; elastic deformation	HF-Chapter 6
Nov. 30 - W	Ductile rheology; brittle rheology; strength of rocks	
Dec. 2 - F	Stress in the earth; stress on a plane	HF-Chapters 4 and 5
Dec. 5 - M	Mohr circle for stress	HF-Chapter 7
Dec. 7 - W	The Mohr circle and Coulomb envelope	
Dec. 9 - F	Conjugates and the Anderson model of faults	HF-Chapter 9
Dec. 12 - M	Stress fields	
Dec. 14 – W	Fractures, joints , and dikes	

FINAL EXAM – DEC 16 TO DEC 22 – COVERS NOV 4 TO DEC 14 IN PART A; WHOLE COURSE IN PART B

DATE	LECTURE SCHEDULE	READING
Sept. 7 – W(=M)	Introduction to Structural Geology	Chapter 1, p.2-37
Sept. 9 - F	Primary sedimentary and igneous structures	Part IIIC, p. 656-662
Sept. 12 - M	Contacts; the geologic unit; geometrical measurements	Part IIIB, p. 645-655
Sept. 14 - W	Folds I: Fold types and their description	Chapter 7, p. 372-388; p. 391-423
Sept. 16 - F	Folded and tilted beds on maps	
Sept. 19 - M	Folds II: How do folds form?	
Sept. 21 - W	How do rocks flow?	Chapter 4, p. 150-189; p. 199-202
Sept. 23 - F	Folds III: Fold related structures	
Sept. 26 - M	Introduction to the stereonet	Part IIIH, p. 691-720; Chapter 7, p. 389-391
Sept. 28 - W	More stereonets	
Sept. 30 - F	Fabrics I: Fabric types and their description	Chapter 8, p. 424-472; p. 476-492
	EXAM I - WEEK OF OCT 3 TO OCT 7 - COVERS SEPT 7 TO SEPT 28	
Oct. 3 - M	Fabrics II: More on fabric	
Oct. 5 - W	Strain I: Introduction to strain; translation, rotation & shear	Chapter 2, p. 38-97
Oct. 7 - F	Strain II: The strain ellipse	
Oct. 10 - M	**MID SEMESTER BREAK**	
Oct. 12 - W	Strain III: Pure and simple shear; subsimple shear	
Oct. 14 - F	Strain IV: Strain analysis	
Oct. 17 - M	Strain V: 3D Strain & Progressive deformation	
Oct. 19 - W	Fault geometries	Chapter 6, p. 269-303
Oct. 21 - F	Thrust fault geometries	Chapter 6, p. 319-339; Chapter 7, p. 414-416
Oct. 24 - M	Thrust faults in map and cross section	
Oct. 26 - W	Thrust belts	
Oct. 28 - F	Balancing cross sections	
	******** FIELD TRIP SUNDAY, OCTOBER 30 ********	

DATE	LECTURE SCHEDULE	READING
	EXAM II - WEEK OF OCT 31 TO NOV 4 - COVERS SEPT 30 TO OCT 28	
Oct. 31 - M	Reverse faults	Chapter 6, p. 315-317
Nov. 2 - W	Normal faults	Chapter 6, p. 340-357
Nov. 4 - F	Tectonic setting of normal faults	
Nov. 7 - M	Low angle normal faults; collapse structures	
Nov. 9 - W	Strike-slip faults	Chapter 6, p. 357-371
Nov. 11 - F	Transpression and transtension	
Nov. 14 - M	Tectonic setting of strike-slip faults	
Nov. 16 - W	Ductile faults; shear zones	Chapter 9, p. 493-563
Nov. 18 - F	Introduction to stress, dynamics, and rock mechanics	Chapter 3, p. 98-141
Nov. 21 - Nov. 25	**THANKSGIVING VACATION**	
Nov. 28 - M	Strain and stress; rheologies; elastic deformation	Chapter 3, p. 142-149
Nov. 30 - W	Ductile rheology; brittle rheology; strength of rocks	
Dec. 32 - F	Stress in the earth; stress on a plane	
Dec. 5 - M	Mohr circle for stress	Chapter 5, p. 226-249
Dec. 7 - W	The Mohr circle and Coulomb envelope	
Dec. 9 - F	Conjugates and the Anderson model of faults	Chapter 6, p. 304-319
Dec. 12 - M	Stress fields	
Dec. 14 – W	Fractures, joints , and dikes	Chapter 5, p. 204-226; p 249-268

FINAL EXAM – DEC 16 TO DEC 22 – COVERS NOV 4 TO DEC 14 IN PART A; WHOLE COURSE IN PART B