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GEO 315.01: Structural Geology

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Structural Geology

GEO 315; 4 credits; Autumn, 2020

Instructor: Jim Sears, X 5251; CHCB 362, james.sears@umontana.edu

Office Hours: 10-11 AM MWF

Content: Structures of deformed rocks; field measurements and mapping, graphical interpretation of structural problems; mechanical principles; tectonic principles. We will take advantage of the superb structural setting of our campus in the western Montana Rockies to gain first-hand understanding of structural and tectonic principles.

Three lecture hours per week plus 3-4 lab hours per week.

During the first part of the course, we will take a field trip each Thursday. Students will keep detailed field notes (**using a bound, weatherproof field book**) for recording structural measurements and field observations. We will analyze field measurements using various methods, including stereo net plotting and structural cross-section construction. We will begin our field trips examining near-surface rocks structures, and week by week, proceed to deeper structural levels.

During the second part of the course we will investigate quantitative aspects of rock strength and deformation in detail, and study geophysical measurements of structures. We will augment classroom lectures and readings with lab exercises.

Recommended Textbook: Davis, Reynolds, and Kluth, 2012, Structural Geology of Rocks and Regions, 3rd ed., Wiley. Additional readings as assigned. Many resources will be posted on Moodle.

Assessment:

Field trips and assignments	40 points
Lab assignments	20 points
Take home final part 1	20 points
Take home final part 2	20 points
TOTAL	100 points

Covid Safety Precautions:

- Stay home if you feel sick and/or if exhibiting COVID-19 symptoms
- Mask use is required within the classroom
- Clean your personal work space when you arrive and before you leave class
- Class attendance will be recorded to support contact tracing efforts
- This class is being recorded for students who cannot attend in person
- For more information:
 - UM Coronavirus Website: <https://www.umt.edu/coronavirus>
 - UM COVID-19 Fall 2020 website: <https://www.umt.edu/coronavirus/fall2020.php>

Approximate schedule:

Week of	Lectures (MWF)	Field trip/lab (Thursdays) ◊Travel in bus
Aug 19	Introduction	
Aug 24	Kinematic elements	◊ Rainbow Bend (Fabrics, Geo Map)
Aug 31	Stereonets	Ridge Trail (Planes & Lines)
Sep 7	Thrust belts	Hellgate Canyon (Joints)
Sep 14	Balanced cross-sections	◊ Bonner (Shear fabrics, Geo Map)
Sep 21	Balanced cross-sections	Greenough Park (Traverse)
Oct 5	Balanced cross-sections	◊ Snowbowl Road (Strain)
Oct 12	Metamorphic rocks	M Trail (Tectonic geomorph)
Oct 19	Extensional systems	◊ North Hills (map fault)
Oct 26	Strain	Strain measurement
Nov 2	Force, stress, and strength	Mohr diagram
Nov 9	Brittle failure	Mohr diagram
Nov 16	Brittle failure	Take home final Part 1
Nov 26	Plastic failure	Take home final Part 3
Nov 25	Take home final due by 10 am	

Learning outcomes: Students will learn to describe, measure, map, graph, and analyze geologic structures of deformed rocks. They will learn mechanical principles of rock deformation.

The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students. If you think you may have a disability adversely affecting your academic performance, and you have not already registered with Disability Services, please contact Disability Services in Lommasson Center 154 or 406.243.2243. I will work with you and Disability Services to provide an appropriate modification.