**GY 315** **Structural Geology** Colorado College

COURSE PHILOSOPHY: Structural geology is the study of deformation of Earth's crust. Deformation creates extraordinary geometrical forms—structures-- in rock, over a full range of scales from molecule to mountain belt. Structures of interest include faults, folds, fractures, slickensides, and shear zones. This course focuses on ways to recognize and characterize structures—as individual entities, and as components of regional scale structural systems—beginning with the fundamentals of geometrical description. Geometrical description entails compass measurement of planar and linear elements within the structural forms, performed in local field settings along the Colorado Front Range. From this basis of field observation of geological structures in nature, the course progresses to higher levels of interpretation. The descriptive, geometrical characteristics of structures provide the means to interpret the crustal movements that brought about deformation (kinematics), and to determine the configuration of tectonic stresses responsible for deformation (dynamics), which originate from plate tectonic boundaries. Put another way, the aim of structural interpretation is to understand and quantify strain and stress (an appropriate focus for a course taught under the *block plan*!).

Understanding of structural geology is of great practical and conceptual value. Developing an eye for bedrock trends and typical structural geometries gives geologists vast predictive power when they undertake geological field investigations—particularly when the focus of study is not strictly "structural," at all (e.g. the K-T boundary; an economic ore deposit; the distribution of Cambrian sedimentary rocks in Antarctica)! Specific geometrical forms and orientations bespeak the mechanical properties of the rocks involved in deformation, and from them we can learn about the physical conditions of formation and deformation of the rocks in virtually any Earth environment (not limited to Earth's surface). And finally, familiarity with structural geology reveals the deep inner beauty of mountain belts that arises from profound plate tectonic movements. To see beneath the surface landforms is to gain understanding of dynamic character and evolution of Earth.

**Instructor:** Christine Siddoway

**Syllabus**: Changes from year to year depending on the emphasis of field projects and the time of year that the course is taught.

**Required Text**: Earth Structure: an Introduction to Structural Geology and Tectonics, *by* Ben van der Pluijm and Steve Marshak

**Lab Manual:** Structural Analysis and Synthesis, by Rowland, Duebendorfer and Schiefelbein

**Alternative text resources for laboratory and field methods** in structural geology are available in the classroom. Texts are Davis (Davis); Davis and Reynolds (**DR**);, and Marshak and Mitra (**MM**). An Introduction to Structural Methods, by R. Burger and T. Harms (**BH**) is on CD-ROM. Our department owns multiple copies of Davis and of the BH CD-ROM, for your use. Using a variety of resources will help you become proficient in structural analysis techniques!

**Required items:** Calculator, straight-edge ruler / protractor, 0.5 mm mechanical pencil with 2H lead or higher, colored pencils, technical pens (.01 and .005; Micron brand recommended), acid bottle containing dilute HCl, field notebook (hardcover) and map board. Topographic map reading and locating ability.