# Structural Geology

Elastic Rebound Theory:
Stress and Strain:

The Elastic Limit: Stress>Strain

Brittle and Ductile Behavior in Rocks:

When does Brittle behavior occur? Brittle behavior results in _____.

When does ductile occur? Ductile behavior results in _____.

| Stress: | Strain: |
|---|---|
| 1) Compressive>>> | Shortening |
| 2) Extensional or Tensional>>> | Stretching |
| 3) Shear>>> | Sliding past |

Deformation occurs in rocks that undergo stress. Types of deformation:
1) Displacement: change in location
2) Rotation: change in orientation
3) Distortion: change in shape

Undeformed vs. Deformed

One of the most common forms of deformation is through plate tectonic processes, and involves the formation and building of mountains, called **orogenesis**.

Mountains can exhibit:

| | | | |
|---|---|---|---|
| Deformation | Jointing | Faulting | Foliation and Metamorphism |
| Folding | Igneous Rocks | Uplift | Erosion and Sedimentation |

Constructive processes build mountains up…Active Tectonics
Destructive processes tear mountains down…Weathering and Erosion

Young mountains are jagged and growing, middle-aged are being eroded, and old age are eroded remnants.

The “attitude” of rocks:

Strike

Dip

These parameters are used on **geologic maps**, special maps that show the types of rock exposed in a geographical area.

They are also used in the construction of **geologic cross-sections**, which represent a vertical slice through a portion of the Earth.

## Folding

Folding occurs when the rock behaves in a ductile fashion (typically far below the surface).

1) Anticlines:

2) Synclines:

3) Monocline

4) Excessive Stress Folds:

   a) Asymmetrical

   b) Overturned

   c) Recumbent

   d) Hairpin or Isoclinal

Other Fun Terminology:
Plunge of the Fold:

Pitch of the Fold:

**Other Special Structural Folds: Domes and Basins**
1) Dome

2) Basin

**Brittle Behavior**

Fractures in the rock are called joints.
*>No movement has taken place on these features.*

Typically joints occur in joint sets. Conjugate Joints and Lift Joints.

Veins will frequently form where fluids fill in these cracks.

**Faulting**
Faulting occurs when rock behaves in a brittle fashion (typically near the surface).

1) Dip Slip Faults

a) Normal (or detachment)

b) Reverse (or Thrust)

Horst and Graben Topography

2) Strike-slip

a) Left Lateral

b) Right Lateral

Oblique Slip Faults

Faulting can occur at all scales…a few centimeters or many miles.