

## Study Exam 1 and 2- all aspects.

Know how to calculate slope and read basic topographic lines.

### Endogenic and Exogenic processes – re-read p. 253 Part III Earth Atmosphere Interface

Endogenic processes (internal driven) Exogenic processes (external driven)

### Chapter 8 Dynamic Planet

What major elements make up the earth's crust?

UPPER MOST MANTLE + CRUST = LITHOSPHERE

ATHENOSPHERE –What is it?

CONTINENTAL crust vs OCEANIC crust What? Where? Why?

**Extrusive rock;** from lava (i.e. molten rock exposed at the surface); fast cooling; volcano eruptions; lava flows on surface.

**Intrusive rock;** from magma (i.e. molten rock NOT exposed to surface); slow cooling; plutons; batholiths, cooled under the surface.

**Building Crust** Vocabulary: craton, shield, (buried) plutons (granite), Volcanic Eruptions (shield volcanoes, composite volcanoes, flood basalts); Sedimentation into large basins or ocean floors, Deformation of the crust  
Orogeny

### Rock cycle-

Read vertically under each of the 3 major rock types

| <u>Igneous</u><br>↓      | <u>Sedimentary</u><br>↓ | <u>Metamorphic</u><br>↓     |
|--------------------------|-------------------------|-----------------------------|
| Intrusive flow = magma   | 1) Clastic type         | heat/ pressure              |
| Extrusive flow = lava    | 2) Chemical             | changes crystal structure   |
| Give Examples            | Give Examples           | Give Examples               |
| Variance in Crystal size | Strata or layers        | foliated texture            |
| Cooling differences      | Cementation             |                             |
| Viscosity differences    | Lithification           | often near plate boundaries |

Δ High viscosity = sticky, stiff lava or magma creating composite volcanoes

^ Low viscosity = more liquid-like and flows easily creating shield volcanoes and flood basalts; like that of the Columbia Plateau.

**Hot spots.** Know how they work, what is an example or two?

### Chapter 9 Tectonic earthquakes and volcanoes

**Plate tectonics.** Be able to name major the plates that have convergent and divergent boundaries. Know where the Juan de Fuca Plate and what is significant about it for us.

What are common features of convergent and divergent boundaries? Subduction zones, **Where? What?**

**Why?** Sea-floor spreading centers, **Where? What? Why?** Transform faulting **Where? What? Why?**

Volcanism? **Where? What? Why?** P. 309 Rifting **Where? What? Why?**

Changes in Major continents over Geologic time; India, Africa, South America, North America (generalization – do not attach time scale to this but understand basic plate movements such as the rifting of Atlantic Ocean resulting from North America diverging from Eurasia.

**Crustal Deformation-** Different forces and pressures that make rock bend/break in different ways.

Ductile Rock v. Brittle rock; importance to landform topography?

## **Orogeny – Mountain building processes and forces**

Folded mountains- Forces involved? Where common? What resulting fault type? P. 299

Fault Block mountains- Forces involved? Where common? What resulting fault type? P. 295-299

Volcanic Mountains- Forces involved? Where they are common? P. 309

## **3 Types of forces and resulting landscapes, fault types, and features p. 290-296**

### **Compression**

Reverse faulting

Folded mountains

Where? What Why?

### **Tension**

Normal Faulting

Fault block mountains

Where? What Why?

### **Shear**

Strike Slip Faulting

not necessarily mountain building

Where? What Why?

All of these can come together in one region due to complexities of nature. But dominant stresses occur in various regions.

## **Earth quakes** Common locations of quake activity; p. 300- 307.

Quake Terminology: Seismic waves

foci

epicenter

asperities p. 306

Liquefaction

land subsidence

Tsunami

P-Waves

S-Waves

How Tsunamis travel and cause disasters (video)

## **Chapter 10 Weathering and Mass Movement**

Terminology: Denudation Geomorphology

### **WEATHERING –**

Jointing is important to all types of weathering. Jointing is initiated by tectonic activity. These joints or cracks are not faults. Faults must be off-set or displaced in a new position. Joints are cracks and important.

All Rocks are unstable at earth's surface due to conditions upon which they were formed and the conditions of the environment they are exposed to. All break down, some more slowly than others.

### **Mechanical /Physical Weathering**

Frost Action

Tree roots

Pressure Joint Release

### **Chemical Weathering Processes**

Oxidation

Hydration/Hydrolysis

Carbonation

Carbonation- Rain dissolves CO<sub>2</sub> Carbon Dioxide creating carbonic acid- a weak natural occurring acid

“Carbonation process” effectively dissolves limestone, dolomite and carbonate cemented sedimentary rock.

Cave formation in sedimentary rock is due to carbonation process.

## **MASS MOVEMENT; weathered materials displaced by erosion transport and deposition**

See figure 10,3 p 335. Rock fall to Creep; note influence of water on mass movements

## **Ch 11. River or Fluvial Landforms; Key Learning concepts and review**

**EROSION** Channel abrasion, hydraulic action, dissolution

**TRANSPORT** suspended load (suspension), saltation, traction of bedload, and dissolved load 11.13

**DEPOSITION** (aggradation the building up of alluvial sediments); Braided rivers. River deltas, sand bars, point bar, alluvial fan

## **Terminology**

Drainage basin                      Drainage divide – highest elevation between watersheds 11.3  
Base-level (local, artificial and ultimate)  
Stream profile 11.18                      floodplains p. 362                      Tributary & Distributaries 11.26 11.27  
Braided Stream 11.4                      Alluvium (Glossary G-1)                      Alluvial Fan 11.25  
Aggraded stream (i.e. aggradation (Glossary G-1))                      Confluence  
Terraces: paired landforms that change with climate cycles & human impact 11.24 a&b  
  
Meanders,                      point bar,                      undercut bank (aka cut-bank) 11.15 11.23  
Incised or degraded channel, entrenched meander 11.19 a degraded stream is the erosion of the channel (deepening) also known as an incised or entrenched stream

## **Glaciers and Landscapes. Chapter 13 pp 410--420 and 428-430.**

### **ALL LECTURE NOTES**

Isostasy regarding glaciers.

Open systems

### **Two basic types of glaciers**

**Alpine:** High elevation regions that flow into rivers or into tidal areas.

Parts of an alpine glacier terminology

accumulation zone,                      firn                      tributary glacier, 13.5a. d.

Ablation zone 13.5b 13.5                      moraines                      crevasses

**Flow of ice-** internal and surface flow, Plastic flow, basal slip, glacial surges. p 416

See extent of Pleistocene Glaciation at 18K fig 13.25

**Erosion-** glacial plucking, abrasion, grinding, gouging, polishing, striations

### ***Landforms created by Alpine Glaciers***

U-shaped glacial valleys, fjord, see 13.12

horns, arêtes, cirques see 13.9 compare with 13.10

### **Continental: 428-430 see all figures and maps**

High to mid Latitude areas depending on climate cycle. See 428 13.24 glacial interglacial cycles over two million years.

Glacial cycles nearly every 100,000 years. Followed by interglacial cycles. Milankovitch Theory regarding the sun-earth relationship.

**Ice domes**, albedo rate changes, **sea level changes**, Isostasy of the landmass

See maps and diagrams of continental glacier p. 429 lobes; domes p. 429; paleo-lakes in Western US p. 430.

Think about positive feedback loops. Think about aquifer recharge in ground water.

### ***Landforms results of continental glaciers: p 421 fig 13.15***

**“Kettle Lakes”**; Example: Minnesota “Land of 1,000 Lakes” – all “Kettle Lakes”;

**“Till”** big dumps of coarse unsorted rocks.

**“Drumlins”** – stream-lined deposits of glacial “till”;

**“Loess”** (aka glacial dust or glacial flour) comes from grinding of rock inside glacier as it moves then released with melt. Silt sized material laid by the wind erosion from the end moraine of a continental glacier. Much of Midwest soils are created in these rich deposits. Also the Palouse Hills of Eastern Washington are also Loess. Video notes from Missoula Floods).

All videos notes since the Exam 2.

