Chapter 8 Geomorphology

Endogenic and Exogenic processes

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

Super-position Uniformitarianism

UPPER MOST MANTLE + CRUST = LITHOSPHERE
ATHENOSPHERE

What major elements make up the earth's crust?

CONTINENT crust vs OCEAN crust

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, dikes, sills etc. cooled under the surface.

Building Crust: craton, shield, sedimentation, Pluton terranes Orogeny
Transform faulting on Ocean floor along plate boundaries

Rock cycle-

Igneous	**Sedimentary**	**Metamorphic**
Intrusive-Plutons-magma	1) Clastic type	heat/ pressure
Examples	Examples	Examples? see text
Extrusive-flow- lava	2) Chemical	
Examples	Examples	
Various form and texture	Strata or layers	foliated texture
Variance in Crystal size	Cementation	Crystals Changed
Viscosity differences	Lithification	
Cooling differences	Examples of Cementing agents??	

High viscosity = sticky, stiff lava or magma creating composite volcanoes
Low viscosity = more liquid and flows easily creating shield volcanoes and flood basalts.

Chapter 9 Tectonic earthquakes and volcanoes

Topography =lay of the land

Plate tectonics: Convergent and Divergent plates, **Where?** What Why?
Subduction zones, **Where?** What? Why?
Sea-floor spreading centers, **Where?** What? Why?
Continental Drift
Hot spot.

Crustal Deformation-
Tectonic activity and landform development and slope

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

Folded mountains
Fault Block mountains
Volcanic Mountains

Where? locations of each type in the US, **What?** form taken? **Why?** causes/forces involved.
3 Types of forces and resulting landscape fault types and features

Compression	**Tension**	**Shear**
Reverse fault	Normal Fault	Strike Slip Fault
Folded mountains	Fault block mountains	not necessarily mountain building
Where? What Why?	Where? What Why?	Where? What Why?

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

Earth quakes Common locations of quake activity
Seismic waves; P Waves; S-waves foci epicenter asperities
Elastic rebound theory

Volcanism Common locations of volcanic activity Where? Why?
Explosive vs effusive landform features, conditions, viscosity and characteristics
Landform features: composite volcanoes, shield volcano, flood basalts, and fissure

Chapters 10, 11, 14

Chapter 10 Weathering and Mass Movement
Terminology: Denudation Geomorphology
WEATHERING –
Jointing is important to all types of weathering. Jointing is initiated by tectonic activity.
Rock is unstable at earth's surface due to conditions upon which they were formed.
Mechanical /Physical Weathering
- Frost Action
- Salt Crystal Growth,
- Tree roots
- Pressure Release

Chemical Weathering Processes
- Oxidation
- Hydration & Hydrolysis
- Carbonation

Carbonation- Rain dissolves Carbon Dioxide CO_2
$H_20 + CO_2 = H_2CO_3$ carbonic acid- a weak natural occurring acid
H_2CO_3 =creates "carbonation process" which
Effectively dissolves limestone, dolomite and carbonate cemented sedimentary rock

Soil formation and the variety of soils are caused by combination of Climate, Organisms Parent material and Time. (CLORPT)
Soil forms in layers called horizons A B C (see video notes)
Cave formation due to carbonation process
MASS MOVEMENT; rearrangement of earth materials by erosion transport and deposition.
Slope Avalanche, debris flow, rockfall (fastest) slides = fast movement of intact blocks

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

ROCK MATERIAL CAN BE ERODED
TRANSPORTED
DEPOSITED
BY WIND WATER ICE
WE ARE ONLY ADDRESSING WATER (RIVERS) AND ICE (GLACIERS)

Drainage basin = Catchment area, Watershed 11.2
Drainage divide – highest elevation between watersheds 11.3
Base-level (local, artificial and ultimate)
Confluence
Stream profile 11.18
Sheet flow
Tributary Distributaries 11.26 11.27
Braided Stream 11.4
Alluvium Alluvial Fan 11.25
Aggraded stream (i.e. aggradation process
Bed-load

Erosion- abrasion, hydraulic action, solution
Transport-, suspended load (suspension), saltation, traction, and dissolved load 11.13
Deposition –aggradation; Braided rivers. River deltas, sand bars, point bar
Active floodplain
Terraces: paired landforms that change with climate cycles& human impact 11..24 a&b
Flow and Channel Characteristics
Meanders, point bar, undercut bank (aka cut-bank) 11.15 11.23

Incised or degraded channel, entrenched meander 11.19
Human impact of dam construction.

Glaciers and Landscapes. Chapter 13 pp 409--422 and 428-430

Isostacy regarding glaciers.
Open systems
Ice covers about 11% of planet.
% of fresh water is tied up as ICE

Two basic types of glaciers

Alpine: High elevation and or high latitude regions. Formation Alpine of glaciers Parts of an alpine glacier: Cirque basin 13.6 , **accumulation** zone 13.5 b, **firn** line, **tributary glacier**, 13.5 **Ablation** zone 13.5b 13.5a lateral moraine, end moraines 13.5a.
***Landforms* of Alpine Glaciers** = fjord, see 13.12 U shaped glacial valleys, horns, moraines arêtes, cirques 13.9 compare with 13.10

Continental: 428-430 see all figures and maps

High to mid Latitude areas depending on climate cycle.
Glacial cycles nearly every 100,000 years. Followed by interglacial cycles. Milankovitch sun-earth relationship.
I**ce domes**, albedo rate changes, **sea level changes**, See maps and diagrams, part of continental glaciers: lobes domes, melt ponds, positive feedback loops.
Landforms of continental glaciers: Kettle lakes, kames, drumlins, eskers, outwash plain, till plain, **loess** (aka glacial dust or glacial flour).

Pluvial Lakes or Paleo-lakes of the American West (Lake Missoula video)
Flow of ice- internal and external , Plastic flow, basal slip, crevasses, glacial surges. P 416
See extent of Pleistocene Glaciation at 18K fig 13.25
Erosion- glacial plucking, abrasion, grinding, gouging, polishing, striations