

**ES322 Geomorphology Mid-Term Study Guide
Fall 2008**

Study Tips

- go through the web site, look at the figures and slide shows, compare to notes
- use study guide in combination with notes
- go back through the in class / lab exercises, make sure you can work the math / units
- spend a couple days studying, the exam will be essay and there is much material.
- don't wait until the last minute!
- carefully go through the notes, some of the material we briefly discussed, but did not spend much time on in class... but the notes will give you the detail
- Exam format: Part 1. Closed book short answer / essay. Part 2. Open-book lab-style problem solving.

Key Words

Introduction

landscape construction

tectonics

landscape destruction

weathering

erosion

denudation

driving mechanisms

climate / solar energy

tectonics / internal

gravity

process rates

Earth Systems

process-response models

Systems

mass and energy flux

equilibrium concept

driving force vs. resisting

framework

force

energy

kinetic energy

potential energy

work

climate controls

insolation

precipitation

temperature

gravity controls

tectonic controls

resisting framework

lithology

rock structure

resistant vs. non-resistant

lithologies

geomorphic thresholds

extrinsic vs. intrinsic

critical angle

Constructional landforms

destructional landforms

exogenic processes

endogenic processes

isostasy

isostatic rebound

crustal uplift / isostasy

rates of crustal uplift

rates of crustal denudation

Quaternary (when ?)

Pleistocene (ages?)

Holocene (ages?)

Weathering

mass transfer

weathering

sediment / grain size

"sediment" vs. rock

erosion

denudation

water molecule

volume expansion

hydrolysis

bedrock

regolith

residuum

colluvium

alluvium

diamicton

eolian

glacial

till

drift

lacustrine

deltal

pedogenesis

O,A,B,C, R

porosity

clay

clay size

clay minerals

joints

faults

permeability

physical weathering

frost wedging

unloading

sheeting

exfoliation

thermal expansion

organic activity

root wedging

salt wedging

clay expansion

thermal expansion

chemical weathering

pH
chelation
hydration
oxidation
ion exchange
solution
parent material
aspect
soil
horizonation
eluviation
illuviation
soil color / color index
soil profiles (A, B, C)
soil percolation
soil translocation
weathering rinds
relative dating
iron accumulation
phyllosilicates / clays
hydrous aluminosilicates
bowen's reaction series
temp-pressure reactions

soil forming factors:
climate, parent, organic
time, slope/relief/aspect

*Mass Wasting / Hillslope
Process*

potential energy
kinetic energy
force
stress
joules
newtons
shear force
normal force
shear stress
normal stress
shear strength
slope stability
internal friction
pore pressure
cohesion
safety factor
coulomb equation
mass wasting
angle of repose
slope angle
hillslope
rock
debris
earth
fall
topple
slide
slump
flow
slope gradient

angle: degrees vs. percent
head scar
creep
solifluction
avalanche
landslide classification
flow velocity
laminar vs. turbulent flow
channel erosion

Aerial Photographs

air photo
electromagnetic spectrum
wavelength
frequency
speed of light
reflected light
stereo pair
stereoscope
altitude / camera height
focal length
photo scale
relief displacement
principal point
vertical exaggeration
orthophoto
texture, color, patterns, shading
photo interpretation

Geomorphic and Landscape Age Dating

Quaternary (when / how long ago?)
Pleistocene
Holocene
Relative age dating
Absolute or numerical age dating
Early-middle-late Pleistocene
Age of material vs. age of surface
coastal wave-cut terrace
soil correlation
law of superposition
law of geomorphic position

Topographic map Principles

topographic maps
north arrow
magnetic declination
map scale
fractional scale
graphical scale
longitude latitude
township-range-section
equator
prime meridian
parallels
angular measurement
7.5 min quadrangle
contour interval
index contour
law of V's / streams

Geomorphic Mapping Criteria

(**see new notes on web site)

Landform
Material
Process (Aeolian,
Age

hollow
side slope
channel
floodplain
dune
terrace
levee
sediment texture
diamicton

lacustrine
eolian
colluvial
alluvial
glacial

Quantitative Skills

Process Rate Calculations

Basic map reading / landform identification from a topographic map.

Given a rate of weathering and "soil erosion", calculate the equivalent rate of crustal denudation and rock erosion

From a topographic map, calculate hillslope gradient (in degrees, in percent, in ratio form)

Draw a topographic profile from a topographic map.

Plot soil texture data on a triangular diagram, determine soil classification, calculate soil texture parameters

calculate potential energy, kinetic energy, force, weight, stress

resolve weight, shear and normal stress from a basic slope problem

be able to work the Coulomb equation, and

determine slope stability; calculate gradient and slope angle in degrees and percent

air photo scale calculations, other air photo calculations as in lab

identification of basic landforms and geomorphic process by examining aerial imagery

calculating the slope of stream channel or hillslope from a topographic map (in degrees and percent)

Aerial photography calculations: photo scale, height-displacement calculations, photo distortion principles, 3-d viewing of landforms.

Key Concepts

Give examples of resistant vs. non-resistant lithologies, and how they respond to erosion and landscape evolution.

List and discuss the driving mechanisms for geologic / geomorphic processes.

Give example rates of crustal uplift and crustal erosion

What are the necessary elements for the collection and analysis of air photos.

What is the significance of “clay” at the Earth's surface

What factors effect rates of weathering? What are the physical and chemical weathering processes?

What is the difference between soil and sediment? How are soils formed? How are they identified?

What are the soil forming factors, and how are they used as a dating tool in geomorphology?

What are the range of processes, landforms, and surficial materials found at the Earth's surface? in western Oregon? Can you make some general sketches showing these geomorphic elements?

How does the landscape evolve over time? How does this relate to systems theory? Thresholds theory?

What are the typical ranges of rates and processes of erosion and deposition found at the Earth's surface?

List and discuss the mass wasting classification system?

What factors effect slope stability?