

Environmental Geology Final Exam Study Guide (Thursday May 4, 10 AM – 1 PM)

Midterm will be in 2 parts, the lab skills portion will be open book. You will be able to use your notes, conversion charts, answer keys, etc. to work on lab-style problems. Make sure you go over the answer keys before the exam, if you are still uncertain how to solve the problems. The second part of the quiz will be closed book, and consist of long-answer essay questions, short-answer terminology, perhaps some true/false.

Recommended Study Techniques

- 1) go over lab questions / study them
- 2) review the "How to Study" sheet handed out at beginning of term
- 3) use the concepts below as a guide to help you focus on your notes
- 4) memorize terms and concepts; use key word list as a checklist of material covered
- 5) go back over the labs and make sure you can do the tricks / skills
- 6) review some of the important figures in your lab manual and text
- 7) go to the lab and look at the lab answer keys,
- 8) review the techniques for working with maps
- 9) Study until you pass out, get up and study some more
- 10) change your socks and drink plenty of water
- 11) clean your room....

Water Budget / Hydrologic Cycle

hydrology	lakes	discharge-time
spatial scale	glaciers	river stage
temporal scale	ice caps	hydrograph
mass	transpiration	flood peak
energy	evapotranspiration	flood peak lag
flux	runoff	peak annual discharge
mass transfer functions	infiltration	recurrence interval
evaporation	vegetative interception	runoff
condensation	ice sheets	infiltration
precipitation	oceans	floodplain storage
runoff	springs	drainage basin
infiltration	soil moisture	watershed
transpiration	atmospheric moisture	drainage divide
deterministic vs. stochastic	fresh water storage	drainage network
processes	Flood Hazards	channel
hydrologic cycle (sketch it)	Hydrologic cycle	floodplain
convection	Infiltration	terrace
advection	Runoff	100-yr floodplain
groundwater	flood	floodplain management
surface water	discharge	flood hazard mitigation
global water storage	continuity equation	flood hazard assessment
residence time	$Q=AV$	floodplain zoning
compartments	bankfull discharge	risk assessment
oceans	magnitude-frequency	hazard vs. risk
groundwater		urbanization
		floodplain storage

dam - flood retention
climatic vs. geologic causes of
flooding

Mass Wasting Hazards

Potential energy
Kinetic energy
Force
Weight
Acceleration due to gravity
Newton
Joule
Stress
Shear strength
Shear stress
Angle of internal friction
Cohesion
Clay cohesion
Water cohesion
Weathering
Regolith
Bedrock
Earth
Debris
Rock
Fall
Topple
Slide
Slump
Rotational slide
Translational slide
Flow
Creep
Debris flow
Earth flow
Rock fall
Rock slide
Debris slide

Landfills / Coffin Butte

landfill
solid waste
liquid waste
municipal waste
residual waste
hazardous waste
industrial waste
composting

sludge ponds
injection wells
leachate
soil contamination
water contamination
seepage
surface runoff
sediment erosion
erosion control
air emissions
fugitive dust
methane generation
anaerobic bacterial decay
methane
groundwater monitoring system
upgradient
downgradient
liner system
double liner system
geomembrane
geotextile
impermeable barrier
leachate containment
methane collection system
fugitive dust control
air pollution monitoring
vector control
erosion and sedimentation
borrow
fill
landfill closure
remedial action plan
erosion / sedimentation pond,
landfill closure,
daily cover,
disposal cell,
buffer zone,
active life,
fault / seismic activity,
seismic impact zone,
surface water,
methane monitoring system,
corrective action,
primary liner,
secondary liner,
drainage layer,
cover liner,
leachate treatment,
gas collection,

rock quarrying,
leachate lagoon,
waste screening,
radioactive waste,
permitted and non-permitted
types of waste,
biomedical waste,
geomembrane,
quarterly water sampling,
split samples,
nested monitoring wells,
wastewater treatment system,
direct osmosis, reverse osmosis,
clay liner,
fire hazard,
Coffin Butte bedrock setting /
hydrogeology (fractured basalt,
pillow basalt, regolith/soil),
methane extraction well,
leachate collection system,
"the bubble",
sediment ponds

Groundwater

groundwater
meteoric water
connate water
juvenile water
porosity
permeability
horizontal permeability
vertical permeability
intergranular porosity
fracture porosity
solution cavities
pendular water
effective porosity
total porosity
yield porosity
primary vs. secondary porosity
Darcy's law
 $Q=KIA$
hydraulic gradient
cross-sectional area
specific yield
specific retention
zone of aeration
vadose zone

zone of saturation
phreatic zone
water table
groundwater flow
cone of depression
aquifer
aquitard
artesian aquifer
water table aquifer
unconsolidated aquifer
consolidated aquifer
infiltration
groundwater contamination
contaminant plume
well
monitoring well
well hydraulics
total depth
screened interval
sand pack
well casing
riser pipe
static water level
depth to water
drawdown
hydraulic head
specific capacity
pumping rate

*Willamette Valley
Hydrogeology*

hydrogeologic setting
Quaternary alluvium
Quaternary older alluvium
Quaternary terrace deposits
Missoula Flood Deposits
Willamette Silts
gravel aquifer
unconfined aquifer
regional hydraulic gradient
Columbia River Basalts
Groundwater Contour Map
agricultural practice
pesticide / herbicide
land use
production wells
municipal well supply
gravel aquifer

*Sources of Ground Water
Contamination*

Heavy metals
Organic chemicals
Chlorinated solvents

Industrial processes
Agricultural pesticides
/herbicides
Underground storage tanks
Petroleum hydrocarbons
Land fills
Surface impoundments
Deep disposal wells
Septic / sewage wastes
NAPL's
DNAPL's
LNAPL's

Student Presentations

Brennan – Forest Hydrology

What are the general impacts of clear-cutting on forest hydrology, runoff hydrographs, and the water budget?

Possible essay questions and other concepts

Student Presentations

Brennan – Forest Hydrology

What are the general impacts of clear-cutting on forest hydrology, runoff hydrographs, stream temperature, fish habitat and the water budget?

Eslbeth – Newberry Volcano / Jon – Mt. Adams / Chris – Mt. Hood / Cari – Mt. Rainier

List and discuss the volcanic hazards in the Cascades, relate to human hazard potential; What are the highest risk localities associated with volcanism in the PNW? Compare the volcanology and volcanic hazards of Newberry to Mt. Hood to Mt. Adams to Mt. Rainier; what are the similarities? What are the differences? How are these similarities and differences controlled by tectonic setting? Compare the volcanic history of each of these volcanoes over the past 20,000 years. Which are most active? What types of activity? How are lahar's generated?

Skylar – Gravel mining

What are the methods of in-stream gravel mining? How does gravel mining impact the fluvial system?

Hydrology? Sediment budget? How does gravel mining impact fish habitat?

Michele – Water Quality in Willamette Valley

What are the sources of water quality impacts in the Willamette Valley? How do these impacts relate to land use? How do clay particles relate to water contamination? Discuss the geologic and physiographic setting of the Willamette valley? Where are the large alluvial fans and why? What is the recent geologic history of the WV?

Ana – Coastal Hypoxia

What is hypoxia and how does it impact coastal areas? What are the possible causes of hypoxia? How does climate impact hypoxia cycles?

Other stuff to think about:

List and discuss anthropogenic vs. natural environmental geology problems.

List and discuss the types of environmental hazards (natural and manmade) in Oregon / PNW.

List and discuss the sources of anthropogenic contaminants in the Willamette Valley

Discuss flood hazards in western Oregon vs. eastern Oregon

What is a flood hydrograph and how does it look when comparing a forested area to an urbanized area?

What types of meteorological events trigger landslides, floods, and debris flow hazards in Oregon?

Homework / Exercise Skills

Be able to apply basic physics and geology principles to quantitative-style problem solving.

Be able to do unit conversions

Be able to problem solve using your notes and calculator.

Can you use excel to graph hydrologic data? Solve hydrologic problems? Can you work quantitative problems in mass wasting? Groundwater? Can you decode Darcy's law? Can you determine flood recurrence interval?