Environmental Geology Spring 2018 Midterm Exam Study Guide

The Midterm Exam will be in 2 parts, the lab skills portion will be open book. You will be able to use your notes, conversion charts, portfolio products, etc. to work on lab-style problems. Labs have largely focused on identifying features on maps and photos, and thinking about geologic hazards in relation to human populations. The second part of the exam will be closed book, and consist of long-answer essay questions and short-answer terminology. Be prepared to make sketches of diagrams and recall key equations to illustrate your answers.

I would spend a minimum of studying 8-10 hours total for this exam, to assure maximum success. Use the keyword and concept list below as a check list for studying. I will share an example exam with you in class. ES473 Team Leaders with Taylor 300-400 Level Exam Experience.

Class Notes to Review:

Introduction to Env. Geology http://www.wou.edu/las/physci/taylor/g473/intro.pdf

Mass Wasting http://www.wou.edu/las/physci/taylor/g473/masswast.pdf

Lidar mapping technology http://www.wou.edu/las/physci/taylor/g473/hill_etal_2000_lidar_overview.pdf

Flood Hazards http://www.wou.edu/las/physci/taylor/g473/floods.pdf

Introduction to River Restoration
http://www.wou.edu/las/physci/taylor/g473/1_OWEB_1999_watershed_fundamentals.pdf

Text Chapters (Moodle):

Introduction
http://moodle.wou.edu/pluginfile.php/405656/mod_folder/content/0/1_Keller_Intro.pdf?forcedownload=1
Earth Overview
http://moodle.wou.edu/pluginfile.php/405656/mod_folder/content/0/2_Keller_Earth_Overview.pdf?forcedownload=1
Hazards Overview
http://moodle.wou.edu/pluginfile.php/405656/mod_folder/content/0/3_Keller_Hazards_Overview.pdf?forcedownload=1
Mass Wasting overview
http://moodle.wou.edu/pluginfile.php/405656/mod_folder/content/0/5_Keller_Landslides.pdf?forcedownload=1
Rivers/Flood Overview
http://moodle.wou.edu/pluginfile.php/405656/mod_folder/content/0/6_Keller_Rivers.pdf?forcedownload=1

Supporting Video Study Content:

national environmental policy overview https://www.youtube.com/watch?v=fwxy_9HO1MI
What are landslides? http://www.youtube.com/watch?v=JrV4uCVwmfk&feature=related
Overview of Lidar mapping technology https://www.youtube.com/watch?v=EYbhNSUnIdU
Intro to Rivers and Flooding http://www.youtube.com/watch?v=4PXj7bOD7IY
Calculating Flood Risk http://www.youtube.com/watch?v=a1gXKyIKnHk
Flood Mgt. Strategies http://www.youtube.com/watch?v=9pFTI7GjBBE
Introduction to River Restoration (we are working on now...)
Video 1: Natural Stream Restoration Part I (Good Streams) (Oklahoma State, ~9 min)
Video 2: Natural Stream Restoration Part II (Bad Streams) (Oklahoma State, ~9 min)
Video 3: Natural Stream Restoration Part III (Bad Streams Gone Good) (Oklahoma State, ~17 min)

Key Words

Introduction

Environmental Geology
- natural hazards
- environmental quality
  - water
  - soil
  - waste
- management
- natural resources
  - water
  - energy
  - mineral

Geologic Hazards
fluvial
mass wasting
coastal
seismic
volcanic
coastal
death / destruction
anthropogenic
urbanization
hazard vs. risk
contaminants
health effects
environmental fate
industrial waste
biological waste
pollution
nature vs. humans
humans vs. nature

Introductory Video Exercise

Hanford Site
Radiation
Groundwater
Nuclear reactor
Plutonium waste
Soil/water contamination
K-reactor
Reactor fuel rods
Site Remediation

Oregon Natural Hazards Overview

seismic / earthquake
subduction zone earthquake
intraplate earthquake
landslide
coastal erosion
volcanic activity
- ash zone
- lahar

tsunami
flood
stream bank erosion
quake-slide
quake-tsunami
flood-coastal erosion

Mass Wasting Hazards

Cohesion
Clay cohesion
Water cohesion
Weathering
Regolith
Colluvium
Landslide deposit
Bedrock
Controls
- Vegetation
- Root strength
- Slope
- Gradient
- Angle of repose
- Cohesion
- Pore pressure
- Friction
- Human activity

Earth
Debris
Rock
Fall
Topple
Slide
Slump
Rotational slide
Translational slide
Flow
Creep
Debris flow
lahar
Earth flow
Rock fall
Rock slide
Rock block slide
Debris slide
Scarp
Toe slope
Hummocky topography
Deranged contour patterns
Slow-moving landslide
Rapidly moving landslide
Cut slope
Fill slope
Landslide hazard mapping
Source region
Run-out zone

LIDAR Introduction

LIDAR
Laser
Laser pulse
Reflection
Absorption
Two-wave travel time
Laser source
Pulse detector
first-returns
second-returns
last returns
bare-earth model
digital elevation model
DEM
Aerial surveys
Laser swath mapping
Land classification
Vegetative structure
Ground cover
Flight lines
GPS – positioning systems
Urban modeling
Watershed modeling
Topographic analysis
Point cloud
Laser altimetry
First-return model

Intro to Flood Hazards

Hydrologic cycle
Infiltration

Runoff
flood
discharge
bankfull discharge
magnitude-frequency
discharge-time
river stage
hydrograph
flood peak
flood peak lag
peak annual discharge
recurrence interval
runoff
infiltration
floodplain storage
drainage basin
watershed
drainage divide
drainage network
channel
floodplain
100-yr floodplain
floodplain management
flood hazard mitigation
flood hazard assessment
floodplain zoning
risk assessment
hazard vs. risk
urbanization
floodplain storage
dam - flood retention
climatic vs. geologic causes of flooding

Fish life cycle (spawning-rearing-fry-redd)
Hydrograph
Hyporheic Zone
Peak flow
Floodplain
Large woody debris (LWD)
Low flow-high flow
Recurrence interval
Recruitment of LWD
Redd
Resident fish
Riparian zone
Critical habitat
Degraded streams
Channel narrowing
Urbanization
Ecosystem services
Nutrient cycling
Riparian vegetation
Fish passage
Culverts
Rip-rap
Side channel
Floodplain
In-Channel Modification
Wood-boulder placement
Off-channel habitat
Nutrient loading
Stream canopy/shading

Intro to River Restoration (Key Words)

Anadromous fish
Salmonid
Coho-Chinook-Steelhead
Channel complexity
Channel habitat
Channel pattern (straight, meandering, braided)
Debris flow
Drainage basin
Disturbance (fire-flood-slide)
Downcutting / incision
Estuary

Possible essay questions and other concepts

- What is the difference between geologic hazard and risk?
- List and discuss anthropogenic vs. natural environmental geology problems. How does these relate to the introductory video examples given for the Hanford Nuclear Reservation?
- List and discuss the types of environmental hazards (natural and manmade) in Oregon / PNW.
- List and discuss the types of earthquakes associated with the Pacific Northwest
- Discuss the types of hazards associated with seismic events in the PNW.
- What are the volcanic hazards in Oregon? Why do we have volcanic and seismic hazards in Oregon?
- What are the ultimate energy sources for tectonic and climactic hazards?
- List and discuss anthropogenic vs. natural environmental geology problems.
- List and discuss the types of environmental hazards (natural and manmade) in Oregon / PNW.
- List, discuss, describe, sketch the mass wasting classification.
- What is the difference between a slump and slide?
- What is the difference between a debris flow and lahar? And mudflow? Bedrock and regolith?
- Discuss flood hazards in western Oregon vs. eastern Oregon
- What is a flood hydrograph and rating curve? How are they used to assess flood hazards.
- What types of meteorological events trigger landslides, floods, and debris flow hazards in Oregon?
- List and discuss the mass wasting classification system, with sketch examples of each type.
- How are magnitude-frequency concepts applied to geologic hazards? How do these concepts relate to floods, earthquakes, and volcanic eruptions?
- What is LIDAR? How is it acquired? What is it used for?
- Discuss flood hazards in western Oregon vs. eastern Oregon; what types of conditions lead to floods?
- What is a debris flow? What types of conditions lead to debris flow?
- List and discuss the primary variables controlling slope stability and mass wasting.
- What are the significant climatic events in western Oregon that lead to flooding? What time of year?
- How is the 100-yr floodplain determined and mapped out?
- What is a rating curve? How do you calculate recurrence interval and probability of occurrence?
- 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?
- List and discuss the three primary methods for managing geologic hazards to prevent loss of life or property.
- List and discuss the goals and methods of "River Restoration" in the Pacific Northwest. Provide example restoration methods that we discussed in class.

Homework / Lab Exercise Skills

Map reading, photo observation, and process interpretation.
Can you conduct basic calculations of map scale, and unit conversions?
Can you draw a profile and make basic map observations?
Can you read a topographic map?
Can you identify mass wasting and flood hazard zones on a topographic map?
Can you solve basic hydrology / watershed problems?
How is a recurrence interval and probability for floods determined?

The exam will also include an open-book problem solving portion related to the lab exercises that have been assigned, the list of which is located at the following URL:
http://www.wou.edu/las/physci/taylor/g473/ES473_Assignment_Checklist_May1_2018.pdf
Lab answer keys will be posted on the class web site at:
http://www.wou.edu/las/physci/taylor/g473/ES473_home.html