ES458 River Geology Field Course
Summer 2016 – Final Portfolio Instructions

The final report should be compiled as a portfolio, presented in the neat, professional-looking three ring binder, with cover and tab-separators. In addition to paper-hard copy version, portfolios can also be compiled as electronic Adobe Acrobe *.pdf documents. The final class portfolio may be submitted electronically via email attachment, uploaded via moodle, copied/mailed via flash drive, or submitted in hard copy/three ring binder format. For purposes of formatting and to see an example of what a model portfolio document, link on the following URL: http://www.wou.edu/las/physci/taylor/gs407rivers/nair_su2009_portfolio.pdf

Final class portfolios and assignments are due by Friday September 9, 11 PM.

Your field trip portfolio will be organized according to the following outline format, and presented in the following order, with section title pages clearly labeled (use the outline below as a checklist for completion):

SECTION I.

Introduction (word processed, formal writing, neat and complete)

A. General introductory statement (2-3 paragraphs) of course objectives and overview of field trip adventure, lessons learned.

i. Include Figure 1: Road Map with Trip Stops (refer to field stop summary below)

SECTION II.

Pre-Trip Reading Review Questions (word processed, formal writing, neat and complete)
http://www.wou.edu/las/physci/taylor/gs407rivers/Pre_Trip_Reading_Questions_Updated_Summer2016.pdf

SECTION III.

One-paragraph summary of Pre-Trip Youtube Video Clips (word processed, formal writing, neat and complete) (one 4-5 sentence paragraph for each video below)

Introduction to Newberry Volcano Part 1 (Youtube; 5 minutes)
https://www.youtube.com/watch?v=bEanjPUR2dI

Introduction to Newberry Volcano Part 1 (Youtube; 6 minutes)
https://www.youtube.com/watch?v=K12dzKFnEQg

Introduction to Cascade Volcanism and Processes / Lahar Hazards (Youtube; ~4 minutes)
https://www.youtube.com/watch?v=1PxgDLaLleE

Missoula Floods Overview (Youtube; 18 minutes)
https://www.youtube.com/watch?v=wJo8m4oKc6k

Introduction to Columbia Gorge, Columbia Plateau, Columbia River Basalts (Youtube; ~22 minutes)
https://www.youtube.com/watch?v=w7eqBtc2tv0

Introduction to Deschutes River Geology (Youtube; ~7 minutes)
https://www.youtube.com/watch?v=i3qpioMYZIc

SECTION IV.

Course Synthesis and Summary Questions (Answer the following in narrative format; word processed, neat and professional looking)

A. Landforms and Processes Associated with western and central Oregon Rivers

What are the dominant processes that influence western and central Oregon Rivers? In your narrative include both a discussion of both geologic and tectonic processes.

What are the landforms associated with lower hillslope and valley environments along western and central Oregon Rivers?

B. Meteorologic and Climate Controls on Fluvial Processes in western and central Oregon

Compare and contrast precipitation patterns west of the Cascades vs. east of the Cascades. What are the dominant controls on these precipitation patterns?

What types of meteorologic conditions cause flooding west of the Cascades? What meteorologic condition causes the highest magnitude floods?

What types of meteorologic conditions cause flooding east of the Cascades?

C. Geologic Controls on Fluvial Processes in western and central Oregon

What types of climatically-driven and tectonically driven geologic processes result in large magnitude flooding in western and central Oregon?

Compare and contrast the magnitude of floods associated with meteorological vs. geological processes in western and central Oregon.

SECTION V.

Results from Lab Exercises (answer all questions / word processed; present in the following order:)
Note: exercises marked with one star (*) were worked on during the field trip; two stars (**) are post-trip homework items

A. River Environments Key Word Search and Short Answer Review *(** post-trip assignment)*
http://www.wou.edu/las/physci/taylor/gs407rivers/river_environments_key_terms_summary.doc
B. Fundamental Concepts p. 203-204 Field Guide (all questions 1, 2 and 3)*
C. Newberry Volcano Review Questions p. 191 Field Guide, Section 2 (all questions 2-1 through 2-5)*
D. Paulina Creek Terrace Incision Rate Calculation (on-the-fly data collection and calculation)*
E. Deschutes River Incision Rate Problem p. 219-220 Field Guide, Part 3 (all questions A through E)*
F. Deschutes Water Budget Problem (p. 221-222 Field Guide; Part 4, all questions A-E)*
G. Flood Recurrence Exercise, p.211 Field Guide (Question 1, A through E)*
H. Paulina Creek Summary Questions, p. 206 Field Guide (Questions 7 and 8)**

SECTION VI.

Acknowledgements

APPENDIX I

Copies of Field Notes, as available

Key Concept Summary of Field Stops – 2016 River Trip

DAY 1

1-1 Natural Science Building / Class Introduction

Tectonic setting of western Oregon, Juan de Fuca Plate, North American Plate, Coast Range accretion, Cascade Volcanic Arc, Willamette Valley, Earth Energy sources (gravity, geothermal, solar), watersheds, trip itinerary/overview; introductory video clips: Plate Dynamics, Oregon Field Guide Missoula Floods, Kayaking Sucks Landslide Video

1-2 North Santiam River State Recreation Area

Tectonic setting of western Oregon, Juan de Fuca Plate, North American Plate, Coast Range accretion, Cascade Volcanic Arc, Earth Energy sources (gravity, geothermal, solar), watersheds, trip itinerary/overview. Geomorphic mapping criteria (landform, material, age, process), bedrock vs. regolith, colluvium alluvium, force, work, mass, gravity, weight, bedload, suspended load, dissolved load, climate history, glacial history of western Cascades, geologic history of western Cascades

1-3 Detroit Dam / Santiam

Dams, anthropogenic, reservoirs, energy vs. load, downstream scour, upstream sedimentation, salmonid habitat, dam census of Pacific Northwest, significance of dams, social factors of dams, dam building history, reasons for dams (flood control, reservoirs, water resources), more on western Cascades geologic history

1-4 Suttle Lake / Mount Washington Overview

Mt. Washington vs. Black Butte, high cascades volcanic arc, history of cascades/high cascades, climate change, glacial vs. interglacial, glacial erosion, roadcut with diamicton, Suttle lake, moraine-dammed lake, glacial valley, soils chronology

Night 1 – Camp at La Pine State Park

DAY 2

2-1 Morning Camp Discussion

Landscape analysis (landform, material, age, process), sediment coring, soil sampling, Mt. Mazama, Crater Lake History, tephra, Mazama Ash, pumiceous sediment, Mazama blast zone, regolith, lava flows, basalt, High Cascades, regional Newberry geology, cinder cone history, Teepee Draw Tuff, Newberry Caldera, fault junction (Brothers, Tumalo, Walker Rim), High Lava plains, rhyolite age progression, Basin and Range extension, bimodal volcanism.

2-2 Paulina Peak / Newberry Caldera

Overview of newberry volcano, cinder cones, big obsidian flow, history of newberry eruptions, Newberry volcanism vs. Cascade arc, overview of caldera / lakes, significance of Newberry with respect to regional tectonics, cinder cone morphology / age relations.

2-3 Paulina Lake Outlet / Paulina Falls Knickpoint Erosion

Paulina lake observations, lake terraces, wave erosion, caldera uplift, Paulina outlet knickpoint, headward erosion, catastrophic outburst floods, knickpoint processes, headward erosion, slope/gradient observations, catastrophic outburst floods, paleoflood hydrology

2-4 Paulina Creek / Ogden Group Camp / Paulina Creek Terrace Analysis / Catastrophic Flood Record

Field hydrology, discharge calculations, terraces, terrace gravels, mazama ash, catastrophic outburst floods, floodplains, high terrace, middle terrace, flood scour, soils chronology, aridisols, clay films, soil development vs. time, landform / geomorphic surfaces.

Night 2 – Camp at Beavertail / Meet River Guides

DAY 3

3-1 Beavertail Camp (Deschutes hydrology/lecture)

Ground water, hydrogeology, regional geology of Deschutes basin, influence of groundwater on Deschutes River discharge, flood history of Deschutes river, regional hydrologic analysis, climatology, water resources, river hydrology, river discharge, fluvial landforms (active channel, floodplain, terraces, hillslopes).

3-2 Lunch Stop

Regional geology of Deschutes basin, whitewater hydraulics, fluvial mechanics, sediment transport processes, formative causes of river rapids,

DAY 4

4-1 Beavertail Camp Morning Discussion + Lunch Stop (cont.)

Flood recurrence intervals, flood history, regional flood geography, statistical analysis of historic hydrologic data, hydrometeorology, rain-on-snow history. Deschutes flood history, flood records, landscape analysis, paleoflood hydrology, depostional vs. erosional landscape records, carbon dating, flood chronology, landslide dams, catastrophic outburst floods, geology vs. meteorologic flood processes.

Columbia River Basalts, bedrock terrain, overview of Missoula Floods, Palouse Loess, last glacial advance, Montana Ice Dam Lakes, Clark Fork Idaho Ice Dams, Dam Burst Floods, channeled scablands, slackwater deposits, flood scour landscapes; Missoula flood silts, Missoula flood silts.

Drive back to WOU / Monmouth / fare-thee-well…