

# EART140



**Course overview:** We live on landscapes. Although much of human civilization relies on the relatively static nature of landscapes, in fact the Earth's surface is constantly changing. Consequently, predicting how and at what rate landscapes change are both of fundamental scientific importance. In this class, we will study processes that govern landscape evolution. Our mantra will be "process from form." That is, the form of a landscape can provide insight into the physical processes responsible for its creation. Specifically, we will study river, hillslope, glacier, and coastal processes.

**Instructor:** Noah Finnegan

**Contact Info:** Office: E&MS A115, email: [nfinnega@ucsc.edu](mailto:nfinnega@ucsc.edu)

**Office Hours:** Monday, 11 am -1 pm or by appointment (email please)

**Lectures:** T/Th 2:00 – 3:45 PM, E&MS D226

**Teaching Assistants:**

Allison Pfeiffer, ampfeiff@ucsc.edu, office hours: TBD

Danica Roth, dlroth@ucsc.edu, office hours: TBD

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**Lab 1:** Wednesday, 9:00 AM – 12:00 PM, E&MS D226,

**Lab 2:** Thursday, 10:00 AM – 1:00 PM, E&MS D226

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**Text:** R.S. Anderson and S.P. Anderson: The Mechanics and Chemistry of Landscapes

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### **Evaluation/Assignments:**

6 lab exercises

2 Reports Based on Field Trips

Two 1 Day Field Trips, 1/9/16, 2/20/16

Open Book, Open Notes, Take Home Final

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### **Grading**

Labs and problem sets can and should be done together in groups. Although I encourage you to discuss together the data collected during the weekend field trips I expect that you will ultimately work alone in actually drafting the scientific reports. If you collaborate on the writing of a scientific report with another person, you will both receive no credit for the report. I will give you very specific objectives for the reports when I assign them.

You will receive one grade for the class (i.e. combined lab and lecture). The weighting of the assignments for the lecture is as follows

Report 1 – 25% (10% Draft 1, 15% Draft 2)\*

Report 2 – 25% (10% Draft 1, 15% Draft 2)\*

\*Together Reports 1 and 2 constitute 1/2 of the UCSC disciplinary writing requirement

Open Notes, Open Book, Take Home Final – 25%

Labs – 25%

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**Late Policy:** 10 % will be deducted for every day after the due date that an assignment or lab is turned in.

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**Attendance Policy:** You are responsible for the material that is presented in class every day. It is in your best interest to attend class. I will not take attendance. However, it is VERY unlikely that you will be able to pass this course without attending the lectures. If you miss a class, please make arrangements to get a copy of lecture notes from a friend.

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### **Distribution of Readings and Course Materials**

For the reports, labs, and lectures I will periodically post materials on a shared Google Drive folder

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### **Course Schedule and Reading Assignments**

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Week 1

Syllabus overview, class pictures

1/5/16 Lecture 1. Quick Class Introduction, Alluvial Rivers I

Lab 1: Surveying Basics, Quantifying Grain Size in a River, Excel Basics

1/7/16 Lecture 2. Alluvial Rivers II & Debris Flows, Report 1 Assigned

Reading For Class: 395-414, 340-343

**1/9/16 Mandatory Fieldtrip 1, San Lorenzo River Valley (8 AM-6 PM), Meet at E&MS Loading Dock at 8 AM. Rain or Shine.**

Reading for Fieldtrip: Montgomery and Buffington, 1997; USGS Debris Flow Report

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Week 2

1/12/16 Lecture 3. Why Geomorphology? Classical views of Geomorphology, Precipitation and Channelization

Reading For Class: P. 100-104; Chapter 11 (skip groundwater section)

Lab 2: Data Assimilation and Processing for Report 1

1/14/16 Lecture 4. River Deltas and Alluvial Fans, Effective Report Writing

Reading For class: TBD

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Week 3:

1/19/16 Lecture 6. Weathering and Soil Production, **Report 1, Draft 1 Due**

Reading For Class: Chapter 7

Lab 3: Precipitation and Fluvial Geomorphology on Titan

1/21/16 Lecture 7. Hillslopes

Reading For Class: Chapter 10 through page 328

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Week 4

1/26/16 Lecture 7. Landslides and Mass-wasting, **Report 1, Draft 1 Returned**

Reading For Class: 330-435

Lab 4: Hillslope Sediment Transport and Hillslope Form

1/28/16 Lecture 8. Glaciers I

Reading For Class: Chapter 8

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Week 5

2/2/16 Lecture 9. Glaciers II, **Report 1, Final Draft Due**

Reading For Class: Chapter 8

Lab 5: Glacial Geomorphology and Mechanics

2/4/16 Lecture 10. Tectonic Geomorphology I – Orogen Scale.

Reading: TBD

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Week 6

2/9/16 Lecture 11. Tectonic Geomorphology II – Bedrock River Channels I

Reading for Class: Chapter 13

Lab 6: Climate, Tectonics and the Morphology of the Andes

2/11/16 Lecture 12. Bedrock River Channels II

Reading for Class: Chapter 13

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Week 7

2/16/16 Lecture 13. Coastal Processes

Reading For Class: Chapter 16.

Lab 7: Tectonics, Topography, and Bedrock River Profiles

2/18/16 Lecture 14. Whole Landscapes: Coupling of Hillslope, Coastal, Glacial, and Fluvial Processes, **Report 2 Assigned**

**2/20/16 Mandatory Fieldtrip 2, TBD (8 AM-6 PM), Meet at E&MS Loading Dock at 8 AM. Rain or Shine.**

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Week 8

2/23/16 Lecture 15. Geochronology and Geomorphology I

Reading For Class: Chapter 6

Lab 8: Work on Report 2

2/25/16 Lecture 16. Geochronology and Geomorphology II

Reading For Class: Chapter 6

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Week 9:

3/1/16 Lecture 17. Aeolian Processes

Chapter 15

Lab 9: Santa Cruz Marine Terraces

3/3/16 Lecture 18. Planetary Geomorphology, **Report 2 Due**

TBD

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Week 10:

3/8/16 Lecture 19. Eco-geomorphology

TBD

Lab 10: Review For Final

3/10/16 Lecture 20. Geomorphology of Santa Cruz, **Take Home Final Posted**

3/15/16, 5 PM, Take Home Final Due