FLUVIAL GEOMORPHOLOGY AND ENVIRONMENTAL CHANGE

GRG 338-C / Unique #: 37350

Spring 2012, M/W/F 2:00-3:00pm, GRG 102

Instructor: Carlos E Ramos-Scharrón, Ph.D.

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Office hours: Wed 11:00–12:00, Fri 10:00-11:00, or by appointment

Description

The apparently sturdy exterior of Earth is actually a malleable and dynamic surface that is constantly being subjected to processes and forces that result in the many types of landscapes we observe today. Geomorphology is the field of science that studies landforms as canvases that express the by-product of both internal and external forces as they act upon the Earth's surface. This course will focus in the sub-field of Hydro-geomorphology by providing both theoretical and applied approaches to study the interactions between hydrologic and geomorphic processes, and the impacts that human activities have on those interactions. The course will be divided into four major sections which include surface hydrology, hillslope processes, fluvial geomorphology, and watershed analyses. Students should come out of the course with a broad appreciation of the importance of hydro-geomorphic knowledge for understanding environmental change and its relevance to a variety of fields including geology, ecology, engineering, and land use planning. Examples will be provided from throughout the world with a special emphasis in Latin America and the United States.

Prerequisites

Students should be of upper division undergraduate or graduate level standing. Students are not required to have had prior courses in fluvial geomorphology, but should have at a minimum some background in physical geography, geology, and/or natural sciences.

Homework

The course includes two assignments. The educational objective of these assignments is to test the quantitative, data analysis, and interpretation skills of students. We will review the materials and the methods for each during class time. I will either make the data available, or indicate where it may be obtained. Each assignment will involve basic data analysis and a short write-up of the results. The topic of Assignment # 1 revolves around hydrologic analyses, slope stability, and surface erosion. Undergraduate students must work with a partner, while graduate students are expected to complete individual work. Assignment #2 entails fluvial geomorphology concepts, including calculating bed load mobility, and requires field work in an Austin river (UT campus). The date/time for the required field work for Assignment #2 must be arranged in advance as it will require the entire class to be out in the field for at least 2-3 hours. All field work and reporting related to Assignment #2 will be completed in small groups.

Exams

The course includes two partial exams. Each exam will include a combination of short essay, multiple-choice, fill-in the blank, and simple quantitative problems. The first exam will cover the topics of geomorphology principles, water, and hillslope processes, while the second exam will cover fluvial geomorphology and watershed analyses. There is no final exam in this course.

Oral presentations

Groups of 3-4 undergraduate students will prepare a 10-min long presentation on a topic of their choice that is relevant to the course. The topic must be pre-approved by the instructor and requires preparing a short, one-page summary (due 3/21). Undergraduate students are expected to select a practical environmental issue related to hydrogeomorphology (e.g., dam removal, agriculture and soil erosion, forestry impacts on stream habitat, etc.), describe a case study, and define how principles described in class can be applied to that particular problem.

Each graduate student will prepare 12-15-min long presentation on a pre-approved hydrogeomorphology topic. The topic of the presentation is the same as the final paper (see below) and requires preparing a short, one-page summary (due 3/21).

The date and order of oral presentations will be randomly selected during class time.

Final Paper (graduate students only)
Graduate students will complete an in-depth term paper on an pre-approved topic. If your thesis topic is not appropriate, please see the instructor for a list of potential topics. The paper is due May 15th. The paper must adhere to a journal format, and include appropriate references, tables, and figures. The paper should range between 3,000 to 5,000 total words. The paper should involve original research and data analysis, and must include one or a combination of fieldwork, archival, laboratory, and/or GIS analysis and research. Importantly, the paper must include an in-depth literature review as it relates to a specific *problem* in hydro-geomorphology.

Policies
Attendance: You are required to attend all classes and arrive on time. Attendance and class participation are part of your final grade.
Lateness: Late labs, exams, and papers will be assigned a 5% reduction per day.
Electronic media: The use of any electronic and/or computer media is not allowed in class (e.g., laptops, Ipads, cell phones, etc…)

Text, Readings, and Lectures
All lectures will be in PowerPoint format, and all lectures will be made available to students via the course web site as a *pdf* file at the end of each week.

All class lectures will be in GRG 102, except for a meeting along Waller Creek for which I'll give you plenty of notice.

Course readings will include the text (Ritter, Kochel & Miller. 2011. Process Geomorphology-Fifth Edition, Waveland Press, Inc. Available at the UT-Bookstore), journal articles and other resources downloadable from the course web site, and brief readings and figures distributed in class.

Students are expected to have read before class and will be held responsible for readings on examinations.

Grading

Task	***Percent of final grade/Undergrads***	***Percent of final grade/Grad students***
Assignment #1	*15%*	*10%*
Assignment #2	*15%*	*10%*
Oral presentation/Final paper outline	*5%*	*5%*
Exam #1	*25%*	*20%*
Exam #2	*25%*	*20%*
Oral presentation	*10%*	*10%*
Final paper	*0%*	*20%*
Attendance/participation	*5%*	*5%*
	100%	*100%*

Class Web Site and Blackboard
In this class I use Blackboard—UT's Web-based course management system with password-protected access at http://courses.utexas.edu —to distribute grades and other course materials.

University of Texas Honor Code

The core values of The University of Texas at Austin are learning, discovery, freedom, leadership, individual opportunity, and responsibility. Each member of the university is expected to uphold these values through integrity, honesty, trust, fairness, and respect toward peers and community.

Academic Integrity

All students are expected to adhere to University policies concerning scholastic integrity. Any form of scholastic dishonesty will not be tolerated, and will be dealt with in an appropriate manner as outlined by the University. "Scholastic dishonesty includes, but is not limited to, cheating, plagiarism, collusion, falsifying academic records, and any act designed to give unfair academic advantage to the student (such as, but not limited to, submission of essentially the same written assignment for two courses without the prior permission of the instructor, providing false or misleading information in an effort to receive a postponement or an extension on a test, quiz, or other assignment), or the attempt to commit such an act." Student's should refer to the University guidelines on Academic Dishonesty (section 11-802).

Documented Disability Statement

The University of Texas at Austin provides upon request appropriate academic accommodations for qualified students with disabilities. For more information, contact Services for Students with Disabilities at 471-6259 (voice) or 232-2937 (video phone) or http://www.utexas.edu/diversity/ddce/ssd

Use of E-Mail for Official Correspondence to Students

E-mail is recognized as an official mode of university correspondence; therefore, you are responsible for reading your e-mail for university and course-related information and announcements. You are responsible to keep the university informed about changes to your e-mail address. You should check your e-mail regularly and frequently—I recommend daily, but at minimum twice a week—to stay current with university-related communications, some of which may be time-critical. You can find UT Austin's policies and instructions for updating your e-mail address at http://www.utexas.edu/its/policies/emailnotify.php

Religious Holy Days

By UT Austin policy, you must notify me of your pending absence at least fourteen days prior to the date of observance of a religious holy day. If you must miss a class, an examination, a work assignment, or a project in order to observe a religious holy day, I will give you an opportunity to complete the missed work within a reasonable time after the absence.

Behavior Concerns Advice Line (BCAL)

If you are worried about someone who is acting differently, you may use the Behavior Concerns Advice Line to discuss by phone your concerns about another individual's behavior. This service is provided through a partnership among the Office of the Dean of Students, the Counseling and Mental Health Center (CMHC), the Employee Assistance Program (EAP), and The University of Texas Police Department (UTPD). Call 512-232-5050 or visit http://www.utexas.edu/safety/bcal

FLUVIAL GEOMORPHOLOGY & ENVIRONMENTAL CHANGE

GRG 338-C, SPRING 2012, Instructor: CE RAMOS-SCHARRON, COURSE SCHEDULE

Date	***Topic***	***Required readings***	***Other recommended readings***	***Assignments/Exams***
Week 1 *1/18 -1/20*	***COURSE INTRO:*** *basic definitions, principles of Geomorphology*	*Ritter-Chapter 1*	*Sidle & Onda (2004)* *	
Week 2 *1/23-1/27*	***SETTING THE TABLE:*** *Internal forces and climate, weathering, physical characterization of water & granular materials.* ***DATA ANALYSES INTRODUCTION***	*Ritter-Chapter 2, Chapter 3 (pp. 47-51; 61-70), Chapter 4 (pp. 85-100)*	*Julien (1995)-Chapter 2* *	
Week 3 *1/30-2/3*	***EXCEL TRAINING SESSION*** ***WATER:*** *the water cycle, water budgets, rainfall*	*Dunne & Leopold-Chapter 1 (pp. 3-6), Chapter 8*	*TBA*	*Final paper description handed out 1/27*
Week 4 *2/6-2/10*	***WATER****: rainfall, interception, evapotranspiration, infiltration*	*Dunne & Leopold- Chapter 2 (pp. 35-56), Chapter 3, Chapter 4 (pp. 95-103), Chapter 5 (pp. 126-138), Chapter 6*	*Selby (1993)-Chapter 11*	
Week 5 *2/13-2/17*	***WATER:*** *subsurface flow, runoff, hydrographs, stormflow, the drainage basin*	*Ritter- Chapter 5 (149-161; 176-190); Dunne & Leopold-Chapter 9*	*Selby (1993)-Chapter 11*	*Assignment #1 handed out 2/13*
Week 6 *2/20-2/24*	***HILLSLOPES:*** *material properties, biogenic processes, mass wasting*	*Ritter-Chapter 4 (pp. 100-139)*	*Selby (1993)-Chapter 5 (pp. 49-59), Chapters 13, 14, & 15*	*Oral presentation groups must be defined by 2/24*
Week 7 *2/27-3/1*	***HILLSLOPES:*** *mass wasting, surface erosion*	*Ritter-Chapter 4 (pp. 100-139), Chapter 5 (pp. 190-209)*	*Selby (1993)-Chapter 12*	*Random drawing selecting oral presentation date/order (2/29)* *Assignment #1 due 2/29*
Week 8 *3/5-3/9*	***REVIEW FOR TEST #1 (3/5)*** ***EXAM #1-Intro, Water, Hillslopes (3/7)***			*EXAM #1 (3/7)*
Week 9 *3/12-3/16*	***Spring Break***			
Week 10 *3/19-3/23*	*Exam #1 discussion (3/19)* ***FLUVIAL PROCESSES:*** *drainage networks, flow mechanics, sediment transport*	*Ritter- Chapter 5 (pp. 161-176), Chapter 6 (pp. 211-252)*	*Wohl (2000)- Chapter 3 (pp. 78-127)*	*Oral presentation/final paper outline due 3/21*
Week 11 *3/26-3/30*	***FLUVIAL PROCESSES:*** *channel morphology, mountain rivers, large rivers, channel adjustments*	*Ritter-Chapter 6 (pp. 211-252); Montgomery & Buffington (1997)* *; Latrubesse (2008)* *	*Wohl (2000)-Chapter 4; Nelson & others (2006)* *; Montgomery & MacDonald (2002)**	
Week 12 *4/2-4/6*	***FLUVIAL PROCESSES:*** *channel processes and morphology review, field methods*	*Simon & Castro (2003)* *	*Whiting (2003)* *; Ramos (1997)* *	*Field work (4/4 or 4/6)!!!* *Assignment #2 handed out (4/2)*
Week 13 *4/9-4/13*	***WATERSHED ANALYSES:*** *watershed modeling, sediment yields, cumulative effects, sediment budgets* *Student presentations (begin 4/13)*	*Ritter-Chapter 5 (pp. 190-209); Reid & Dunne (2003)* *, Walling & Fang (2003)* *	*Ramos-Scharron & MacDonald (2007)* *, Restrepo & Syvitski (2006)* *, Walling (1983)* *, Swanson et al. (1982)* *	
Week 14 *4/16-4/20*	*Student presentations*			*Assignment #2 due 4/16*
Week 15 *4/23-4/27*	*Tentative*			
Week 16 *4/30-5/4*	*Student presentations* ***REVIEW FOR EXAM #2*** ***EXAM #2- Fluvial processes, watershed analyses (5/4)***			*EXAM #2 (5/4)*
5/15	***Graduate student papers due***			

Notes:

Ritter *refers to Ritter, Kochel & Miller. 2011. Process Geomorphology- Fifth Edition, Waveland Press, Inc. Available at the UT Bookstore.*

Dunne & Leopold *refers to Dunne & Leopold. 1978. Water in Environmental Planning , W.H. Freeman & Co. Placed as Reserve in the Geology Library. Required chapters and sections will be available through Blackboard*

Wohl *refers to Wohl. 2000. Mountain Rivers , American Geophysical Union, Washington, DC. Placed as Reserve in the Geology Library.*

Selby *refers to Selby MJ. 1993. Hillslope Materials and Processes. Oxford University Press. Placed as Reserve in the Geology Library.*

* *PDFs of these documents will be available through Blackboard*