GEOL 5260: Fluvial Geomorphology **Fall 2010**

Introduction:
This course will focus on the physical processes operating in stream channels and watersheds. At the reach-scale, we will cover basic fluid mechanics; sediment transport; and channel patterns, forms, and classification systems. Rivers will be placed in their spatial context within the watershed, with analyses of watershed-scale hydrology and topography in GIS. We will discuss river history and changes through time, the role humans have in shaping and altering river systems, and river restoration efforts. The course will include 3 day-long field trips and multiple shorter field exercises to practice data collection techniques at a reach scale, develop a classification system for a North Shore channel system, and study physical modeling of channel processes. A particular emphasis will be placed on scientific report writing, with the core of the course focused on a series of exercises with formal write-ups.

Goals of the course:
By the end of this course, you should be able to:

1) Utilize basic data collection techniques for fluvial geomorphology studies.
2) Work with group data sets.
3) Work with cross-sectional geometry, flow, and grain size data to calculate basic fluid flow parameters and sediment transport capacity at a reach scale.
4) Use ArcMap GIS for spatial analyses of topography at the watershed scale.
5) Understand the unique setting of North Shore streams and how they relate to classic, graded streams.
6) Use simple physical models to answer scientific questions relating to fluid flow, sediment transport, and watershed dynamics.
7) Understand forcing factors in stream dynamics, including the role of humans on rivers.
8) Write a scientific paper including data collection and analysis.

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Office Hours: M 3-4pm; Th 11:15-12:15pm; or by appt.

Time: Lecture T/Th 10:00-11:15 Chem 207
Lab F 10:00-11:50, Chem 207

Three all-day field trips (required):
Saturday, Sept. 13th, 9am
Saturday, October 8th, 9am
Friday, Dec. 3rd, 8am – may change to Nov. 19th, pending vote

Text: *Fluvial Forms and Processes*, by David Knighton (required)
There also will be outside readings which can be accessed through the class website.

Class Website: We have a class website set up on Moodle this year. It will be the go-to place for papers, assignments, extra materials, and data set exchange. I will post powerpoints on the website after class.

Labs: We have a lab scheduled from 10-11:50 on Friday mornings. This time will be used to work on data analysis from field trips, conduct local field exercises, work on GIS assignments, do problem sets, and practice analyses discussed during lecture. We will also have 2 day-long field exercises and a trip to St. Anthony Falls Laboratory. When we are outside, we will often be in river channels. Please dress appropriately! I recommend purchasing a pair of hip boots or chest waders. If you plan to work on rivers, they will be useful in the future, too.

Course Framework: 2010

Week	Dates	Topic	Required Reading	Lab	Items due
I	Sept. 7-10	No Class	Ch. 1, p. 1-8	No Lab	
II	Sept. 13-17	Intro to Fluvial Geomorphology; Fluid Mechanics I	Ch.4, p. 96-107	Optional: Intro to Field surveying	
	Sept 18	**Field trip I** – Reach-scale surveys; Roughness in Sucker River		**Leave at 9am, HH loading dock**	
III	Sept. 20-24	Data Analysis from Field Trip Fluid Mechanics II		Fluid mechanics problem solving	Field Trip 1 Analyses Due 9/24
IV	Sept. 27- Oct. 1	Fluid Mechanics III Flow around bends	Ch. 5, p. 213-230, p. 187-193	Bedforms	Field Trip 1 Report Due 10/1
V	Oct 4- 8	Sediment Transport I, II Floodplains/Depositional Systems	Ch. 4, p. 107-150	GIS meander migration lab	GIS Lab Due 10/8
	Oct 9	**Field trip II** – Flow around a bend; Floodplains in Amity Creek		**Leave at 9am, HH loading dock**	
VI	Oct. 11-15	Sediment transport III Bedrock Rivers	Whipple et al., 2000	Bedrock rivers lab	Field Trip 2 Analyses Due 10/15
VII	Oct. 18-22	Channel classification Discuss Montgomery & Buffington Long profiles	Ch. 5, p. 151-153, 205-241; 242-260; Montgomery & Buffington, 1997	Amity Creek long profile	Bedrock Rivers Due 10/19; Field Trip 2 Due 10/22
VIII	Oct. 25-29	Compile channel classifications Discuss Fitzpatrick et al., 2006 Flood Frequency; Hydraulic geometry	Ch. 5, p. 167-187; Ch.3, p. 75-80; Fitzpatrick et al., 2006	Flood Frequency	Long Profile Lab Due 10/29
IX	Nov 1 - 5	GSA – no class on Tuesday Drainage networks and channel integration	Ch. 2, p. 9-64	GIS - Watersheds	FF Lab Due 11/5
X	Nov. 8-12	Landscape Evolution; Watershed History and Channel Change Discuss Walter & Merritts 2008 Tools in geomorphology Discuss Fitzpatrick et al. 1999	Ch. 6, pp. 261-302; Walter & Merritts, 2008; Fitzpatrick et al. 1999	GIS – Terraces and Knickpoints	Research Proposal Due 11/12
XI	Nov. 15-19	Physical modeling Scaling relationships Discussion of modeling papers	Multiple outside readings	Physical modeling	GIS Watershed Lab Due 11/19
XII	Nov. 22-24 Thanksgiving	Physical modeling – group project time		No lab - Thanksgiving	
XIII	Nov. 29 – Dec 3	Riparian vegetation/Large Woody Debris Dam removals and sediment transport	Outside Readings	**Friday Field Trip to St. Anthony Falls Laboratory (8am, HH loading dock)**	Abstract from Experiments Due 12/3
XIV	Dec. 6-10	Stream restoration Anthropogenic and Climatic Changes	Ch. 6, p. 302-335; Trush et al. 2000	Channel change lab	Channel change lab Due 12/10
XV	Dec. 13-16 Last day of class	Student research presentations			
Finals	Dec. 21	Final Paper due at 2pm			Final Paper Due 12/21

Note: Although this schedule was put together following much deliberation, it may still change.

Attendance Policy: I know this is obvious, but please attend class and lab. Attendance is both required and expected. In-class discussions, exercises, and labs cannot be made up.

Group Work: I encourage you to study in groups and work on labs in groups. However, the work you turn in should be your own.

Course Grade: There are no exams in this course. Your grade will be composed of a series of reports and assignments as follows:

15%	Field trip #1
15%	Field trip #2
15%	Watershed GIS report
20%	Final project (proposal, presentation, report)
25%	Other labs combined (Meander Migration, Bedrock rivers, Long profile, Flood frequency, Physical modeling, Channel history)
5%	In-class exercises, problem sets
5%	Discussion, participation

Grading: Final point totals will be graded on a curve with the following guarantees:
90% and above A
80% B
70% C
< 70% F

Students with disabilities: It is the policy and practice of the University of Minnesota Duluth to create inclusive learning environments for all students, including students with disabilities. If there are aspects of this course that result in barriers to your inclusion or your ability to meet course requirements – such as time limited exams, inaccessible web content, or the use of non-captioned videos – please notify the instructor as soon as possible. You are also encouraged to contact the Office of Disability Resources to discuss and arrange reasonable accommodations. Please call 218-726-6130 or visit the DR website at www.d.umn.edu/access for more information.

Internet ID Access: In this class, our use of technology will sometimes make students' names and U of M Internet IDs visible within the course website, but only to other students in the same class. Since we are using a secure, password-protected course website, this will not increase the risk of identity theft or spamming for anyone in the class. If you have concerns about the visibility of your Internet ID, please contact me for further information.

Academic Dishonesty:
Academic dishonesty tarnishes UMD's reputation and discredits the accomplishments of students. UMD is committed to providing students every possible opportunity to grow in mind and spirit. This pledge can only be redeemed in an environment of trust, honesty, and fairness. As a result, academic dishonesty is regarded as a serious offense by all members of the academic community. In keeping with this ideal, this course will adhere to UMD's Student Academic Integrity Policy, which can be found at www.d.umn.edu/assl/conduct/integrity. This policy sanctions students engaging in academic dishonesty with penalties up to and including expulsion from the university for repeat offenders.

Student Conduct:
The instructor will enforce and students are expected to follow the University's Student Conduct Code (http://www.d.umn.edu/assl/conduct/code). Appropriate classroom conduct promotes an environment of academic achievement and integrity. Disruptive classroom behavior that substantially or repeatedly interrupts either the instructor's ability to teach, or student learning, is prohibited. Disruptive behavior includes inappropriate use of technology in the classroom. Examples include ringing cell phones, text-messaging, watching videos, playing computer games, doing email, or surfing the Internet on your computer instead of note-taking or other instructor-sanctioned activities.