CIVE 521 HYDROMETRY

Instructor: Dr. Peter Nelson
Email: peter.nelson@colostate.edu **Phone**: 970-491-5247
Office location: Eng B212 **Office hours:** T 1-2, W 2-4 or by appointment
Lecture Time: 4:00 - 4:50 pm MW **Lab Time:** 3:00 - 5:50 pm T
Lecture Location: Eng D102 (Mondays), Titan Studio (Wednesdays)
Lab Location: TBA for each lab, or GIS Classroom, C205
Class website: https://ramct.colostate.edu/ The RamCT website will be used to post lab assignments, lecture notes, additional instructional material, announcements, etc.
Course Prerequisite: CIVE 322 / ENVE 322 or permission of course instructor

OVERVIEW

The goal of this course is to teach a variety of experimental measurement and data analysis techniques in the context of water measurements. This course will cover the principles, methods, instruments, and equipment for measuring water quantity and water quality variables in nature.

Course Objectives:
Upon completion of this course you will have:

- Developed a clear understanding of river and stream field measurement techniques.
- Used water quality and quantity data collected in the field in advanced modeling tools to solve engineering problems.
- Analyzed experimental data with a variety of universal data analysis techniques.
- Become familiar with software packages commonly used in industry and research.
- Conducted independent research and written a research paper.

COURSE LOGISTICS

Reading assignments:
There is no formal textbook for this course. Each week, you will be required to read an assigned journal article that is relevant to that week's lecture and laboratory material. My intention is that this will expose you to recent advancements in research, get you accustomed to reading scientific literature, develop your critical thinking skills, and improve your scientific communication and writing ability.

Before class each Monday, you should upload to the course website a short (< 1 page) summary of that week's article that addresses the following questions: What is the motivation for the study? What methods were used in the study? What were the major findings? Additionally, please think of discussion questions and bring them up during lecture. To encourage you to actually do the reading, these article summaries make up a small but significant part of your grade. No late article summaries will be accepted, and they will be graded on a check / check-plus / check-minus system.

Lectures:
In a typical week, Monday's lecture will introduce the concepts necessary for that week's lab. Wednesday classes meet in a computer lab (Titan Studio) because frequently these will be interactive sessions with computer-based exercises designed to introduce techniques for data analysis.

Labs:
Lab locations will vary from week to week and you are responsible for getting yourself there. For the outdoor labs, you will be given the lab location ahead of time and we will meet at the site with the goal of starting to collect data by 3:30 pm. I will drive to the labs and can take up to 3 passengers; I will leave the Engineering parking lot at 3:00 pm, and if you want to ride with me just let me know ahead of time.

Lab write-ups are due no later than the 2nd Friday following the lab session. No late lab write-ups will be accepted. While labs will be done collectively, lab write-ups must be done individually. All lab write-ups must be computer generated, with attached field records when appropriate. **CIVE 521 – Fall 2014, Lab Number, and Your Name** must be printed on the top of the first page. The lowest laboratory write-up grade will be dropped. All write-ups should be submitted through the course website.

The lab write-ups should concisely state what you did, why you did it, what you found, and what you learned. In general, the following structure will be sufficient for lab write-ups (although individual labs may have different requirements, which will be detailed in the lab handout):

- Lab Objectives (a bulleted list)
- Methods (numbered or bulleted list- 1 page maximum)
- Computer generated plots of the data collected in the lab
- Short answers to any questions in the laboratory handout

Project

There will be one semester long independent project that will be chosen by the student. The goal of this research project is to get you to collect and analyze data and communicate your findings in the form of a journal article. The student may choose to analyze their data from their current research, a topic of their choosing, or I will provide suggestions for a topic. The projects must be approved by me. The final report will be a short research paper written as if it were to be submitted to Geophysical Research Letters (see http://publications.agu.org/author-resource-center/author-guide/text-requirements/ for text requirements and a link to the AGU author style guide). GRL has a length requirement that the article be 12 "publishing units" or less; this is calculated as Total publishing units = # of words/500 + # of figures + # of tables. It is challenging to write concisely!

The project will be due on the last day of classes. Prior to that, I ask you to email or meet with me to discuss your research question and have it approved early in the semester, and submit a brief progress report with preliminary results prior to Fall Break.

Project Deadlines:

September 29, 2014	Meet with Dr. Nelson, turn in research question
November 17, 2014	Progress report with initial results
December 12, 2014	Final reports due

Course Evaluation

Lab reports and exams will be weighted as follows:

Weekly reading summaries	15%
Lab write-ups	50%
Project	30%
Participation in class/lab	5%

* Grading will be assigned according to a fixed grade scale and use the +/- grade system as described in the CSU catalog.

Academic Integrity

This course will adhere to the CSU Academic Integrity Policy as found in the General Catalog (http://www.catalog.colostate.edu/FrontPDF/1.6POLICIES1112f.pdf) and the Student Conduct Code (http://www.conflictresolution.colostate.edu/conduct-code). At a minimum, violations will result in a grading penalty in this course and a report to the Office of Conflict Resolution and Student Conduct Services.

The academic integrity policies specific to this course are as follows: (1) Students may work together on the data analysis portions of their laboratory write-ups and the independent projects, (2) Students may

consult with other faculty or professionals on the data analysis portions of the lab reports and independent projects. For the independent projects the students will acknowledge the people who contributed to the project in a section called acknowledgements, (3) Students will write the lab write-ups and project report independently and will not plagiarize (i.e., citations will be used appropriately).

Tentative class schedule (subject to change depending on weather conditions and availability of guest lecturers)

Date		Lecture	Lab	Reading
Aug	25	Introduction to Hydrometry	No lab	
	27	Bankfull/USGS Data		
Sept	1	Labor Day - NO CLASS	USGS gage/Bankfull	No reading this week
	3	Scientific writing discussion	Cache la Poudre at Lincoln Street	
	8	Review of surveying techniques	Stream surveying	Draut et al 2011
	10	Analyze survey data	Edora Park	
	15	Flow measurement	Flow measurement	Parsons et al 2013
	17	computer lab - distributions and Matlab	Cache la Poudre at Lee Martinez Park	
	22	Channel roughness in natural systems / GPS surveying	Manning's n / GPS	Cavalli et al 2008
	24	computer lab - uncertainty	Cache la Poudre at Shields St.	
	29	Environmental tracers	Tracer fate and transport	Moore, 2004a,b and 2005
Oct	1	tracer lab data analysis	Edora Park	
	6	Sediment sampling	Surface sediment analysis	Warrick et al 2009
	8	Sediment sample analysis	Cache la Poudre at Overland Trail	
	13	River ecosystems and hypothesis testing	Stream ecology / macroinvertebrate sampling	Cover et al 2008
	15	computer lab - hypothesis testing, statistical significance, and power	Edora Park	
	20	CLP guest lecture? - or limnology	Electrofishing	McNaughton et al 2014
	22	computer lab - regression	Cache la Poudre at Lee Martinez Park	
	27	Sediment transport measurements and calculations	Velocity profiles and sediment transport	Venditti et al 2010
	29	Analyze flume data	ERC	
Nov	3	GIS and LiDAR	GIS lab - delineating drainage networks	Passalacqua et al 2012
	5	(work on lab)	GIS classroom	
	10	Hydraulic modeling overview	HEC GeoRAS	de Almeida and Rodriguez 2012
	12	(work on lab)	GIS Classroom	
	17	Turbulence	PIV demo / turbulence	Gunawan et al 2012
	19	computer lab - autocorrelation	Dasi Lab	
	24	NO CLASS OR LAB: Fall Recess		
	26			
Dec	1	Topographic differencing	DEM differencing lab	Pelletier and Orem 2014
	3	(work on lab)	GIS Classroom	
	8	Stream classification	No lab	Montgomery and Buffington 1997
	10	Course summary and wrap up		
	12	n/a	Projects due (last day of classes)	