

CIVE 514 HYDRAULIC STRUCTURES/SYSTEMS

COLORADO STATE UNIVERSITY

Fall 2013

Instructor: Dr. Timothy K. Gates, B209 Engineering, 491-5043, tkg@engr.colostate.edu
Office Hours: 10 - 11 Monday, 2:30 - 4 Wednesday, or by appointment

Objectives: The aim of this course is to develop for the students (1) insight into the basic physical principles that govern the control of flows in hydraulic systems, (2) analytical and mathematical skills needed to describe and predict flow conditions in hydraulic structures, and (3) an ability to effectively apply these principles and skills to the analysis and design of structures in hydraulic systems.

Tentative Schedule:

Dates	Topics
26 August	Introduction to the Course
26 – 30 August	Principles of Hydraulic Systems Analysis Classification and Use of Structures for Flow Control
30 August – 25 September	Channel Regulating Structures Weirs Broad-crested Weirs (Free and Submerged Flow) Sharp-crested Weirs (Free and Submerged Flow) Sluice Gates Vertical Sluice Gates (Free and Submerged Flow) Radial Sluice Gates (Free and Submerged Flow) Hydraulic Jumps Downstream of Sluice Gates Diversion Barrages (containing sluices and weirs in parallel)
25 September – 4 October	Channel Intake and Outlet (Diversion) Structures Gated Pipe Diversion Structure Weirs and Sluice Gates as Diversion Structures
4 – 14 October	Flow Measurement Structures Parshall Flumes (Free and Submerged Flow) Cutthroat Flumes (Free and Submerged Flow) Long-throated Flumes (Free and Submerged Flow)
14 October	Review for Midterm Exam
16 October	<i>Midterm Exam</i>
18 October – 22 November	Dam Spillways Ungated and Gates Ogee Crests Gate Piers Dam Freeboard in Relation to Spillway Crest Shaft Spillways Design of Spillways (Crest Elevation, Dimensions, and Shape) Energy Dissipation Structures Hydraulic Jumps (Sequent Depths, Length, Profile) Stilling Basins Roller Buckets and Flip Buckets Design of Stilling Basins Dam Bottom Outlet Works
23 - 30 November	THANKSGIVING BREAK
1 – 11 December	Culvert Flow and Design Stochastic Analysis of Hydraulic Structures
13 December	Course Review
17 December	<i>Final Exam (4:10 – 6:10PM)</i>

Text: Selected journal articles and handouts.

References: Novak, P., et al. 2007. *Hydraulic structures*. 4th Ed. Taylor and Francis, London.
Mays, L. W. , ed. 1999. *Hydraulic design handbook*. McGraw-Hill

Website: http://www.engr.colostate.edu/CIVE514/course_info.html

Homework: **This course will adhere to the Academic Integrity Policy of the Colorado State University General Catalog (page 7) and the Student Conduct Code (<http://tilt.colostate.edu/integrity/honorpledge/index.cfm>)** . The Honor Pledge (attached) with a place for the student's signature must be applied to every exam and assignment turned in for this course. Please make sure that you read, understand, and comply with the **Policy on Academic Integrity in CIVE 514** statement on the class website.

Reading assignments from handouts and papers will be made for which students will be held accountable. Analytical and design problems will be assigned throughout the semester. Many problems will require solution using *Excel* spreadsheets. Brief written reports on selected hydraulic structures also will be required. **No late homework will be accepted.**

Grading: Homework Problems and Reports (written and oral) – 40% of grade; Mid Semester Exam – 25%; Final Exam – 35%.

A: 90-100%
B: 80-89%
C: 70-79%
D: 60-69%
F: <59%

Introduction to Instructor:

Born in Texas, I was raised with my younger brother and sister in Louisiana, where my mother still lives (you can probably detect the accent). I completed my BS degree at Louisiana Tech University in 1978 and my MS degree at Colorado State University in 1980. After working for several years, I attended the University of California at Davis where I completed my PhD degree. In 1988, I accepted a position on the Civil and Environmental Engineering faculty here at Colorado State University. I am associated with the Hydraulic Engineering and the Water Resources Planning & Management divisions of our department. Over the course of my career, I have had the opportunity to work on water projects in Egypt, Sri Lanka, India, and Australia and have lectured in China and in Vietnam.

I teach a variety of courses, primarily related to hydraulic engineering and fluid mechanics. My research focuses on field and computational analysis for description, design, and management of hydraulic and water resources systems. My specialty is in hydrosystems for irrigation and drainage, particularly open-channel surface water systems and phreatic ground water systems. Much of my work has examined how to describe, simulate, and optimize such systems subject to various forms of uncertainty. I have some interesting research projects currently that address the characterization and improvement of flow, water quality, and water conservation in rivers, in shallow unconfined aquifers, and in irrigation systems.

My wife of 37 years, Valerie, and I are blessed with two sons, both now grown. Jeremy is a medical doctor serving in U.S. Army, stationed at Fort Benning in Georgia, and currently is deployed in Afghanistan. He is married to Robin. Benjamin is a loan officer for a commercial bank here in town, and is married to Katie. We are proud grandparents of Emmi (8 years), Cade (7 years), Halle (3 years), children of Jeremy and Robin, and Everette (3 years), and Penny (1 year), children of Ben and Katie. Valerie is the consummate craftswoman: she loves quilting, needlepoint, cross-stitching, stenciling, interior decorating, and cooking. My sons participated in baseball, basketball, and soccer while they were at home. We also have enjoyed camping and skiing as a family. Reading, working in our yard and gardens, and spending time visiting with people are some of my favorite pastimes. Recently, my wife and I enjoyed re-reading J. R. R. Tolkien's *The Hobbit* aloud. I'm currently enjoying reading Stephen Meyer's new book, *Darwin's Doubt: The Explosive Origin of Animal Life and the Case for Intelligent Design*, and Rick Atkinson's *An Army at Dawn: The War in North Africa, 1942 - 1943*.

I am a Christian. I believe that nature is chock-full of countless examples of the Creator's intelligent design. I believe that Truth and Right exist in a real and objective sense, that they can be found in Christ and should be pursued, and that they bring blessing to those who embrace them. My convictions as a Christian form my world-view and guide the way I strive, under God's grace, to conduct my personal and professional life. Even though I enjoy my engineering and academic endeavors a great deal, I don't view them as the most important things (MITs) in life. I welcome the opportunity to chat with students outside of class about these MITs.

I look forward to getting to know you this semester, not only academically and professionally, but also personally. I take seriously my responsibility to help you learn hydraulic structures and systems. Please keep me informed of your concerns about the course.

T. K. Gates

CSU Student Honor Pledge

I pledge on my honor that I have not received or given any unauthorized assistance in this exam [assignment] [academic work].

Signature: _____

Date: _____