

Engineering 174, Spring 2007
Practice in Civil Engineering: Water Resources
Course Information

All the rivers run into the sea; yet the sea is not full; unto the place from whence the rivers come, thither they return again. Ecclesiastes 1:7

Water-resources engineering is concerned with the design of systems that control the quantity, quality, timing, and distribution of water to support both human habitation and the needs of the environment. The technical and scientific bases for most water-resources specializations are found in the areas of fluid mechanics, hydraulics, hydrology, contaminant fate and transport processes, and water-treatment processes.

Virtually all civil engineering practice requires an understanding of and sensitivity to economic, technical, social and political forces and processes. This is particularly true in water resources engineering. The ability to provide clean water while remaining responsive to environmental and other social factors is at the heart of hydrology and hydraulic engineering. In this course, we will examine water systems from the perspective of both the engineer and planner. We will consider technical issues necessary to understand such systems, and examine the systems in their larger context.

This course can be counted toward the Engineering major as a technical elective and toward the Integrative Experience requirement for graduation.

1. Assigned Text: Water-Resources Engineering. David A. Chin. Prentice Hall.
2. Instructor: M. Cardenas Parsons 2378 x71249 mary_cardenas@hmc.edu
3. Course Components: As noted above, this course is both a technical elective and an IE course. As such, the course will require demonstration of technical skills and application of these skills to a relevant context. As such, students will complete several problem sets, 2 exams, a research paper and a public presentation. Because the topics being covered will often benefit from active discussion, class participation is also an integral part of the course.

A research paper of at least 20 pages, covering a topic that combines technical analysis and social impacts is required. The topic for the paper must be approved by the instructor, and a written draft must be submitted. The draft will be graded and incorporated into the final grade for the paper. Acceptable topics might include (but are not limited to) analysis of an existing or pending water resources project, review of proposed government rules for environmental impacts of water projects, evaluation of current or proposed water policies, and alternative designs for appropriate water conveying structures. Students will be asked to submit at least three topic ideas early in the course so that the faculty can approve an appropriate topic.

An in-class presentation (open to the public) of the paper is required for all students. The presentations and papers will be due before April 16 in order to avoid conflict with other obligations such as Clinic. No extensions will be approved.

Two take-home exams will be given.

4. Grading: The weighting of the assessed material will be as follows:

Homework	10%
Exam I	25%
Exam II	25%
Presentation	10%
Paper	25%
Class participation	5%
5. Web page: <http://www3.hmc.edu/~cardenas/e174.html>

6. Syllabus (as of 1/15/07—Chapter listings for 2nd edition)

Week 1: Introduction. Hydrology. Chapters 1, 5.

Week 2: Hydrology, fluids review. Chapters 5, 2.

Week 3: Fluids, pipes. Chapters 2.

Week 4: Open channel flow, stormwater management. Chapters 3,5.

Week 5-7: Social impact.

Week 8: probability. Chapter 4, **EXAM I (March 8th)**

Week 9: Spring Break.

Week 10: Probability and statistics. Chapter 4.

Week 11-12: **In-class presentations**

Week 13: **In-class presentations**, Groundwater and surface water, Chapter 6.

Week 14: Fate and transport

Week 15: Fate and transport, modeling. **EXAM II (April 26th)**

Major deadlines:

27 February: Three potential paper topics, along with a one-paragraph description of each topic.

6 March: Paper topic approved.

8 March: Exam I.

27 March: Paper draft due.

27 March-10 April: In-class presentations.

17 April: Final paper due.

26 April: Exam II.