

**Engineering 174, Spring 2005**  
**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. Instructors: M. Cardenas Parsons 2378 x71249 [mary\\_cardenas@hmc.edu](mailto:mary_cardenas@hmc.edu)  
P. Little Parsons 2362 x71712 [little@hmc.edu](mailto:little@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. Students are expected to complete several problem sets, 2 exams, and participate actively in the analysis of a major water resources project. This participation will include development of large document much like a preliminary environmental impact statement, and a public presentation of the findings. Because the topics being covered throughout the course benefit from active discussion, class participation is also an integral part of the course.

The college's IE requirement includes an individually written paper of at least 20 pages, covering a topic that combines technical analysis and social impacts. We intend to satisfy that by a large group project in which we will evaluate the possible environmental consequences of constructing a series of dams in a canyon in Orange County, California. This topic and the time limits of the course lend themselves to dividing the research areas among several teams and working groups before undertaking the individual sections of the larger study. Students should be prepared to begin working on the IE paper very early in the course and continuing on throughout the semester. The documents are being prepared on behalf of an interested party, but it is essential that all analysis be conducted and reported in as unbiased and intellectually honest manner as possible. Students will satisfy the IE requirement for public presentation by presenting their findings to the interested party and their Board of Directors. The presentations and papers will be due on or before April 15 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 1/9/04)

Week 1: Introduction. Hydrology. Chapters 1, 6.

Week 2: Hydrology, EIS. Chapters 6.

Week 3: Fluids, pipes. Chapters 2, 3.

Week 4: Pipes, open channel flow, stormwater management. Chapters 4,6.

Week 5: Stormwater management, social impact.

Week 6-7: Social impact.

Week 8: **EXAM I** (March 10<sup>th</sup>)

Week 9: Spring Break.

Week 10: Probability and statistics. Chapter 5.

Week 11: Groundwater. Chapter 7.

Week 12: Groundwater, surface water. Chapter 7.

Week 13: Surface water, presentations.

Week 14: Fate and transport, modeling. Chapter 8.

Week 15: **EXAM II** (April 28<sup>th</sup>)

**Major deadlines:**

**22 February: Research summary**

**1 March: Paper outline and study plan**

**10 March Exam I**

**31 March: Paper draft**

**14 April: Final paper and presentation**

**28 April: Exam II**