

UNIVERSITY OF CINCINNATI

DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING 20 CEE 493 HYDRAULIC SYSTEMS

Spring Quarter 2009
TR 11:00 AM – 12:15 PM
533 Baldwin

Prof. Dominic Boccelli
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Lecture and Reading Schedule

| Date-Class Day | Brief Outline of Topics | Textbook Readings |
|----------------|--|---------------------------------|
| Mar 31 1 | Course Outline, Concept Hieracrhy, Continuity Bernoulli's Theorem, Energy in Steady Incompressible Flow | 4.7 5.1–5.3 5.5, 5.6, 5.8 |
| Apr 2 2 | Hydraulic and Energy Grade Lines, Solution of Flow Problems | 5.11–5.14 |
| Apr 7 3 | Laminar/Turbulent Flow, Reynolds Number, Friction Loss Laminar and Turbulent Flow | 4.2, 8.1–8.6 8.7–8.11 |
| Apr 9 4 | Pipe Roughness | 8.12–8.14 |
| Apr 14 5 | Single Pipe Solutions | 8.15–8.17 |
| Apr 16 6 | Empirical and Nonrigorous Head-loss Eqns Minor Losses and Pumps, and Single Pipe Solutions | 8.18–8.19 8.20–8.28 |
| Apr 21 7 | Branching Pipes, Pipes in Series | 8.29–8.30 |
| Apr 23 8 | Pipes in Parallel | 8.31 |
| Apr 28 9 | Pipe Networks | 8.32 |
| Apr 30 10 | Review | |
| May 5 11 | EXAM #1 | |
| May 7 12 | Uniform Flow, Open Channels, “Wide and Shallow” | 4.3, 10.1–10.5 |
| May 12 13 | Efficient Cross Section, Energy Principles in Open Channel Flow | 10.6, 10.9–10.11 |
| May 14 14 | Energy Principles in Open Channel Flow, Gradually Varied Flow | 10.12–10.15 |
| May 19 15 | Surface Profiles, Hydraulic Jump | 10.16–10.18 |
| May 21 16 | Water Pump, Head | 15.1–15.3 |
| May 26 17 | Performance Characteristics | 15.4–15.7 |
| May 28 18 | Selection of Pumps, Pumps in Series and Parallel | 15.12–15.13 |
| Jun 2 19 | OPEN | |
| Jun 4 20 | Overflow, Review | |
| FINALS | EXAM #2 | |

Description: This course provides an overview of fundamental topics in engineering hydraulics. It builds on the concepts and material learned in Fluid Mechanics to provide a broad coverage of topics ranging from pipe flows to open channel flow and design. This course is intended to bridge the gap between fundamental understanding of basic fluid principles and hydraulic engineering design.

Lectures: Lectures will meet Tuesdays and Thursdays at 11:00 AM in 533 Baldwin Hall. We will closely follow the textbook and other reference material as outlined in the schedule above. The course content is defined by the material presented in lectures, so regular attendance is advisable. Scheduled office hours will be held 4:00–5:00 PM on Monday and 3:00–4:00 PM on Wednesday [subject to change] or by appointment.

Text: Fluid Mechanics with Engineering Applications (2002), Finnemore and Franzini, 10th ed.

Selected Readings:

- Open-Channel Hydraulics (1959), Chow.
- Open Channel Flow (1966), Henderson.

References:

- Fundamentals of Hydraulic Engineering Systems (1996), Hwang and Houghtalen, 3rd ed.
- Water Resources Engineering (2002), Wurbs and James.
- Water Resources Engineering (2006), Chin, 2nd ed.

Homework: Problem sets will be distributed throughout the quarter. There will be a total of five to six problem sets. Problem sets will be due one to one-and-a-half weeks after being distributed. The solution sets will be provided electronically.

Exams: There will be a mid-term and a final exam. Previous final exams have been either been comprehensive or covering the 2nd half of the course material. During the exams, you may bring in a one page (letter size) summary [subject to change].

Grades: Class attendance and participation (5%), Homework (20%), and Exams #1 and #2 (75% [total]). Unless otherwise mentioned in class, Exam #2 will not be comprehensive, and each exam will be weighted equally.

Policies: Assignments may be turned in late with prior permission from the instructor under reasonable conditions. Otherwise, late assignment grades will be reduced by 10%; assignments turned in after solutions are posted will only receive 50% of the remaining grade (after losing the 10%/day), and will not be higher than the lowest grade given to any homework set submitted on-time. I encourage students to discuss homework sets and solution techniques. However, every student must do their own work (unless otherwise specified). In the event the students submit “copied” assignments, each student involved will receive 50% of the grade.