



CE323 Hydraulic Engineering and Design

Spring 2018

Catalog Description: (4 units) Open channel flow, natural streams and waterways, hydrologic analysis and design, pressure flow, analysis and design of pipe networks and pump systems.

Prerequisite(s): C E 218, Advanced Standing.

Course Objectives: To obtain the background theory and the basic design procedures for topics in hydraulics, hydrology and water resources engineering.

ABET outcomes:

Primary

- C. Ability to design a system, component, or process to meet desired needs

Secondary

- A. Apply mathematics, science and engineering principles
- D. Ability to function on multidisciplinary teams
- E. Ability to identify, formulate, and solve engineering problems
- G. Ability to communicate effectively
- K. Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

Instructor: Kevin Lansey

Class time & place: MF 9:00-9:50; W 8:00-9:50 @ Harshbarger Rm. 206;

Office Hours: By appointment

Review Sessions: TBA

Office: CE 206

e-mail: lansey@email.arizona.edu (PLEASE DO NOT USE THE D2L EMAIL)

Textbook: Water Resources Engineering, 2nd ed., L. Mays, Wiley, 2010. (ISBN 978-0-470-46064-1). Other materials will be supplied through course D2L website

Evaluation

Homeworks and quizzes	18%
Design Projects (3)	15%
Tests (2)	42%
Final Exam	25%

Exams will be closed book. I will provide a packet of equations, tables and figures that I will distribute before the exam for study purposes.

Homework assignments will be announced in class and must be submitted **at the start of class** on the assigned due date. No late assignments will be accepted, including assignments turned in during or at the end of the class.

Topic	Reading
Course Introduction. Energy and momentum eq. – Design of thrust blocks	4.1-4.4
Series and Parallel Pipe Flow. Branching Pipe Flow – Newton’s method	4.5
Water Distribution Systems – Hardy Cross method	12.4, 12.6
Pumps: Introduction. Specific Speed. Net Positive Suction Head. Pump Characteristics. <i>Project 1: EPANET</i>	12.2, 12.5
Pump System Analysis.	12.5
Introduction to Hydrology. Precipitation. IDF Curves.	7.1-7.2
Rational Method. Rainfall-runoff. Unit Hydrographs. <i>Project 2: PC-Hydro.</i>	8.1-8.3
Test I (through pump system analysis – Week of Feb. 19 or Feb. 26)	
SCS Rainfall Runoff, Curve Number Method, SCS Synthetic Unit Hydrographs.	8.6, 8.7, 8.8
Open Channel Flow, Roadway Drainage.	5.1, 16.1, 15.1-2.4, 15.3
Hydraulic Design of Culverts. <i>Project 3: HY8</i>	16.2
Test II (through culvert design)	
Specific Energy. Gradually Varied Flow. Water Surface Profiles. Direct and Standard Step Methods.	5.2-5.3.1
Water Surface Profiles. Direct and Standard Step Methods. Rapidly Varied Flow.	5.3-5.5
Detention pond design	15.4
Scour and sediment analysis	6.5
Introduction to Probability and Risk for Hydrologic Design	10.1-10.5

Final Exam: Thursday May 10, 2018 10:30 am - 12:30 pm

Do not make travel plans until after the final.

Projects and Project Teams

EPANET is an individual project. HY-8 and PC-Hydro projects may be done in groups of up to 3 students. You need to form your own group and notify me of its composition

A written report is required for each project. It should be typed in a professional format (double spaced), and it should include your objectives, introduction, description of the system, a brief review of theory, some discussion of the design process, a description of the final design and alternatives, results and conclusions, and references. *A guideline for project reporting will be posted on the D2L site.*

Academic Integrity

Principle Integrity and ethical behavior are expected of every student in all academic work. This Academic Integrity principle stands for honesty in all class work, and ethical conduct in all labs and clinical assignments. This principle is furthered by the student Code of Conduct and disciplinary procedures established by ABOR Policies 5-308 through 5-404, all provisions of which apply to all University of Arizona students.

This Code of Academic Integrity (hereinafter "this Code") is intended to fulfill the requirement imposed by ABOR Policy 5-403.A.4 and otherwise to supplement the Student Code of Conduct as permitted by ABOR Policy 5-308.C.1.

Failure to follow the code of academic integrity will result in failing the course and be reported to the Dean of Students' office.

Prohibited Conduct: Conduct prohibited by this Code consists of all forms of academic dishonesty, including, but not limited to:

- 1 Cheating, fabrication, facilitating academic dishonesty, and plagiarism as set out and defined in the Student Code of Conduct, ABOR Policy 5-308-E.6, E.10, and F.1
- 2 Submitting an item of academic work that has previously been submitted without fair citation of the original work or authorization by the faculty member supervising the work.
- 3 Violating required professional ethics rules contained or referenced in the student handbooks (hardcopy or online) of undergraduate or graduate programs, or professional colleges.
- 4 Violating health, safety or ethical requirements to gain any unfair advantage in lab(s) or clinical assignments.
- 5 Failing to observe rules of academic integrity established by a faculty member for a particular course.
- 6 Attempting to commit an act prohibited by this Code. Any attempt to commit an act prohibited by these rules shall be subject to sanctions to the same extent as completed acts.

Student Responsibility

Students engaging in academic dishonesty diminish their education and bring discredit to the academic community. Students shall not violate the Code of Academic Integrity and shall avoid situations likely to compromise academic integrity. Students shall observe the generally applicable provisions of this Code whether or not faculty members establish special rules of academic integrity for particular classes. Students are not excused from complying with this Code because of faculty members' failure to prevent cheating.

ABET 2010 Criteria Course Classification Form

Course Number CE 323 Course Name Hydraulic Engineering
 Required? Circle: **YES** / NO Semester/Instructor Spring 2010 – Juan Valdes
 Homework Frequency weekly Exam Frequency Two (2) midterms & one (1) final
 Course Project? Circle: YES / **NO** Labs or Case Studies? Circle: YES / **NO**

For each of the following ABET outcome criteria, please list the level (**H**igh, **M**edium, **L**ow, or blank if not applicable) contained in this course. The criteria descriptions that will be used by the College in the ABET evaluation are attached. Please describe the relevant course activities that you can use to justify why you think your course meets the criteria. **No course is expected to address all of these criteria and it would be rare to have more than 2 or 3 criteria at a high level (except a capstone course)** Be conservative in your judgment. For the ABET evaluation, we will assess student performance for criteria that are judged High. If you judge your course as High in a criteria, then the course should include a large percentage of effort (class time, homework, projects) devoted to the criteria. Note that 2 extra table entries are available for departments to specify their own criteria.

Outcome criteria	Level H M L	Relevant Activities
A. Apply mathematics, science and engineering principles	M	Ten (10) homework assignments two (2) tests; final exam; and five (5) design assignments
B. Ability to design and conduct experiments and interpret data		
C. Ability to design a system, component, or process to meet desired needs	H	Five (5) design assignments
D. Ability to function on multidisciplinary teams	L	Design assignments are done in teams
E. Ability to identify, formulate, and solve engineering problems	M	Same as above
F. Understanding of professional and ethical responsibility		
G. Ability to communicate effectively	M	Produce reports on design assignments
H. The broad education necessary to understand the impact of engineering solutions in a global context		
I. Recognition of the need for and an ability to engage in life-long learning		
J. Knowledge of contemporary issues		
K. Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	M	Use several state-of-the-practice software tools in homework and design assignments