

Fall 2015

ENCE 4318

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UNIVERSITY OF NEW ORLEANS
DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING

ENCE 4318
HYDRAULIC ENGINEERING SYSTEMS

CATALOG DESCRIPTION

ENCE 4318 Hydraulic Engineering Systems 3 cr.
Classification of flows. Application of continuity, energy and momentum principles to hydraulic systems. Similitude in hydraulic models. Application of hydrostatics to hydraulic structures including preliminary design of gravity and arch dams. Friction concepts. Flow in pipe networks. Pumping systems. Application of basic principles to open channel flow. Concepts of critical flow, uniform flow, and hydraulic jumps. Design of non-erodible and erodible channels. Steady gradually varied flow in open channels. Design of hydraulic structures.

PREREQUISITES for ENCE 4318 and 4319
ENCE 3318 or ENME 3720 and ENME 3716.

CO-REQUISITES: ENCE 4318 and 4319 must be taken concurrently

TEXTBOOK: Elementary Hydraulics by James F. Cruise; Mohsen M. Sherif; Vijay P. Singh, Thomson, 2006.

LECTURES: Tuesday and Thursday: 1:00-2:15 PM, EN 319

INSTRUCTOR: Donald E. Barbe', Ph.D., P.E., F.ASCE
Office: EN 821
Phone: 280-6283
email: dbarbe@uno.edu

OFFICE HOURS: Tuesday and Thursday: 12:15-1:00PM
On-line: TBA
OR by appointment

GRADING SCHEME

ATTENDENCE:	10%
TESTS: 4 @ 15% each	60%
DESIGN REPORTS: 2 @ 15% each	30%
FINAL EXAM:	15%

(I will drop your lowest TEST 15%)

GRADING SYSTEM:

- A 90 and up
- B 80 to 89
- C 70 to 79
- D 60 to 69
- F Below 60

GENERAL COURSE OBJECTIVE (ENCE 4318) : To familiarize the students with the application of the basic principles of fluid mechanics to problems associated with pipe and open channel flows. The applications in this course will involve pipelines, pipe networks, flow measurement, flow in rivers, design of canals, and hydraulic structures.

SPECIFIC COURSE OBJECTIVES (ENCE 4318) : On the successful completion of this course the students should have the ability to:

- a) understand and applied the continuity equation to steady open-channel flows and steady incompressible pipe flows;
- b) understand and applied the energy principle to steady open-channel flows and steady incompressible pipe flows;
- c) understand and applied the momentum principle to steady open-channel flows and steady incompressible pipe flows;
- d) apply the principles of hydrostatic to hydraulic structures.
- e) apply the Manning Equation for uniform open channel flow;
- f) compute water surface profiles for gradually varied steady flow;
- g) compute the steady state operating flow and head for a pipeline with a pump;
- h) design a culvert with inlet or outlet control.

REFERENCE BOOKS AND OTHER MATERIAL

1. Robertson, Cassidy and Chaudhry, Hydraulic Engineering, Houghton Mifflin, 1988.
2. Handouts.
3. Terry W. Sturm, (2001) "Open Channel Hydraulics", McGraw-Hill Book Co., New York, NY.
4. Ven te Chow, (1959) "Open Channel Hydraulics", McGraw-Hill Book Co., New York, NY.
5. US Army Corps of Engineers. Hydraulic Design Manuals
6. EPANET Manual.
7. HECRAS Manual.
8. Computer Applications in Hydraulic Engineering, Haestad Press, www.haestad.com

TOPIC OUTLINE

Tentative Schedule

Chapter	Topic
1	Introduction
2	Fluid Properties
3	Forces Motion and Energy
4	Hydrostatics
5	Governing Equations
6	Dimensional Analysis and Hydraulic Similarity
7	Flow Resistance and Velocity Distribution
8	Closed Conduit Flow
9	Pumps
10	Channel Geometry
11	Resistance in Open Channels
12	Energy Principles in Open Channels
13	Momentum Principle in Open Channels
14	Gradually Varied Flow
15	Computation of Water Surface Profiles
16	Design of Hydraulic Controls and Structures

*ENCE 4319 is integrated with the theory in ENCE 4318 Tutorial/laboratory of 3 hours/week.

GENERAL INSTRUCTIONS ON THE ADMINISTRATION OF THE CLASS:

- 1) The nature of this course is such that attendance is required in order to maintain the requisite continuity to pass the course. If you cannot attend class for some reason, call the instructor or the Engineering secretary and explain why. You must sign in on a sign-in sheet passed around during class.
- 2) You should read all assignments and take and maintain detailed notes. All students are encouraged to ask questions and to enter into class discussions. The instructor is unable to determine the degree of understanding by each student. For this reason it is each student's responsibility to ask for clarification of any topic he feels is needed.
- 3) Students are expected to conduct themselves according to the principles of academic integrity as defined in the statement on Academic Dishonesty in the UNO Student Code of Conduct. Any student or group found to have committed an act of academic dishonesty shall have their case turned over to the Office of Student Accountability and Advocacy for disciplinary action which may result in penalties as severe as indefinite suspension from the University. Academic dishonesty includes, but is not limited to: cheating, plagiarism, fabrication, or misrepresentation, and being an accessory to an act of academic dishonesty.
- 4) Assignments that are turned in late will have 10 points per class deducted.
- 5) In case of withdrawal from the course or resignation from the University, the course grade will be determined from the work completed according to the grading schedule.
- 6) I am generally available with the exception of those times when I am in class, busy with my research work or other university and professional duties. Please make an appointment.
- 7) It is University policy to provide, on a flexible and individualized basis, reasonable accommodations to students who have disabilities that may affect their ability to participate in course activities or to meet course requirements. Students who seek accommodations for disabilities must contact the Office of Disability Services prior to discussing their individual needs for accommodation with their instructors.
- 8) Be in class on time. Please do not come five, ten, or twenty minutes late. Distracting interruptions are inconsiderate, disrespectful, and time-wasting. There is no excuse for repeatedly arriving late. Parking is often a hassle; allow enough time for it. Cell phones should be turned off before class begins.
- 9) Feel free to ask questions of the instructor during class. But please do not ask other students, as talking disturbs my concentration and the concentration of other class members.
- 10) Students are expected to treat faculty and fellow students with respect. Any actions that purposefully and maliciously distract the class from the work at hand will not be allowed.
- 11) Civility in the classroom and respect for the opinions of others is very important in an academic environment. It is likely you may not agree with everything that is said or discussed in the classroom. Courteous behavior and responses are expected.
- 12) Students must have Internet access to www.uno.edu and the Moodle portion of ENCE 4318. All communications, including the posting of grades will be done through Moodle. Students are responsible for all e-mail communications from the instructor to their UNO email account. Help with Moodle can be accessed at <http://www.uno.edu/moodle>.
- 13) Students are expected to fully participate in all classroom activities. Full participation means that students arrive on time, have prepared for class by completing all assignments, and are ready for active and purposeful engagement with the topic at hand.