Spring 2024

CE 320 - 002, 102: FLUID MECHANICS

Thomas Olenik

Thomas Olenik
2023-08-17 10:49:28

@Spring2024@njit.edu Please view this document. You can also comment on it.

CEE 320 –Sections 002 and 102: FLUID MECHANICS

Lectures Section 002 and Section 102 Revised December 2023

Instructor **Dr. Thomas Olenik P.E.**
Colton Hall 227
olenik@njit.edu
973-596-5895

Office Hours: 9AM -9PM WEBEX (except in class) Email for appointment Webex(Access code 927 78 446); in person on class days

Prerequisite See course catalog This course is designed to present the fundamental laws relating to the static and dynamic behavior of fluids. The emphasis is placed on applications dealing with the flow of water and other incompressible fluids. These include flow in pipe systems and open channels/gravity flow. Design applications are included in this course.

Required Textbook/REQUIRED

Hibbeler, Fluid Mechanics, 3rd Edition/electronic version

Students must purchase the master engineering access codes from the NJIT bookstore or at www.masteringengineering.com, No other sources are acceptable, (you cannot stay in the course if you do not have the access code) The access codes for the Spring 2024 semester are: olenik73157 for the day section(002) and olenik05052 for the evening section(102). Please see the grading policies shown below. All reading and homework assignments are shown on the Pearson Website. Students must make sure their names appear on the NJIT and Pearson rosters

Course Description

Course Objectives (General): Analysis of fluid properties, hydrostatic forces, incompressible flow principles; design of water distribution systems; open channel flow design of gravity systems; flood plain analysis

By the end of this course, the student will be able to:

1. an ability to identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors
3. an ability to communicate effectively with a range of audiences

4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

This program is accredited by the Engineering Accreditation Commission of ABET, http://abet.org.

POLICIES & PROCEDURES

Academic Integrity: It is expected that NJIT's University Code on Academic Integrity will be followed in all matters related to this course. Refer to NJIT's Dean of Students website to become familiar with the Code on Academic Integrity and how to avoid Code violations.

https://www.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf

Communication: Email and Webex

Lectures/Class: all course items can be freely discussed and questioned in class

Handouts: in class and Canvas

Homework: All assignments are available on the Pearson Website for this course.

Homework Format: Pearson website.

Late Homework: not accepted

Homework Solutions: in class and Canvas

***The NJIT Honor Code will be upheld, and any violations will be brought to the immediate attention of the Dean of Students.**

Exams: The use of electronic devices (other than calculators) is strictly prohibited during class hours. (Severe Penalties May)

Course Grading: Every other week there will be a short quiz given during one of the class periods. Each quiz will be worth 30 points and it is anticipated there will be at least 6 short quizzes. The passing grade on each quiz is 21, any student who fails 3 or more quizzes must withdraw or fail the course irrespective of any other grades. There will be no midterm exam. A 100 point final exam will be given during the normal exam period. The final grade will be based on the percentages shown below based upon the final point total

The assigned problems shown on the Pearson website are worth 30 points total

The minimum requirements for final letter grades are as follows:

A =90-100%, B+ = 85-89%, B = 80-84%, C+ = 70-79%, C = 60-69%, D = 50-59%, F < Below 50%

Instructor Commitment: You can expect the Instructor to be courteous, punctual, organized, and prepared for lecture and other class activities; to answer questions clearly; to be available during office hours or to notify you beforehand if office hours are moved; to provide a suitable guest lecturer or pre-recorded lecture when they are traveling or unavailable; and to grade uniformly and consistently.

Students with Documented Disabilities: NJIT is committed to providing students with documented disabilities equal access to programs and activities. If you have, or believe that you may have, a physical, medical, psychological, or learning disability that may require accommodations, please contact the Coordinator of Student Disability Services located in the Center for Counseling and Psychological Services, in Campbell Hall, Room 205, (973) 596-3414. Further information on disability services related to the self-identification, documentation and accommodation processes can be found on the webpage at: (http://www.njit.edu/counseling/services/disabilities.php)

Course Schedule: See Pearson website for dates of weekly assignments and exam dates

WEEK	TOPIC	READING ASSIGNMENT	PROBLEMS
1	INTRODUCTION CHAPTER	See Pearson Website(SPW)	See masteringengineering assignments (All Weeks)

2&3	Fluid Statics (Chapter 2)	SPW	
4&5	Fluid Flow Concepts (Chapter.3) Conservation of Mass (Chapter 4)	SPW	
6&7	Fluid Flow Concepts (Chapter.3) Conservation of Mass (Chapter 4)	SPW	
9	Fluid Momentum (Chapter 6)	SPW	
10&11	Analysis and Design of Pipe Flow (Chapter 10)(Chapter 14*)	SPW	
12&13	Open Channel/gravity Flow (Chapter 12)	SPW	
14	Modeling/Similitude (Chapter 8) (including Chapter Review)	SPW	
FINAL	DATE TO BE DETERMINED		

Course Objectives Matrix - CE 320 – FLUID MECHANICS

Schedule: Weekly
Professional Component: ENGINEERING COMPONENT
Program Objectives Addressed: 1,2
Prepared By: PROF. OLENIK

Strategies and Actions		ABET Student Outcomes (1-7)	Program Educational Objectives	Assessment Methods/Metrics
Course Objective 1: Define fluid properties and statics utilizing the principles developed in previous mechanics courses.				
Illustrate basic fluid properties and fluid statics.		1	1	Weekly homeworks and quizzes
Discuss the design of structures impacted by fluids.		1	1,2	Weekly homeworks and quizzes
Course Objective 2: Develop the principles and equations for pressure flow and momentum analysis.				
Develop the continuity and Bernoulli equations and friction loss equations.		1	1	Design problems
Provide distinct and detailed examples of how these equations are utilized in design.		1,2	1,2	Design problems
Course Objective 3: Design water distribution and pressure flow systems (pressure flow, pumps and network analysis).				
Provide design solutions and examples for pumping and network analysis.		2	1	Design problems..
Introduce actual engineering design problems.		2	1,2	Design problems.
Course Objective 4- Illustrate and develop the equations and design principles for open channel flow. Included in this objective is sanitary and storm sewer design and flood control hydraulics (varied flow).				

Develop the principles of open channel flow and introduce Manning's Equation.		1	1	Homework and quizzes
Provide design principles for sanitary and storm sewer design along with drainage analysis.		2	1	Homework and quizzes
Introduce the varied flow principles and their application. Discuss The use of software-based solutions such as HEC-RAS		2,7	1,2	Homework and quizzes.

CEE Mission, Program Educational Objectives and Student Outcomes

The mission of the Department of Civil and Environmental Engineering is:

- to educate a diverse student body to be employed in the engineering profession
- to encourage research and scholarship among our faculty and students
- to promote service to the engineering profession and society

Our Program Educational Objectives are reflected in the achievements of our recent alumni:

1. Engineering Practice: Alumni will successfully engage in the practice of civil engineering within industry, government, and private practice, working toward safe, practical, resilient, sustainable solutions in a wide array of technical specialties including construction, environmental, geotechnical, structural, transportation, and water resources.
2. Professional Growth: Alumni will advance their technical and interpersonal skills through professional growth and development activities such a graduate study in engineering, research and development, professional registration and continuing education; some graduates will transition into other professional fields such as business and law through further education.
3. Service: Alumni will perform service to society and the engineering profession through membership and participation in professional societies, government, educational institutions, civic organizations, charitable giving and other humanitarian endeavors.

Our Student Outcomes are what students are expected to know and be able to do by the time of their graduation:

1. an ability to identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning