

**Department of Civil, Environmental and Construction Engineering
University of Hawaii at Manoa**

CEE320 FLUID MECHANICS FUNDAMENTALS

Instructor: Dr. Jonghyun Harry Lee (808-956-7658; jonghyun.harry.lee@hawaii.edu).

Office hours: By appointment (Walk-in: Holmes Hall 336)

Teaching Assistant: TBA

Textbook: “Fluid Mechanics: Fundamentals and Applications, 4e, Y.A. Cengel and J.M. Cimbala, McGraw-Hill, New York, 2017” with access to McGraw-Hill (MH) Connect web-based course system from Laulima

Class Meetings: TBA

Laulima: Class and lab material will be posted to Laulima <https://laulima.hawaii.edu/portal>. Lectures will follow the textbook so students can use the textbook for the same information. Any lecture or lab material not found in the textbook, will be posted. Exam solutions will not be posted.

Homeworks: Homework is assigned once a week or every two weeks through MH Campus, except during the midterm weeks. Additional traditional paper-work based homework may be assigned and this homework is expected to be neat and understandable.

Lab Sessions: Lab lectures will be given in Holmes Hall 244 followed by Lab *experiments* conducted in Holmes Hall 142, Hydraulics Lab where students will be brought down in groups of 5 to perform experiments. All lab reports are due one week after each experiment. Detailed lab report format and requirements will be discussed in the lab sessions.

Exams: Midterm and Final Exams are non-comprehensive, closed book exam. One 5” x 8” index card (two-sided), a programmable calculator, and pencils will be allowed into the exam. No cell phones, or laptops allowed. Scratch paper will be provided, do not bring your own. Exam, index card, and scratch paper will be collected at the end of the exam. Common errors to exams will be discussed during class and students will have an opportunity to look at their exam in class and afterward through office hours. Students who submit identical work to each other and previous years, exams and labs, will share the score divided by the number of the students with the identical work.

Grading: The course grade will be based on the formula: Lab and participation 20%, Exam 1 20%, Exam 2 20%, Final exam: 20%, Homework 20%. Letter grades will follow the scale A+: 100-97, A: 96-93, A-: 92-90, B+: 89-87, B: 86-83, B-: 82-80, C+: 79-77, C: 76-73, C-: 72-70, D+: 69-67, D: 66-63, D-: 62-60, and F: below 60.

Writing Requirement for CEE320

Please note that CEE320 is designated as a Writing Intensive (W) class. To satisfy the W requirement, there will be several writing assignments. The students must complete all the writing assignments in order to pass this class.

Here is the detailed information and requirement:

1. Each student needs to write two individual lab reports related to the engineering plotting, and buoyancy experiment.
2. Students also need to write three group lab reports on the three experiments related to the Venturi meter, pipe friction and valve head loss in a pipe flow. Each group usually consists of five students. Every student needs to contribute to the group report.
3. There is a design project on a special topic of the hydraulic jump experiment. Each student group needs to write a minimum 10 page report on this project as well.
4. Each report – individual or group – will be at least 10 pages long. All texts, figures and plots must be done on a computer. Handwritten works will not be accepted.
5. The reports and design project will be graded by the TA and/or instructor.
6. The students' reports will be graded based on grammar, writing style, content, technical correctness, and completeness. Written comments, feedback and corrections will be provided on each report.
7. After the graded lab reports are returned to the class, the TA or instructor will explain orally in class the common errors and problems observed in the students' reports, and discuss ways to correct and improve the reports.
8. Whenever needed, the TA or instructor will meet with a student individually to help the student improve his or her writing.

Required statement from the UH Manoa Writing Board for W courses: “Students must adequately complete all writing assignments to pass the course with a D- grade or better. Students who do not complete all writing assignments will fail the course.”

Course Outline/Tentative Schedule

<u>Date</u>	<u>Topics</u>
Lecture 1	Introduction
Lecture 2	Basic Concepts
Lecture 3	Fluid Properties
Lecture 4	Fluid Properties
Lecture 5	Fluid Statics/Pressure
Lecture 6	Fluid Statics/Hydrostatic conditions
Lecture 7	Fluid Statics/Hydrostatic forces on surfaces (1)
Lecture 8	Fluid Statics/Hydrostatic forces on surfaces (2)
Lecture 9	Fluid Statics/Hydrostatic forces on surfaces (3)
Lecture 10	Fluid Statics/Hydrostatic forces on surfaces (4)
Lecture 11	Fluid Kinematic (1)
	Midterm Exam #1
Lecture 12	Fluid Kinematic (2)
Lecture 13	Control Volume
Lecture 14	Continuity Equation
Lecture 15	Momentum Equation (1)
Lecture 16	Momentum Equation (2)
Lecture 17	Bernoulli's Equation (1)
Lecture 18	Bernoulli's Equation (2)
Lecture 19	Bernoulli's Equation (3)
	Spring Break
	Midterm Exam #2
Lecture 20	Dimensional Analysis (1)
Lecture 21	Dimensional Analysis (2)
Lecture 22	Dimensional Analysis (3)
Lecture 23	Similitude
Lecture 24	Steady Pipe Flow (1)
Lecture 25	Steady Pipe Flow (2)
Lecture 26	Steady Pipe Flow/Turbulent Flow (1)
Lecture 27	Steady Pipe Flow/Turbulent Flow (2)
Lecture 28	Turbulent Pipe Flow/ Differential Analysis/CFD
	Final Exam