Course Code	CIVL 2510 (Spring 22-23)
Course Title	Fluid Mechanics
Class Time & Venue	Two 1.5-hour lectures per week
Instructor	Jiachuan Yang ( <u>cejcyang@ust.hk</u> )
Course Credits	3
Class Quota	180
Prerequisites	MATH 2011/CIVL 2110
Course Description	An introduction to the mechanics of fluids, including fluid statics, kinematics and fundamental equations of fluid flow, laminar and turbulent flow, boundary layers and applications in the design of hydraulic structures
Course Objectives	At the end of this course, students will be able to:
	1. Understand fluid properties and behavior under various conditions of internal and external flows
	<ol> <li>Analyze static and dynamic fluids using fundamental laws and basic equations;</li> </ol>
	3. Recognize the importance of fluid mechanics in civil and environment engineering
Topics	<ul> <li>Fluid Definitions, Scales and Dimensions</li> <li>Fluid Properties</li> <li>Dimensional Analysis</li> <li>Fluid Statics</li> <li>Fluid Kinematics</li> <li>Conservation laws</li> <li>Mass Conservation</li> <li>Momentum Conservation</li> <li>Energy Conservation</li> <li>Bernoulli Equation</li> <li>Pipe Flow</li> </ul>
Intended Learning Outcomes (ILOs) of this course	On successful completion of this course, students are expected to be able to:
	1. Describe the fundamental concepts of fluid mechanics
	2. Apply basic equations to determine pressure by static fluid
	3. Analyze fluid flows with fundamental laws including mass, momentum, and energy conservation
	4. Apply principles of dimensional analysis to conceptualize and simplify real problems

	5. Understand the broad application of fluid mechanics in civil and environmental engineering
Relationship to the program objectives	<b>PEO1:</b> Provide students with professional skills in the design, construction and management of the civil infrastructure, as well as an awareness of environmental sustainability.
	This course provides students with fundamental knowledge of fluid mechanics, including fluid statics, fluid kinematics, pipe flow.
Relationship to program outcomes	<b>PO1:</b> Acquire fundamental knowledge in mathematics and science on which civil and environmental engineering research and practice are based.
	Students have to apply knowledge in mathematics and science in this course.
	<b>PO2:</b> Understand fundamental principles of engineering science relevant to civil engineering disciplines.
	Students will learn static and dynamic fluids under various conditions.
	<b>PO3:</b> Acquire an ability to conduct experiments, analyze and interpret results, and appreciate the importance of experimental data in establishing empirical relationships and parameters for analysis and design.
	Students will conduct measurement experiments in lab and analyze the results.
	<b>PO5:</b> Develop an ability to identify and formulate civil and environmental engineering problems, and propose feasible solutions with an appreciation of their underlying assumptions, uncertainties, constraints, and technical limitations.
	Students have to identify and formulate assumptions in solving fluid mechanics problems.
Textbook / Reference material	DF Young, BR Munson, TH Okiishi, & WW Huebsch, Introduction to Fluid Mechanics, 5thEd, Wiley, 2012
	DF Elger, BA LeBret, CT Crowe, & JA Roberson et al., Engineering Fluid Mechanics, 10thEd, Wiley, 2013
Assessment of outcomes	This course contributes to the assessment of program outcomes as follows:
	<ol> <li>Lab report (15%) allows for assessment of students' experimental skills and willingness to participate in learning environment.</li> </ol>
	<ol> <li>Homework assignments (20%) with related examples allow for reinforcement and assessment of students' mathematical knowledge and understanding of fundamental principles.</li> </ol>
	3. Mid-term (30%) and Final exams (35%) allow for assessment of students' ability to apply knowledge learnt in class to solve engineering problems.
Last modified	13 Jan 2023