Subject Code	CSE10252
Subject Title	Fluid Mechanics
Credit Value	3
Level	1
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This subject aims to: (1) familiarize students with the basic concepts and principles of fluid mechanics; (2) enable students to acquire basic laboratory techniques of fluid mechanics; and (3) train students to apply the basic principles to explain and solve practical fluid mechanics problems.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Master the basic principles and essential concepts of fluid mechanics, including fluid properties, hydrostatics, fluid kinematics, continuity, momentum, and energy equations; b. Acquire basic laboratory techniques to study fluid mechanics problems; c. Derive useful fluid mechanic formulas and models, with an understanding of the underlying principles, assumptions, and their limitations; d. Apply the aforementioned knowledge in solving typical fluid mechanics problems;
Subject Synopsis/ Indicative Syllabus	1. <u>Fundamental Concepts</u> (3 weeks) Definitions of basic fluid properties: density, specific weight, pressure, bulk modulus, compressibility, Newton's equation for viscosity and shear stress, saturation pressure and surface tension. Units and dimensions. 2. <u>Fluids at Rest</u> (4 weeks) Hydrostatic pressure calculation and measurement for plane and curved surfaces. Thrust on submerged surfaces. Equilibrium of submerged and floating bodies. Free body motion of liquid in containers, including the cases of constant acceleration and constant angular velocity. 3. <u>Fluid Kinematics</u> (1 week) Classification of flows. Lagrangian and Eulerian descriptions. Flow visualization: streamlines, pathlines, and streaklines. Deformation of fluid elements. 4. <u>Fluids in Motion</u> (5 weeks) Control volume and surface. Conservation of mass, energy, and momentum. Applications of continuity, energy, and momentum equations. Flow measuring devices: Pitot tube, orifice meter, venturi meter weirs, and notches. 5. <u>Laboratory Work</u> Hydrostatic force; V-notch; Venturi meter; and Jet impact.

Teaching/Learning Methodology	(1) Basic principles of fluid mechanics will be discussed in lectures; (2) Tutorials will be conducted mainly in the form of examples and problem-solving sessions related to topics covered during lectures; (3) Laboratory work will introduce students to real situations, enable students to appreciate the limitations of derived theories and provide the opportunity to use flow-measuring instruments.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Homework, quizzes, laboratory reports, and mid-term tests	30	✓	✓	✓	✓
2. Final Examination	70	✓		✓	✓
Total	100				

Students must attain at least grade D in both coursework and final examination (whenever applicable) in order to attain a passing grade in the overall result.

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: A student will demonstrate successful completion of all the outcomes by achieving a grade C or above on 1 mid-term test, 2 laboratory reports and a final examination.

Student Study Effort Expected

	Average hours per week
Class contact:	
▪ Lectures/ Tutorials/ Laboratory	3 Hrs.
Other student study effort:	
▪ Reading and study	3 Hrs.
▪ Completion of assignments and laboratory reports	3 Hrs.
Total student study effort	9 Hrs.

Reading List and References

(1) Potter, M.C. and Wiggert D.C. (2012). *Mechanics of Fluids.* (4th ed.).Cengage Learning

(2) Cengel, Y.A., and Cimbala, J.M. (2010). *Fluid Mechanics: Fundamentals and Applications. (*2nd ed. in SI units). McGraw Hill

(3) Douglas, J.F., Gasiorek, J.M., Swaffield, J.A. and Jack, L.B. (2005). *Fluid Mechanics* (5th ed.). Pearson/Prentice Hall

(4) Streeter, V.L., Wylie, E.B. and Bedford, K.W. (1998). *Fluid Mechanics. (*9th ed.). McGraw Hill.