FI343 Fluid Physics

Module name:	Fluid Physics	
Module level, if applicable:	Undergraduate	
Code:	FI-343	
Sub-heading, if applicable:	-	
Classes, if applicable:	-	
Semester:	3rd	
Module coordinator:	Judhistira Aria Utama	
Lecturer(s):	Judhistira Aria Utama	
Language:	Bahasa Indonesia	
Classification within the curriculum:	Compulsory course	
Type of Teaching	Contact hours per week during the semester	Class Size
1. Lecture (conceptual, contextual and problem-solving approaches through expository, discussions and presentation). 2. Structured activities (assignments based on conceptual, contextual and problem-solving approaches, Presentation) 3. Self-study (reading literature)	1 hour 40 minutes	35
Workload:	The total workload is 91 hours/5440 minutes (3.2 ECTS) per semester, consisting of 25 hour 20 minutes/1400 minutes lectures (0.82 ECTS), 28 hours/1680 minutes structured activities (0.98 ECTS) and 28 hours/1680 minutes self-study (0.98 ECTS) per week for 14 weeks, 11hour 54 minutes/714 minutes for two exams (0.42 ECTS).	
Credit points:	3.2 ECTS	
Pre-requisites course(s):	FI121 Basic Physics I, FI222 Mathematical Physics I	
Course Learning Outcomes (CLO):	After taking this course, the students have ability to: CLO1: Explain the basic principles of fluid physics and to describe various types of fluid flow that are encountered in everyday life. CLO2: Determine the variation of pressure in a fluid at rest and calculate the pressure and momentum exerted by a fluid at rest against the flat and curved walls of an immersed plane. CLO3: Describe Lagrangian and Eulerian: velocity fields and acceleration fields. CLO4: Apply Reynolds transport theorem. CLO5: Differences in the characteristics of laminar and turbulent flow based on the Reynolds number.	

<table>
<tr><td></td><td>CLO6: Identify the various forces and momentum acting on the control volume.
CLO7: Describe the usefulness and limitations of the Bernoulli equation in its application to various fluid flow problems.
CLO8: Explain the general properties of internal flow: laminar, transition, and turbulent.
CLO9: Explain the general properties of external flow, the concept of drag and lift and be able to determine the magnitude and direction of these forces
CLO10: Apply the concept of similarity and be able to apply it in experimental modeling.
CLO11: Design and construct simple educational teaching aids as a medium for learning fluid physics in independent work and teamwork</td></tr>
<tr><td>Content:</td><td>(i)FLUID STATICS includes measures of mass and fluid weight, laws, principles, and basic equations, variations in static fluid pressure, hydrostatic forces on flat and curved surfaces; (ii) FLUID KINEMATICS including velocity field, acceleration field, Reynolds transport theorem, laminar flow, turbulent flow; (iii) FLUID DYNAMICS includes Newton's second law, Bernoulli's equation and the application limitations of Bernoulli's equation, viscous flow in pipes, flow in immersed bodies (lift and drag), and dimensional analysis & modelling.</td></tr>
<tr><td>Study/exam achievements:</td><td>The final mark will be weight as follow:
<table>
<tr><th>No</th><th>CLO</th><th>Assessment Object</th><th>Assessment Techniques</th><th>Weight</th></tr>
<tr><td>1</td><td>CLO1 – CLO10</td><td>Subject specific competences:
a. Weekly Task
b. Exam:
- Mid exam
- Final exam</td><td>

Written

Written test
Written test</td><td>

20%

30%
30%</td></tr>
<tr><td>2</td><td>CLO 11</td><td>c. Presentation</td><td>Performance</td><td>20%</td></tr>
<tr><td colspan="4">Total</td><td>100%</td></tr>
</table></td></tr>
<tr><td>Forms of media:</td><td>Board, LCD Projector, Laptop/Computer</td></tr>
<tr><td>Literature:</td><td>1. Cengel, Y.A. & Cimbala, J.M. (2017). Fluid Mechanics: Fundamentals and Applications 4th Edition. McGrawHill
2. Munson, B.R. dkk. (2018). Fundamentals of Fuid Mechanics 8th Edition. John Willey and Sons Inc.
3. Massey, B. S., & Ward-Smith, A. J. (2018). Mechanics of fluids. Crc Press.
4. Franz Durst. (2008). Fluid mechanics an introduction to the theory of fluid flows; with 13 tables. Berlin Heidelberg Springer.</td></tr>
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PLO and CO mapping

	PLO1	PLO 2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1		√										
CLO2		√										
CLO3		√										
CLO4		√										
CLO5		√										
CLO6		√										
CLO7		√										
CLO8		√										
CLO9		√										
CLO10		√										
CLO11		√										