

(Fluid Mechanics) Course Catalogue

2023-2024

College	Erbil technology	
Department	Petroleum technology	
Module Name	Fluid Mechanics	
Module Code	FM205	
Semester	2	
Credit	7	
Module type	Assist.	
Weekly hours	4	
Weekly hours (Theory)	(2) hr Class	(196)hr Workload
Weekly hours (Practical)	(2)hr Class	()hr Workload
Lecturer (Theory)	Dr Shara Kamal Mohammed	
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Lecturer (Practical)	Dr Shara Kamal	
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Course Book

Course overview:

- This course provides a fundamental understanding of Fluid mechanics in the oil industry. It presents theoretical and practical background besides modules to calculate fluid flow and behaviours in the operation units. For this reason, problems and solutions are included throughout the course.

Course objective:

The objectives of the course are

1. understanding basic laws, principles and phenomena in the area of fluid mechanics
2. solve simplified examples of fluid mechanics
3. theoretical and practical preparation enabling students to apply the acquired knowledge in oil industry.

Student's obligation

Students should be prepared for discussion during the class as they will be provided with the lecture in advance. They will be asked to solve problems during the class and will also be given homework for each subject. In addition, a continuous system of quizzes will be applied throughout the semester to evaluate students' progress. Finally, they will be asked to prepare reports and seminars.

Forms of teaching

- Submit the homework (HW) by the day before the class.
- Attend practical class and actively participate in group worksheet activities.
- Submit your individual worksheet by the end of the practical class.
- Test students knowledge through quizzes, midterms, and final.

Assessment scheme

10% Mid. Theory exam

15% Mid. Practical exam

8% Quiz

5% Homework

10% Reports and Seminars

2% Attendance

40% final theory

Student learning outcome:

At the end of the course, student will:

1. define basic terms, values and laws in the areas of fluids properties, statics, kinematics and dynamics of fluids, and hydraulic design of pipes,
2. describe methods of implementing fluid mechanics laws and phenomena while analyzing the operational parameters of hydraulic problems, systems and machines,
3. practically apply tables and diagrams, and equations that define the associated laws
4. calculate and optimize operational parameters of hydraulic problems, systems and machines,
5. explain the correlation between different operational parameters,
6. select engineering approach to problem solving based on the acquired physics and mathematical knowledge.

- Course Reading List and References:

References

Gerhart, P. M., Gerhart, A. L., & Hochstein, J. I. (2016). Munson, Young and Okiishi's fundamentals of fluid mechanics. John Wiley & Sons.

Cengel, Y., & Cimbala, J. (2013). Ebook: Fluid mechanics fundamentals and applications (si units). McGraw Hill.

Textbooks:

Gerhart, P. M., Gerhart, A. L., & Hochstein, J. I. (2016). Munson, Young and Okiishi's fundamentals of fluid mechanics. John Wiley & Sons.

. Source links:

https://drive.google.com/file/d/12aDFXV-zcFU9mUkgRE8VbmKY4frgNpiu/view?usp=drive_link

Course topics (Theory)	Weak	Learning Outcome
<p>1. Introduction:</p> <p>Fluid mechanics, fluid dynamics, shear stress, fluid characteristics, difference between liquids and gases, The arrangement of atoms in different phases, fluids properties, density, viscosity, problems and solutions.</p>	1,2	Understanding the fundamentals of fluid mechanics and learn to solve problems
<p>2. Pressure in Fluids</p> <p>Atmospheric pressure, gauge pressure, vacuum pressure, absolute pressure, pressure differential, Pressure-Density-Hight Relationships, Problems and solutions</p>	3,4	Understanding the deference between different type of pressure and learn how to measure or calculate each type.
<p>3. Fluid Statics</p> <p>Hydrostatic: application of hydrostatics, factors affecting the pressure of the fluid, hydrostatic paradox, hydrostatic lift, force on a plane-side wall, continuity equation, problems and solutions.</p>	5	Understanding the application of hydrostatics and learn to solving problems
<p>4. Fluid dynamics</p> <p>Fluid in motion Conversion of energy in flowing liquid, Bernoulli's equation: venture tube flowmeter, Orifice plate flowmeter, liquid draining from a tank, problems and solution.</p>	6, 7	Understanding the principles of flow measurements and solving problems

<p>5. Force Summation of force, parallelogram theory, Determination of force component (graphically and analytical methods), resultant of force. Problems and solutions</p>	<p>8,9</p>	<p>Understanding the theory of force determination and learning how to calculate the resultant of force through solving different examples.</p>
<p>6. Moment of force, equilibrium, Moment of force, equilibrium. Problem and solutions.</p>	<p>10</p>	<p>Learn how to calculate equilibrium and the moment of forces</p>
<p>7. Laminar and turbulent flow Laminar flow, turbulent flow, Reynold number, problems and solutions.</p>	<p>11</p>	<p>Introduce different types of flow and learn how to apply the Reynolds number in different cases.</p>
<p>8. Hydrostatic force on a plane surface Hydrostatic force on a plane surface problems and solutions.</p>	<p>12</p>	<p>Understanding the hydrostatics force on a plane surface and solving problems.</p>
<p>Course topics (Practical)</p>	<p>Weak</p>	<p>Learning Outcome</p>
<p>1. Introduction</p>	<p>1</p>	<p>Lab induction</p>
<p>2. Density</p>	<p>2</p>	<p>Learn how to measure density using two different methods</p>
<p>3. Viscosity</p>	<p>3</p>	<p>Learn how to determine viscosity</p>

