COURSE Syllabus

Course Name: Fluid Mechanics

Course Number: 0408303 + 04033131

General Information and Course Details:

Course title	Fluid Mechanics
Course number	0408303 + 04033131
Credit hours (theory, practical)	3h (theory)
Contact hours (theory, practical)	3h in three times weekly
Prerequisites/corequisites	0408221 Applied Mechanics (Statics) + 0402202 Engineering Analysis (2)
Program title	Renewable Energy Engineering
Program code	REE
Awarding institution	Isra University
Faculty	Faculty of Engineering
Department	Renewable Energy Engineering Department
Level of course	Third year
Year of study and semester (s)	2022/2023 1st Semester
Final Qualification	B.Sc.
Other department (s) involved in teaching the course	None
Language of Instruction	English & Arabic
Date of production/revision	2022/2023

Course Coordinator:

Office No.: 4309

Office Hours: Wed: 12:00 – 14:00

Email: mohanad.alghriybah@iu.edu.jo

Other Instructors:

Office No.:

Email:

Office Hours:

Course Description:

Fluid and their properties. Fluid Statics. Kinematics of fluid flow. Conservation equations and their application: Euler's equation applications, Bernoulli's equation applications, Dimensional analysis and similarity.
Pipe flows, Calculations of head losses.

Text Book: *Author(s), Title, Publisher, Edition, Year, Book website.*

Clayton T. Crowe, Engineering Fluid Mechanics, 9th,2009

References: *Author(s), Title, Publisher, Edition, Year, Book website.*

Required book (s), assigned reading and audio-visuals:

1. Yunus A. Cengel, & Jojn M. Cimbala, Fluid Mechanics – Fundamentals and Applications – 2nd Edition, McGraw Hill, New York, (2006), ISBN: 0-07-111566-8

2. Introduction to Fluid Mechanics 7th Edition R.W. Fox, P.J. Pritchard and A.T. McDonald John Wiley, New York, 2009, ISBN: 970-471742999

3. Advanced Fluid Mechanics W.P. Graebel Elsevier, New York, 2007, ISBN: 978-0-12-370885-4

Course Educational Objectives (CEO):

1.	To cover the basic principles of Fluid Mechanics.
2.	To present a wealth of real-world engineering applications to give students a feel for engineering Fluid mechanics Applications.
3.	To develop an intuitive understanding of the subject matter by emphasizing the physics and physical arguments.

Intended Learning Outcomes (ILO's):

After successful completion of this course, you should be able to: Intending Learning Outcomes (ILO's)		**Relationship to CEO**	**Contribution in Program PLOs**
A	**Knowledge and Understanding**		
A1	Describe the physical properties of a fluid and demonstrate the application point of hydrostatic forces on plane and curved surfaces.	1	1+2
A2	Describe the principles of motion for fluids and the areas of velocity and acceleration and Identify how to derive basic equations and know the related assumptions.	1	1+2
B	**Intellectual skills**		
B1	Calculate the pressure distribution for incompressible fluids, the hydrostatic pressure and force on plane and curved surfaces	1+2	1+2
B2	Formulate the motion of fluid element	1+2	1+2
C	**Subject specific skills**		
C1	Use the dimensional analysis and derive the dimensionless numbers and apply the equation of the conservation.	1+2+3	1+2

Topic Outline and Schedule:

Topic	Weeks	Achieved ILOs
Review of Fluid Properties (Properties Involving Mass and Weight, Ideal Gas Law, and Properties Involving Thermal Energy).	**2 weeks**	**A1, A3, A5, B3**
Viscosity, Bulk Modulus of Elasticity, Surface Tension.	**1 week**	**A1, A3, A5, B3**
Fluid Statics (Pressure, Pressure Variation with Elevation and Pressure Measurements).	**2 weeks**	**B1, B2, B3**
Forces on Plane Surfaces (Panels), Forces on Curved Surfaces, and Buoyancy	**2 weeks**	**B1, B2, B3**
Descriptions of Fluid Motion, Acceleration, Euler's Equation, Pressure Distribution in Rotating Flows, The Bernoulli Equation Along a Streamline, Rotation and Vorticity, The Bernoulli Equation in Irrotational Flow,	**2 weeks**	**A2, A3, A5,B1, B2, B3**
Rate of Flow, Control Volume Approach, Continuity Equation	**2 weeks**	**A2, A3, A5, B3, C1**
Flow in Pipes.	**2 weeks**	**A2, A3, A4, A5, B3, C1**
Flow over Bodies: Drag & Lift	**2 weeks**	**A2, A3, A5, B3, C1, C2**
Final exam	**16th**	

Teaching Methods and Assignments:

Development of ILOs is promoted through the following teaching and learning methods:

Lectures

Lab hands on

Lab hands on & on line

DELIVERY *Face-to-face, Distance learning, etc.*	Distance learning
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	**Use of ICT teaching for notes, references communication with students.**
TEACHING METHODS *The manner and methods of teaching are described in detail.* *Lectures, seminars, Quizzes, laboratory practice, fieldwork, YouTube videos, study and analysis of bibliography, tutorials, art workshop, interactive teaching, educational visits, project, essay writing, etc.*	• Online exams (Mid + Final) • Quizzes • Videos • Homework including analysis of Of some engineering problems

Evaluation Methods and Course Requirements:

Opportunities to demonstrate achievement of the ILOs are provided through the following assessment methods and requirements:

Attendance
Students should attend every class meeting for the entire course period. If you miss class, it is your responsibility to obtain announcements and assignments.
How to success – ***Active s haring and cooperation, on time, prepared.***

Grading Policy:

1. **Midterm** **35%**
2. **Assignments and technical reports** **15%**
3. **Final Examination** **50%**

Academic Assistance

- Homework is due to the beginning of class on the due date.
- At least one project during the term.
- Any potential conflicts have to be discussed before the exam dates.
- Quizzes in-class will be given and there will be no make-up quizzes.
- Final Exam (50%).
- Copying of assignments or other means of duplicating materials that is turned for grading is **forbidden.**
- Cheating on exams will result in a zero grade for the exam or the whole course.

At any point in the semester, if you encounter difficulty with the course or feel you could be performing at a higher level, consult with me.

Academic support for Students with Disabilities – Students who may need assistance due to a disability are encouraged to ask for a support.

Course Policies:

A- Attendance policies:
15% of 48 lecturing hours
B- Absences from exams and handing in assignments on time:
Exam can retake based on approval of excuse from dean
Not handing assignment on time will result in zero mark
C- Health and safety procedures: NA
D- Honesty policy regarding cheating, plagiarism, misbehavior:
Cheating, plagiarism, misbehavior may result in zero grade
E- Grading policy:
- All homeworks are posted on line
- All quizzes and exams are provided with solution for perfect score

F- Available university services that support achievement in the course: Labs, Software, Simulation programs

Required equipment:

Labs: None

Software:

Hardware: Later on.

Assessment Plan for the Course Learning Outcome (just select):

- ■ Midterm Online Exam.
- ■ Final Online Exam.
- ■ Quizzes.
- ■ Written Reports.
- ■ Homework.

- Term Projects.
- Case Study.
- Participation in Lecture.
- Illustrative Presentations.
- Oral Exams.
- Others (identify): Active attendance and on-time.

Program Learning Outcomes (PLOs)

1	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3	An ability to communicate effectively with a range of audiences
4	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Responsible Persons and their Signatures:

Course Coordinator	**Dr. Mohanad Al-Ghriybah**	**Completed Date**	/ / 2022
		Signature	
Received by (Department Head)		**Received Date**	/ /
		Signature	