جامعة آل البيت
دائرة ضمان الجودة والتخطيط

Al alBayt University

Faculty: Faculty of Engineering
Department: Department of Civil Engineering

Course Syllabus

Course Description

Fundamentals of fluid mechanics, physical properties of fluid, fluid statics, control volume approach (mass, momentum and energy conservation), Bernoulli equation, dimensional analysis, friction and head losses, flow in closed conduits.

Course Information

Course Title	Fluid Mechanics
Course Number	704361
Prerequisites	704241Statics (prerequisite) Engineering Mathematics (concurrent)
Total Credits	3 (lectures)

Text Book(s)

Title	Engineering Fluid Mechanics
Author(s)	**Elger, D.F.; Barbara, C.W.; Crow, C.T.; Roberson, J.A.**
Publisher	John Wiley and Sons
Year	2012
Book Website	https://www.academia.edu/37581876/Engineering_Fluid_Mechanics_10th_2012_Wiley_4790_.pdf
Edition	10th

References

Books	Fluid Mechanics, 2nd edition by R.C. Hibbler
Internet links	

Instructors

Instructors	Dr.Zain M. Al-Houri
Office Location	
Office Phone	
E-mail	zain.houri@aabu.edu.jo

Teaching Assistant

NA

Class Schedule & Room				
Section	**Time**	**Days**	**Room**	**Instructor**
1	10:00-11:00	Sunday, Tuesday, Thursday	Dean Building Hall#34	Dr.Zain Al-Houri

Office Hours		
Instructor	**Days**	**Time**
Dr.Zain Al-Houri	M,W	10:30-11:30 or by appointment
	S, T, Th	9:00-10:00 or by appointment

Evaluation		
Assessment Tool	**Expected Due Date**	**Weight**
First Exam	05/03/2020	25%
Second Exam	09/04/2020	25%
Worksheets/ Assignment/Short Quizzes	TBD	10%
Final Exam	TBD	40%

Course Objectives	
A.	To introduce fluid mechanics and establish its relevance in civil engineering
B.	To develop the fundamental practical and theoretical principles governing the behavior of static and flowing fluids and demonstrate how these are used in Civil Engineering.

No.	Course Learning Outcomes (CLOs)	Assessment Methods
1	Understand the basic concepts of fluid mechanics	
2	Knowledge of fluid properties (e.g. density, viscosity, compressibility)	
3	Measure and calculate pressure in engineered systems.	
4	Calculate forces on a submerged structure in a static fluid	
5	Knowledge of Euler's and Bernoulli's Equations for calculating pressure variations in a moving fluid	
6	Apply the momentum and energy equations to engineering problems	
7	Utilize Poiseuille's Law (laminar low) and the Moody Diagram (turbulent flow) to analyze frictional losses in pipeline systems.	
8	Evaluate head loss in pipes and conduits, graph energy grade lines and hydraulic grade lines of hydraulic systems.	

Class Schedule

Topics are indicated as a general guide. Coverage and schedule MAY CHANGE in accordance with the class progress

Topic	Chapters in Text	Related CLOs	Week No.
Introduction o Describing Fluid Mechanics o Liquids and Gases o Dimensions, units o Engineering Analysis	Ch.1		1
Fluid Properties o Properties involving Mass and Weight o Ideal Gas law o Viscosity o Bulk modulus of elasticity o Surface Tension o Vapor Pressure	Ch.2		2-3
Fluid Statics o Pressure o Pressure Variation with Elevation o Pressure Measurement o Forces on a Plane Surface o Forces on a Curved Surface o Stability of Immersed and Floating Bodies	Ch.3		4-6
First Exam (05/03/2020)			
Flowing Fluids and Pressure Variation o Description of fluid Motion o Acceleration o Euler's Equation o Pressure Distribution in Rotating Flows o The Bernoulli Equation Along a Streamline o Separation	Ch.4		7
Basic Control Volume Approach and Continuity Equation o Rate of Flow o Control Volume Approach o Continuity Equation o Cavitation o Different Forms of Continuity Equation	Ch.5		8-9
Momentum Equation o Momentum Equation derivation and interpretation o Common Application (Jet, nozzle, vane, bend)	Ch.6		10-11
Second Exam (09/04/2020)			
Energy Principle o Energy, Work and Power o General form of Energy Equation o Energy equation: Pipe flow o Power Equation o Hydraulic and Energy Grade Lines	Ch.7		12-13
Dimensional Analysis & Similitude o Needs for Dimensional Analysis o Buckingham II Theorem o Dimensional Analysis o Model Prototype Performance	Ch. 8		14
Flow in Conduits o Flow classification o Specifying Pipe sizes o Stress Distribution in Pipe flow o Laminar Flow in a Round Tube o Turbulent Flow and The Moody Diagram o Combined Head Loss	Ch.10		15
Final Exam (TBA)			

Teaching & Learning Methods

- **Class lectures:** Class lectures will expose students to the knowledge required by this course
- **Class Discussions:** Relevant issues will be discussed in class. These discussions are supposed to improve the students' communication and problem solving skills by motivating them to express their opinions.
- **Activity:** Students will be expected to work on a group activity. The activity could be in class work sheets, or small software project. In addition to improving the students' technical and analytical skills, these worksheets aims at improving the students' team work, and self-management.
- **Self-study:** Students will be required to study one of the assigned chapters as self-study. A number of questions from the self-study chapter will be included in the exam. This learning method aims at improving the students' learning skills.

Other Policies and Notes

Attendance	Students are expected to attend class and to come to class on time. In accordance with university regulations, **students missing more than 20% of total classes are subject to failure.** If you miss class, it is your responsibility to find out about any announcements or assignments you may have missed. Attendance will be recorded at the beginning or end of each class.
Participation	You are expected to participate in class. Participation includes asking and answering questions, raising issues, and suggesting solutions to the discussed problems.
Activity	Students are expected to work on an activity within a group of 2-3 students. The activity could be a small software project, or in class worksheets.
Exams	Exam dates are FIXED so please make all of your plans accordingly. The course includes two mid-term exams and a comprehensive final exam that will test student mastery of the stated learning objectives. All Exams are CLOSE-BOOK and notes . Computers/tablets/cell phones are not allowed on any exam. The format for the exams is generally as follows: multiple-choice, and solving questions.
Makeup Exams	Make-up exams will be given only if written documentation of the extenuating circumstance regarding the absence is provided and authenticated by the students through valid channels in AABU.Makeup exams may be different from regular exams in content and format.
Workload	Average work-load student should expect to spend is 4 hours/week.
University Policies Academic Dishonesty	DO NOT CHEAT. Quizzes and exams need to be done individually. Each student is responsible for securing his or her work from copying. Any student who copies material or knowingly allows it to occur will fail the assignment and perhaps fail the class Cheating or copying from neighbor on exam is an illegal and unethical activity and standard AABU policy will be applied.
Electronic Equipment Usage	Please turn off cell phones prior to entering the class, Surfing the web/texting during classes is considered negative class participation.
Miscellaneous	Bring your calculator with you to the class