Kurdistan Region Government
Ministry of Higher Education
and Scientific Research
Erbil Polytechnic University

ERBIL POLYTECHNIC UNIVERSITY
زانکۆی پۆلیتەکنیکی هەولێر

Module (Course Syllabus) Catalogue

2021-2022

College/ Institute	Erbil Technical Engineering College	
Department	Highway Engineering,	
Module Name	FLUID MECHANICS & HYDROLOGY	
Module Code	FMH305	
Degree	Technical Diploma ☐ Bachelor ☒ High Diploma ☐ Master ☐ PhD ☐	
Semester	3rd	
Qualification	PhD holder	
Scientific Title	Lecturer	
ECTS (Credits)	5	
Module type	Prerequisite ☐ Core ☒ Assist. ☐	
Weekly hours		
Weekly hours (Theory)	(3) hr Class	(5 credits *27=135) Total hrs Workload
Weekly hours (Practical)	(0) hr Class	(0) Total hrs Workload
Number of Weeks	16	
Lecturer (Theory)	Rawaz Kurda	
E-Mail & Mobile NO.	07505834949	
Lecturer (Practical)	None	
E-Mail & Mobile NO.	None	
Websites	https://academicstaff.epu.edu.iq/faculty/rawaz.kurda https://scholar.google.com/citations?user=KesSqb4AAAAJ&hl=ar&oi=sra	

Course Book

Course Description	The course focuses on analyzing different engineering problems and examining various aspects of the problem through focusing on each component through a holistic approach that recombines the different elements of the problem back into an integrated problem. Fundamentals of Fluid mechanics are learned through real life problem solving and they are set as basis for solving open ended questions. Additionally, this course is to understand fundamentals of engineering hydrology. It is the study of water in all its forms (rain, snow and water on the earth's surface), and from its origins to all its destinations on the earth. The study of hydrology that concerned mainly with engineering applications is known as applied hydrology. Engineering Hydrology deals with estimation of water resources, the study of processes such as runoff, precipitation and their interaction, the study of problems such as Floods, Droughts and strategies to overcome them.
Course objectives	- To familiarize the student basic principles and equations of fluid mechanics and show their application real life engineering example. - To give the students the correct intuition when comes to Fluids and their application - The student uses fundamentals of math needed for solving complicated problems - Brain storming on open ended problems and using learned method to get educated approximation for solving them. - The course will focus on explaining the background of Applied hydrology, - The application of hydrology in different engineering structures.
Student's obligation	Students should attend in all the lectures except what is allowed by university regulations. They should attend quizzes, exams and do their homework, this is in addition to the assignments which can carry considerable credits.
Required Learning Materials	All the lectures will be given with the aid of projector, using PowerPoint presentations. Students will have access to the handouts.

		Task	Weight (Marks)	Due Week	Relevant Learning Outcome
Evaluation		Paper Review			
	Assignments	Homework	14		
		Class Activity	2		
		Report	8		
		Seminar	8		
		Essay			

	Project	8	
	Quiz	2	
	Lab.	0	
	Midterm Exam	16	
	Final Exam	40	
	Total	100	

Specific learning outcome:	After successful completion of the course, students are expected to have: 1. understand the basic concepts of Fluid Mechanics (Recognize the various types of fluid flow problems encountered in practice.) 2. understand how the main concept of the Fluid Mechanics and Hydrology is used in the Civil Engineering (Water, Drainage and Sewerage) 3. model engineering problems and solve them in a systematic manner. 4. a working knowledge of accuracy, precision, and significant digits, and recognize the importance of dimensional homogeneity in engineering calculations.
Course References:	i. Fluid Mechanics Fundamental and application/ Yunus A Cengel /3th edition ii. Fundamental of Fluid Mechanics / Bruce R.Munson/ 7th edition iii. Fluid Mechanics / Frank M. White/ 7th edition iv. Water Resources Engineering, Chin, D.A., second edition. Printed in USA. Pearson, Prentice Hall. New Jersy 07458. 2006. v. Engineering Hydrology, K. Subramantya, Second Edition, McGraw – Hill Publishing Company, Reprint 2004. vi. Hydrology. Principles. Analysis. Design. H. M. Raghunath. New age international publishers. New Delhi. 2004. vii. Groundwater Hydrology, Todd, D.K., (third edition), Jhon Wiley & Sons, Third Reprint, Inc. India, 2007. viii. The Hand Book of Ground Water Engineering. Delleur, J.W. Published by CRC press LLC, 1999.

Course topics (Theory)	**Week**	**Learning Outcome**
1.1 Introduction 1.2 Properties of fluids 1.2.1 Density and volume 1.2.2 Viscosity 1.2.3 Thermodynamic properties 1.2.4 Compressibility and bulk Modulus 1.2.5 Surface Tension and capillarity 1.2.6 Vapour pressure and cavitation	2	They will understand the main concept of the Fluid Mechanics _ properties of fluids
2.1 Fluid pressure at a point 2.2 Pascal's law	2	They will understand the main concept of the Pressure and its measurement (Fluid Statics)

2.3	Pressure variation a fluid at rest		
2.4	Measurement of pressure		
2.5	Simple nanometers		
2.6	Differential Manometers		
3.1	Introduction	2	They will understand the main concept of the Buoyancy and floatation
3.2	Bouncy		
3.3	Center of Bounce		
3.4	Meta-centric height		
3.5	Analytical Method for meta-center Height		
3.6	Conditions of Equilibrium of a floating and sub-merged body		
3.7	Experimental method of determination of Meta-centric height		
4.1	Introduction	1	They will understand the main concept of the Kinematics of flow and ideal flow
4.2	Methods of describing fluid motion		
4.3	Type of fluid flow		
4.4	Rate of flow or discharge		
4.5	Continuity Equation		
4.6	Continuity equation in three dimensions		
4.7	Velocity and acceleration		
4.8	Velocity potential function and stream function		
5.1	Introduction	1	They will understand the main concept of the Dynamics of fluid flow
5.2	Equation of Motion		
5.3	Euler's equation of motion		
5.4	Bernoulli's equation form Euler's equation		
5.5	Assumptions		
5.6	Bernoulli's Equation for real fluid		
5.7	Practical applications of Bernoulli's equation		
5.8	The Momentum Equation		
5.9	Kinetic energy correction factor		
6.0 Fundamentals of Engineering Hydrology 6.1 introduction to hydrology 6.2 Domain and objective of Engineering hydrology		4	They will understand fundamentals of engineering hydrology

6.3 Practical applications of hydrology 6.3.1 Hydraulic structures 6.3.2 Water supply 6.3.3 Wastewater treatment and disposal 6.3.4 Irrigation 6.3.5 Drainage 6.3.6 Hydropower generation 6.3.7 Flood control 6.3.8 Navigation 6.3.9 Erosion and sediment control 6.3.10 Salinity control 6.3.11 Pollution abatement 6.3.12 Recreational use of water 6.3.13 Fish and wildlife protection 6.4 Hydrologic cycle 6.5. Steps of the Hydrologic Cycle 6.6 Measurement techniques 6.7 Estimated world water quantities 6.8 Hydrologic budget in details 1 week 6.9 Test for consistency of record 6.10 Analysis of Precipitation Records 6.10.1 Precipitation depth 6.10.2 Precipitation intensity 6.10.3 Computation of Average Rainfall Depth over a Basin 6.10.3.1 Arithmetic Average Method 6.10.3.2 Thiessen Polygon Method 1 week 6.11 Analysis of Evaporation losses 6.11.1 Factors affecting evaporation 6.11.1.1 Meteorological Data: 6.11.1.2 Type of Surface: 6.11.1.3 Water Quality: 6.11.2 Measurement or estimation of evaporation 6.11.2.1 Water budget method 6.11.2.2 Empirical formulae 6.11.2.3 Energy budget method 6.11.2.4 Mass transfer method 6.11.2.5 Actual observations 6.11.2.6 Pan observations 2 weeks		

Practical Topics	Week	Learning Outcome
None	None	None

Questions Example Design

Solving Problems
Such as solve, derive, find, determine, ... etc.
Explanations and graphing
Such as explain, why, show that, prove that ..., etc.
Number of Questions: 3-6
Number of Assignments: 2-4
Recommendations for Students at Exams
• Read the questions carefully and at least twice.
• Think about the answers and don't hurry.
Answer the questions with the easiest first
At the end, review the answers.

Extra notes:

For the above time schedule, 12 weeks of teaching is considered, hence, the completion of the program is dependent on the available number of weeks. However, some changes might happen to optimize the available time.

External Evaluator

I hereby confirm that all syllabuses given in the attached course book is sufficient to cover required subjects, areas and titles needed for students regarding the study year.

Ahmed S.Ali

Ahmed Suad Ali:
Head of QA/QC committee + Senior scientific Committee member of Engineering Department 2021-2022