Module (Course Syllabus) Catalogue

2023-2024

College/ Institute	Erbil Technical Engineering College	
Department	Mechanical and Energy Engineering Techniques	
Module Name	Advanced Fluid Mechanics	
Module Code	AFM202	
Degree	Technical Diploma ☐ Bachler ☐ High Diploma ☐ Master ■ PhD ☐	
Semester	2nd Semester	
Qualification	M.Sc.	
Scientific Title	Assistant Professor	
ECTS (Credits)	6	
Module type	Prerequisite ☐ Core ■ Assist. ☐	
Weekly hours	3 hrs.	
Weekly hours (Theory)	(3)hr Class	( )Total hrs Workload
Weekly hours (Practical)	(0)hr Class	( )Total hrs Workload
Number of Weeks	16	
Lecturer (Theory)	Dr. Banipal Nanno Yaqob	
E-Mail & Mobile NO.	banipal.yaqob@epu.edu.iq	
Lecturer (Practical)		
E-Mail & Mobile NO.		
Websites	https://academicstaff.epu.edu.iq/faculty/banipal.yaqob	

Course Book

Course Description	The course is intended to instruct the student in advanced topics in fluid mechanics, develop problem-solving skills in areas of fluids-related mechanical engineering and understand the role of fluid dynamics in everyday life.
Course objectives	▪ Review and understand the continuity, momentum and energy equations for viscous, incompressible fluids. ▪ Understand vorticity and circulation concepts and theorems. ▪ Understand and utilize approximate solutions of the Navier-Stokes equation. ▪ Provide a fundamental understanding of analytic and numerical methods used to solve fluid dynamics problems. ▪ To develop the skill to develop models of real processes and systems and draw conclusions.
Student's obligation	1. **Class Attendance, Participation, Punctuality and Cheating:** Attendance at each class session is expected. Students are expected to be on time for class. It is the student's responsibility to familiarize himself or herself with and adhere to the standards set forth in the policies on cheating and plagiarism as defined in the Erbil Polytechnic University website or the appropriate graduate program handbook. **Cheating is absolutely unacceptable in any guise. If you are caught cheating, you will be warned once and you will receive a "0" (zero) on that assignment. The second offense will result in an "Fail" for the course.** Cheating means using the work of others as your own. Copying homework, using papers from the Internet, using solutions from the instructors solution manual, any talking or looking around during exams and allowing others to look at your exam papers are examples of cheating. Additionally, "recycled" work is not accepted in this course. 2. **Preparation, Deadlines and Late Policy:** Late assignments will not be graded. Please do not wait until the last minute to submit your assignment. 3. **Homework:** Homework is important and represents a key component of your grade. I will not be able to accept homework or assignments emailed to me. You must show all your work (math) step by step. Simply supplying an answer or excluding logical steps will result in points being taken off your grade. Incorrect calculations with correct answers may be given a 0 for that problem. Late homework will not be graded. The following checklist is strongly recommended while presenting the solutions in the homework.

				■ Sketch of problem and discussion of the problem solving procedure. ■ Equation(s) stated in general form ■ Necessary assumptions stated ■ Substitutions or simultaneous solutions labelled ■ Units converted properly ■ Final answers clearly indicated 4. **Exams:** For this round there will be no midterm exam. But in general, there will be two exams. The exams will include materials covered in class. The last exam will be given during finals week. It is suggested that you obtain a calculator which has trig functions. No laptops, computers, or phones with calculators will be allowed during exams (only calculators specifically). You may not share a calculator with another classmate during an exam. You must show all your work (math) step by step. Simply supplying an answer or excluding steps will result in points being taken off your grade. 5. **Phones:** As a courtesy to classmates and faculty, phones should be turned off during class.

Required Learning Materials	

Evaluation		Task	Weight (Marks)	Due Week	Relevant Learning Outcome
		Paper Review			
	Assignments	Homework			
		Class Activity			
		Report	5 %		
		Seminar	10 %		
		Essay			
		Project			
	Quiz		10 %		
	Attendance		5 %		
	Midterm Exam		20 %		
	Final Exam		50%		
	Total		100%		

Specific learning outcome:	The focus of the course is to solve problems in industry. The course is intended to provide students with the following benefits: (1) Understanding the concept of fluid and the models of fluids (2) Understanding the basic physical meaning of general equations

	(3) Understanding the concept of stream function and potential function
	(4) Ability to derive the equation for viscous flow, including laminar flow and turbulent flow
	(5) Ability to address such problems in engineering, and to solve the problems
	(6) Understanding the concept of two-phase flow and their relations
	(7) Ability to cooperate with the team members
Course References:	1. Basic Text Books in Fluid Mechanics. 2. Cengel, Y., Cimbala, J., "Fluid Mechanics: Fundamentals and Applications", 2nd Edition, McGraw-Hill, 2009. 3. Schlichting, H., Boundary Layer Theory, 8th edition, Springer, 2000. 4. Raudkivi, A.J. & Callander, R.A. "Advanced Fluid Mechanics", Edward Arnold. 5. Panton, R. L., Incompressible Flow, John Wiley & Sons, Inc. 6. Collier, J. G., Convective Boiling and Condensation, McGraw-Hill Book Company. 7. Frank M. White "Viscous Fluid Flow", 2nd edition, McGraw-Hill, 1991.

Course topics (Theory)	Week	Learning Outcome
Fluid kinematics	1-3	
Finite control volume analysis	4-5	
Differential analysis of fluid flow	6-7	
Boundary layer theory	8-9	
Two-phase flow	10-12	
Unsteady flow	13-14	
Final Examination	15	

Practical Topics	Week	Learning Outcome

Questions Example Design
Extra notes:

External Evaluator:

I herby confirm that the content of this course catalogue is sufficient for the proposed program.

Prof. Dr. Ahmed Mohammed Adham

06/03/2024