Course Specification

(Postgraduate)

Course Title:**Fluid Mechanics**
Course Code:**MATH665**
Program: **Master Program in Mathematics**
Department: **Mathematics**
College: **Science**
Institution: **University of Tabuk, KSA**
Version: **2**
Last Revision Date:**1/12/1443 H**

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A. General information about the course:

Course Identification	
1. Credit hours:	3 H
2. Course type	
a.	University ☐ College ☐ Department☒ Track☐ Others☐
b.	Required ☐ Elective☒
3. Level/year at which this course is offered: Level-2 or higher	
4. Course general Description In this course, we will study some basic fundamentals of Fluid Mechanics. Some important properties, theorems, problems, and applications will be discussed.	
5. Pre-requirements for this course (if any): None	
6. Co- requirements for this course (if any): None	
7. Course Main Objective(s)	

1. Identify how properties of fluids change with temperature and their effect on pressure and fluid flow.
2. Describe fluid pressure and its measurement.
3. Define the relationship between pressure and elevation as it relates to manometers, barometers and other pressure measuring devices.
4. Calculate forces on a plane submerged in a static fluid.
5. Calculate buoyancy on a body submerged in a static fluid.

Use the general energy equation to calculate changes in fluid flow for circular and non-circular pipes for in-compressible fluids

1. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	45	100 %
2.	E-learning		
3.	Hybrid • Traditional classroom • E-learning		
4.	Distancelearning		

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	3 H /week
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	
5.	Others (specify)	
	Total	45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding The students will be able to:			
1.1	Demonstrate deep concepts and fundamentals of Fluid Mechanics.	K1	Lectures, Group works, Presentations, Classroom discussion, Seminar, Case study, problem solving session	Exams, Quizzes, Research project, presentation, interactive discussion and participation, Surveys.
1.2	Describe recent methods to solve the fluid mechanic problems.	K2		
2.0	Skills The students will be able to:			
2.1	Apply the concepts of Dimensional analysis in solving the fluid mechanic problems.	S1	Lectures, Group works, Presentations, Classroom discussion, Seminar, Case study, problem solving session	Exams, Quizzes, Home works, Assignments, Research project, presentation, interactive discussion and participation, Surveys.
2.2	Analyze and identify the right analytical method to find the solution of problems.	S2		
2.3	Communicate and interpret the achieved analytical results with the practical results.	S4		

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.0	Values, autonomy, and responsibility The students will be able to:			
3.1	Demonstrate responsibly to solve the given assignments by their own and submit the solution on time.	V2	Lectures, Group works, Presentations, Classroom discussion, Seminar, Case study, problem solving session	Research project, Home works, Assignments, presentation, interactive discussion and participation, Surveys.
3.2	Demonstrate the responsibility to work independently or as group.	V2		

C. Course Content

No	List of Topics	Contact Hours
1	Definition of fluid dynamics, some basic properties of the fluid, units, dimensions,	3
2	incompressible and compressible fluids, Newtonian and non-Newtonian fluids, real and ideal fluids with examples.	3
3	The Navier-Stokes equations of motions of a viscous and non-viscous compressible and incompressible fluids	3
4	Energy equation for viscous and non-viscous compressible and incompressible fluids.	3
5	The main limitations of the Navier -Stokes equations and the some exact solutions of Navier -Stokes equations,	3
6	Steady laminar flow between two parallel plates.	3
7	**Mid-Exam #**	---
7	Flow through a circular pipe	3
8	Laminar steady flow between two coaxial circular cylinders, velocity profile, flow rate and average velocity.	3
9	Laminar flow between two concentric rotating cylinders-Couette flow.	3
10	Temperature distribution in steady laminar incompressible fluid flow between two parallel plates.	3
11	Temperature distribution in steady laminar incompressible fluid flow between two circular disks	3
12	Flow of two immiscible fluids between two parallel plates,	3
13	Steady incompressible fluid flow with suction/injection on the boundaries	3
14	Unsteady incompressible fluid flow over a suddenly accelerated flat	3

	plate	
15	Concept of Prandtl's boundary layer theory, Boundary layer flow over a flat plate (Blasius solution), flow over a wedge.	3
16+17	**Revision & Final Exam**	
Total		45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Home works and Assignments	Weekly basis	20%
2.	Mid-term exam	7th week	25%
3.	Presentation and discussion	During the Semester	15%
4.	Final Exam	At End of Semester	40 %

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Yunus A. Çengel and John M. Cimbala, "Fluid Mechanics, Fundamentals and Applications," 1st Ed, McGraw Hill higher Edu. 2005. Nandagopal, PE, N. Fluid and Thermal Sciences: A Practical Approach for Students and Professional, Springer International Publishing (2022).
Supportive References	Joseph H. Spurk· NuriAksel, Fluid Mechanic Second Edition, Springer Verlag Berlin Heidelberg, 1997.
Electronic Materials	Digital Saudi Arabia
Other Learning Materials	None

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture Room with capacity of 30 students and equipped with White Board, Library
Technology equipment (projector, smart board, software)	Overhead projector and internet connection.
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Direct and Indirect
Effectiveness of students assessment	Teacher	Direct
Quality of learning resources	Students	Indirect
The extent to which CLOs have been achieved	Teacher, Quality Committee	Direct and Indirect
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods(Direct, Indirect)

G. Specification Approval Data

Council / Committee	**Approval by the Department Council**
Reference No.	DEPARTMENT COUNCIL NO (26)
Date	**11/9/1444 H**