هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

T-104
2022

Course Specification

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Course Specification

Course Title:	**Fluid Dynamics**
Course Code:	**453Math-3**
Program:	**B.Sc. of Mathematics**
Department:	**Mathematics**
College:	**Arts and Sciences**
Institution:	**Najran University**
Version:	**1**
Last Revision Date:	**07-05-2023**

Table of Contents:

A. General information about the course:

Course Identification					
1. Credit hours:	3				
2. Course type					
a.	University ☐	College ☐	Department☒	Track☐	Others☐
b.	Required ☒	Elective☐			
3. Level/year at which this course is offered:	7/4				
4. Course general Description This course introduce: Importance of fluid mechanics, Kinematics of the Fluid Motion, Dynamics of Fluid Motion, Two-Dimensional Motion and Theory of Waves.					
5. Pre-requirements for this course (if any): Partial Differential Equations (343Math-3)					
6. Co- requirements for this course (if any):					
7. Course Main Objective(s) The main objective of the course is to introduce the basic concepts related to the principles of fluid Dynamics.					

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.	Distance learning		

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45
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			
1.1	Define the main concepts of the fluid Dynamics.	K1	• Lecture • Cooperative learning • Problem solving	• Assignments • Quizzes • Midterm • Final Exam
1.2	Recognize the Kinematics of the Fluid Motion, Two-Dimensional Motion and Theory of Waves.			
2.0	Skills			
2.1	Solve some problems in two-dimension	S1	• Lecture • Cooperative learning • Problem solving	• Assignments • Quizzes • Midterm • Final Exam
2.2	Apply the descriptive analysis of fluid Dynamics conclusions and recommendations.	S2		
2.3	Derive the fundamental formula of the fluid mechanics.	S3		
3.0	Values, autonomy, and responsibility			
3.1	Work effectively within groups and independently	V1	• Assignments	• Oral Test • Rubrics

C. Course Content

No	List of Topics	Contact Hours
1- Kinematics of the Fluid Motion		
1.1	The Lagrangian and Eulerian Methods.	2
1.2	Streamlines and Paths of the Particles of fluid	2
1.3	Equation of Continuity – Motion of Fluid Element	2
1.4	The Velocity Potential Function - Laplace's Equation	2
1.5	Boundary Conditions – Uniqueness Theorems – Kinetic Energy	2
1.6	Symmetric motion about a point – Axisymmetric Motion	5

1.7	Two-dimensional Motion.	5
2- Dynamics of Fluid Motion		
2.1	Forces in Fluids – Euler's Momentum Equation	3
2.2	Integration of the Momentum Equation(Bernoulli's Equations)	3
2.3	Constancy of Circulation (Kelvin's Theorem)	2
2.4	Persistence of Irrotational Motion (Lagrange's Theorem) .	2
3- Two-Dimensional Motion		
3.1	Stream Function – Velocity Potential – Complex Potential.	2
3.2	Complex Velocity – Blasius Theorem – Uniform Stream.	2
3.3	A rectilinear Vortex – Source and Sink .	2
3.4	Source and an Equal Sink-Doublets	3
4-	**Theory of Waves**	
4.1	Mathematical Representation of Wave Motion	2
4.2	Boundary Conditions at the Free Surface	2
4.3	Simple Harmonic Progressive Waves - Progressive Waves in Deep Water – Energy of a Progressive Waves	2
Total		45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	First Exam	7	20%
2.	Assignments & Quizzes	During classes	10%
3.	Second Exam	13	20%
4.	Final Exam	16	50%

*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	ميكانيكا الموائع، أ.د. مصطفى مراد حواس. جامعة قاريونس ، بنغازي 1993م - .
Supportive References	1- Advanced Hydrodynamics, M. D. Raisinghania and R. S. Aggarwal, New Delhi, 1982. 2- Textbook of Fluid Dynamics, F. Chorlton, London, 1970.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	- Classroom with 30 seats.
Technology equipment (projector, smart board, software)	- Blackboard Platform - Mathematica Program - Projector
Other equipment (depending on the nature of the specialty)	**N/A**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Student Questionnaire (Indirect)
Effectiveness of students assessment	Peer Reviewer	Rubrics (Indirect)
Quality of learning resources		
The extent to which CLOs have been achieved	Faculty	Direct
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	Council of Mathematics Department
REFERENCE NO.	14441017-0208-00014
DATE	17-10-1444H