



BENHA UNIVERSITY



FACULTY OF ENGINEERING AT SHOUBRA

**Model No.12**  
**Course Specifications (2014-2015)**  
**Course Specifications: Fluid Mechanics**

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**University:** Benha University

**Faculty:** Faculty of Engineering at Shoubra

**Department offering the program:** Mechanical Engineering Department

**Department offering the course:** Mechanical Engineering Department

**1- Course Data**

**Course Code:** MPE291

**Course Title:** Fluid Dynamics

**Specialization:** Mechanical Production Engineering

**Course Type:** Compulsory

**Study Year:** Second Year

**Teaching Hours:** Lecture: 3

Tutorial: 1

Practical: 1

Total: 5

**2- Course Aims**

For students undertaking this course, the aims are to:

- 1- Understand the fluid properties.
- 2- Evaluate forces due to fluid pressure on adjacent surfaces.
- 3- Describe fluid motion.
- 4- Estimate forces due to change of fluid momentum.

**3- Intended Learning Outcomes of Course (ILO's)**

- a. **Knowledge and Understanding:** On completing this course, students will be able to demonstrate the knowledge and understanding of:
  - a.1) Newton's law viscosity and surface tension, vapor pressure and discuss the variable types of fluid forces on gates (flat and curved). (A.1)
  - a.2) The fluid linear and rotational motion, and illustrate intensive and extensive properties. (A.3)
  - a.3) The differential and integral forms of the equation of mass and momentum conservation. (A.8)
- b. **Intellectual Skills:** At the end of this course, the students will be able to:
  - b.1) Compare between the differential and integral forms of energy equation. (B5)
  - b.2) Analyze dimensionless parameters in order to form dimensionless quantities. (B3)
  - b.3) Assess and evaluate major and minor losses of the flow through pipes. (B9)
- c. **Practical and Professional Skills:** On completing this course, the students are expected to be able to:
  - c.1) Sketch stream function from two velocity components. (C11)
  - c.2) Use the momentum equation in order to analyze forces on propulsion engines. (C10)
  - c.3) Use moody chart to get friction loss factor by using Reynolds number and roughness coefficient. (C9)
- d. **General and Transferable Skills:** At the end of this course, the students will be able to:
  - d.1) Work in stressful environment and within constraints. (D 2).
  - d.2) Effectively manage tasks, time, and resources. (D5)



#### 4- Course Contents

Week no.	Topics
1	Introduction to Fluid Dynamics
2	Fluid Properties
3	Fluid Static-1 and Manometers
4	Fluid Moving with Acceleration
5	Kinematics of Fluid Flows-1
6	Control Volume and Reynolds Transport Theorem
7	Momentum and Energy Conservation-1
9	Momentum and Energy Conservation-2
10	Angular Momentum Conservation
11	Dimensional Analysis and Similarity
12	Pipe flow-1
13	Pipe flow-2

#### 5- Teaching and Learning Methods

- 5.1 Lectures
- 5.2 Class activity
- 5.3 Assignments/homework
- 5.4 Practical training/laboratory.
- 5.5 Tutorial problem session

#### 6- Teaching and Learning Methods of Disables

- Nothing.

#### 7- Student Assessment

##### a- Student Assessment Methods

1. Six Assignments to assess knowledge and intellectual skills.
2. Three Quizzes to assess knowledge, intellectual and professional skills.
3. Midterm exam to assess knowledge, intellectual, professional and general skills.
4. Oral/practical exam to assess knowledge, intellectual, professional and practical skills.
5. Final exam to assess knowledge, intellectual, professional and general skills.

##### b- Assessment Schedule

NO.	Assessment	Week
1	Assignments	3, 5, 7, 9, 11, 13
2	Quiz	3, 7, 12
3	Midterm exam	8
4	Oral/Practical exam	14
5	Final exam	15

##### c- Weighting of Assessments

Assessment	Weight (%)
Mid Term Examination	10 %
Final Term Examination	60 %
Oral Examination	20 %
Practical Examination	5 %
Semester work	5 %
Other types of assessment	0 %
<b>Total</b>	<b>100</b>



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## **8- List of References**

**a- Course Notes** prepared by instructor

### **b- Recommended Books**

- Engineering Fluid Dynamics by Donald F. Elger, Barbara C. Williams, Clayton T. Crowe, John Wiley & Sons; 9<sup>th</sup> edition, 2009.
- Mechanics of Fluids, by Frank White, McGraw-Hill, 7<sup>th</sup> edition, 2011.

**Course Coordinator:** Prof. Dr. Samir Sobhy Ayad & Dr. Mohamed Hassan Shehata

**Head of Department:** Prof. Dr. Osama Ezzat Abdelatif



**BENHA UNIVERSITY**



**FACULTY OF ENGINEERING AT SHOUBRA**

**Model No.11A**

**Course Specifications: Fluid Dynamics**

**University:** Benha University

**Faculty:** Faculty of Engineering at Shoubra

**Department offering the program:** Mechanical Engineering Department

**Department offering the course:** Mechanical Engineering Department

**Matrix of Knowledge and Skills of the Course**

no.	Topics	Week no.	Knowledge and Understanding	Intellectual Skills	Practical and Professional Skills	General and Transferable Skills
1	Introduction to Fluid Dynamics	1	a1			d1
2	Fluid Properties	2	a1,a4			
3	Fluid Static-1 and Manometers	3	a1,a4			d2
4	Fluid Moving with Acceleration	4	a1,a4			d2
5	Kinematics of Fluid Flows-1	5	a2,a3			
6	Control Volume and Reynolds Transport Theorem	6	a2,a3	b1	c1	
7	Momentum and Energy Conservation-1	7	a2,a3	b1	c1	
8	Midterm Exam	8				
9	Momentum and Energy Conservation-2	9	a5	b1	c2	d1
10	Angular Momentum Conservation	10	a5	b1	c2	d1
11	Dimensional Analysis and Similarity	11		b2		d2
12	Pipe flow-1	12		b2		d2
13	Pipe flow-2	13		b1,b3	c3	d1
14	Oral/Practical Exam	14				
15	Final Exam	15				

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### **Matrix of Course Aims and ILO's**

**Course Title:** Fluid Dynamics

**Course Code:** MPE291

**Teaching Hours:** Lecture: 3                      Tutorial/Practical: 2                      Total: 5

**Major or minor element of program:** Major

**Program on which the course is given:** B.Sc. Mechanical Production Engineering

**Department offering the program:** Mechanical Engineering Department

**Department offering the course:** Mechanical Engineering Department

**Academic year / level:** 2014-2015 Second Year / First Semester

**Date of specifications approval:** 16/3/2010

Course aims	a	b	C	d
2.1- Understand the fluid properties.	a1 a4		c1	d1 d2
2.2- Evaluate forces due to fluid pressure on adjacent surfaces.	a2 a3	b1		d2
2.3- Describe fluid motion.	a2 a3	b1 b2	c2 c3	
2.4- Estimate forces due to change of fluid momentum.	a5	b3	c1	d1

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