

**Faculty of Engineering & Technology**  
**Thermodynamics and Fluid Mechanics**

**Information :**

**Course Code :** MPR 243                      **Level :** Undergraduate                      **Course Hours :** 3.00- Hours  
**Department :** Department of Electrical Engineering

**Instructor Information :**

| Title              | Name                              | Office hours |
|--------------------|-----------------------------------|--------------|
| Professor          | Mahmoud Mohamed Kamal Abdel Aziz  |              |
| Teaching Assistant | Mohammed Ahmed Mahmoud Morsy      |              |
| Teaching Assistant | Zakaria Mostafa Abdo Salim Marouf | 4            |

**Area Of Study :**

- The overall aims of this course are:
- Enrich students' knowledge about the theory of fluid mechanics and the comparison between fluids and other substances.
  - Enrich students' knowledge about the theory of thermodynamics and heat transfer systems on different thermodynamics systems.
  - Train students' to measure different fluid properties and analyze different fluid systems in laboratory.

**Description :**

Thermodynamics: macroscopic approach to energy analysis, energy transfer as work and heat, and the first law of thermodynamics, Properties and states of simple substances, Control-mass and control-volume analysis, The essence of entropy and the second law of thermodynamics, Fluid dynamic: fluid properties, similarity of fluid flows, conservation equations, conservation of mass-momentum, Newton second law, energy conservation of mechanical energy (Bernoulli Equation), Application: flow through pipes: laminar and turbulent flow, Pipes connected in series or in parallel, branching of pipes, Measuring devices, Mathematical models.

**Course outcomes :**

**a.Knowledge and Understanding: :**

|     |   |
|-----|---|
| 1 - | Relate the physics background to fluids.                      |
| 2 - | Recognize the difference between fluids and other substances. |
| 3 - | Define new terms; System, Thermodynamics, Fluid Mechanics.    |
| 4 - | State the difference between different fluid flow types.      |
| 5 - | Illustrate between series and parallel pipe network design.   |

**b.Intellectual Skills: :**

|     |  |
|-----|--|
| 1 - | Think in a creative way to solve different engineering problems related to Thermodynamics and Fluid Mechanics. |
| 2 - | Analyze different system types found in nature.  |

|  |   |
|--|---|
| 3 -  | Deduce conservation equations of mass and energy  |
| <b>c. Professional and Practical Skills: :</b> |   |
| 1 -  | Calculate experimentally the performance of fluid and thermal devices.                                |
| 2 -  | Practice basic experiments on Thermodynamics and Fluid Mechanics.                                     |
| 3 -  | Follow up safety requirements at experimental work and observe the appropriate steps to manage risks. |
| 4 -  | Write a technical report on a project or an assignment.   |
| <b>d. General and Transferable Skills: :</b>   |   |
| 1 -  | Collaborate effectively within multidisciplinary team.  |
| 2 -  | Lead and motivate individuals.  |
| 3 -  | Effectively manage tasks, time, and resources.  |
| 4 -  | Refer to relevant literatures   |

**Course Topic And Contents :**

| Topic                           | No. of hours | Lecture | Tutorial / Practical |
|---------------------------------|--------------|---------|----------------------|
| Introduction to fluid mechanics | 10           | 6       | 4                    |
| Properties of fluids            | 10           | 6       | 4                    |
| Fluid statics                   | 5            | 3       | 2                    |
| Fluid kinematics                |              |         |                      |
| Fluid dynamics                  |              |         |                      |
| Internal flow                   |              |         |                      |
| Introduction to thermodynamics  |              |         |                      |
| Heat transfer methods           |              |         |                      |
| First law of thermodynamics     |              |         |                      |
| Second law of thermodynamics    |              |         |                      |

**Teaching And Learning Methodologies :**

|                       |
|-----------------------|
| Interactive Lecturing |
| Discussion            |
| Problem Solving       |
| Experiential Learning |
| Cooperative Learning  |
| Research activity     |

**Course Assessment :**

| Methods of assessment | Relative weight % | Week No | Assess What  |
|-----------------------|-------------------|---------|--|
| • Final exam          | 40.00             |         | to assess the skills of problem solving, understanding of related topics |
| o Assignments         | 10.00             |         | to assess the skills of problem solving, understanding of related topics |

|   |       |  |  |
|---|-------|--|--|
| o In class quizzes and attendance                             | 10.00 |  | to assess the skills of problem solving, understanding of related topics |
| o Midterm exams   | 30.00 |  | to assess the skills of problem solving, understanding of related topics |
| o Participation (Lab reports, Research activity and Oral Exam | 10.00 |  | to assess the skills of problem solving, understanding of related topics |

**Books :**

| Book                                   | Author         | Publisher   |
|--|----------------|-------------|
| Fundamentals of Thermal-Fluid Sciences | Yunus A.Cengel | McGraw Hill |

**Course Notes :**

No course notes are required

**Recommended books :**

None