YEAR II

MEC 2101: Fluid Mechanics I

Hours per semester				Weighted total mark	Weighted exam mark	Weighted continuous assessment mark	Credit unit
LH	PH	TH	CH				CU
45	30	75	60	100	60	40	4

Course description

This course introduces the behaviour of fluids with a bias on liquids. It covers both the properties of fluids at rest (or relative equilibrium) looking at the forces exerted by the fluid on the surface and their effects, and the fluids in motion focusing on the change of energy as the fluid particles move from one place to another, and the impact of the force exerted by the moving fluid on the surface.

Objectives

The aim of this course is to Guide the students' understanding of the importance of fluids in engineering, derived from the principles of fluid Statics and dynamics together with the associated effect on contact surfaces. This will help the student in the design and analysis of hydraulic structures based on derived knowledge.

Learning Outcomes

At the end of this course, the students will able to:

- Distinguish between difference types of fluids and their properties
- Apply the basic principles of fluid statics and dynamics in the design and analysis of hydraulic structures
- Identify various parameters that affect the flow of a fluid and relate them to define a criterion that describe a certain phenomenon of practical importance.

Course Content

1. Introduction to fluid mechanics and Properties of fluids (8 Hours)

• Definitions

- Properties of Fluids

2. Fluid Statics

- Static Pressure and Head
- Measurement of Pressure
- Static Forces on Surfaces
- Buoyancy

3. Fluids in motion

- Mass and energy conservation
- Momentum equation and its application
- Flow Measurement
- Steady flow in pipes
- Behaviour of Real Fluids
- Unsteady flow in closed conduits

4. Dimensional analysis

- Dimensional Reasoning
- Similitude and Model analysis

5. Laboratories

- Flow Measurement

(12 Hours)

(17 Hours)

(8 Hours)

(30 Hours)

- Losses in pipes and fittings

Assessment Methods:

Course work (assignments and tests) and final examination and their relative contributions to final grade are shown as follows:

Requirement	**Percentage contribution**
Course work	40%
Final examination	60%

References

- J.R.D Francis, ***Fluid Mechanics for Engineering Students, 4th Edition.*** Edward Arnold (Publishers) Ltd. ISBN 0 7131 33325

- Bernard Massey, ***Mechanics of Fluids, 7th Edition.*** Stanley Thornes Publishers. ISBN 0 7487 40430

- John F. Douglas, Janusz M. Gasiorek, John A. Swaffield, Lynne B. Jack, ***Fluid Mechanics, 5 Edition.*** Pearson Prentice Hall, ISBN 0-13-129293-5

J. F. Douglas, ***Solving Problems in Fluid Mechanics,*** Volume 1, **3rd Edition** ISBN 0- 582-30556-X