MEC 4206: Fluid Power Systems

Hours per Semester				Weighted Total Mark	Weighted Exam Mark	Weighted Continuous Assessment Mark	Credit Units
LH	PH	TH	CH	WTM	WEM	WCM	CU
45	30	00	60	100	60	40	4

Course Description

This course builds on an earlier Fluid Mechanics course. It extends the study of fluid statics and dynamics to applications to fluid power systems. It finds application in construction machines and motor vehicles.

Course Objectives

The objectives of this course are:

- Provide students with a strong knowledge base on the principle components of a fluid power system.
- To equip the students with the basic principles behind hydraulic circuit elements.
- To introduce the students to fluid power system circuit and control system. **Expected Outcomes:**

At the end of this course, a student should be able to:

- Describe the basic components of a fluid power system
- Solve for the power and efficiencies and other characteristics of a fluid power system
- Explain characteristics of hydraulic circuit elements
- Analyze a fluid power system circuit
- Analyze a fluid logic control system **Course Content**

Basic Fluid Power Components **(6 Hours)**

- Definitions using Steady-State Characteristics
- Relief valve, Non-relief valve, Pilot-operated relief valve,
- Pipes

- Pressure Compensation of Flow Control Valve
- Pressure Compensated Pump

Transmission Systems **(8 Hours)**

- The prime mover
- The transmission system
- The Load
- Flow control Systems
- Transmission Circuits

Valve-Controlled Systems **(8 Hours)**

- Speed-control Valve
- Series Pressure Compensation
- Parallel Pressure Compensation

Accumulator Systems **(6 Hours)**

- Simple Analysis
- Size of Accumulator
- Analysis of Accumulator System Dynamics
- Thermodynamic Considerations
- Applications: power and control, integration with microprocessors, pneumatics and applications of pneumatics

Fluid Logic Control System **(8 Hours)**

Servomechanisms **(5 Hours)**

Fluid Power System Maintenance Practical

Mode of Delivery

The course will be taught by using lectures and tutorials

Assessment

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%

Total 100%

References

- Bernard Massey (Revised by John Ward-Smith), 1998, "*Mechanics of fluids*" Stanley Thormes (Publishers) Ltd, Cheltenham,UK, Seventh Edition.
- Quin Zhan Basics Hydraulics Systems 2009 Taylar and Francis Group
- J. F. Douglas, J. M. Gasiorek and J. A. Swaffield, 1998, "*Fluid Mechanics*," Longman Group Limited, 3rd Edition
- J. F. Douglas, 1996, "*Solving Problems in Fluid Mechanics*," Addison Wesley Longman Limited, England, Volume 2.
- John F. Douglas, Jenus M. Gasiorek and John A. Swaffield, 2001, "*Fluid Mechanics*," Pearson Education, Fourth Edition.
- Robert W. Fox and Alan T. McDonald, 1998, "*Introduction to Fluid Mechanics*," John Wiley and Sons, Inc., Fifth Edition.
- Michael J Pinches, Power Hydraulics,Longman 1989.