COURSE NUMBER: ME 4232, 4 credits	**COURSE TITLE:** Fluid Power Control Lab
TERMS OFFERED: Fall and Spring	**PREREQUISITES:** ME 4031 ME 3281
TEXTBOOKS/REQUIRED MATERIAL: Industrial Hydraulics Manual, Vickers	**PREPARED BY:** Professors Li and Durfee **DATE OF PREPARATION:** September 20, 2005 Updated by Stelson on May 4, 2007
COURSE LEADER(S): Professors Li, Stelson	**CLASS/LABORATORY SCHEDULE:** One 120 minute lecture and two 120 minute laboratory per week **CONTRIBUTION OF COURSE TO MEETING PROFESSIONAL OBJECTIVES:** 100 % Engineering Topics
CATALOG DESCRIPTION: Introduction to fluid power principles, components, circuits and systems. Construction, experimentation and measurements on hydraulic circuits. Design, analysis, simulations and implementation of control systems for electrohydraulic actuators.	**COURSE TOPICS:** 1. Principles of hydraulics 2. Descriptions and modeling of hydraulic components 3. Modeling and analysis of hydraulic circuits 4. Component sizing 5. System identification techniques 6. Analysis and design of Proportional, Proportional-Integral, Feedforward, Adaptive feedforward, Internal Model Principle controllers 7. Matlab modeling and simulation of hydraulic components and circuits

COURSE OBJECTIVES	1. Teach basics of hydraulic components 2. Teach fundamentals of modeling hydraulic components 3. Introduce students to the use of Matlab for analyzing and simulating hydraulic systems 4. Teach fundamentals of hydraulic system identification and control 5. To develop experience in the design, implementation and analysis of laboratory experiments involving hydraulic systems
COURSE OUTCOMES	**(Letters shown in brackets are linked to program outcomes a-k)** 1. To be familiar with basic types of hydraulic components, their construction, characteristics and use [a] 2. To be able to develop mathematical models of hydraulics components and circuits [a] 3. To be familiar with the use of software (Matlab) to analyze and simulate dynamic systems [k] 4. To be aware of components necessary for the implementation of control systems [a] 5. To be able to apply dynamical systems concepts to real hydraulic systems [a] 6. To be aware of some methods of identifying an unknown dynamical system [a] 7. To be familiar with various types of controllers, their uses, design, analysis and implementation [a, c] 8. Become familiar with basic laboratory components and instrumentation for hydraulic systems [b, k] 9. Ability to design and implement appropriate experiments involving hydraulic systems [b, c, e] 10. To be able to succinctly present findings and interpretations of experimental results [b, g] 11. Ability to work in teams [g]
ASSESSMENT TOOLS:	About 20 two-page lab reports Team modeling exercise in which dynamical models of hydraulic components are obtained and coded in SIMULINK, and presented as a webpage (optional) Final oral exam Participation in lecture hours and lab sessions

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Nature of Changes:
This syllabus was reviewed in 2007 and no changes were made.