ME 438 COURSE PROFILE

DEGREE PROGRAM: Mechanical Engineering

COURSE NUMBER: ME 438	**COURSE TITLE:** Internal Combustion Engines
REQUIRED COURSE OR ELECTIVE COURSE: Elective	**TERMS OFFERED:** Fall
TEXTBOOK / REQUIRED MATERIAL: Internal Combustion Engine by Heywood	**PRE / CO-REQUISITES:** MECHENG 235, MECHENG 336 recommended (advised). I (4 credits)
COGNIZANT FACULTY: A. Boehman	**COURSE TOPICS:** 1. Introduction 2. Engine design and operating parameters 3. Ideal models of engine processes and cycles 4. Combustion thermodynamics 5. Thermodynamic properties of engine working fluids 6. Fuel/Air cycle analysis 7. Spark-ignition engine combustion 8. Diesel engine combustion 9. SI and diesel engine emissions 10. Engine friction and Lubrication 11. Engine heat transfer 12. The future of I.C. Engines
BULLETIN DESCRIPTION: Analytical approach to the engineering problem and performance analysis of internal combustion engines. Study of thermodynamics, combustion, heat transfer, friction, and other factors affecting engine power, efficiency, and emissions. Design and operating characteristics of different types of engines. Computer assignments. Engine laboratories.	
COURSE STRUCTURE/SCHEDULE: Lecture: 2 days per week at 2.0 hours	

COURSE OBJECTIVES: for each course objective, links to the Program Outcomes are identified in brackets.	1. To make students familiar with the design and operating characteristics of modern internal combustion engines [1, 2, 6] 2. To apply analytical techniques to the engineering problems and performance analysis of internal combustion engines [1, 2, 6] 3. To study the thermodynamics, combustion, heat transfer, friction and other factors affecting engine power, efficiency and emissions [1, 6] 4. To introduce students to the environmental and fuel economy challenges facing the internal combustion engine [4] 5. To introduce students to future internal combustion engine technology and market trends [4]
COURSE OUTCOMES: for each course outcome, links to the Course Objectives are identified in brackets.	1. Differentiate among different internal combustion engine designs 2. Recognize and understand reasons for differences among operating characteristics of different engine types and designs 3. Given an engine design specification, predict performance and fuel economy trends with good accuracy 4. Based on an in-depth analysis of the combustion process, predict concentrations of primary exhaust pollutants 5. Exposure to the engineering systems needed to set-up and run engines in controlled laboratory environments 6. Develop skills to run engine dynamometer experiments 7. Learn to compare and contrast experimental results with theoretical trends, and to attribute observed discrepancies to either measurement error or modeling limitations 8. Develop an understanding of real world engine design issues 9. Develop an ability to optimize future engine designs for specific sets of constraints (fuel economy, performance, emissions) 10. Through the use of both theoretical techniques and experimentation, develop an appreciation for theoretical and practical limits to engine performance and fuel economy
ASSESSMENT TOOLS: for each assessment tool, links to the course outcomes are identified	1. Regular homework assignments 2. Exam(s) and/or project(s)

PREPARED BY: A. Boehman
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