Mechanical Engineering Dept. Department

Syllabus
ME 421: Automotive Design & Engg. (3-0-3)

Course Catalog Description:

Major systems and subsystems of a vehicle will be discussed. Engineering metrics and design requirements will be presented for major sub systems of a vehicle. Vehicle dynamics, aerodynamics, safety, fuel economy, and performance will be explained using real world examples and relevant engineering analysis. Automotive materials, manufacturing, and future trends in mobility will also be discussed.

Course Pre-requisites:

- EE 234: Electronics & Microcontrollers
- ME 216: Materials Science and Engg.
- ME 307: Machine Design I
- ME 322: Manufacturing Processes

Course Objectives:

1. Understand the basics of function, operation, and control of vehicle systems.
2. Understand the basic engineering calculations necessary to support the analysis and design of major automotive subsystems
3. Understand the product design process in context of automotive engineering
4. Understand the materials and manufacturing in terms of automotive engineering

Course Learning Outcomes:

CLO1. Demonstrate a basic technical understanding of the function, operation, and control of vehicle subsystems.

CLO2. Demonstrate the ability to perform basic engineering calculations necessary to support the analysis and design of major automotive subsystems

CLO3. Understand the interdependency of various subsystems in a complex engineering product.

CLO4. Understand the product design process in context of automotive engineering.

CLO5. Understand the materials and manufacturing in terms of automotive engineering.

CLO6. Demonstrate the understanding of environmental issues related to current automotive technology.

CLO7. Demonstrate the understanding of alternative fuel and electric vehicles.

Learning Resources:

- An Introduction to Modern Vehicle Design, Happinan-Smith, J., 2001

Lecture Assessment Plan:

Assessment Task	Week Due	Weight
Exam	13	25.0%
HW and Quiz	3,5,8,11,14	20.0%
Exam	7	25.0%
Exams	7,13,15	80.0%

Lecture Weekly Schedule:

Week#	Topics
1	Automobiles and Transportation: A systems perspective
2	Automobiles and Transportation: A systems perspective (Continue)
3	New Product Development for Automobiles
4	Vehicle body systems
5	Vehicle chassis systems
6	Vehicle powertrain systems: IC engines and transmissions
7	Vehicle powertrain systems: Electric and hybrid systems
8	Vehicle Dynamics: Acceleration, braking, cornering
9	Vehicle Aerodynamics
10	Vehicle Safety and Crashworthiness
11	Vehicle Fuel Economy and Emissions
12	Vehicle Ergonomics and Occupant Packaging
13	Vehicle Electrical and Electronic Systems
14	Automotive Manufacturing and Materials
15	Automotive Manufacturing and Materials (Continue)