



FUNDAMENTALS OF AUTOMOTIVE SYSTEMS

PROF. C. S. SHANKAR RAM

Department of Design Engineering
IIT Madras

PRE REQUISITES: Rigid Body Dynamics (done in 1st year BE), Thermodynamics, Fluid Mechanics

INTENDED AUDIENCE: 3rd/4th year undergraduate and 1st year M.Tech./M.S./Ph.D. students

COURSE OUTLINE :

The objective of this course is to provide a fundamental understanding of the various systems of a typical automobile.

Course Outcomes: At the end of this course, the participant should be able to:

1. acquire fundamental knowledge of the various systems of an automobile,
2. associate the functions of each system with its design and layout, depict the various systems using simple schematics, and apply concepts learnt in core undergraduate courses to synthesize mathematical models of the various systems.

ABOUT INSTRUCTOR :

Prof. C. S. Shankar Ram is currently a professor in the Department of Engineering Design, Indian Institute of Technology Madras, Chennai, India. He received his Bachelor of Engineering (B. E.) in Mechanical Engineering from Motilal Nehru Regional Engineering College, Allahabad, India, and his M. S. and Ph. D. from Texas A&M University, USA. His research interests are in the areas of dynamics and control with applications to automotive and transportation systems. He teaches courses on Control Systems, Fundamentals of Automotive Systems and Control of Automotive Systems at IIT Madras

COURSE PLAN :

Week 1 : Course Overview, Classification of Internal Combustion Engines, Engine Components, Operation of Four Stroke Engines

Week 2 : Two Stroke Engines, Engine Cycles

Week 3 : Engine Performance, Supercharging, Combustion in Spark Ignition Engines

Week 4 : Combustion in Compression Ignition Engines, Carburetion, Fuel Introduction Systems

Week 5 : Engine Emissions, Emission Control Systems, Automotive Powertrain

Week 6 : Automotive Clutch, Transmission, Powertrain Analysis

Week 7 : Transmission Matching and Introduction to Brake System

Week 8 : Components of Brake System, Hydraulic Brake

Week 9 : Air Brake, Antilock Brake System

Week 10 : Braking Analysis, Introduction to Steering System, Manual Steering System

Week 11 : Power Steering System, Wheel Alignment, Introduction to Suspension System

Week 12 : Components of Suspension System, Dependent and Independent Suspension, Introduction to Electric and Hybrid Powertrain, Tyres.