THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Vehicle Dynamics

MECHENG 5234

Credit Hours:
4.00

Course Levels:
Undergraduate (1000-5000 level)
Graduate (5000-8000 level)

Course Components:
Lecture
Lab

Course Description:
A first course in vehicle dynamics devoted to the basic concepts of rubber wheeled vehicles with an actual driving and demonstrated laboratory.

Prerequisites and Co-requisites:
Prereq: 3360 (482) and 3671 (563), or Grad standing in MechEng, or permission of instructor.

Course Goals / Objectives:

- Be able to represent the vehicle as a free body diagram illustrating all forces acting on the system. Be able to explain each term and how the forces are generated
- Obtain an understanding of the specific components of the vehicle including, but not limited to: the suspension, the braking system, the steering system, and the interaction of these components on the ride and handling of the vehicle
- Be able to define the ride and handling characteristics of a vehicle and their interaction on performance
- Have an appreciation of the driver inputs to a vehicle and how the system responds
- Understand the role of Federal Motor Vehicle Safety Standards (FMVSS) and Society of Automotive Engineers (SAE) requirements and regulations on the production of vehicles produced for sale in the United States
- Gain experience in driving tests and test methodologies (laboratory portion of class) and test equipment used in industry
- Gain an understanding of the complete range of nonlinear tire force and moment responses to variations in slip angle, longitudinal slip, and vertical load
- Become familiar with the state-of-the-art full vehicle computer simulations used for research and development by industrial, government and academic organizations
- Be able to generate equations of motion necessary to derive analytical models representing the full nonlinear range of vehicle handling dynamics
- Gain insight into stability systems such as Anti-lock Braking Systems (ABS), Electronic Stability Control (ESC), and Traction Control; as well as emerging safety technologies based on radar, vision, and Global Positioning System (GPS) technologies

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Course Topics:

- Acceleration/Deceleration
- Braking straight line
- Road loads
- Rolling resistance
- Ride
- Cornering
- Suspensions
- Tires/Suspensions
- Steering systems
- Tires
- Rollover
- Safety regulations

Designation:

Elective