TEXAS A&M UNIVERSITY
Department of Mechanical Engineering
MEEN 432 Automotive Engineering
Section 500, Spring 2026

General Description (3 credits):

Introduction to vehicle dynamics; application of engineering mechanics principles to analysis of acceleration and braking, cornering and handling; analysis and design of drive train, suspension, brakes and tires to achieve desired performance. Introduction to Unconventional Powertrains (Electric, Hybrid-Electric and Fuel Cell vehicles)

Prerequisites: MEEN 363 or equivalent; Recommended MEEN 364 or equivalent

Instructor: Dr. Arnold Muyshondt, 531 Mechanical Engineering Office Building, Email: amuyshondt@tamu.edu

Teaching Assistant / Grader: Laxmi Viswanadha,
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Lecture: Zachary, Room 218, MWF 9:10 AM – 10:00 AM
Course Goals: At the end of this course, the students should be able to

1) Identify and build mathematical models for basic sub-systems of an automobile such as the power train and the steering;
2) Simulate the dynamic response of the vehicle using MATLAB from the inputs from the driver and the environment;
3) Team with other students to simulate the dynamic response of an automobile and write a technical paper
4) Have an introductory understanding of major trends in the automotive industry – in terms of unconventional powertrains and automated driving.

Course Content and Schedule[1]:

Weeks 1-3:	Overview of vehicular subsystems; Introduction to Numerical Simulation of Dynamic Systems; Review of PID control; Review of Rigid Body Dynamics
Weeks 4-6:	Vehicle Lateral Dynamics, Steering components, cornering characteristics, lateral tire dynamic model, simulation models of the lateral dynamics
Weeks 7-8:	Suspension analysis and impact on performance (time permitting)
Weeks 9-11	Modeling and Simulation of Powertrain and Vehicle Longitudinal Dynamics (Electric Motors, Gear Trains, Chassis and Tires), Shift Scheduling, Motor Transmission Matching

[1] Tentative

Weeks 12-13:	Batteries, Other energy storage systems; Regenerative Braking, Energy Efficiency and Performance
Weeks 13-14:	Introduction to Different Powertrains and Architectures (SI Engines, Electric, Hybrid Electric and Fuel Cell Vehicles). Racing!

Use of Computer Software:
This course will make extensive use of MATLAB/SIMULINK. We will use the online repository system at github.tamu.edu to submit work related to projects and examples. Every student shall get an account on github.tamu.edu

Student Evaluation:
There will be three projects that will be the basis for grading, with weights 25%, 35% and 40%. Timely completion of the projects is expected.

Project progress will be monitored through appropriate submission requirements on a regular (e.g. weekly) basis. Weekly progress on the project will constitute 15% of project scores.

Projects 1, 2 and parts of 3 will be performed in teams of 2 or 3. Project 3 will also have an individual sub-project. For team projects, the project evaluation will also consist of a "peer-evaluation" component that could significantly influence each individual's score relative to the overall project evaluation.

Final grade will be based on the cumulative score that takes into account all the project scores. The following is the grading policy:

Grade	Score
A	> 90
B	81-90
C	71-80
D	61-70
F	<= 60

Use of e-mail:
You are required to check your e-mail regularly (at least daily) and stay in touch with the announcements that appear on the class web site. You must make available to the instructor the most reliable e-mail address you have, and/or any changes to it, as soon as possible.

Americans with Disabilities Act (ADA) Policy Statement:
The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, or call 845-1637. For additional information visit http://disability.tamu.edu.

Academic Integrity Statement:
Plagiarism consists of passing off as yours the work that belongs to someone else. As such, you will be committing plagiarism if you present someone else's work as your own, even with the other person's consent. Be aware that such conduct is against University rules and could have serious consequences. If you have

questions about this subject, please consult the Texas A&M University Student Rules, under the section "Scholastic Dishonesty."

Aggie Honor Code: "An Aggie does not lie, cheat, or steal, or tolerate those who do."

It is the responsibility of students and instructors to help maintain scholastic integrity at the university by refusing to participate in or tolerate scholastic dishonesty (Student Rule 20. Scholastic Dishonesty, http://student-rules.tamu.edu). New procedures and policies have been adopted effective September 1, 2004. Details are available through the Office of the Aggie Honor System (http://www.tamu.edu/aggiehonor/). An excerpt from the Philosophy & Rationale section states:

"Apathy or acquiescence in the presence of academic dishonesty is not a neutral act -- failure to confront and deter it will reinforce, perpetuate, and enlarge the scope of such misconduct. Academic dishonesty is the most corrosive force in the academic life of a university."