

MECHANICAL & AEROSPACE ENGINEERING

Course: ME 186 – Automotive Engineering
Course Code: 41388 section 1
Semester: Fall 2018
Prerequisites: ME 114, ME 130, ME 154.
Credit Units: 3 Seminar
Instructor: Kevin A. Sawyer, Ph.D., P.E.
Class Hours: Wednesday, 6:00-8:45 pm
Final Examination: Wednesday, December 12. 5:15-7:30
Class Location: Engineering Building 403
Office Hours: Wednesday 4:00-6:00: By appointment.
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Description: Overview of automotive engineering fundamentals including powerplant, structures, suspension, steering, brakes, tires, and drive train. Application of engineering principles in automotive design and analysis. Introduction to alternative vehicle technologies. Use of mechanical engineering principles for automobile performance analysis.

Course Goals:

1. Learn automotive specific engineering principles
2. Learn basic automobile operational principles
3. Study traditional and advanced vehicle technologies
4. Apply engineering principles to automotive component performance analysis
5. Apply engineering principles to analyze automobile stability and handling.

Student Learning Objectives:

1. The ability to identify various components of automotive vehicles
2. The ability to describe various automotive operational principles
3. The ability to calculate basic automotive performance parameters
4. The ability to describe automotive systems in terms of engineering models
5. The ability to apply mechanical engineering concepts in the automotive design processes

Required Text: Fundamentals of Vehicle Dynamics, by Thomas D. Gellespie. ISBN 1.56091-199-9

Reference Texts: Automotive Engineering Fundamentals, by Stone & Ball. SAE press ISBN 0-7680-0987-1

Grading:

Homework	30%
Midterm exam	35%
Final exam	35%

Late homework accepted with a penalty of 50% maximum credit

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Tentative Course Topics and Schedule:

Week	Topic
1	Introduction and course overview. Alternative power plants.
2	Combustion and IC engine fundamentals.
3	I.C. engine performance. Mechanical subcomponents. HW #1 due
4	Transmission, driveline, and steering gear
5	Axle loads, acceleration and braking performance HW #2 due.
6	Road loads, introduction to ground vehicle aerodynamics
7	Ride and suspension. Vibration analysis for ride quality evaluation HW# 3 due.
8	Midterm Exam based on weeks 1-6.
9	Random vibrations and related topics. HW #4 due.
10	Electric vehicles. Guest speaker from industry.
11	Vehicle ride and Random vibrations. HW #5 due.
12	Pneumatic tires and steady state cornering.
13	Cornering and handling performance parameters. HW #6 due.
14	Thanksgiving week, No class
15	Vehicle dynamics and chassis design considerations HW #7 due.
16	Sensors for autonomous vehicles. Guest speaker from industry

Homework #1

1. Select any topic from the material discussed in session one and provide up to date information on the subject. Specifically, research and present how the technologies and predictions of 2013 have evolved (or gone by the wayside) into what is considered state of the art today.
2. Compare and contrast the overall environmental impact of internal combustion based versus all electric vehicles. Consider all aspects from raw material extraction and processing, overall environmental impacts and the source of the fuel.

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Classroom Protocol

Regular attendance and active participation are encouraged. Please attend to non-classroom related discussion outside of the classroom.

Dropping and Adding

Students are responsible for understanding the policies and procedures about add/drop, grade forgiveness, etc. Refer to the current semester's [Catalog Policies](http://info.sjsu.edu/static/catalog/policies.html) section at <http://info.sjsu.edu/static/catalog/policies.html>. Add/drop deadlines can be found on the [current academic calendar](http://www.sjsu.edu/academic_programs/calendars/academic_calendar/) web page located at http://www.sjsu.edu/academic_programs/calendars/academic_calendar/. The [Late Drop Policy](http://www.sjsu.edu/aars/policies/latedrops/policy/) is available at <http://www.sjsu.edu/aars/policies/latedrops/policy/>. Students should be aware of the current deadlines and penalties for dropping classes.

Information about the latest changes and news is available at the [Advising Hub](http://www.sjsu.edu/advising/) at <http://www.sjsu.edu/advising/>.

University Policies

Academic integrity

Your commitment as a student to learning is evidenced by your enrollment at San Jose State University. The [University's Academic Integrity policy](http://www.sjsu.edu/senate/S07-2.htm), located at <http://www.sjsu.edu/senate/S07-2.htm>, requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. The [Student Conduct and Ethical Development website](http://www.sa.sjsu.edu/judicial_affairs/index.html) is available at http://www.sa.sjsu.edu/judicial_affairs/index.html.

Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade and sanctions by the University. For this class, all assignments are to be completed by the individual student unless otherwise specified. If you would like to include your assignment or any material you have submitted, or plan to submit for another class, please note that SJSU's Academic Policy S07-2 requires approval of instructors.

Campus Policy in Compliance with the American Disabilities Act

If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. Presidential Directive 97-03 requires that students with disabilities requesting accommodations must register with the [Disability Resource Center](http://www.drc.sjsu.edu/) (DRC) at <http://www.drc.sjsu.edu/> to establish a record of their disability.

“Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of forty-five hours over the length of the course (normally 3 hours per unit per week with 1 of the hours used for lecture) for instruction or preparation/studying or course related activities including but not limited to internships, labs, clinical practica. Other course structures will have equivalent workload expectations as described in the syllabus.”