

MECH1901 Automotive Engineering

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| Course Code: MECH 1901 | Course Title: Automotive Engineering |
| Required Course Or Elective Course: University Common Core | Terms Offered (Credits): Fall or Spring (3 credits) |
| Faculty In Charge: Kai Tang | Pre/Co-Requisites: NA |
| Course Structure (weekly, blended teaching format): Lecture: 2+ hours of self-studying the recorded lecture videos + completing online knowledge check questions, and 1.5 hours compulsory interaction session with the instructor. Lab: 1.5 hours | |
| Textbook/Required Material: <ol style="list-style-type: none">1. Class notes2. Reference text books | |
| Course Description: <ol style="list-style-type: none">1. This course teaches fundamental technologies in automotive engineering. It is targeted at the general student body and opens to all the students of science, engineering, or business majors. It will cover all the important aspects of automobile engineering and technologies, including its history, development, and current state. Content wise, it will cover key components of an automobile, i.e., the engine, transmission (both manual and automatic), suspension systems, brake system, control, chassis, etc. In addition, it will cover the managerial and operational aspects of modern automobile companies.2. There will be little calculation involved in the teaching of this course. Instead, the focus of the course is on teaching the fundamental working principles of an automobile. For example, students will learn why the torque of the engine drops after the engine speed reaches certain level and thus obtain a firm understanding of the physical meaning of the torque vs. RPM graph. However, how exactly this graph is calculated will not be covered. As another example, students will learn why a suspension system usually uses a shock absorber by studying the general spring-mass system; however, they will not be tangled with how to solve the accompanying differential equations.3. The course will be taught using the lecture+lab method. Basically, after a new system/component is taught in the lecture, e.g., the internal combustion engine, the students will spend the next three hours in using CAD software (SolidWorks) to design a simple internal combustion engine and to watch its computer simulation. The "design" will be mostly done using "canned" software modules and tools. In other words, students will not learn how to design; rather, they will go through the design process which will help solidify what they have just learnt in the lecture. | |
| Course Topics: <ol style="list-style-type: none">1. Introduction to automobiles2. Basic scientific principles3. Engines4. Manual transmission5. Automatic transmission6. Axles and drives7. Suspensions8. Steering systems9. Brakes10. Body design | |

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| Course Objectives: | <ol style="list-style-type: none"> 1. To equip the students with fundamental working principles and technologies in automotive engineering. 2. To introduce basic and entry level theories and terminology of mechanical engineering that are foundations of automotive engineering. 3. To provide students an overview and understanding of the social and environmental influence related to automotive engineering. | | | | | | | | |
| Course Outcomes: | <ol style="list-style-type: none"> A. The students will have a clear understanding and knowledge of the fundamental engineering and mathematical theories underneath automotive engineering. B. Be able to use CAD software to simulate the working of key automotive components such as engine, transmission, differential, etc. C. Be able to understand and identify social and environmental issues related to automobiles. | | | | | | | | |
| Assessment Tools: | <table border="0" style="width: 100%;"> <tr> <td style="padding-left: 20px;">Regular homework problems</td> <td style="text-align: right;">5%</td> </tr> <tr> <td style="padding-left: 20px;">Lab projects</td> <td style="text-align: right;">20%</td> </tr> <tr> <td style="padding-left: 20px;">In-class quizzes</td> <td style="text-align: right;">10%</td> </tr> <tr> <td style="padding-left: 20px;">Mid-term exam and Final exams</td> <td style="text-align: right;">65%</td> </tr> </table> | Regular homework problems | 5% | Lab projects | 20% | In-class quizzes | 10% | Mid-term exam and Final exams | 65% |
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