AUTOMOTIVE SYSTEMS ENGINEERING

The automotive industry of the twenty-first century is advancing at a rapid pace with great emphasis on lightweight structures, alternative energy sources, high efficiency powertrains, intelligent control systems, lower emissions, robust design and manufacturing, as well as improved comfort and safety. To meet the challenges of the automotive industry, engineers are required to improve their technical knowledge and skills in a variety of topics that are beyond the realm of traditional engineering curricula.

Today’s automotive engineers are expected to make connections among different areas of knowledge and integrate them in ways that benefit the automotive industry, society and the environment. Automotive engineers must be well grounded in their own areas of specialty. They must also have a good understanding of the related disciplines, be skilled in synthesis, analysis and design, work effectively in a team environment, and adopt a ‘systems’ approach.

In response to these needs, the College of Engineering and Computer Science offers a 30-credit-hour interdisciplinary graduate degree program leading to a master’s degree in Automotive Systems Engineering. Many courses in this program are specifically designed to address the new and emerging technology in the automotive industry. Students in this program will not only learn about advanced technologies, but also how to apply them in practice for creative design and problem solving.

The Automotive Systems Engineering degree program aims to achieve the following educational goals:

1. Provide depth in the area of automotive systems engineering.
2. Provide breadth across the engineering disciplines of electrical, industrial, mechanical, materials, and manufacturing engineering and provide this breadth from an engineering systems perspective.

A candidate for the Master of Science in Engineering in Automotive Systems Engineering must meet the requirements for the Bachelor of Science degree at this campus or the equivalent of these requirements. Undergraduate degrees must be from an accredited program, and for regular admission must be with an average of B or better. Each applicant should present complete, official transcripts of all prior college work.

The candidate must then complete at least 30 semester hours of graduate work approved by the program advisor/graduate advisory committee with a grade of at least a B covering all courses elected. No more than one B- will be allowed under any circumstances. Applicants who meet the general admission criteria but do not have adequate preparation in required areas of engineering would be asked to take appropriate undergraduate courses as a condition for full admission to the program. Such courses, when elected, will not count towards the degree requirements.

The automotive systems engineering degree program is made up of three components:

1. Core courses of 12 credit hours.
2. Concentration courses of 18 credit hours.

Core Courses

The core is intended to provide a unified graduate-level preparation in interdisciplinary topics that will allow students to elect courses in departmental, systems, or general concentrations. It consists of six credit hours of required courses and six credit hours of elective core courses based on the applicant’s background.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AENG 500</td>
<td>Automobile: An Integrated Syst</td>
<td>3</td>
</tr>
<tr>
<td>AENG 587</td>
<td>Automotive Manuf Processes</td>
<td>3</td>
</tr>
</tbody>
</table>

Elective Core Courses

Select from the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>AENG 502</td>
<td>Modeling of Automotive Systems</td>
</tr>
<tr>
<td>AENG 505</td>
<td>Intro to Embedded Systems</td>
</tr>
<tr>
<td>AENG 510</td>
<td>Vehicle Electronics I</td>
</tr>
<tr>
<td>AENG 545</td>
<td>Vehicle Ergonomics I</td>
</tr>
<tr>
<td>AENG 547</td>
<td>Automotive Powertrains I</td>
</tr>
<tr>
<td>AENG 581</td>
<td>Materials Sel in Auto Design</td>
</tr>
<tr>
<td>IMSE 515</td>
<td>Fundamentals of Program Mgt</td>
</tr>
<tr>
<td></td>
<td>or IMSE 516 Project Management and Control</td>
</tr>
<tr>
<td></td>
<td>or IMSE 517 Managing Global Programs</td>
</tr>
<tr>
<td>AENG 596</td>
<td>Internal Combustion Engines I</td>
</tr>
</tbody>
</table>

Total Credit Hours: 12

Concentration Courses

The program offers several concentration areas to meet the needs of individual students. The student may select the concentration based on his/her interest and background. The following concentrations are currently offered. Each student is required to take at least four courses (12 credit hours) in the concentration area.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>ECE 515</td>
<td>Vehicle Electronics II</td>
</tr>
<tr>
<td>ECE 530</td>
<td>Energy Storage Systems</td>
</tr>
<tr>
<td>ECE 531</td>
<td>Intelligent Vehicle Systems</td>
</tr>
<tr>
<td>ECE 532</td>
<td>Auto Sensors and Actuators</td>
</tr>
<tr>
<td>ECE 533</td>
<td>Active Automotive Safety Sys</td>
</tr>
<tr>
<td>ECE 5462</td>
<td>Elec Aspects of Hybrid Vehicle</td>
</tr>
<tr>
<td>ECE 565</td>
<td>Digital Control Systems</td>
</tr>
<tr>
<td>ECE 580</td>
<td>Digital Signal Processing</td>
</tr>
<tr>
<td>ECE 646</td>
<td>Adv Elec Drive Transportation</td>
</tr>
<tr>
<td>IMSE 519</td>
<td>Quan Meth in Quality Engin</td>
</tr>
<tr>
<td>IMSE 538</td>
<td>Intelligent Manufacturing</td>
</tr>
<tr>
<td>IMSE 561</td>
<td>Tot Qual Mgmt and Six Sigma</td>
</tr>
<tr>
<td>IMSE 577</td>
<td>Human-Computer Interaction</td>
</tr>
<tr>
<td>IMSE 593</td>
<td>Vehicle Package Engineering</td>
</tr>
<tr>
<td>AENG 546</td>
<td>Vehicle Ergonomics II</td>
</tr>
<tr>
<td>AENG 589</td>
<td>Auto Assembly Systems</td>
</tr>
</tbody>
</table>
Mechanical:
- ME 537 Automotive Air Conditioning
- ME 543 Vehicle Dynamics
- ME 545 Acoustics and Noise Control
- ME 548 Automotive Powertrains II
- ME 570 Powertrain NVH of Elect Veh
- ME 597 Internal Combustion Engines II
- ME 598 Engine Emissions
- AENG 550 Design of Automotive Chassis
- AENG 551 FEM in Auto Structure Design
- AENG 555 Vehicle Stability & Control
- AENG 566 Vehicle Thermal Management
- AENG 598 Energy Sys for Auto Vehicles
- AENG 650 Anyls&Des for Veh Crshwrthnss

Materials:
- AENG 584 Lightweight Automotive Alloys
- AENG 586 Design & Mfg: Ltwt Auto Mat
- AENG 588 Design&Manufac for Environment
- AENG 687 Adv Auto Mfg Processes
- ME 582 Injection Molding
- ME 583 Mechanical Behav of Materials
- ME 584 Mechanical Behavior of Polymer
- ME 587 Automotive Composites
- ME 589 Composite Materials
- ME 591 Degradation of Materials

General:
With the approval of the advisor, a general concentration of twelve credit hours may be satisfied by selecting courses in more than one concentration

Total Credit Hours: 12

Students may elect AENG 698, a 3 credit hour or a 6-credit hour project, or AENG 699, a 6-credit hour master's thesis, in lieu of equivalent credit hours of courses. This will require prior approval of a faculty advisor and the program director.

ASE 990 Doctoral Dissertation 1 to 9 Credit Hours
Dissertation work by a Ph.D. student who has been admitted to the candidacy status. The student must be registered during the semester of the dissertation defense. (1 to 9 credit hours per semester)
Restriction(s):
- Can enroll if Class is Doctorate
- Can enroll if Level is Doctorate or
- Can enroll if College is Engineering and Computer Science
- Can enroll if Major is Automotive Systems Engineering

* An asterisk denotes that a course may be taken concurrently.

Frequency of Offering
The following abbreviations are used to denote the frequency of offering:
(F) fall term; (W) winter term; (S) summer term; (F, W) fall and winter terms; (YR) once a year; (AY) alternating years; (OC) offered occasionally

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ASE 990 Doctoral Seminar 0 Credit Hours
After attaining candidacy every Ph.D. student is required to attend and actively participate in seminars each semester until graduation. In addition, each Ph.D. student is required to present a one hour seminar about his/her research or an a pre assigned research topic, and lead a follow-up discussion on the future trends in his/her field.
Corequisite(s): ASE 990
Restriction(s):
- Can enroll if Class is Doctorate
- Can enroll if Level is Doctorate or
- Can enroll if College is Engineering and Computer Science
- Can enroll if Major is Automotive Systems Engineering

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