

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.

Code	Title	Credit Hours
Required Core Courses		
AENG 500	Automobile: An Integrated Syst	3
AENG 587	Automotive Manuf Processes	3
Elective Core Courses		
Select from the following:		6
AENG 502	Modeling of Automotive Systems	
AENG 505	Intro to Embedded Systems	
AENG 510	Vehicle Electronics I	
AENG 545	Vehicle Ergonomics I	
AENG 547	Automotive Powertrains I	
AENG 581	Materials Sel in Auto Design	
IMSE 515	Fundamentals of Program Mgt	
	or IMSE 516 Project Management and Control	
	or IMSE 517 Managing Global Programs	
AENG 596	Internal Combustion Engines I	
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.

Code	Title	Credit Hours
Select at least four courses from an area of concentration:		12
Electrical:		
ECE 515	Vehicle Electronics II	
ECE 530	Energy Storage Systems	
ECE 531	Intelligent Vehicle Systems	
ECE 532	Auto Sensors and Actuators	
ECE 533	Active Automotive Safety Sys	
ECE 5462	Elec Aspects of Hybrid Vehicle	
ECE 565	Digital Control Systems	
ECE 580	Digital Signal Processing	
ECE 646	Adv Elec Drive Transportation	
Industrial and Manufacturing:		
IMSE 519	Quan Meth in Quality Engin	
IMSE 538	Intelligent Manufacturing	
IMSE 561	Tot Qual Mgmt and Six Sigma	
IMSE 577	Human-Computer Interaction	
IMSE 593	Vehicle Package Engineering	
AENG 546	Vehicle Ergonomics II	
AENG 589	Auto Assembly Systems	

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: Ltw 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.

Learning Goals

1. Students will be able to apply knowledge and skills to engineering problems
2. Students will be able to design, analyze, and model automotive systems or process.
3. Students will be able to communicate effectively in professional reporting and presentations.

ASE 798 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

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