

AUTOMOTIVE ENGINEERING MAJOR

Program Curriculum

Code	Title	Credits
Degree Core Requirements		
ME 2004	Engineering Analysis Using Numerical Methods	3
ME 3414	Fluid Dynamics (w lab)	4
ME 3624	Mechanical Design (w lab)	4
ME 3304	Heat and Mass Transfer	3
ME 3534	Controls Engineering I (w lab)	4
ME 4005	Mechanical Engineering Lab	3
Subtotal		21
Major Requirements		
ME 4534	Land Vehicle Dynamics	3
ME 4544	Automotive Engineering	3
ME 4564	Vehicle Control	3
Select 9 credits of technical electives from the list shown.		9
Subtotal		18
Additional Course Requirements		
CHEM 1035	General Chemistry	3
CHEM 1045	General Chemistry Laboratory	1
ECE 2054	Applied Electrical Theory	3
ESM 2104	Statics	3
ESM 2204	Mechanics of Deformable Bodies	3
ESM 2304	Dynamics	3
ISE 2214	Manufacturing Processes Laboratory	1
MATH 2114	Introduction to Linear Algebra	3
MATH 2204	Introduction to Multivariable Calculus	3
ME 2134	Thermodynamics	4
ME 3524	Mechanical Vibrations	4
MSE 2034	Elements of Materials Engineering	3
STAT 3704	Statistics for Engineering Applications	2
Subtotal		36
Pathways to General Education		
<i>Pathways Concept 1 - Discourse</i>		
ENGL 1105	First-Year Writing (1F)	3
ENGL 1106	First-Year Writing (1F)	3
ME 3024	Engineering Design and Economics (1A)	3
ME 3034	Mechanical Engineering Discourse (1A)	1
ME 4015 & ME 4016	Engineering Design and Project and Engineering Design and Project (1A) ²	6
or ENGE 4735 & ENGE 4736	Interdisciplinary Design Capstone and Interdisciplinary Design Capstone	
<i>Pathways Concept 2 - Critical Thinking in the Humanities</i>		
Select six credits in Pathway 2 (https://catalog.vt.edu/course-search/?attrs_pathways=attrs_pathways_G02)		6
<i>Pathways Concept 3 - Reasoning in the Social Sciences</i>		
Select six credits in Pathway 3 (https://catalog.vt.edu/course-search/?attrs_pathways=attrs_pathways_G03)		6
<i>Pathways Concept 4 - Reasoning in the Natural Sciences</i>		

PHYS 2305	Foundations of Physics	4
PHYS 2306	Foundations of Physics	4
<i>Pathways Concept 5 - Quantitative and Computational Thinking</i>		
MATH 1225	Calculus of a Single Variable (5F) ¹	4
MATH 1226	Calculus of a Single Variable (5F)	4
MATH 2214	Introduction to Differential Equations (5A)	3
<i>Pathways Concept 6 - Critique and Practice in Design and the Arts</i>		
Select three credits in Pathway 6a (https://catalog.vt.edu/course-search/?attrs_pathways=attrs_pathways_G06A)		3
ENGE 1215 & ENGE 1216	Foundations of Engineering and Foundations of Engineering (6D)	4
or ENGE 1414	Foundations of Engineering Practice	
<i>Pathways Concept 7 - Critical Analysis of Identity and Equity in the United States</i>		
Select a course with covers both Concept 7 and Pathways Concept 2 or 3 to avoid taking additional credits.		
Subtotal		54
Total Credits		129

¹ Consult Timetable of Classes or University Course Catalog for minimum required prerequisite grade in MATH1225 to proceed to other MATH courses such as MATH1226 and MATH2114.

² All students should enroll in ME4015. Students interested in joining an ENGE4735/4736 senior design project should apply through the ME4015 senior design coordinator during the project selection process at the start of the Fall semester. Because participation in all projects is limited, students are not guaranteed a seat in any particular project. Grades earned in ENGE4735/4736 will also count towards a student's in-major GPA. Students must meet all ME4015 prerequisites to be eligible to enroll in ENGE4735.

Technical Electives

The Automotive Engineering major requires 9 credits of approved technical electives from list. No more than 6 of these credits can be taken Pass/Fail. Please see attached list for technical elective choices.

Code	Title	Credits
ECE 3254	Industrial Electronics	3
ME 3604	Kinematics and Dynamics of Machinery	3
ME 4204	Internal Combustion Engines	3
ME 4554	Advanced Technology for Motor Vehicles	3
ME 4614	Mechanical Design II	3
ME 4624 or ME 5634	Finite Element Practice in Mechanical Design ^{2,3} Finite Elements in Machine Design	3
ME 4634	Introduction to Computer-aided Design and Manufacturing	3
ME 4644 or ME 5644	Introduction to Rapid Prototyping ^{2,3} Rapid Prototyping	3
ME 4654 or ME 5794	Optimization Techniques in Engineering ^{2,3} Optimization Techniques in Engineering	3
ME 4674	Materials Selection in Mechanical Design	3
ME 4744	Mechatronics: Theory and Application	4
ME 4974	Independent Study ¹	1-19
ME 4994	Undergraduate Research ¹	1-19

- ¹ Independent study and undergraduate research must be automotive-related and requires departmental/major approval. No more than 6 credits total of independent study and/or undergraduate research can count towards technical elective requirement. Consult undergraduate advisor with questions.
- ² Students not already accepted into the accelerated BS/MS graduate program should plan to take the 4000-level version of these classes.
- ³ Students within 2 semesters of graduating who have a minimum overall GPA of 3.0 or higher who have not been accepted into an accelerated BS/MS program may request permission to enroll in a 5000-level ME course provided that: (1) an undergraduate version of the course is not available, (2) the student cannot otherwise complete the major with current undergraduate course offerings, and (3) the student has earned a B or higher in all previous ME courses. Permission from both the ME department head and the course instructor are required for the student to enroll in a 5000-level ME course. These courses may not be used on the Plan of Study for a graduate degree at Virginia Tech.

Satisfactory Progress Towards Degree

University Policy 91 outlines university-wide minimum criteria to determine if students are making satisfactory progress towards the completion of their degrees. The ME Department fully supports this policy. Specific expectations for satisfactory progress for Mechanical Engineering majors are as follows:

- Each student must meet the minimum University-wide criteria as described in Policy 91 and summarized in the Undergraduate Catalog <http://www.undergradcatalog.registrar.vt.edu/>
- Once a student is in the ME major, a student must:
 - Within 2 semesters of entering ME Department, complete PHYS2305, ENGL1106, CHEM1035, MATH2114, and ME2004
 - Within 3 semesters of entering ME Department, complete ME2134
 - Complete a minimum of 12 credits that apply toward a BSME degree during each 12 month period
 - Maintain an in-major GPA of at least 2.00. In-major is calculated using all courses taught under the ESM, ME, and NSEG designators and ENGE 4735 and ENGE 4736 if applicable .
 - Complete ESM 2104 Statics, MATH 2114 Introduction to Linear Algebra and MATH 2204 Introduction to Multivariable Calculus within 50 attempted required course credits (not to include Pathways courses, technical electives or free electives)
 - Complete ESM 2304 Dynamics, ME 2004 Engineering Analysis Using Numerical Methods and MATH 2214 Introduction to Differential Equations within 69 attempted required course credits (not to include Pathways courses, technical electives or free electives)
 - Complete ME 2134 Thermodynamics, ME 3524 Mechanical Vibrations, and (ME 3024 Engineering Design and Economics or ME 3624 Mechanical Design) with 87 attempted required course credits (not to include Pathways courses, technical electives or free electives)
 - Complete ME 4015 Engineering Design and Project and ME 4544 Automotive Engineering within 104 attempted required course credits (not to include Pathways courses, technical electives or free electives)

Graduation Requirements

Graduation Requirements

Each student must complete at least 129 semester credit hours with a minimum overall GPA of 2.00 and a minimum in-major GPA of 2.00. In-major GPA is determined from all courses with Engineering Science and Mechanics (ESM), Mechanical Engineering (ME), and Nuclear Engineering (NSEG) designators and ENGE 4735/ENGE 4736 if applicable.

Required courses in the Automotive Engineering "Major Requirements" category (ME 4534, ME 4544, and ME 4564) and electives in the "Technical Elective" category cannot be double-counted as technical electives towards a second Mechanical Engineering (BSME) major.

General Information about Checksheet

Course offerings are subject to change based on course enrollment and the availability of sufficient resources. Students should confirm course offerings in advance with their department.

Statement of Prerequisites

Prerequisites may change. Students are responsible for pre-requisites and pre-requisites of pre-requisites whether specifically listed in the Undergraduate Course Catalog or not.

Be sure to consult the University Timetable of Classes or check with your advisor for the most current prerequisite requirements. Note that some courses, such as MATH 1225, may have a minimum grade requirement to move on to other courses at Virginia Tech, such as MATH 2114 and MATH 1226.

Acceptable Substitutions

- MATH 2405H (5 cr) may be substituted for MATH 2114 (3 cr)
- MATH 2405H + MATH 2406H may be substituted for MATH 2114 (3 cr) + MATH 2204 (3 cr) + MATH 2214 (3 cr)
- STAT 4604 (3 cr), STAT 4705 (3 cr), or STAT 4714 (3 cr) may be substituted for STAT 3704 (2)
- MSE 2044 (4 cr) may be substituted for MSE 2034 (3 cr).

Foreign Language Requirement

Foreign Language Requirements

Students must have had 2 years of a foreign language in high school or one year at the college level (6 credit hours) of the same language. College-level credits used to meet this requirement do not count towards the degree.

Roadmap

First Year		
Fall Semester		Credits
CHEM 1035	General Chemistry	3
CHEM 1045	General Chemistry Laboratory	1
ENGL 1105	First-Year Writing	3
MATH 1225	Calculus of a Single Variable ¹	4
ENGE 1215	Foundations of Engineering	2
Select three credits in Pathways 2, 3, 6A, or 7 ²		3
Credits		16
Spring Semester		
ENGL 1106	First-Year Writing	3
MATH 1226	Calculus of a Single Variable ¹	4

MATH 2114	Introduction to Linear Algebra ¹	3
ENGE 1216	Foundations of Engineering	2
PHYS 2305	Foundations of Physics (w/lab)	4
Credits		16
Second Year		
Fall Semester		
ESM 2104	Statics	3
ISE 2214	Manufacturing Processes Laboratory	1
MATH 2204	Introduction to Multivariable Calculus	3
PHYS 2306	Foundations of Physics	4
MSE 2034	Elements of Materials Engineering	3
ME 2004	Engineering Analysis Using Numerical Methods	3
Credits		17
Spring Semester		
ECE 2054	Applied Electrical Theory	3
ESM 2204	Mechanics of Deformable Bodies	3
ESM 2304	Dynamics	3
MATH 2214	Introduction to Differential Equations	3
ME 2134	Thermodynamics	4
Credits		16
Third Year		
Fall Semester		
STAT 3704	Statistics for Engineering Applications	2
ME 3024	Engineering Design and Economics	3
ME 3414	Fluid Dynamics (w lab)	4
ME 3524	Mechanical Vibrations	4
ME 3624	Mechanical Design (w lab)	4
Credits		17
Spring Semester		
ME 4544	Automotive Engineering	3
ME 3304	Heat and Mass Transfer	3
ME 3534	Controls Engineering I (w lab)	4
ME 4005	Mechanical Engineering Lab	3
ME 3034	Mechanical Engineering Discourse	1
Select three credits in Pathways 2, 3, 6A, or 7 ²		3
Credits		17
Fourth Year		
Fall Semester		
ME 4015	Engineering Design and Project	3
ME 4564	Vehicle Control	3
Technical Electives		3
Technical Electives		3
Select three credits in Pathways 2, 3, 6A, or 7 ²		3
Credits		15
Spring Semester		
ME 4016	Engineering Design and Project	3
ME 4534	Land Vehicle Dynamics	3
Select three credits in Pathways 2, 3, 6A, or 7 ²		3
Select three credits in Pathways 2, 3, 6A, or 7 ²		3
Technical Electives		3
Credits		15
Total Credits		129

¹ Consult Timetable of Classes or University Course Catalog for minimum required prerequisite grade in MATH1225 to proceed to other Virginia Tech MATH courses such as MATH1226 and MATH2114.

² If enrolling in a Pathways Concept 7 elective, choose one that also covers either Concept 2 or 3 to avoid taking 3 additional credits to meet graduation requirements.