

COLLEGE OF ENGINEERING
DEPARTMENT OF MECHANICAL ENGINEERING
DEGREE: BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING
MAJOR: MECHANICAL ENGINEERING
FOR STUDENTS ENTERING UNDER UG CATALOG 2023-2024
CREDITS REQUIRED FOR GRADUATION: 129

FALL SEMESTER FIRST YEAR		Credits	SPRING SEMESTER FIRST YEAR		Credits
CHEM 1035 General Chemistry <i>Pre: Eligible to Enroll</i>	3		ENGL 1106 First-Year Writing <i>Pre: 1105</i>	3	
CHEM 1045 General Chemistry Laboratory <i>Co: 1035</i>	1		MATH 1226 Calculus of a Single Variable <i>Pre: 1225 (C-)</i>	4	
ENGL 1105 First-Year Writing	3		MATH 2114 Introduction to Linear Algebra~ <i>Pre: 1226 or 1225 (B)</i>	3	
MATH 1225 Calculus of a Single Variable (C-) <i>Pre: Eligible to Enroll</i>	4		ENGE 1216 Foundations of Engineering~ <i>Pre: 1215</i>	2	
ENGE 1215 Foundations of Engineering~	2		PHYS 2305 Foundations of Physics w/lab <i>Pre: **</i>	4	
Pathways 2, 3, 6a, or 7	3				
TOTAL	16		TOTAL	16	
FALL SEMESTER SECOND YEAR		Credits	SPRING SEMESTER SECOND YEAR		Credits
ESM 2104 Statics <i>Pre: MATH 1226; Co: MATH 2204 or MATH 2204H or MATH 2406H</i>	3		ECE 2054 Applied Electrical Theory <i>Pre: PHYS 2306; Co: MATH 2214</i>	3 ^[F,S]	
ISE 2214 Manufacturing Process Laboratory	1		ESM 2204 Mechanics of Deformable Bodies <i>Pre: †</i>	3	
MATH 2204 Intro Multivariable Calculus~ <i>Pre: 1226</i>	3		ESM 2304 Dynamics <i>Pre: †; Co: MATH 2214</i>	3	
PHYS 2306 Foundations of Physics w/lab <i>Pre: (MATH 1206 or MATH 1206H or MATH 1226), PHYS 2305</i>	4		MATH 2214 Intro to Differential Equations~ <i>Pre: (MATH 1114 or MATH 2114 or MATH 2114H or MATH 2405H or ISC 2105), 1226</i>	3	
MSE 2034 Elements of Materials Engineering~ <i>Pre: CHEM 1035; Co: PHYS 2305</i>	3		ME 2134 Thermodynamics <i>Pre: (MATH 2204 or MATH 2204H or MATH 2406H), CHEM 1035, PHYS 2305; Co: (MATH 2214 or MATH 2214H or MATH 2406H)</i>	4 ^[F,S]	
ME 2004 ⁽¹⁾ Engineering Analysis using Numerical Methods <i>Pre: ***, (ENGE 1215 or ENGE 1414), MATH 1226</i>	3 ^[F,S,SI]				
TOTAL	17		TOTAL	16	
FALL SEMESTER THIRD YEAR		Credits	SPRING SEMESTER THIRD YEAR		Credits
STAT 3704 Statistics for Engineering Applications~ <i>Pre: MATH 2224 or MATH 2224H or MATH 2204 or MATH 2204H or MATH 2406H or CMDA 2005</i>	2		Pathways 2, 3, 6a, or 7	3	
ME 3024 Engineering Design and Economics <i>Pre: ESM 2104, ENGL 1106</i>	3 ^[F,S]		ME 3304 ⁽¹⁾ Heat & Mass Transfer <i>Pre: 2134, 3414, MATH 2214 or MATH 2214H or MATH 2306H), (MATH 2204 or MATH 2204H or MATH 2406H)</i>	3 ^[S,SI]	
ME 3414 ⁽¹⁾ Fluid Dynamics (w lab) <i>Pre: ††, 2004 ; Co: 2134</i>	4 ^[F,S]		ME 3534 ⁽¹⁾ Controls Engineering I (w lab) <i>Pre: ††, 2004, ESM 2104, ESM 2304</i>	4 ^[S,SI]	
ME 3524 Mechanical Vibrations <i>Pre: 2004, ESM 2304, : (MATH 2114 or MATH 2114H or MATH2405H), (MATH 2214 or MATH 2214H or MATH 2406H)</i>	4 ^[F,S]		ME 4005 ⁽¹⁾ ME Lab <i>Pre: 3524, (STAT 3704 or STAT 4604, or STAT 4705 or STAT 4714), ECE 2054</i>	3 ^[S,SI]	
ME 3624 ⁽¹⁾ Mechanical Design (w lab) <i>Pre: ESM 2204, (MATH 2214 or MATH 2214H or MATH 2406H), 2004</i>	4 ^[F,S]		Pathways 2, 3, 6a, or 7	3	
			ME 3034 Mechanical Engineering Discourse <i>Pre: ENGL 1106</i>	1 ^[S,SI]	
TOTAL	17		TOTAL	17	
FALL SEMESTER FOURTH YEAR		Credits	SPRING SEMESTER FOURTH YEAR		Credits
ME 4015 Engineering Design & Project~ <i>Pre: 3024, 3034, 3304 or MSE 2034, 3524, 3534, 3624, 4005</i>	3 ^[F]		ME 4016 Engineering Design & Project~ <i>Pre: 4015</i>	3 ^[S]	
Technical Elective	3		Technical Elective	3	
Technical Elective	3		Technical Elective	3	
ME 4124 Computer Aided Design of Fluid-Thermal Systems: <i>Pre: 2134, 3414, 3304</i>	3 ^[F]		Pathways 2, 3, 6a, or 7	3	
Pathways 2, 3, 6a, or 7	3		Pathways 2, 3, 6a, or 7	3	
TOTAL	15		TOTAL	15	

General Information about Checksheet: Superscripted annotation after the course number (1) indicates core course of the degree. Core courses are also shaded in green. Pathways courses are shaded in tan. Additionally [F,S,SI,SII] in credits column indicates terms when a course is expected to be offered. Course offerings are subject to change and the availability of sufficient resources. Students should confirm course offerings in advance with their department. Grade requirements in specific courses are indicated in parenthesis. For example, a minimum grade of (C-) must be earned in MATH 1225. This is also shown in the prerequisite list for MATH 1226 where (C-) is indicated next to the MATH 1225 prerequisite.

**** Pre:** (MATH 1205 or MATH 1205H or MATH 1225) or (MATH 1206 or MATH 1206H or MATH 1226); **Co:** 2325 or (MATH 1206 or MATH 1206H or MATH 1226)

***** Pre:** (MATH 2114 or MATH 2114H or MATH2405H or MATH 2214 or MATH 2214H or MATH 2406H)

† Pre : (ESM 2104 or ESM 2114) and (MATH 2204 or MATH 2204H)

†† Pre: (MATH 2114 or MATH 2114H or MATH 2405H), (MATH 2204 or MATH 2204H or MATH 2406H), (MATH 2214 or MATH 2214H or MATH 2406H)

Pathways to General Education (Pathways)

Consult the pathways courses table: <https://www.pathways.prov.vt.edu/about/pathways-guides.html>, Pathways courses need to be completed prior to graduation

Pathways Concept 1: Discourse (6 hrs foundational, 3 hrs advanced)	<i>Foundational:</i> ENGL 1105	(3)	<i>Foundational:</i> ENGL 1106	(3)
	<i>Advanced:</i> ME 3024, 3034, 4015-4016			(3)
Pathways Concept 2: Critical Thinking in the Humanities (6 hrs)		(3)		(3)
Pathways Concept 3: Reasoning in the Social Sciences (6 hrs)		(3)		(3)
Pathways Concept 4: Reasoning in the Natural Sciences (8 hrs)	PHYS 2305	(4)	PHYS 2306	(4)
Pathways Concept 5: Quantitative and Computational Thinking Minimum 3 hrs Foundational, 3 hrs Advanced, 11 hrs total	<i>Foundational:</i> MATH 1225	(4)	<i>Foundational or Advanced:</i> MATH 1226	(4)
	<i>Advanced:</i> MATH 2214			(3)
Pathways Concept 6: Critique and Practice in Design and the Arts (7 hr)	<i>Arts:</i>			(3)
	<i>Design:</i> ENGE 1215 + 1216			(4)
Pathways Concept 7: Critical Analysis of Identity and Equity in the United States (3 hrs)				(3)

Electives: Technical elective requirements are satisfied by one of two different paths. Path 1: Twelve credits of approved technical electives from a list. Six of the twelve elective credits must be from either **Mechanical Engineering (ME)** or **Nuclear Engineering (NSEG)**. A maximum of 3 credits of technical elective may be taken from List #2. Up to 9 credits of technical electives may be taken Pass/Fail. See the attached list for technical elective choices. Path 2: Complete one of the following minors and twelve electives from the list of electives associated with Path 1. Only three of the twelve elective credits may be taken from List #2.

Accepted minors: Biomedical Engineering, Computer Science, Engineering Science and Mechanics, Green Engineering, Physics.

Change of Major Requirements: Please see <https://www.eng.vt.edu/em>

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.

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 the ME Department, complete ME2004 .
 - Within 3 semesters of entering the ME Department, complete ME2134 .
 - Complete a minimum of 12 credits that apply toward the ME degree during each 12 month period
 - Maintain an in-major GPA (in-major is calculated using all courses taught under the ME and NSEG designators) of at least 2.00
 - Students who do not yet have an in-major GPA must also maintain an extended in-major GPA (extended in-major is calculated using all courses taught under the ME and NSEG designators plus ESM 2104, 2204 and 2304) of at least 2.00
 - Complete ESM 2104, MATH 2114 and MATH 2204 within 50 attempted required course credits (not to include Pathways courses, technical electives or free electives)

- Complete ESM 2304, ME 2004 and MATH 2214 within 69 attempted required course credits (not to include Pathways courses, technical electives or free electives)
- Complete ME 2134, 3524, and (3024 or 3624) with 87 attempted required course credits (not to include Pathways courses, technical electives or free electives)
- Complete ME 4015 and 4124 within 104 attempted required course credits (not to include Pathways courses, technical electives or free electives)

Statement of Hidden Prerequisites: Prerequisites may change. Students are responsible for pre-requisites and pre-requisites of pre-requisites whether specifically spelled out or not on this checksheet. Be sure to consult the University timetable of classes or check with your advisor for the most current requirements. There are no hidden pre-requisites in this program of study.

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 ME and NSEG (nuclear) designators.

~Additional Checksheet Comments:

1. ENGE 1414 (4 cr) may be substituted for ENGE 1215 (2 cr) + ENGE 1216 (2 cr)
2. MATH 2405H (5 cr) may be substituted for MATH 2114 (3 cr)
3. MATH 2405H (5 cr) + MATH 2406H (5 cr) may be substituted for MATH 2114 (3 cr) + MATH 2204 (3 cr) + MATH 2214 (3 cr)
4. MSE 3094 (3 cr) may be substituted for MSE 2034
5. MSE 2044 (4 cr) may be substituted for MSE 2034
6. STAT 4604 (3 cr) or STAT 4705 (3 cr) or STAT 4714 (3 cr) may be substituted for STAT 3704 (2 cr)
7. ENGE 4735 (3 cr) + ENGE 4736 (3 cr) may be substituted for ME 4015 (3 cr) + ME 4016 (3 cr) – Students will need to meet the prerequisites for ME 4015/4016 to be eligible to take ENGE 4735/4736. These courses will also count in the ME in-major GPA.
8. ECE1X1c (3 cr) and ECE1X1E (1 cr) together may be substituted for ECE 2054 (3 cr).

Department of Mechanical Engineering Technical Elective Lists For Students Entering Under UG Catalog 2023-2024

Technical electives must be selected from either List #1 or a combination of Lists #1 and List #2.
Six (6) credits must be from ME or NSEG. A maximum of 3 credits are allowed from List #2.

Department of Mechanical Engineering Technical Elective List #1

Aerospace and Ocean Engineering (AOE): Any 3000 or 4000 level AOE course except: 3014, 3034, 3044, 3054, 3094, 3984, 4004, 4024, 4065, 4066, 4105, 4106, 4165, 4166, 4205, 4206, 4265, 4266, 4974, 4984, 4994.

Biological Systems Engineering (BSE): Any 3000 or 4000 level BSE course except: 3134, 3144, 3494, 3504, 3954, 3984, 4125, 4126, 4204, 4224, 4974, 4984, 4994.

Biomedical and Veterinary Science (BMVS): 4064.

Biomedical Engineering (BMES): Any non-duplicating 3000 or higher level BMES courses except: 3984, 4015, 4016, 4974, 4984, 4994.

Building Construction (BC): Any 3000 or 4000 level BC course except: 3954, 3984, 4974, 4984, and 4994.

Construction Engineering and Management (CEM): Any 3000 or 4000 level CEM course except: 3984, 4024, 4445, 4446, 4974, 4984, 4994.

Chemical Engineering (CHE): Any 3000 or 4000 level CHE course except: 3015, 3016, 3044, 3114, 3124, 3984, 4014, 4024, 4144, 4304, 4974, 4984, 4994.

Chemistry (CHEM): 3615, 3616, 3625, 3626, 4074, 4114, 4124, 4404, 4424, 4524, 4534, 4554, 4615, 4616, 4634, 4734.

Civil and Environmental Engineering (CEE): Any 3000 or 4000 level CEE course except: 3304, 3684, 3954, 3984, 4804, 4974, 4984, and 4994.

Computer Science (CS): 3114, 3214, 3304, 3414, 3704, 3714, 3724, 3744, 3754, 3824, 4104, 4114, 4204, 4214, 4234, 4244, 4254, 4304, 4414, 4504, 4570, 4604, 4704, 4804, 4824.

Electrical and Computer Engineering (ECE): Any 3000 or 4000 level ECE course except: 3004, 3054, 3074, 3704, 3714, 3974, 3984, 4584, 4704, 4805, 4806, 4974, 4984, 4994.

Engineering (ENGR): 3124, 4134.

Engineering Science and Mechanics (ESM): Any 3000 or 4000 level ESM course except: 3024, 3034, 3114, 3134, 3234, 3444, 3984, 4015, 4016, 4194, 4404, 4734, 4974, 4984, 4994.

Geological Sciences (GEOS): 3104, 4164.

Industrial and Systems Engineering (ISE): Any 3000 or 4000 level ISE course except: 3984, 4005, 4006, 4974, 4984, 4994.

Materials Science and Engineering (MSE): Any 3000 or 4000 level MSE course except: 3094, 3114, 3344, 3354, 3884, 3954, 3984, 4075, 4076, 4085, 4086, 4095H, 4096H, 4974, 4984, 4994.

Mathematics (Math): 3034, 3214, 3224, 4124, 4175, 4225, 4226, 4234, 4245, 4246, 4425, 4426, 4445, 4446, 4564, 4574.

Mechanical Engineering (ME): Any non-required or non-duplicating 3000 or higher-level ME course except: 4454 3984, 4974, 4994.

Mining and Minerals Engineering (MINE): Any 3000 and 4000 level MINE course except: 3984, 4635, 4636, 4664, 4974, 4984, 4994.

Nuclear Engineering (NSEG): Any non-duplicating 3000 or higher level NSEG course except: 3984, 4974, 4994.

Physics (PHYS): 3355, 3356, 3405, 3406, 3655, 3656, 3704, 4315, 4316, 4455, 4456, 4504, 4554, 4574, 4614, 4624, 4674, 4714.

Statistics (STAT): Any 3000 or 4000 level Stat course except: 3XXX, 3005, 3006, 3604, 3615, 3616, 3704, 3984, 4524, 4604, 4705, 4706, 4714, 4804, 4964, 4974, 4984, 4994.

Urban Affairs and Planning (UAP): 4374, 4394.

Department of Mechanical Engineering Technical Elective List #2 – Maximum of 3 credits from this list

Agricultural, Leadership, and Community Education (ALCE): 2484

Biological Systems Engineering (BSE): 2484.

Biomedical Engineering (BMES): 2104.

Chemistry (CHEM): 2514

Computer Science (CS): 2114, 2505

English (ENGL): 4804.

Education, Curriculum & Instruction (EDCI): 4454.

Electrical & Computer Engineering (ECE): 2164, 2574.

Engineering Education (EngE): 4094.

Industrial Design (IDS): 2044, 3124.

Industrial and Systems Engineering (ISE): 2204.

Mechanical Engineering (ME): 4454, 3984.

Residential Environments and Design (RED): 4604.

Note #1: Any 4974, 4994 course from any degree granting department in the College of Engineering is approved as List #2 (whether from ME or another department) and counts toward the 3 credit limit associated with List #2.

NOTE #2: Any 3984, 4984 course from any degree granting department in the College of Engineering except ME and NSEG is approved as List #2. They count toward the 3 credit limit associated with List #2.

NOTE #3: Students are responsible for checking the prerequisite courses for any listed technical elective course. Many courses on the lists require one or more prerequisite courses. Students may need to get permission from the department offering a course to sign up for non-ME courses.

NOTE #4: A student will not receive technical elective credit for more than one course covering essentially the same material. If two courses have similar descriptions or appear to partially duplicate material, students should check with their academic advisor before attempting to take both for technical elective credit (or if the technical elective partially duplicates material in any required ME course).