

COLLEGE OF ENGINEERING
DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING
DEGREE: **BACHELOR OF SCIENCE IN MATERIALS SCIENCE AND ENGINEERING, NUCLEAR MATERIALS OPTION**
MAJOR: MATERIALS SCIENCE AND ENGINEERING
FOR STUDENTS ENTERING UNDER UG CATALOG 2023-2024
CREDITS REQUIRED FOR GRADUATION: 126

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 Lab <i>Co: 1035</i>	1		MATH 1226 Calculus of a Single Variable <i>Pre: 1225</i>	4	
ENGL 1105 First-Year Writing	3		PHYS 2305 Found of Physics I w/lab <i>Pre^(a) Co: Math 1226</i>	4	
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		MATH 2114 Introduction to Linear Algebra~ <i>Pre: 1225 (B) or 1226</i>	3	
TOTAL	13		TOTAL	16	
FALL SEMESTER SECOND YEAR		Credits	SPRING SEMESTER SECOND YEAR		Credits
MATH 2204 Intro Multivariable Calculus~ <i>Pre: 1226</i>	3		CHEM 1036 General Chemistry <i>Pre: CHEM 1035</i>	3	
PHYS 2306 Foundations of Physics I w/lab <i>Pre: MATH 1226, 2305</i>	4		MATH 2214 Intro Diff Equations~ <i>Pre: (1114 or 2114 or 2114H or 2504H or ISC 2105), 1226</i>	3	
ESM 2104 Statics <i>Pre: MATH 1226</i>	3		ESM 2204 Mechanics of Deformable Bodies <i>Pre: (2104 or 2114), (MATH 2204 or MATH 2204H)</i>	3	
ISE 2214 Manufacturing Processes Lab	1		MSE 2054 ¹ Fund of Materials Science <i>Pre: 2044</i>	3 ^[S]	
MSE 2044 ¹ Fund of Materials Eng (C) <i>Pre: CHEM 1035, Co: PHYS 2305</i>	4 ^[F,S]		MSE 2114 ² Math Programming MSE I <i>Pre: 2044</i>	1 ^[S]	
MSE 2884 Matls Engr Professional Dev I	1 ^[F]		MSE 3314 ¹ Materials Lab I <i>Pre: 2044</i>	1 ^[S]	
			Pathways (2, 3, 6a, or 7)	3	
TOTAL	16		TOTAL	17	
FALL SEMESTER THIRD YEAR		Credits	SPRING SEMESTER THIRD YEAR		Credits
ECON 2005 Principles of Economics~ (Pathway 3)	3		MSE 3044 ¹ Transport Phenomena MSE <i>Pre: 2044, MATH 2214</i>	3 ^[S]	
MSE 3114 ² Math Programming MSE II <i>Pre: 2114</i>	1 ^[F]		MSE 3054 (ESM 3054) Mech Behavior of Materials <i>Pre: ESM 2204, (MSE 2034 or MSE 2044 or MSE 3094 or AOE 3094 or CEE 3684)</i>	3 ^[F,S]	
MSE 3134 ¹ Crystallography and Crystal Structures <i>Pre: 2044</i>	3 ^[F]		MSE 3064 (ESM 3064) Mech Behavior Matls Lab <i>Co: 3054</i>	1 ^[F,S]	
MSE 4034 ¹ Thermo of Materials <i>Pre: 2044; Co:CHEM 1036</i>	3 ^[F]		MSE 3884 Matls Engr Professional Dev II <i>Pre: junior standing, 2884</i>	1 ^[S]	
MSE 4424 ¹ Materials Lab II <i>Pre: 2044</i>	1 ^[F]		MSE 4644 Materials Design Experiments <i>Pre:3314 or 4424</i>	3 ^[S]	
Physical Materials Course ^{2,~}	3		Physical Materials Course ^{2,~}	3	
Physical Materials Course ^{2,~}	3		MSE 4164 ³ Principles of Materials Corrosion <i>Co:4034</i>	3	
TOTAL	17		TOTAL	17	
FALL SEMESTER FOURTH YEAR		Credits	SPRING SEMESTER FOURTH YEAR		Credits
MSE 4055 ² Materials Selection & Design~ <i>Pre: (b) Co:3054</i>	3 ^[F]		MSE 4076 ¹ Senior Design Laboratory~ <i>Pre: 4075 Co: 4086,</i>	2 ^[S]	
MSE 4075 ¹ Senior Design Laboratory~ <i>Pre: 4644 Co: 4055, 4085</i>	1 ^[F]		MSE 4086 Senior Design Recitation~ <i>Pre: 4085 Co: 4076 or 4096H</i>	1 ^[S]	
MSE 4085 Senior Design Recitation <i>Pre: senior standing, 3884 Co: 4075 or 4095H</i>	2 ^[F]		Physical Materials Course ^{2,~}	3	
MSE 4384 ³ Nuclear Materials <i>Pre:(MSE 3044 or ME 3304), (MSE 3054 or ESM 3054 or ME 3614)</i>	3		Tech NSEG 3146 ³ Fundamentals of Nuclear Engr <i>Pre: NSEG 3145 or ME 3145</i>	3	
NSEG 3145 ³ Fundamentals of Nuclear Engr <i>Pre: MATH 2214 or 2214H</i>	3		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	

Footnotes:			
a. Pre: (MATH 1205 or MATH 1205H or MATH 1225) or (MATH 1206 or MATH 1206H or MATH 1226).			
b. Pre: (3204, 3304) or (3204, 4414) or (3204, 4554) or (3304, 4414) or (3304, 4554) or (4414, 4554).			
General Information about Checksheet: Superscripted annotation after the course number (1) indicates common degree core, (2) indicates major requirements, and (3) indicates option courses. Additionally, (F, S, SI, SII) in credits column indication 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.			
Pathways General Education (Pathways)			
Consult the pathways courses table: https://www.pathways.prov.vt.edu/students-and-advisors/pathways-guides.html Pathways courses need to be completed prior to graduation			
Pathways Concept 1: Discourse (6 hrs foundational, 3 hrs advanced)	<i>Foundational: ENGL 1105</i>	(3)	<i>Foundational: ENGL 1106</i>
	<i>Advanced: MSE 2884,3884,4085,4086</i>		(3)
Pathways Concept 2: Critical Thinking in the Humanities (6 hrs)		(3)	(3)
Pathways Concept 3: Reasoning in the Social Sciences (6 hrs)	ECON 2005~	(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 (11 hrs)	<i>Foundational: MATH 1225</i>	(4)	<i>Foundational: MATH 1226</i>
	<i>Advanced: MATH 2214</i>		(3)
Pathways Concept 6: Critique and Practice in Design and the Arts (7 hrs)	<i>Arts:</i>		(3)
	<i>Design: ENGE 1215 + ENGE 1216</i>		(4)
Pathways Concept 7*: Critical Analysis of Identity & Equity in the US (3 hrs)			(3)
*Pathway 7 should be double counted with either Pathway 2, 3 or 6a to avoid taking any additional credit hours.			
Electives: No technical electives required.			
Change of Major Requirements: : Please see https://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 MSE Department fully supports this policy. Specific expectations for satisfactory progress for Materials Science and Engineering majors are as follows:			
<ul style="list-style-type: none"> • Each student must meet the minimum University-wide criteria as described in Policy 91 and summarized in the Undergraduate Catalog (https://www.undergradcatalog.registrar.vt.edu/) • Maintain an in-major GPA of 2.0 or better and an overall GPA of 2.0 or better. (In-major GPA is calculated using all courses taken under the MSE designator) • Students may not earn a semester GPA less than 2.0 in any 2 consecutive semesters • Students must complete a minimum of 9 credits per semester satisfying the MSE checksheet, • A grade of C or better in MSE 2044 is required as a prerequisite for all MSE courses, and • Students are allowed to take MSE 2044 a maximum of two times in their attempt to achieve a grade of C or better. 			
Statement of Hidden Prerequisites: Prerequisites for each course are listed after the course title. The (letter grade) notation, such as (C-), indicates the minimum grade students must earn in the prerequisite course. There are no hidden prerequisites in the program of study. Prerequisites may change from what is indicated. Be sure to consult the timetable for the most current prerequisites.			
Graduation Requirements: Each student must complete at least 126 semester credit hours with a minimum overall GPA of 2.00 and a minimum in-major GPA of 2.00. In-major GPA is calculated using all courses taken under the MSE designator.			
~Additional Checksheet Comments:			
<ul style="list-style-type: none"> • Honors students may substitute MSE 4095H/4096H Honors Senior Project Lab for MSE 4075/4076. • Physical Materials Courses: <ul style="list-style-type: none"> ○ MSE 3204^[F,S] Fund Electronic Materials Pre: 2054, PHYS 2306 ○ MSE 3304^[F,S] Physical Metallurgy Pre: 2044 (C) ○ MSE 4414^[F,S] Physical Ceramics Pre: 2044 (C) ○ MSE 4554^[F,S] Polymer Engineering Pre: 2044 (C) • ENGE 1414 (4 cr) may be substituted for ENGE 1215 (2 cr) + ENGE 1216 (2 cr) • MATH 2405H (5 cr) may be substituted for MATH 2114 (3 cr) • MATH 2405H (5 cr) + MATH 2406H (5 cr) may be substituted for MATH 2114 (3 cr) + MATH 2204 (3 cr) + MATH 2214 (3 cr) 			

- ECON 2006 (3 cr) may be substituted for ECON 2005 (3 cr)
- ISE 2014 (2 cr) may be substituted for ECON 2005 (3 cr), one additional credit of free elective will be needed
- MSE 2034 (3 cr) + MSE 2014 (1 cr) may be substituted for MSE 2044 (4 cr)
- ENGE 4735 (3 cr) + ENGE 4736 (3 cr) may be substituted for MSE 4075 (1c), MSE 4085 (2c) + MSE 4076 (2c), MSE 4086 (1c). Students will need to meet the prerequisites for MSE 4075/4085 to be eligible to take ENGE 4735/4736. These courses will also count in the MSE in-major GPA.
- Students interested in focusing in the area of polymers are strongly encouraged to take CHEM 1036 Freshman Spring semester and to speak with the MSE undergraduate advisor.