COLLEGE OF ENGINEERING
DEPARTMENT OF MECHANICAL ENGINEERING
DEGREE: BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING
MAJOR: ROBOTICS AND MECHATRONICS
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 *Pre: Eligible to enroll*	3	ENGL 1106 First-Year Writing *Pre: 1105*	3
CHEM 1045 General Chemistry Laboratory *Co: 1035*	1	MATH 1226 Calculus of a Single Variable *Pre: 1225 (C-)*	4
ENGL 1105 First-Year Writing	3	MATH 2114 Introduction to Linear Algebra~ *Pre: 1226 or 1225 (B)*	3
MATH 1225 Calculus of a Single Variable (C-) *Pre: Eligible to enroll*	4	ENGE 1216 Foundations of Engineering~ *Pre: 1215*	2
ENGE 1215 Foundations of Engineering~	2	PHYS 2305 Foundations of Physics w/lab *Pre: ** *	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 *Pre: MATH 1226; Co: MATH 2204 or MATH 2204H or MATH 2406H*	3	ECE 2054 Applied Electrical Theory~ *Pre: PHYS 2306; Co: MATH 2214*	3[F,S]
ISE 2214 Manufacturing Process Laboratory	1	ESM 2204 Mechanics of Deformable Bodies *Pre: †*	3
MATH 2204 Intro Multivariable Calculus~ *Pre: 1226*	3	ESM 2304 Dynamics *Pre: †; Co: MATH 2214*	3
PHYS 2306 Foundations of Physics w/lab *Pre: (MATH 1206 or MATH 1206H or MATH 1226), PHYS 2305*	4	MATH 2214 Intro to Differential Equations~ *Pre: (MATH 1114 or MATH 2114 or MATH 2114H or MATH 2405H or ISC 2105), 1226*	3
MSE 2034 Elements of Materials Engineering~ *Pre: CHEM 1035; Co: PHYS 2305*	3	ME 2134 Thermodynamics *Pre: (MATH 2204 or MATH 2204H or MATH 2406H), CHEM 1035, PHYS 2305; Co: (MATH 2214 or MATH 2214H or MATH 2406H)*	4[F,S]
ME 2004[1] Engineering Analysis using Numerical Methods *Pre: ***, (ENGE 1215 or ENGE 1414), MATH 1226*	3[F,S,SII]		
TOTAL	17	TOTAL	16

FALL SEMESTER THIRD YEAR	Credits	SPRING SEMESTER THIRD YEAR	Credits
STAT 3704 Statistics for Engineering Applications~ *Pre: : MATH 2224 or MATH 2224H or MATH 2204 or MATH 2204H or MATH 2406H or CMDA 2005*	2	ECE 3254[2] Industrial Electronics *Pre: ECE 2054*	3[S]
ME 3024 Engineering Design and Economics *Pre: ESM 2104, ENGL 1106*	3[F,S]	ME 3304[1] Heat & Mass Transfer *Pre: 2134 , 3414, MATH 2214 or MATH 2214H or MATH 2306H), MATH 2204 or MATH 2204H or MATH 2406H)*	3[S,SII]
ME 3414[1] Fluid Dynamics (w lab) *Pre: ††, 2004; Co: 2134*	4[F,S]	ME 3534[1] Controls Engineering I (w lab) *Pre: ††, 2004, ESM 2104, ESM 2304*	4[S, SI]
ME 3524 Mechanical Vibrations *Pre: 2004, ESM 2304, : (MATH 2114 or MATH 2114H or MATH2405H), (MATH 2214 or MATH 2214H or MATH 2406H)*	4[F,S]	ME 4005[1] ME Lab *Pre: 3524, (STAT 3704 or STAT 4604, or STAT 4705 or STAT 4714), ECE 2054*	3[S,SII]
ME 3624[1] Mechanical Design (w lab) *Pre: ESM 2204, MATH 2214 or MATH 2214H or MATH 2406H), 2004*	4[F,S]	CS 1044[2] Introduction to Programming in C~	3
		ME 3034 Mechanical Engineering Discourse *Pre: ENGL 1106*	1[S,SII]
TOTAL	17	TOTAL	17

FALL SEMESTER FOURTH YEAR	Credits	SPRING SEMESTER FOURTH YEAR	Credits
ME 4015[4] Engineering Design & Project~ *Pre: 3024, 3034, 3304 or MSE 2034, 3524, 3534, 3624, 4005*	3[F]	ME 4016[4] Engineering Design & Project~ *Pre: 4015*	3[S]
ME 4524[2] Robotics and Automation *Pre: 2004, 3524, 3534*	3[F]	Technical Elective	3
ME 4744[2] Mechatronics: Theory and Application *Pre: (ECE 3254, 3534) or (ECE 2004, ECE 2704), CS 1044*	4[F]	Pathways[3] 2, 3, 6a, and 7	3
ME 4584[2] Robotics Lab *Co: ME 4524 or ECE 4704*	1[F]	Pathways 2, 3, 6a, or 7	3
Pathways 2, 3, 6a, or 7	3	Pathways 2, 3, 6a, or 7	3
ME 4734[2] Robotics and Mechatronics Seminar *Pre: 3534, ECE 3254) or (ECE 2004, ECE 2704)*	1[F]		

1

General Information about Checksheet: Superscripted annotation after the course number (1) indicates core course of the degree. Core courses are also shaded in light green. while [2] indicates courses associated with the major (and shaded blue). Pathways courses are shaded in tan. [3] Indicates Pathways Concept 7 must be doubled-counted with another Pathways Concept course. [4] Senior Capstone Design must be approved for credit towards the Robotics and Mechatronics major. 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)	*Foundational:* **ENGL 1105**	(3)	*Foundational:* **ENGL 1106**	(3)
	Advanced: **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	*Foundational:* **MATH 1225**	(4)	*Foundational or Advanced:* **MATH 1226**	(4)
	Advanced: **MATH 2214**			(3)
Pathways Concept 6: Critique and Practice in Design and the Arts (7 hr)	*Arts (6a):*			(3)
	Design: **ENGE 1215 + 1216**			(4)
Pathways Concept 7*: Critical Analysis of Identity and Equity in the United States (3 hrs)				(3)

*Pathways 7 should be double-counted with Pathway 2 or 3, or 6a to avoid taking additional credits.

Electives: The Robotics and Mechatronics major requires 3 credits of approved technical electives from list. Please see attached list for technical elective choices. Technical electives in the Robotics and Mechatronics major may be taken Pass/Fail.

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 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 degree (regardless of major), a student must:
  - Within 2 semesters of entering the ME Department, complete ME 2004.
  - Within 3 semesters of entering the ME Department, complete ME 2134.
  - 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)

- o Complete ESM 2304, ME 2004 and MATH 2214 within 69 attempted required course credits (not to include Pathways courses, technical electives or free electives)
- o Complete ME 2134, 3524, and (3024 or 3624) with 87 attempted required course credits (not to include Pathways courses, technical electives or free electives)
- o Complete ME 4015 and 4524 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).
9. CS 2505 (3 cr) may be substituted for CS 1044.

Robotics and Mechatronics Major Technical Elective List
for Students Entering Under UG Catalog 2023-2024

ELECTIVE COURSES (select one):

Course No.	Title	Credits
ME 3604	Kinematics and Dynamics of Machinery	3
ME 4034	Bio-inspired Technology	3
ME 4624	Finite Element Practice in Mechanical Design	3
ME 4634	Intro to Computer Aided Design and Manufacturing	3
ME 4644	Introduction to Rapid Prototyping	3
ME 4674	Materials Selection in Mechanical Design	3
ME 4754	Mechatronics: Advanced Topics and Applications	3
ME 4824	Introduction to Human-Robot Interaction	3
ME 4864	Micro/Nano Robotics	3
ME 4974	Independent Study[*]	3
ME 4994	Undergraduate Research[*]	3
	Any non-duplicating ME/ECE/CS 4000-5000 level Controls course[*]	3
*	Requires departmental/major approval	