

ROBOTICS ENGINEERING (BS) / ROBOTICS ENGINEERING (MS) (COMBINED OPTION)

Program Overview

BS Overview

Robotics Engineering degree is a four-year course of study leading to exciting careers and/or advanced studies in robotics and automation. The robotics engineering faculty are dedicated to undergraduate and graduate teaching and to working closely with students at all levels of their study. The program equips students with the practical skills of an engineer combined with the fundamental knowledge and understanding gained through the study of physics. The program allows for a focus on the hardware, modeling and programming all of which are the integral components of robotics.

The application of robotics is a "multi-craft" activity in that it is the blending of multiple disciplines including computer engineering, mechanical engineering, and electrical engineering. A roboticist engages in the design, construction, and programming of robotic systems, including wheeled mobile robots, drones (unmanned aerial systems), autonomous marine vehicles, space systems, and industrial robot manipulators.

Career Opportunities

Students graduating with a Bachelor's degree in Robotics Engineering typically work in the robotics and automation industry or continue their studies in graduate school, or enter the armed services.

MS Overview

Master of Science degree in Robotics Engineering offers a comprehensive course of study in robotics. Research opportunities exist for students to actively participate in the program's research activities. The research areas include image processing, computer vision, artificial intelligence, industrial robot manipulators, unmanned aerial vehicles, autonomous ground robots, embedded systems, and microelectronics.

Career Opportunities

Robotics Engineering graduates typically work in the robotics industry, continue their studies in doctoral programs at premier institutions.

Program of Study

Code	Title	Credit Hours
Core IMPACTS Area : Institutional Priorities ¹		4-5
COMM 1110	Public Speaking	3
ITDS 1779	Scholarship Across the Disciplines	2
LEAD 1705	Introduction to Servant Leadership	2
PERS 1506	Perspectives 1-hour	1
PERS 1507	Perspectives 2-hour	2
Foreign Language Course Options		

ARAB, CHIN, FREN, GERM, GREK, ITAL, JAPN, KREN, LATIN, PORT, SPAN - 1001, 1002, 2001, 2002		
SWAH 1001	Elementary Swahili I	
SWAH 1002	Elementary Swahili II	
Core IMPACTS Area : Mathematics & Quantitative Skills ¹		3-7
DATA 1501	Introduction to Data Science	3
MATH 1001	Quantitative Skills and Reasoning	3
MATH 1101	Introduction to Mathematical Modeling	3
MATH 1111	College Algebra	3
MATH 1113	Pre-Calculus	4
MATH 1125	Applied Calculus	3
MATH 1131	Calculus with Analytic Geometry I	4
MATH 1132	Calculus with Analytic Geometry II	4
MATH 1165	Computer-Assisted Problem Solving	3
MATH 1401	Introduction to Statistics	3
MATH 1501	Calculus I	4
MATH 2125	Introduction to Discrete Mathematics	3
STAT 1401	Elementary Statistics	3
Core IMPACTS Area : Political Science and U.S. History		6
HIST 2111	U. S. History to 1865	3
or HIST 2112	U. S. History since 1865	
POLS 1101	American Government	3
Core IMPACTS Area : Arts, Humanities, and Ethics		6
Select one Fine Arts course		3
ARTH 1100	Art Appreciation	
ARTH 2125	Introduction to the History of Art I– Prehistoric through Gothic	
ARTH 2126	Introduction to the History of Art II– Renaissance through Modern	
MUSC 1100	Music Appreciation	
THEA 1100	Theatre Appreciation	
ITDS 1145	Comparative Arts ²	
Select one Humanities course		3
ENGL 2111	World Literature I	
ENGL 2112	World Literature II	
ITDS 1774	Introduction to Digital Humanities	
PHIL 2010	Introduction to Philosophy	
ITDS 1145	Comparative Arts ²	
Core IMPACTS Area : Communicating in Writing		6
ENGL 1101	English Composition I	3
ENGL 1102	English Composition II	3
Core IMPACTS Area : Technology, Mathematics, and Sciences ¹		7-11
ANTH 1145	Human Origins	3
ASTR 1105	Descriptive Astronomy: The Solar System	3
ASTR 1106	Descriptive Astronomy: Stars and Galaxies	3
ASTR 1305	Descriptive Astronomy Lab	1
ATSC 1112	Understanding the Weather	3
ATSC 1112L	Understanding the Weather Lab	1
BIOL 1125	Contemporary Issues in Biology Non-Lab	3
BIOL 1215K	Introductory Biology	4
BIOL 1225K	Contemporary Issues in Biology with Lab	4
CHEM 1151 & 1151L	Survey of Chemistry I and Survey of Chemistry I Lab	4

CHEM 1152 & 1152L	Survey of Chemistry II and Survey of Chemistry II Lab	4
CHEM 1211 & 1211L	Principles of Chemistry I and Principles of Chemistry I Lab	4
CHEM 1212 & 1212L	Principles of Chemistry II and Principles of Chemistry II Lab	4
CPSC 1105	Introduction to Computing Principles and Technology	3
CPSC 1301K	Computer Science I	4
ENVS 1105	Environmental Studies	3
ENVS 1105L	Environmental Studies Laboratory	1
ENVS 1205K	Sustainability and the Environment	4
GEOG 2215	Introduction to the Geographic Information Systems	3
GEOL 1110	Natural Disasters: Our Hazardous Environment	3
GEOL 1121	Introductory Geoscience I: Physical Geology	3
GEOL 1121L	Introductory Geoscience I: Physical Geology Lab	1
GEOL 1122	Introductory Geo-sciences II: Historical Geology	3
GEOL 1322	Introductory Geo-sciences II: Historical Geology Lab	1
GEOL 2225	The Fossil Record	4
PHYS 1111 & PHYS 1311	Introductory Physics I and Introductory Physics I Lab	4
PHYS 1112 & PHYS 1312	Introductory Physics II and Introductory Physics II Lab	4
PHYS 1125	Physics of Color and Sound	3
PHYS 1325	Physics of Color and Sound Lab	1
PHYS 2211 & PHYS 2311	Principles of Physics I and Principles of Physics I Lab	4
PHYS 2212 & PHYS 2312	Principles of Physics II and Principles of Physics II Lab	4
Core IMPACTS Area : Social Sciences		6
Select one Behavioral Science course		
ECON 2105	Principles of Macroeconomics	
ECON 2106	Principles of Microeconomics	
PHIL 2030	Moral Philosophy	
PSYC 1101	Introduction to General Psychology	
SOCI 1101	Introduction to Sociology	
Select one World Cultures course		
ANTH 1107	Discovering Archaeology	
ANTH 1105	Cultural Anthropology	
ANTH 2105	Ancient World Civilizations	
ANTH 2136	Language and Culture	
ENGL 2136	Language and Culture	
GEOG 1101	World Regional Geography	
HIST 1111	World History to 1500	
HIST 1112	World History since 1500	
ITDS 1155	The Western Intellectual Tradition	
ITDS 1156	Understanding Non-Western Cultures	
Core IMPACTS Total Hours		42
Health and Wellness		3
KINS 1106	Lifetime Wellness	2
or PHED 1205	Concepts of Fitness	

Select one PEDS course (<https://catalog.columbusstate.edu/course-descriptions/peds/#peds>)

¹ The hours applied in the Institutional Priorities; Mathematics & Quantitative Skills; and Technology, Mathematics, and Sciences areas must add to 18 credit hours.

² ITDS 1145 Comparative Arts, though listed under both Fine Arts and Humanities, may be taken only once.

Major Requirements

Code	Title	Credit Hours
Core Requirements		
Complete the core requirements for this program		45
Core Total		45
Field of Study Requirements		
Minimum grade of C is required		
ENGR 2221	Computing for Engineers 1	3
ENGR 2255	Engineering Graphics and Computer Aided Design	3
MATH 2115	Introduction to Linear Algebra	3
MATH 2135	Calculus with Analytic Geometry 3	4
PHYS 2212	Principles of Physics II	3
PHYS 2312	Principles of Physics II Lab	1
Include 1 hour from MATH 1131 in Area A		1
Field of Study Requirements Total		18
Required for the Major		
Minimum grade of C is required		
ENGR 1701	Introduction to Robotics	1
ENGR 2115	Statics	3
ENGR 2125	Dynamics of Rigid Bodies	3
ENGR 2206	Digital Logic	4
ENGR 3235	Circuit Analysis	3
ENGR 3236	Introduction to Signal Processing	3
ENGR 3245	Robotics Engineering Design Lab	2
ENGR 3255	Sensors and Actuators	3
ENGR 3275	Feedback Control Systems	3
ENGR 4391	Robotics Senior Design 1	2
ENGR 4392	Robotics Senior Design 2	2
ENGR 5151G	Computer Vision 1 (Also applies toward the master's degree requirements)	3
ENGR 5161U	Elements of Machine Intelligence	3
ENGR 5176U	Kinematics and Dynamics	3
ENGR 5236G	Microelectronic Circuits (Also applies toward the master's degree requirements)	3
ENGR 5238G	Introduction to Embedded Systems (Also applies toward the master's degree requirements)	3
MATH 3107	Differential Equations	3
MATH 3175	Introduction to Probability	3
Required for the Major Total		50
Major Electives		
Include 1 hour from MATH 1132 in Area D		1
Choose 9 hours from the following options:		9
Any 1000+ science course		

Any 1000+ ENGR course	
Any 2000+ MATH/STAT class with advisor approval	
Any 3000+ CPSC class with advisor approval	
Area H Total	10

Master's Degree Requirements

Area 1

The following 3 courses are taken with the bachelor's degree but also count toward the master's degree requirements.

ENGR 5151G	Computer Vision 1
ENGR 5236G	Microelectronic Circuits
ENGR 5238G	Introduction to Embedded Systems

Take four additional courses from the following list to accumulate an additional 12 credit hours in Area 1:

ENGR 6137	Dynamic Optimization
ENGR 6145	Human-Robot Interactions
ENGR 6148	Military Applications in Robotics
ENGR 6152	Computer Vision 2
ENGR 6162	Machine Intelligence and Synthesis
ENGR 6167	Multi-Robot Systems
ENGR 6172	Multivariable Linear Controls
ENGR 6173	Nonlinear Controls
ENGR 6178	Biomechanics
ENGR 6239	Embedded Systems Design
ENGR 6555	Selected Topics in Robotics

Any 5000+ CPSC/MATH class with advisor approval	
Area 1 Total	12

Area 2

Choose one of the following 2 options for 9 additional credit hours

Thesis Option

ENGR 6000	Thesis Defense
ENGR 6999	Thesis Research (Repeat to complete a total of 9 hours)

Nonthesis Option

Take one of the following two courses twice for a total of 6 hours

ENGR 6399	Graduate Research Project
ENGR 6689	Supervised Graduate Internship

Choose one of the following courses that is not applied in Area 1:

ENGR 6137	Dynamic Optimization
ENGR 6145	Human-Robot Interactions
ENGR 6148	Military Applications in Robotics
ENGR 6152	Computer Vision 2
ENGR 6162	Machine Intelligence and Synthesis
ENGR 6167	Multi-Robot Systems
ENGR 6172	Multivariable Linear Controls
ENGR 6173	Nonlinear Controls
ENGR 6178	Biomechanics
ENGR 6239	Embedded Systems Design
ENGR 6555	Selected Topics in Robotics
Any 5000+ CPSC/MATH class with advisor approval	

Area 2 Total	9
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Total Credit Hours	144
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Program Map

BS/MS Robotics Engineering Non-Thesis Option 1

Course	Title	Credit Hours
First Year		
Fall		
ENGL 1101	English Composition I (minimum grade of C)	3
MATH 1131	Calculus with Analytic Geometry I (minimum grade of C)	4
CHEM 1211	Principles of Chemistry I (minimum grade of C)	3
CHEM 1211L	Principles of Chemistry I Lab (minimum grade of C)	1
ENGR 1701	Introduction to Robotics (minimum grade of C)	1
ENGR 2255	Engineering Graphics and Computer Aided Design (minimum grade of C)	3
Area B2	Institutional Options Elective ¹	1
Credit Hours		16
Spring		
ENGL 1102	English Composition II (minimum grade of C)	3
MATH 1132	Calculus with Analytic Geometry II (minimum grade of C)	4
PHYS 2211	Principles of Physics I (minimum grade of C)	3
PHYS 2311	Principles of Physics I Lab (minimum grade of C)	1
Area H	Elective (minimum grade of C) ²	3
KINS 1106 or PHED 1205	Lifetime Wellness or Concepts of Fitness	2
Credit Hours		16
Second Year		
Fall		
MATH 2115	Introduction to Linear Algebra (minimum grade of C)	3
PHYS 2212	Principles of Physics II (minimum grade of C)	3
PHYS 2312	Principles of Physics II Lab (minimum grade of C)	1
ENGR 2115	Statics (minimum grade of C)	3
ENGR 2221	Computing for Engineers 1 (minimum grade of C)	3
Area E	Behavioral Science Elective ³	3
Credit Hours		16
Spring		
MATH 3107	Differential Equations (minimum grade of C)	3
ENGR 2206	Digital Logic (minimum grade of C)	4
ENGR 2125	Dynamics of Rigid Bodies (minimum grade of C)	3
Area H	Elective (minimum grade of C) ²	3

Area B1	Institutional Options Elective ⁴	3
Credit Hours		16
Third Year		
Fall		
MATH 2135	Calculus with Analytic Geometry 3 (minimum grade of C)	4
ENGR 3235	Circuit Analysis (minimum grade of C)	3
ENGR 3236	Introduction to Signal Processing (minimum grade of C)	3
ENGR 5245U	minimum grade of C	2
Area C1	Humanities Elective ⁵	3
Credit Hours		15
Spring		
MATH 3175	Introduction to Probability (minimum grade of C)	3
ENGR 3255	Sensors and Actuators (minimum grade of C)	3
ENGR 3275	Feedback Control Systems (minimum grade of C)	3
Area H	Elective (minimum grade of C) ²	3
PEDS	Physical Education course 1***	1
Area C2	Fine Arts Elective ⁶	3
Credit Hours		16
Fourth Year		
Fall		
ENGR 4391	Robotics Senior Design 1 (minimum grade of C)	2
ENGR 5161U	Elements of Machine Intelligence (minimum grade of C)	3
ENGR 5176U	Kinematics and Dynamics (minimum grade of C)	3
ENGR 5236G	Microelectronic Circuits	3
Area E	American History ⁷	3
Credit Hours		14
Spring		
ENGR 4392	Robotics Senior Design 2 (minimum grade of C)	2
ENGR 5238G	Introduction to Embedded Systems	3
ENGR 5151U	Computer Vision 1 (minimum grade of C)	3
POLS 1101	American Government	3
Area E	World Cultures Elective ⁸	3
Credit Hours		14
Fifth Year		
Fall		
Area 1	Graduate Elective ⁹	3
Area 1	Graduate Elective ⁹	3
Area 1	Graduate Elective ⁹	3
ENGR 6399	Graduate Research Project	3
Credit Hours		12
Spring		
Area 1	Graduate Elective ⁹	3
Area 1	Graduate Elective ⁹	3
Area 2	Graduate elective from Area 1 list ⁹	3

ENGR 6399	Graduate Research Project	3
Credit Hours		12
Total Credit Hours		147

Footnotes

- ¹ Area B2: ITDS 1779 (2) or LEAD 1705 (2) or PERS 1506 (1; may be repeated with different topic) or PERS 1507 (2).
- ² Area H: ENGR 1000+, MATH/STAT 3000+, CPSC 3000+, MATH 2125, Science 1000+
- ³ ECON 2105 or ECON 2106 (recommended)
- ⁴ Area B1: COMM 1110 or FL 1001, 1002, 2001, 2002
- ⁵ Area C1: ENGL 2111, 2112; ITDS 1145, 1155, 2125; PHIL 2010
- ⁶ Area C2: ARTH 1100, 2125, 2126; ITDS 1145, MUSC 1100, THEA 1100
- ⁷ HIST 2111 or HIST 2112
- ⁸ World Culture: ANTH 1105, 1107, 2105, 2136; HIST 1111, 1112; ENGL 2136, GEOG 1101, ITDS 1156
- ⁹ Area 1 Graduate electives:
 - ENGR 6137 Dynamic Optimization
 - ENGR 6145 Human-Robot Interactions
 - ENGR 6148 Military Applications in Robotics
 - ENGR 6152 Computer Vision 2
 - ENGR 6162 Machine Intelligence and Synthesis
 - ENGR 6167 Multi-Robot Systems
 - ENGR 6172 Multivariable Linear Controls
 - ENGR 6173 Nonlinear Controls
 - ENGR 6178 Biomechanics
 - ENGR 6239 Embedded Systems Design
 - ENGR 6555 Selected Topics in Robotics
 - any 5000+ CPSC/MATH class with advisor approval

BS/MS Robotics Engineering Non-Thesis Option 2

Course	Title	Credit Hours
First Year		
Fall		
ENGL 1101	English Composition I (minimum grade of C)	3
MATH 1131	Calculus with Analytic Geometry I (minimum grade of C)	4
CHEM 1211	Principles of Chemistry I (minimum grade of C)	3
CHEM 1211L	Principles of Chemistry I Lab (minimum grade of C)	1
ENGR 1701	Introduction to Robotics (minimum grade of C)	1
ENGR 2255	Engineering Graphics and Computer Aided Design (minimum grade of C)	3
Area B2	Institutional Options Elective ¹	1
Credit Hours		16
Spring		
ENGL 1102	English Composition II (minimum grade of C)	3
MATH 1132	Calculus with Analytic Geometry II (minimum grade of C)	4

PHYS 2211	Principles of Physics I (minimum grade of C)	3
PHYS 2311	Principles of Physics I Lab (minimum grade of C)	1
Area H	Elective (minimum grade of C) ²	3
KINS 1106 or PHED 1205	Lifetime Wellness or Concepts of Fitness	2

Credit Hours 16

Second Year

Fall

MATH 2115	Introduction to Linear Algebra (minimum grade of C)	3
PHYS 2212	Principles of Physics II (minimum grade of C)	3
PHYS 2312	Principles of Physics II Lab (minimum grade of C)	1
ENGR 2115	Statics (minimum grade of C)	3
ENGR 2221	Computing for Engineers 1 (minimum grade of C)	3
Area E	Behavioral Science Elective ³	3

Credit Hours 16

Spring

MATH 3107	Differential Equations (minimum grade of C)	3
ENGR 2206	Digital Logic (minimum grade of C)	4
ENGR 2125	Dynamics of Rigid Bodies (minimum grade of C)	3
Area H	Elective (minimum grade of C) ²	3
Area B1	Institutional Options Elective ⁴	3

Credit Hours 16

Third Year

Fall

MATH 2135	Calculus with Analytic Geometry 3 (minimum grade of C)	4
ENGR 3235	Circuit Analysis (minimum grade of C)	3
ENGR 3236	Introduction to Signal Processing (minimum grade of C)	3
ENGR 5245U	minimum grade of C	2
Area C1	Humanities Elective ⁵	3

Credit Hours 15

Spring

MATH 3175	Introduction to Probability (minimum grade of C)	3
ENGR 3255	Sensors and Actuators (minimum grade of C)	3
ENGR 3275	Feedback Control Systems (minimum grade of C)	3
Area H	Elective (minimum grade of C) ²	3
PEDS	Physical Education course 1***	1
Area C2	Fine Arts Elective ⁶	3

Credit Hours 16

Fourth Year

Fall

ENGR 4391	Robotics Senior Design 1 (minimum grade of C)	2
ENGR 5161U	Elements of Machine Intelligence (minimum grade of C)	3
ENGR 5176U	Kinematics and Dynamics (minimum grade of C)	3
ENGR 5236G	Microelectronic Circuits	3
Area E	American History ⁷	3

Credit Hours 14

Spring

ENGR 4392	Robotics Senior Design 2 (minimum grade of C)	2
ENGR 5238G	Introduction to Embedded Systems	3
ENGR 5151U	Computer Vision 1 (minimum grade of C)	3
POLS 1101	American Government	3
Area E	World Cultures Elective ⁸	3

Credit Hours 14

Fifth Year

Fall

Area 1	Graduate Elective ⁹	3
Area 1	Graduate Elective ⁹	3
Area 1	Graduate Elective ⁹	3
ENGR 6689	Supervised Graduate Internship	3

Credit Hours 12

Spring

Area 1	Graduate Elective ⁹	3
Area 1	Graduate Elective ⁹	3
Area 2	Graduate elective from Area 1 list ⁹	3
ENGR 6689	Supervised Graduate Internship	3

Credit Hours 12

Total Credit Hours 147

Footnotes

¹ Area B2: ITDS 1779 (2) or LEAD 1705 (2) or PERS 1506 (1; may be repeated with different topic) or PERS 1507 (2)

² Area H: ENGR 1000+, MATH/STAT 3000+, CPSC 3000+, MATH 2125, Science 1000+

³ ECON 2105 or ECON 2106 (recommended)

⁴ Area B1: COMM 1110 or FL 1001, 1002, 2001, 2002

⁵ Area C1: ENGL 2111, 2112; ITDS 1145, 1155, 2125; PHIL 2010

⁶ Area C2: ARTH 1100, 2125, 2126; ITDS 1145, MUSC 1100, THEA 1100

⁷ HIST 2111 or HIST 2112

⁸ World Culture: ANTH 1105, 1107, 2105, 2136; HIST 1111, 1112; ENGL 2136, GEOL 1101, ITDS 1156

⁹ Area 1 Graduate electives:

- ENGR 6137 Dynamic Optimization
- ENGR 6145 Human-Robot Interactions
- ENGR 6148 Military Applications in Robotics
- ENGR 6152 Computer Vision 2
- ENGR 6162 Machine Intelligence and Synthesis
- ENGR 6167 Multi-Robot Systems
- ENGR 6172 Multivariable Linear Controls

- ENGR 6173 Nonlinear Controls
- ENGR 6178 Biomechanics
- ENGR 6239 Embedded Systems Design
- ENGR 6555 Selected Topics in Robotics
- any 5000+ CPSC/MATH class with advisor approval

BS/MS Robotics Engineering Thesis Option

Course	Title	Credit Hours
First Year		
Fall		
ENGL 1101	English Composition I (minimum grade of C)	3
MATH 1131	Calculus with Analytic Geometry I (minimum grade of C)	4
CHEM 1211	Principles of Chemistry I (minimum grade of C)	3
CHEM 1211L	Principles of Chemistry I Lab (minimum grade of C)	1
ENGR 1701	Introduction to Robotics (minimum grade of C)	1
ENGR 2255	Engineering Graphics and Computer Aided Design (minimum grade of C)	3
Area B2	Institutional Options Elective ¹	1
Credit Hours		16
Spring		
ENGL 1102	English Composition II (minimum grade of C)	3
MATH 1132	Calculus with Analytic Geometry II (minimum grade of C)	4
PHYS 2211	Principles of Physics I (minimum grade of C)	3
PHYS 2311	Principles of Physics I Lab (minimum grade of C)	1
Area H	Elective (minimum grade of C) ²	3
KINS 1106 or PHED 1205	Lifetime Wellness or Concepts of Fitness	2
Credit Hours		16
Second Year		
Fall		
MATH 2115	Introduction to Linear Algebra (minimum grade of C)	3
PHYS 2212	Principles of Physics II (minimum grade of C)	3
PHYS 2312	Principles of Physics II Lab (minimum grade of C)	1
ENGR 2115	Statics (minimum grade of C)	3
ENGR 2221	Computing for Engineers 1 (minimum grade of C)	3
Area E	Behavioral Science Elective ³	3
Credit Hours		16
Spring		
MATH 3107	Differential Equations (minimum grade of C)	3

ENGR 2206	Digital Logic (minimum grade of C)	4
ENGR 2125	Dynamics of Rigid Bodies (minimum grade of C)	3
Area H	Elective (minimum grade of C) ²	3
Area B1	Institutional Options Elective ⁴	3
Credit Hours		16
Third Year		
Fall		
MATH 2135	Calculus with Analytic Geometry 3 (minimum grade of C)	4
ENGR 3235	Circuit Analysis (minimum grade of C)	3
ENGR 3236	Introduction to Signal Processing (minimum grade of C)	3
ENGR 5245U	minimum grade of C	2
Area C1	Humanities Elective ⁵	3
Credit Hours		15
Spring		
MATH 3175	Introduction to Probability (minimum grade of C)	3
ENGR 3255	Sensors and Actuators (minimum grade of C)	3
ENGR 3275	Feedback Control Systems (minimum grade of C)	3
Area H	Elective (minimum grade of C) ²	3
PEDS	Physical Education course 1***	1
Area C2	Fine Arts Elective ⁶	3
Credit Hours		16
Fourth Year		
Fall		
ENGR 4391	Robotics Senior Design 1 (minimum grade of C)	2
ENGR 5161U	Elements of Machine Intelligence (minimum grade of C)	3
ENGR 5176U	Kinematics and Dynamics (minimum grade of C)	3
ENGR 5236G	Microelectronic Circuits	3
Area E	American History ⁷	3
Credit Hours		14
Spring		
ENGR 4392	Robotics Senior Design 2 (minimum grade of C)	2
ENGR 5238G	Introduction to Embedded Systems	3
ENGR 5151U	Computer Vision 1 (minimum grade of C)	3
POLS 1101	American Government	3
Area E	World Cultures Elective ⁸	3
Credit Hours		14
Fifth Year		
Fall		
Area 1	Graduate Elective ⁹	3
Area 1	Graduate Elective ⁹	3
Area 1	Graduate Elective ⁹	3
ENGR 6999	Thesis Research	3
Credit Hours		12

Spring

Area 1	Graduate Elective ⁹	3
Area 1	Graduate Elective ⁹	3
ENGR 6999	Thesis Research	3
ENGR 6999	Thesis Research	3
ENGR 6000	Thesis Defense	0
Credit Hours		12
Total Credit Hours		147

Footnotes

- ¹ Area B2: ITDS 1779 (2) or LEAD 1705 (2) or PERS 1506 (1; may be repeated with different topic) or PERS 1507 (2)
- ² Area H: ENGR 1000+, MATH/STAT 3000+, CPSC 3000+, MATH 2125, Science 1000+
- ³ ECON 2105 or ECON 2106 (recommended)
- ⁴ B1: COMM 1110 or FL 1001, 1002, 2001, 2002
- ⁵ Area C1: ENGL 2111, 2112; ITDS 1145, 1155, 2125; PHIL 2010
- ⁶ Area C2: ARTH 1100, 2125, 2126; ITDS 1145, MUSC 1100, THEA 1100
- ⁷ HIST 2111 or HIST 2112
- ⁸ World Culture: ANTH 1105, 1107, 2105, 2136; HIST 1111, 1112; ENGL 2136, GEOG 1101, ITDS 1156
- ⁹ Area 1 Graduate electives:
 - ENGR 6137 Dynamic Optimization
 - ENGR 6145 Human-Robot Interactions
 - ENGR 6148 Military Applications in Robotics
 - ENGR 6152 Computer Vision 2
 - ENGR 6162 Machine Intelligence and Synthesis
 - ENGR 6167 Multi-Robot Systems
 - ENGR 6172 Multivariable Linear Controls
 - ENGR 6173 Nonlinear Controls
 - ENGR 6178 Biomechanics
 - ENGR 6239 Embedded Systems Design
 - ENGR 6555 Selected Topics in Robotics
 - any 5000+ CPSC/MATH class with advisor approval

are required in the program. Students must be in Good Academic Standing to be eligible for graduation.

Combined degree students are expected to maintain Good Academic Standing as they progress toward completing their programs. Students will be evaluated each term on the basis of the overall GPA. The criteria for Good Academic Standing and Academic Probation are different for undergraduate and graduate students.

Eligibility to Remain in the Combined Program:

- Maintain a GPA of 3.0 or better.
- Complete all courses in Areas F, G, and the graduate program of study with a grade of not more than one D or F and not more than two Cs.

Any student who does not satisfy the above conditions will be moved from the Combined program back into the BS in Robotics Engineering program.

Admission Requirements:

- Complete application for admission into this Combined BS/MS program.
- Attain junior standing (60 credits).
- Achieve minimum institutional GPA of 3.0 overall and 3.2 calculated on the following courses:
 - MATH 1131/1132/2115/3107
 - PHYS 2211/2311/2212/2312
 - ENGR 1701/2115/2125/2206/2221/2255

Academic Policies:

- No more than nine semester hours of graduate credit may be earned before completion of the baccalaureate degree.
- A maximum of two courses (not to exceed six semester credit hours) with a grade of "C" may apply to the master's degree.
- Students enrolled in the combined degree program must maintain a minimum graduate overall grade point average of 3.0 for the masters. The overall GPA of 3.0 also applies to undergraduate courses which