Robotics Engineering, B.S.

Degree Offered

- Bachelor of Science in Robotics Engineering (B.S.)

Nature of the Program

Robotics engineering ranks amongst the fastest-growing profession globally according to a recent World Economic Forum Future of Jobs Report. This four-year degree program explores mechanical systems, computer science and engineering systems to provide students with a strong interdisciplinary foundation. Through the fundamentals of robotics systems, mobile robotics, robotic manipulators and autonomy students gain the knowledge and skills to develop their own robotics solutions. The culmination of this program is through the development of a yearlong capstone project giving students the experience to be prepared for a career in robotics engineering within the growing industry, government position or academia.

The robotics engineering program is designed to equip students with the knowledge and skills to excel in the engineering design and production of robotics and autonomous systems solutions. The program will prepare next-generation robotics engineers who are:

- Effective in the engineering design and production of robotics and autonomous systems solutions to alleviate the burden of human workload or create safer work environments.
- Versed to apply a theoretical foundation of mechanical, electrical and computer engineering systems to integrate and devise robotics solutions.
- Educated and trained to apply robotics solutions in collaboration with specialists in the field, ensuring a comprehensive and interdisciplinary approach to addressing challenges in robotic systems.

General Education Foundations

Please use this link to view a list of courses that meet each GEF requirement. **(**http://registrar.wvu.edu/gef/**)**

NOTE: Some major requirements will fulfill specific GEF requirements. Please see the curriculum requirements listed below for details on which GEFs you will need to select.

Code	Title	Hours
General Education Foundations		
F1 - Composition & Rhetoric		3-6
ENGL 101 & ENGL 102	Introduction to Composition and Rhetoric and Composition, Rhetoric, and Research	
or ENGL 103	Accelerated Academic Writing	
F2A/F2B - Science & Technology		4-6
F3 - Math & Quantitative Reasoning		3-4
F4 - Society & Connections		3
F5 - Human Inquiry & the Past		3
F6 - The Arts & Creativity		3
F7 - Global Studies & Diversity		3
F8 - Focus (may be satisfied by completion of a minor, double major, or dual degree)		9
Total Hours		31-37

Please note that not all of the GEF courses are offered at all campuses. Students should consult with their advisor or academic department regarding the GEF course offerings available at their campus.

Degree Requirements

Students must meet the following criteria to qualify for a Bachelor of Science in Robotics Engineering degree:

- Complete a minimum of 124 credit hours
- Satisfy WVU's undergraduate degree requirements
- Satisfy Statler College's undergraduate degree requirements (http://catalog.wvu.edu/undergraduate/collegeofengineeringandmineralresources/#policiestext)
- Complete all courses listed in the curriculum requirements with the required minimum grades
- Attain an overall grade point average of 2.00 or better
- Attain a WVU grade point average of 2.00 or better

- Attain a Statler grade point average of 2.00 or better
- A maximum of one math or science course with a grade of D+, D, or D- may be applied toward degree completion
- Complete a survey regarding their academic and professional experiences at WVU, as well as post-graduation job placement or continuing education plans.

The Statler GPA is computed based on all work taken at WVU with a subject code within Statler College (BIOM, BMEG, CE, CHE, CPE, CS, CSEE, CYBE, EE, EMGT, ENGR, ENVE, ETEC, IENG, IH&S, MAE, MINE, MPGE, MSEN, PDA, PNGE, ROBE, SAFM, SENG) excluding ENGR 140, ENGR 150, and CS 101. The WVU GPA is computed based on all work taken at WVU. The Overall GPA is computed based on all work taken at WVU and transfer work.

Curriculum Requirements

Code	Title	Hours
University Requirements		16
Fundamentals of Engineering Requirements		2
Math and Science Requirements		28
Robotics Engineering Program Requirements		78
Total Hours		124

University Requirements

Code	Title	Hours
General Education Foundations (GEF) 1, 2, 3, 4, 5, 6, 7, and 8 (31-37 Credits)		
Outstanding GEF Requirements 1, 5, 6, 7		15
ENGR 191	First-Year Seminar	1
Total Hours		16

Fundamentals of Engineering Requirements

Code	Title	Hours
A minimum grade of C- is required in all Fundamentals of Engineering courses.		
ENGR 101	Engineering Problem Solving 1	2
Total Hours		2

Math and Science Requirements

Code	Title	Hours
A minimum grade of C- is required in all Math and Science courses.		
Lab Science (select one of the following):		4
CHEM 115 & 115L	Fundamentals of Chemistry 1 and Fundamentals of Chemistry 1 Laboratory	
BIOL 115 & 115L	Principles of Biology and Principles of Biology Laboratory	
SUST 101 & 101L	Sustainable Earth and Sustainable Earth Laboratory	
MATH 155	Calculus 1 (GEF 3)	4
MATH 156	Calculus 2	4
MATH 251	Multivariable Calculus	4
MATH 261	Elementary Differential Equations	4
PHYS 111 & 111L	General Physics 1 and General Physics 1 Laboratory	4
PHYS 112 & 112L	General Physics 2 and General Physics 2 Laboratory	4
Total Hours		28

Robotics Engineering Program Requirements

Code	Title	Hours
ECON 201	Principles of Microeconomics	3
EE 221 & 221L	Introduction to Electrical Engineering and Introduction to Electrical Engineering Laboratory	4
EE 251 & 251L	Digital Electronics and Digital Electronics Laboratory	4
CS 110 & 110L	Introduction to Computer Science and Introduction to Computer Science Laboratory	4
CS 111 & 111L	Introduction to Data Structures and Introduction to Data Structures Laboratory	4
CS 350	Computer System Concepts	3
CPE 271 & 271L	Introduction to Digital Logic Design and Digital Logic Laboratory	4
CPE 310 & 310L	Microprocessor Systems and Microprocessor Systems Laboratory	4
MAE 202	Sophomore Seminar	1
MAE 211 & 211L	Mechatronics and Mechatronics Laboratory	3
MAE 212L	Introduction to Computer Aided Design	1
MAE 241	Statics	3
MAE 242	Dynamics	3
MAE 243	Mechanics of Materials	3
MAE 342	Dynamics of Machines	3
MAE 316	Analysis of Engineering Systems	3
MAE 411 & 411L	Advanced Mechatronics and Advanced Mechatronics Laboratory	3
MAE 460	Automatic Controls	3
ROBE 313	Fundamentals of Robotic Systems	3
ROBE 412	Mobile Robotics	3
ROBE 413	Robotic Manipulators	3
ROBE 414	Robot Autonomy	3
ROBE 471S	Principles of Engineering Design	3
ROBE 472S	Engineering Systems Design	3
Choose from the following (for a total of at least 4 credit hours):		4
CPE 410S	Microcomputer Structures and Interfacing	
CPE 442	Introduction to Digital Computer Architecture	
CPE 453	Data and Computer Communications	
CS 455	Computer Architecture	
CS 472	Artificial Intelligence	
CYBE 435	Computer Incident Response	
CYBE 465	Cybersecurity Principles and Practice	
EE 327	Signals and Systems 1	
EE 355 & 355L	Analog Electronics and Analog Electronics Laboratory	
EE 463	Digital Signal Processing Fundamentals	
IENG 405	Design for Manufacturability	
IENG 445	Project Management for Engineers	
MAE 312	Introduction to Mechanical Design	
MAE 353	Intermediate Mechanics of Materials	
MAE 442	Mechanical Vibrations	
MAE 457	UAV Path Planning and Trajectory Tracking	
MAE 466	Spacecraft Dynamics	

MAE 469	UAV Guidance, Navigation & Control	
MAE 473	Bioengineering	
or BMEG 340	Biomechanics	
or BIOM 425	Bioengineering	
MATH 441	Applied Linear Algebra	
PHYS 314	Introductory Modern Physics	
PHYS 321	Optics	
PHYS 332	Theoretical Mechanics 2	
ROBE 271S	Robotic Engineering Design 1	
ROBE 371S	Robotic Engineering Design 2	
ROBE 491	Professional Field Experience	
or ROBE 495	Independent Study	
or ROBE 496	Senior Thesis	
Total Hours		78

Suggested Plan of Study

First Year

Fall	Hours	Spring	Hours
CS 110 & 110L	4	CS 111 & 111L	4
ENGL 101	3	MATH 156	4
ENGR 101	2	PHYS 111 & 111L	4
ENGR 191	1	GEF 5	3
MATH 155	4		
Lab Science	4		
	18		15

Second Year

Fall	Hours	Spring	Hours
EE 221 & 221L	4	MAE 211 & 211L	3
MAE 202*	1	MAE 212L	1
MAE 241	3	MAE 242	3
MATH 251	4	MATH 261	4
PHYS 112 & 112L	4	ENGL 102	3
	16		14

Third Year

Fall	Hours	Spring	Hours
MAE 243	3	ECON 201	3
MAE 316	3	EE 251 & 251L	4
GEF 6	3	MAE 342	3
CS 350	3	ROBE 313	3
CPE 271 & 271L	4	CPE 310 & 310L	4
	16		17

Fourth Year

Fall	Hours	Spring	Hours
MAE 411 & 411L*	3	MAE 460	3
ROBE 412*	3	GEF 7	3
ROBE 414*	3	ROBE 413*	3

ROBE 471S*	3 ROBE 472S*	3
Technical Elective	1 Technical Elective	3
	13	15

Total credit hours: 124

*

Offered once per year in the semester shown.

Area of Emphasis

- Artificial Intelligence

AREA OF EMPHASIS IN ARTIFICIAL INTELLIGENCE

Code	Title	Hours
CS 472	Artificial Intelligence	3
CS 474	Introduction to Responsible and Safe AI	3
Select two of the following:		6
CPE 420	Introduction to Neural Networks	
CS 460	Introduction to Big Data Engineering	
CS 473	Introduction to Data Mining	
CS 476S	Applied Artificial Intelligence Studio	
EE 465	Introduction to Digital Image Processing	
Total Hours		12

Major Learning Outcomes

ROBOTICS ENGINEERING

Upon graduation, all Bachelor of Science students in Robotics Engineering will have acquired the:

- Students will be effective in the engineering design and production of robotics and autonomous systems solutions to lighten the burden of human work;
- Students will be able to apply a theoretical foundation of mechanical systems, electrical systems and computer engineering systems to integrate and devise robotics solutions;
- Student will be effective and planning the use of and participating in the development of robotics and autonomous systems; and
- Students will have the education and training to apply robotics solutions in concert with specialists who deal with robotic systems.

Dual Degree Programs

- B.S.A.E. Aerospace Engineering and B.S. Robotics Engineering (p. 5)
- B.S.Cp.E. Computer Engineering and B.S. Robotics Engineering (p. 5)
- B.S.C.S. Computer Science and B.S. Robotics Engineering (p. 9)
- B.S.M.E. Mechanical Engineering and B.S. Robotics Engineering (p. 12)

B.S.A.E. Aerospace Engineering and B.S. Robotics Engineering

Students can simultaneously pursue two bachelor's degrees in Aerospace Engineering and Robotics Engineering. To successfully complete both degrees, students must meet all requirements of both programs. Exact credit hours and classes will vary per student based on their choice of technical electives and Area of Emphasis courses.

B.S.Cp.E. Computer Engineering and B.S. Robotics Engineering

Degree Requirements

Students must meet the following criteria to qualify for a Bachelor of Science in Computer Engineering and a Bachelor of Science in Robotics Engineering degree:

- Complete a minimum of 153 credit hours
- Satisfy WVU's undergraduate degree requirements

- Satisfy Statler College's undergraduate degree requirements (http://catalog.wvu.edu/undergraduate/collegeofengineeringandmineralresources/#policiestext)
- Complete all courses listed in the curriculum requirements with the required minimum grades
- Attain an overall grade point average of 2.00 or better
- Attain a WVU grade point average of 2.00 or better
- Attain a Statler grade point average of 2.00 or better
- A maximum of one math or science courses with a grade of D+, D, or D- may apply towards a Statler College degree
- Complete a survey regarding their academic and professional experiences at WVU, as well as post-graduation job placement or continuing education plans.

The Statler GPA is computed based on all work taken at WVU with a subject code within Statler College (BIOM, BMEG, CE, CHE, CPE, CS, CSEE, CYBE, EE, EMGT, ENGR, ENVE, ETEC, IENG, IH&S, MAE, MINE, MPGE, MSEN, PDA, PNGE, ROBE, SAFM, SENG) excluding ENGR 140, ENGR 150, and CS 101. The WVU GPA is computed based on all work taken at WVU. The Overall GPA is computed based on all work taken at WVU and transfer work.

Curriculum Requirements

Code	Title	Hours
University Requirements		16
Fundamentals of Engineering Requirements		2
Math and Science Requirements		30
Computer Engineering and Robotics Engineering Program Requirments		105-106
Total Hours		153-154

University Requirements

Code	Title	Hours
General Education Foundations (GEF) 1, 2, 3, 4, 5, 6, 7, and 8 (31-37 Credits)		
Outstanding GEF Requirements 1, 5, 6, and 7		15
ENGR 191	First-Year Seminar	1
Total Hours		16

Fundamentals of Engineering Requirements

Code	Title	Hours
A minimum grade of C- is required in all Fundamentals of Engineering courses.		
ENGR 101	Engineering Problem Solving 1	2
Total Hours		2

Math and Science Requirements

Code	Title	Hours
A minimum grade of C- is required in all Math and Science courses.		
MATH 155	Calculus 1 (GEF 3)	4
MATH 156	Calculus 2 (GEF 8)	4
MATH 251	Multivariable Calculus	4
MATH 261	Elementary Differential Equations	4
MATH 375	Applied Modern Algebra	3
PHYS 111 & 111L	General Physics 1 and General Physics 1 Laboratory (GEF 2B)	4
PHYS 112 & 112L	General Physics 2 and General Physics 2 Laboratory (GEF 8)	4
STAT 215	Introduction to Probability and Statistics (GEF 8)	3
Total Hours		30

Computer Engineering and Robotics Engineering Program Requirements

Code	Title	Hours
CPE 271 & 271L	Introduction to Digital Logic Design and Digital Logic Laboratory	4
CPE 310 & 310L	Microprocessor Systems and Microprocessor Systems Laboratory	4
CPE 453	Data and Computer Communications	3
CPE 410S	Microcomputer Structures and Interfacing	3
or CPE 442	Introduction to Digital Computer Architecture	
or CPE 484	Real-Time Systems Development	
CS 110 & 110L	Introduction to Computer Science and Introduction to Computer Science Laboratory	4
CS 111 & 111L	Introduction to Data Structures and Introduction to Data Structures Laboratory	4
CS 330 & 330L	Introduction to Software Engineering and Introduction to Software Engineering Laboratory	4
CS 350	Computer System Concepts	3
CS 450	Operating Systems Structure	4
ECON 201	Principles of Microeconomics (GEF 4)	3
EE 221 & 221L	Introduction to Electrical Engineering and Introduction to Electrical Engineering Laboratory	4
EE 223 & 223L	Electrical Circuits and Electrical Circuits Laboratory	4
EE 251 & 251L	Digital Electronics and Digital Electronics Laboratory	4
EE 327	Signals and Systems 1	3
EE 355 & 355L	Analog Electronics and Analog Electronics Laboratory	4
MAE 102	Introduction to Mechanical and Aerospace Engineering Design	3
or ENGR 102	Engineering Problem Solving 2	
MAE 202	Sophomore Seminar	1
MAE 211 & 211L	Mechatronics and Mechatronics Laboratory	3
MAE 212L	Introduction to Computer Aided Design	1
MAE 241	Statics	3
MAE 242	Dynamics	3
MAE 243	Mechanics of Materials	3
MAE 316	Analysis of Engineering Systems	3
MAE 342	Dynamics of Machines	3
MAE 411 & 411L	Advanced Mechatronics and Advanced Mechatronics Laboratory	3
MAE 460	Automatic Controls	3
ROBE 313	Fundamentals of Robotic Systems	3
ROBE 412	Mobile Robotics	3
ROBE 413	Robotic Manipulators	3
ROBE 414	Robot Autonomy	3
Capstone Sequence (Select One Pathway)		6-7
CSEE 380 & CSEE 480S & CSEE 481S	Engineering for Societal Impact and Capstone Project - Design and Capstone Project - Implementation (7 Total Hours)	
ROBE 471S & ROBE 472S	Principles of Engineering Design and Engineering Systems Design (6 Total Hours)	

Technical Elective [*]	3
Total Hours	105-106

[*]
See BS CpE (http://catalog.wvu.edu/undergraduate/collegeofengineeringandmineralresources/lanedepartmentofcomputerscienceand/computer_engineering/#majortext) and BS Robotics (http://catalog.wvu.edu/undergraduate/collegeofengineeringandmineralresources/departmentofmechanicalandaerospace/robe/#majortext) degrees for list of technical electives. Except CPE 412 Mobile Robotics.

Suggested Plan of Study

It is important for students to take courses in the order specified as much as possible; all prerequisites and concurrent requirements must be observed. A typical B.S.Cp.E. / B.S. Robotics degree program that completes degree requirements in five years is listed below.

First Year

Fall	Hours	Spring	Hours
CS 110 & 110L	4	CS 111 & 111L	4
ENGL 101	3	MAE 102	3
ENGR 101	2	MATH 156	4
ENGR 191	1	PHYS 111 & 111L	4
MATH 155	4		
GEF 5, 6, or 7	3		
	17		15

Second Year

Fall	Hours	Spring	Hours
EE 221 & 221L	4	CPE 271 & 271L	4
MAE 202	1	ENGL 102	3
MAE 241	3	MAE 212L	1
MATH 251	4	MAE 242	3
PHYS 112 & 112L	4	MATH 261	4
	16		15

Third Year

Fall	Hours	Spring	Hours
CPE 310 & 310L	4	CS 350	3
MAE 211 & 211L	3	EE 223 & 223L	4
MAE 243	3	EE 251 & 251L	4
ROBE 313	3	MAE 316	3
STAT 215	3		
	16		14

Fourth Year

Fall	Hours	Spring	Hours
EE 355 & 355L	4	CS 330 & 330L	4
MAE 342	3	ECON 201 (GEF 4)	3
MATH 375	3	EE 327	3
ROBE 412[*]	3	ROBE 413[*]	3
GEF 5, 6, or 7	3	GEF 5, 6, or 7	3
	16		16

Fifth Year			
Fall	**Hours**	**Spring**	**Hours**
CPE 453		3 CPE 410S, 442, or 484	3
CS 450		4 MAE 460	3
MAE 411 & 411L		3 ROBE 472S or CSEE 481S*	3
ROBE 414*		3 Technical Elective	3
ROBE 471S or CSEE 480S*		3	
		16	12

Total credit hours: 153

*

Courses only taught in given semester.

B.S.C.S. Computer Science and B.S. Robotics Engineering

Degree Requirements

Students must meet the following criteria to qualify for a Bachelor of Science in Computer Science and a Bachelor of Science in Robotics Engineering degree:

- Complete a minimum of 152 credit hours
- Satisfy WVU's undergraduate degree requirements
- Satisfy Statler College's undergraduate degree requirements (http://catalog.wvu.edu/undergraduate/collegeofengineeringandmineralresources/#policiestext)
- Complete all courses listed in the curriculum requirements with the required minimum grades
- Attain an overall grade point average of 2.00 or better
- Attain a WVU grade point average of 2.00 or better
- Attain a Statler grade point average of 2.00 or better
- A maximum of one math or science courses with a grade of D+, D, or D- may apply towards a Statler College degree
- Complete a survey regarding their academic and professional experiences at WVU, as well as post-graduation job placement or continuing education plans.

The Statler GPA is computed based on all work taken at WVU with a subject code within Statler College (BIOM, BMEG, CE, CHE, CPE, CS, CSEE, CYBE, EE, EMGT, ENGR, ENVE, ETEC, IENG, IH&S, MAE, MINE, MPGE, MSEN, PDA, PNGE, ROBE, SAFM, SENG) excluding ENGR 140, ENGR 150, and CS 101. The WVU GPA is computed based on all work taken at WVU. The Overall GPA is computed based on all work taken at WVU and transfer work.

Curriculum Requirements

Code	Title	Hours
University Requirements		16
Fundamentals of Engineering Requirements		2
Math and Science Requirements		30
Computer Science and Robotics Engineering Program Requirements		104-105
Total Hours		152-153

University Requirements

Code	Title	Hours
General Education Foundations (GEF) 1, 2, 3, 4, 5, 6, 7, and 8 (31-37 Credits)		
Outstanding GEF Requirements 1, 5, 6, and 7		15
ENGR 191	First-Year Seminar	1
Total Hours		16

Fundamentals of Engineering Requirements

Code	Title	Hours
A minimum grade of C- is required in all Fundamentals of Engineering courses.		
ENGR 101	Engineering Problem Solving 1	2
Total Hours		2

Math and Science Requirements

Code	Title	Hours
A minimum grade of C- is required in all Math and Science courses except CS 220.		
CS 220	Discrete Mathematics	3
MATH 155	Calculus 1 (GEF 3)	4
MATH 156	Calculus 2 (GEF 8)	4
MATH 251	Multivariable Calculus	4
MATH 261	Elementary Differential Equations	4
PHYS 111 & 111L	General Physics 1 and General Physics 1 Laboratory (GEF 2B)	4
PHYS 112 & 112L	General Physics 2 and General Physics 2 Laboratory (GEF 8)	4
STAT 215	Introduction to Probability and Statistics (GEF 8)	3
Total Hours		30

Computer Science and Robotics Engineering Program Requirements

Code	Title	Hours
CPE 271 & 271L	Introduction to Digital Logic Design and Digital Logic Laboratory	4
CPE 310 & 310L	Microprocessor Systems and Microprocessor Systems Laboratory	4
CPE 453	Data and Computer Communications	3
CS 110 & 110L	Introduction to Computer Science and Introduction to Computer Science Laboratory	4
CS 111 & 111L	Introduction to Data Structures and Introduction to Data Structures Laboratory	4
CS 210	File and Data Structures	4
CS 310	Principles of Programming Languages	3
CS 320	Analysis of Algorithms	3
CS 330 & 330L	Introduction to Software Engineering and Introduction to Software Engineering Laboratory	4
CS 350	Computer System Concepts	3
CS 410	Compiler Construction	3
or CS 422	Automata Theory	
CS 450	Operating Systems Structure	4
ECON 201	Principles of Microeconomics	3
EE 221 & 221L	Introduction to Electrical Engineering and Introduction to Electrical Engineering Laboratory	4
EE 251 & 251L	Digital Electronics and Digital Electronics Laboratory	4
MAE 202	Sophomore Seminar	1
MAE 211 & 211L	Mechatronics and Mechatronics Laboratory	3
MAE 212L	Introduction to Computer Aided Design	1
MAE 241	Statics	3
MAE 242	Dynamics	3
MAE 243	Mechanics of Materials	3

MAE 316	Analysis of Engineering Systems	3
MAE 342	Dynamics of Machines	3
MAE 411 & 411L	Advanced Mechatronics and Advanced Mechatronics Laboratory	3
MAE 460	Automatic Controls	3
ROBE 313	Fundamentals of Robotic Systems	3
ROBE 412	Mobile Robotics	3
ROBE 413	Robotic Manipulators	3
ROBE 414	Robot Autonomy	3
WRIT 304	Business and Professional Writing	3
or WRIT 305	Technical Writing	
or WRIT 403	Grant Proposal Writing for Community & Industry	
Capstone Design Sequence		6-7
CSEE 380 & CSEE 480S & CSEE 481S	Engineering for Societal Impact and Capstone Project - Design and Capstone Project - Implementation	
ROBE 471S & ROBE 472S	Principles of Engineering Design and Engineering Systems Design	
CS 4xx Technical Elective *		3
Total Hours		104-105

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See BSCS (http://catalog.wvu.edu/undergraduate/collegeofengineeringandmineralresources/lanedepartmentofcomputerscienceand/computer_science/#majortext) degree for list of electives with the CS subject code in 400-level or higher.

Suggested Plan of Study

It is important for students to take courses in the order specified as much as possible; all prerequisites and concurrent requirements must be observed. A typical B.S.C.S. / B.S. Robotics degree program that completes degree requirements in four and a half years is listed below.

First Year

Fall	Hours	Spring	Hours
CS 110 & 110L	4	CS 111 & 111L	4
ENGL 101	3	ENGL 102	3
ENGR 101	2	MATH 156	4
ENGR 191	1	PHYS 111 & 111L	4
MATH 155	4		
GEF 5, 6, or 7	3		
	17		15

Second Year

Fall	Hours	Spring	Hours
CS 210	4	CPE 271 & 271L	4
MAE 202	1	MAE 211 & 211L	3
MAE 241	3	MAE 212L	1
MATH 251	4	MAE 242	3
PHYS 112 & 112L	4	MATH 261	4
	16		15

Third Year

Fall	Hours	Spring	Hours
CS 220	3	CPE 310 & 310L	4

CS 330 & 330L	4	CS 310	3
EE 221 & 221L	4	CS 320	3
ROBE 313	3	EE 251 & 251L	4
MAE 243	3		
	17		14

Fourth Year

Fall	Hours	Spring	Hours
MAE 316	3	CS 350	3
MAE 342	3	ECON 201 (GEF 4)	3
ROBE 412*	3	ROBE 413*	3
STAT 215	3	WRIT 304, 305, or 403	3
GEF 5, 6, or 7	3	GEF 5, 6, or 7	3
	15		15

Fifth Year

Fall	Hours	Spring	Hours
CPE 453	3	CS 450	4
CS 410 or 422*	3	MAE 460	3
MAE 411 & 411L	3	ROBE 472S or CSEE 481S*	3
ROBE 414*	3	CS 400-level Technical Elective	3
ROBE 471S or CSEE 480S*	3		
	15		13

Total credit hours: 152

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Courses only taught in given semester

B.S.M.E. Mechanical Engineering and B.S. Robotics Engineering

Degree Requirements

Students must meet the following criteria to qualify for a Bachelor of Science in Mechanical Engineering and a Bachelor of Science in Robotics Engineering degree:

- Complete a minimum of 150 credit hours
- Satisfy WVU's undergraduate degree requirements
- Satisfy Statler College's undergraduate degree requirements (http://catalog.wvu.edu/undergraduate/collegeofengineeringandmineralresources/#policiestext)
- Complete all courses listed in the curriculum requirements with the required minimum grades
- Attain an overall grade point average of 2.00 or better
- Attain a WVU grade point average of 2.00 or better
- Attain a Statler grade point average of 2.00 or better
- A maximum of one math or science courses with a grade of D+, D, or D- may apply towards a Statler College degree
- Complete a survey regarding their academic and professional experiences at WVU, as well as post-graduation job placement or continuing education plans.

The Statler GPA is computed based on all work taken at WVU with a subject code within Statler College (BIOM, BMEG, CE, CHE, CPE, CS, CSEE, CYBE, EE, EMGT, ENGR, ENVE, ETEC, IENG, IH&S, MAE, MINE, MPGE, MSEN, PDA, PNGE, ROBE, SAFM, SENG) excluding ENGR 140, ENGR 150, and CS 101. The WVU GPA is computed based on all work taken at WVU. The Overall GPA is computed based on all work taken at WVU and transfer work.

Curriculum Requirements

Code	Title	Hours
University Requirements		16
Fundamentals of Engineering Requirements		2
Math and Science Requirements		28
Mechanical Engineering and Robotics Engineering Program Requirements		104-109
Total Hours		150-155

University Requirements

Code	Title	Hours
General Education Foundations (GEF) 1, 2, 3, 4, 5, 6, 7, and 8 (31-37 Credits)		
Outstanding GEF Requirements 1, 5, 6, and 7		15
ENGR 191	First-Year Seminar	1
Total Hours		16

Fundamentals of Engineering Requirements

Code	Title	Hours
A minimum grade of C- is required in all Fundamentals of Engineering courses.		
ENGR 101	Engineering Problem Solving 1	2
Total Hours		2

Math and Science Requirements

Code	Title	Hours
A minimum grade of C- is required in all Math and Science courses.		
CHEM 115 & 115L	Fundamentals of Chemistry 1 and Fundamentals of Chemistry 1 Laboratory (GEF 2B)	4
MATH 155	Calculus 1 (GEF 3)	4
MATH 156	Calculus 2 (GEF 8)	4
MATH 251	Multivariable Calculus	4
MATH 261	Elementary Differential Equations	4
PHYS 111 & 111L	General Physics 1 and General Physics 1 Laboratory (GEF 8)	4
PHYS 112 & 112L	General Physics 2 and General Physics 2 Laboratory (GEF 8)	4
Total Hours		28

Mechanical Engineering and Robotics Enginering Program Requirements

Code	Title	Hours
CPE 271 & 271L	Introduction to Digital Logic Design and Digital Logic Laboratory	4
CPE 310 & 310L	Microprocessor Systems and Microprocessor Systems Laboratory	4
CS 110 & 110L	Introduction to Computer Science and Introduction to Computer Science Laboratory	4
CS 111 & 111L	Introduction to Data Structures and Introduction to Data Structures Laboratory	4
CS 350	Computer System Concepts	3
ECON 201	Principles of Microeconomics (GEF 4)	3
EE 221 & 221L	Introduction to Electrical Engineering and Introduction to Electrical Engineering Laboratory	4
EE 251 & 251L	Digital Electronics and Digital Electronics Laboratory	4

IENG 302	Manufacturing Processes	2
MAE 202	Sophomore Seminar	1
MAE 211 & 211L	Mechatronics and Mechatronics Laboratory	3
MAE 212L	Introduction to Computer Aided Design	1
MAE 241	Statics	3
MAE 242	Dynamics	3
MAE 243	Mechanics of Materials	3
MAE 316	Analysis of Engineering Systems	3
MAE 320	Thermodynamics	3
MAE 331	Fluid Mechanics	3
MAE 342	Dynamics of Machines	3
MAE 353	Intermediate Mechanics of Materials	3
MAE 423	Heat Transfer	3
MAE 456 & 456L	Computer-Aided Design and Finite Element Analysis and Computer-Aided Design and Finite Element Analysis Laboratory	3
MSEN 350	Materials Science	3
ROBE 313	Fundamentals of Robotic Systems	3
ROBE 412	Mobile Robotics	3
ROBE 413	Robotic Manipulators	3
ROBE 414	Robot Autonomy	3
ROBE 471S	Principles of Engineering Design	3
ROBE 472S	Engineering Systems Design	3
Focus Areas		**16-21**
Option A (16 Credits)		
MAE 244L	Dynamics and Strength Laboratory	
MAE 411 & 411L	Advanced Mechatronics and Advanced Mechatronics Laboratory	
MAE 442	Mechanical Vibrations	
MAE 460	Automatic Controls	
Technical Electives (6 credits)		
Option B (21 Credits)		
ME Dynamics and Controls AoE (15 Credits) [+]		
Technical Electives (6 Credits) [*]		
Option C (21 Credits)		
Energy Systems AoE (15 Credits) [+]		
MAE 411 & 411L	Advanced Mechatronics and Advanced Mechatronics Laboratory	
Technical Electives (3 credits) [*]		
Option D (20-21 Credits)		
Materials Science AoE (14-15 Credits) [+]		
MAE 411 & 411L	Advanced Mechatronics and Advanced Mechatronics Laboratory	
MAE 460	Automatic Controls	
Total Hours		104-109

[*]

See BSME degree (http://catalog.wvu.edu/undergraduate/collegeofengineeringandmineralresources/departmentofmechanicalandaerospace/mechanical/#majortext) for list of electives

See BS Robotics (http://catalog.wvu.edu/undergraduate/collegeofengineeringandmineralresources/departmentofmechanicalandaerospace/robe/#majortext) degree for list of electives

+

See BSME degree (http://catalog.wvu.edu/undergraduate/collegeofengineeringandmineralresources/departmentofmechanicalandaerospace/mechanical/#areasofemphasistext) for Area of Emphasis (AoE) options

Suggested Plan of Study

It is important for students to take courses in the order specified as much as possible; all prerequisites and concurrent requirements must be observed. A typical B.S.M.E / B.S. Robotics degree program that completes degree requirements in four and a half years is listed below.

First Year

Fall	Hours	Spring	Hours
CHEM 115 & 115L (GEF 2)	4	CS 111 & 111L	4
CS 110 & 110L	4	MATH 156 (GEF 8)	4
ENGL 101 (GEF 1)	3	PHYS 111 & 111L (GEF 8)	4
ENGR 101	2	GEF 5, 6, or 7	3
ENGR 191	1	GEF 5, 6, or 7	3
MATH 155 (GEF 3)	4		
	18		18

Second Year

Fall	Hours	Spring	Hours
MAE 202	1	EE 221 & 221L	4
MAE 212L	1	ENGL 102 (GEF 1)	3
MAE 241	3	MAE 211 & 211L	3
MATH 251 (GEF 8)	4	MAE 242	3
PHYS 112 & 112L	4	MATH 261	4
GEF 5, 6, or 7	3		
	16		17

Third Year

Fall	Hours	Spring	Hours
CPE 271 & 271L	4	ECON 201 (GEF 4)	3
MAE 243	3	MAE 316	3
MAE 244L	1	MAE 342	3
MAE 320	3	MAE 353	3
MAE 331	3	MSEN 350	3
ROBE 313	3		
	17		15

Fourth Year

Fall	Hours	Spring	Hours
EE 251 & 251L	4	CPE 310 & 310L	4
CS 350	3	MAE 442*	3
IENG 302	2	MAE 456 & 456L	3
MAE 411 & 411L	3	ROBE 413*	3
ROBE 412*	3	ROBE 472S*	3
	15		16

Fifth Year

Fall	**Hours**
MAE 423	3
MAE 460	3
ROBE 414*	3
ROBE 471S*	3
Technical Elective	3
Technical Elective	3
	18

Total credit hours: 150