

B.S. in Mechanical Engineering

Prescott Program Requirements

General Education Requirements	42
Core Requirements	51
Area of Concentration	29
Electives	6
Total Credits	128

Program Details

The Bachelor of Science in Mechanical Engineering program requires successful completion of a minimum of 128 credit hours. The program may be completed in eight semesters, or four years, assuming appropriate background and full-time enrollment. A minimum cumulative grade point average of 2.00 is needed for all required AERO, ENGR, ESCI, and MECH courses, excluding technical electives. The program offers options in Energy Systems, Propulsion Systems, and Robotics, as well as multiple capstone design pathways. The courses necessary to earn this degree are listed below.

Students should be aware that many courses have prerequisites and/or corequisites. Students must earn a grade of C or better in all prerequisite courses for required AERO, COMM 221, ENGR, ENGP, ESCI, MECH, and SYSE courses. Students are responsible for ensuring that all prerequisite and degree requirements are met prior to enrollment in advanced coursework.

General Education Requirements

Embry-Riddle degree programs require students to complete a minimum of 36 hours of General Education coursework. For a full description of Embry-Riddle General Education guidelines, please see the General Education (<https://catalog.erau.edu/general-education/>) section of this catalog.

Students may choose other classes outside of their requirements, but doing so can result in the student having to complete more than the degree's 128 credit hours. This will result in additional **time and cost** to the student.

Communication	9
COMM 122 English Composition	
COMM 221 Technical Communication	
COMM 219 Speech	
or COMM 420 Advanced Technical Communication I	
and Advanced Technical Communication II	
& COMM 430	
Humanities - Lower Level	3
Social Sciences - Lower Level	3
ECON 225 Engineering Economics	
Humanities/Social Sciences - Lower or Upper Level	3
Humanities/Social Sciences - Upper Level	3
Computer Science/Information Technology	3
ENGR 115 Introduction to Computing for Engineers	
Mathematics	8
MATH 241 Calculus and Analytical Geometry I	
MATH 242 Calculus and Analytical Geometry II	
Physical/Life Sciences	10
CHEM 110 General Chemistry I	
or CHEM 113 General Chemistry for Engineering	

PHYS 150 & PHYS 160 & CHEM 110L	Physics with Calculus I and Physics with Calculus II and General Chemistry I Laboratory	
or		
MATH 335	Introduction to Linear and Abstract Algebra	
or Math Elective		
PHYS 161	Physics with Calculus I and II	
Total Credits		42

Core Requirements

The following course of study outlines the quickest and most cost-efficient route for students to earn their B.S. in Mechanical Engineering. Students are encouraged to follow the course of study to ensure they complete all program required courses and their prerequisites within four years.

MATH 243	Calculus and Analytical Geometry III	4
MATH 345	Differential Equations and Matrix Methods	4
ENGR 101	Introduction to Engineering	2
ENGR 120	Graphical Communications	3
or ENGR 200	Computer Aided Design of Aerospace Systems	
or ENGR 201	Computer Aided Design of Mechanical Systems	
ESCI 201	Statics	3
ESCI 202	Solid Mechanics	3
ESCI 204	Dynamics	3
ESCI 208	Thermodynamics	3
MECH 200L	Machine Shop Laboratory	1
MECH 309	Fluid Dynamics	3
or ESCI 206	Fluid Mechanics	
ESCI 320	Engineering Materials Science	2
ESCI 320L	Engineering Materials Science Laboratory	1
MECH 304	Introduction to Machine Design	3
MECH 400	Mechanical Vibrations	3
ESCI 403	Heat Transfer	3
ELEC 327	Electrical Engineering Fundamentals	3
or ELEC 335 & 335L	Electrical Engineering I and Electrical Engineering I Laboratory	
MECH 402 & 402L	Model-Based Control System Design and Model-Based Control System Design Laboratory	3
or AERO 430	Control System Analysis and Design	
PHYS 250	Physics with Calculus III	3
PHYS 250L	Physics with Calculus III Laboratory	1
Total Credits		51

Area of Concentration

Energy Systems

ESCI 324	Measurements and Instrumentation	2
ESCI 324L	Measurements and Instrumentation Laboratory	1
MECH 440	Thermal Power Systems	3
MECH 448	Energy Systems Preliminary Design	4
or MECH 468	Propulsion System Preliminary Design	
MECH 449	Energy Systems Detail Design	4
or MECH 469	Propulsion System Detail Design	
MECH 340	Alternative Energy I	3
MECH 405	Thermal-Fluid Science and Energy Measurement	1
MECH 405L	Thermal-Fluid Science and Energy Measurement Laboratory	1
MECH 304L	Machine Design Laboratory	1
ELEC 334	Electrical Engineering for Mechanical Engineers	3

Area of Concentration Electives:	6
MECH 442 Alternative Energy II or MECH 443 Environment Control and HVAC Systems COE courses with MECH, AERO, or ELEC Subject Code	
Total Credits	29

Robotics

MECH 470	Mechatronics	3
MECH 478	Robotic Systems Preliminary Design	4
MECH 479	Robotic Systems Detail Design	4
MECH 304L	Machine Design Laboratory	1
CESC 220	Digital Circuit Design	3
CESC 220L	Digital Circuit Design Laboratory	1
CPSC 125	Computer Science I	3
CPSC 125L	Computer Science I Laboratory	1
MECH 370	Introduction to Robotics	3
MECH 370L	Introduction to Robotics I Laboratory	1
MECH 470L	Mechatronics Laboratory	1
MECH 471	Robotics II	3
MECH 471L	Robotics II Laboratory	1
Total Credits		29

Propulsion Systems

MECH 304L	Machine Design Laboratory	1
ELEC 334	Electrical Engineering for Mechanical Engineers	3
ESCI 324	Measurements and Instrumentation	2
ESCI 324L	Measurements and Instrumentation Laboratory	1
MECH 360	Airbreathing and Rocket Propulsion	3
MECH 440	Thermal Power Systems	3
MECH 405	Thermal-Fluid Science and Energy Measurement	1
MECH 405L	Thermal-Fluid Science and Energy Measurement Laboratory	1
MECH 448	Energy Systems Preliminary Design	4
or MECH 468	Propulsion System Preliminary Design	
MECH 449	Energy Systems Detail Design	4
or MECH 469	Propulsion System Detail Design	

Area of Concentration Electives:	6
AERO 302 Aerodynamics II	
AERO 414 Space Propulsion	
AERO 437 Advanced Space Propulsion	
ESCI 414 High Temperature Turbine Materials	
MECH 460 Advanced Propulsion	
MECH 461 Boost Rocket Propulsion	
MECH 461L Boost Rocket Propulsion Laboratory	
Any 500 Level MECH course	
Total Credits	29

Electives

Technical Electives	6
One of the technical electives must be a 300-500 level engineering course designated by the prefixes AERO, CESC, CIVE, CPSC, ELEC, ENGR, ENGP, MECH, PHYS, SFTW, or SYSE that is not listed in the degree requirements. Students may take one 300-500 level math course designated by the prefix MATH.	
Total Credits	6

Suggested Plans of Study

Energy Systems Option

Year One

Requirements	Credits
COMM 122 - English Composition	3
CHEM 113 - General Chemistry for Engineering	3
ENGR 101 - Introduction to Engineering	2
ENGR 201 - Computer Aided Design of Mechanical Systems	3
MATH 241 - Calculus and Analytical Geometry I	4
MECH 200L - Machine Shop Laboratory	1

Semester Hours	16
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Requirements	Credits
COMM 221 - Technical Communication	3
ECON 225 - Engineering Economics	3
ENGR 115 - Introduction to Computing for Engineers	3
MATH 242 - Calculus and Analytical Geometry II	4
PHYS 161 - Physics with Calculus I and II	4

Semester Hours	17
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Total Credits

Total Hours for All Requirements: 33

Year Two

Requirements	Credits
ESCI 201 - Statics	3
ESCI 208 - Thermodynamics	3
MATH 243 - Calculus and Analytical Geometry III	4
PHYS 250 - Physics with Calculus III	3
PHYS 250L - Physics with Calculus III Laboratory	1
Humanities/Social Sciences - Lower or Upper Level	3

Semester Hours	17
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Requirements	Credits
ELEC 335 - Electrical Engineering I	2
ELEC 335L - Electrical Engineering I Laboratory	1
ESCI 202 - Solid Mechanics	3
ESCI 206 - Fluid Mechanics	3
MATH 345 - Differential Equations and Matrix Methods	4
Humanities - Lower Level	3

Semester Hours	16
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Total Credits

Total Hours for All Requirements: 33

Year Three

Requirements	Credits
ELEC 334 - Electrical Engineering for Mechanical Engineers	3
ESCI 204 - Dynamics	3
ESCI 324 - Measurements and Instrumentation	2
ESCI 324L - Measurements and Instrumentation Laboratory	1
ESCI 403 - Heat Transfer	3
MECH 440 - Thermal Power Systems	3
Semester Hours	15

Requirements	Credits
AERO 430 - Control System Analysis and Design	3
ESCI 320 - Engineering Materials Science	2
ESCI 320L - Engineering Materials Science Laboratory	1
MECH 340 - Alternative Energy I	3
MECH 405 - Thermal-Fluid Science and Energy Measurement	1
MECH 405L - Thermal-Fluid Science and Energy Measurement Laboratory	1
Area of Concentration	3
Math/Science Elective	3
Semester Hours	17

Total Credits

Total Hours for All Requirements: 32

Year Four

Requirements	Credits
COMM 420 - Advanced Technical Communication I and COMM 430 - Advanced Technical Communication II	3
MECH 304 - Introduction to Machine Design	3
MECH 304L - Machine Design Laboratory	1
MECH 448 - Energy Systems Preliminary Design	4
Area of Concentration	3
Technical Elective	3
Semester Hours	17

Requirements	Credits
MECH 400 - Mechanical Vibrations	3
MECH 449 - Energy Systems Detail Design	4
Humanities/Social Sciences - Upper Level	3
Technical Elective	3
Semester Hours	13

Total Credits

Total Hours for All Requirements: 30

Robotics Option

Year One

Requirements	Credits
CHEM 113 - General Chemistry for Engineering	3
COMM 122 - English Composition	3
ENGR 101 - Introduction to Engineering	2
ENGR 201 - Computer Aided Design of Mechanical Systems	3
MATH 241 - Calculus and Analytical Geometry I	4
Semester Hours	15

Requirements	Credits
COMM 221 - Technical Communication	3
CESC 220 - Digital Circuit Design	3
CESC 220L - Digital Circuit Design Laboratory	1
MATH 242 - Calculus and Analytical Geometry II	4
MECH 200L - Machine Shop Laboratory	1
PHYS 161 - Physics with Calculus I and II	4
Semester Hours	16

Total Credits

Total Hours for All Requirements: 31

Year Two

Requirements	Credits
ENGR 115 - Introduction to Computing for Engineers	3
ESCI 201 - Statics	3
MATH 243 - Calculus and Analytical Geometry III	4
PHYS 250 - Physics with Calculus III	3
PHYS 250L - Physics with Calculus III Laboratory	1
Humanities/Social Sciences - Lower or Upper Level	3
Semester Hours	17

Requirements	Credits
CPSC 125 - Computer Science I	3
CPSC 125L - Computer Science I Laboratory	1
ELEC 335 - Electrical Engineering I	2
ELEC 335L - Electrical Engineering I Laboratory	1
ESCI 204 - Dynamics	3
MATH 335 - Introduction to Linear and Abstract Algebra	3
MATH 345 - Differential Equations and Matrix Methods	4
Semester Hours	17

Total Credits

Total Hours for All Requirements: 34

Year Three

Requirements	Credits
ESCI 202 - Solid Mechanics	3
ESCI 208 - Thermodynamics	3
MECH 370 - Introduction to Robotics	3
MECH 370L - Introduction to Robotics I Laboratory	1
MECH 470 - Mechatronics	3
MECH 470L - Mechatronics Laboratory	1
Humanities - Lower Level	3
Semester Hours	17

Requirements	Credits
AERO 430 - Control System Analysis and Design	3
ESCI 206 - Fluid Mechanics	3
ESCI 320 - Engineering Materials Science	2
ESCI 320L - Engineering Materials Science Laboratory	1
MECH 471 - Robotics II	3
MECH 471L - Robotics II Laboratory	1
Humanities/Social Sciences - Lower or Upper Level	3
Semester Hours	16

Total Credits

Total Hours for All Requirements: 33

Year Four

Requirements	Credits
COMM 420 - Advanced Technical Communication I and COMM 430 - Advanced Technical Communication II	3
ESCI 403 - Heat Transfer	3
MECH 304 - Introduction to Machine Design	3
MECH 304L - Machine Design Laboratory	1
MECH 478 - Robotic Systems Preliminary Design	4
Technical Elective	3
Semester Hours	17

Requirements	Credits
ECON 225 - Engineering Economics	3
MECH 400 - Mechanical Vibrations	3
MECH 479 - Robotic Systems Detail Design	4
Technical Elective	3
Semester Hours	13

Total Credits

Total Hours for All Requirements: 30

Propulsion Systems

Year One

Requirements	Credits
CHEM 113 - General Chemistry for Engineering	3
COMM 122 - English Composition	3
ENGR 101 - Introduction to Engineering	2
ENGR 201 - Computer Aided Design of Mechanical Systems	3
MATH 241 - Calculus and Analytical Geometry I	4
MECH 200L - Machine Shop Laboratory	1
Semester Hours	16

Requirements	Credits
COMM 221 - Technical Communication	3
ECON 225 - Engineering Economics	3
ENGR 115 - Introduction to Computing for Engineers	3
MATH 242 - Calculus and Analytical Geometry II	4
PHYS 161 - Physics with Calculus I and II	4
Semester Hours	17

Total Credits

Total Hours for All Requirements: 33

Year Two

Requirements	Credits
ESCI 201 - Statics	3
ESCI 208 - Thermodynamics	3
MATH 243 - Calculus and Analytical Geometry III	4
PHYS 250 - Physics with Calculus III	3
PHYS 250L - Physics with Calculus III Laboratory	1
Humanities/Social Sciences - Lower or Upper Level	3
Semester Hours	17

Requirements	Credits
ELEC 335 - Electrical Engineering I	2
ELEC 335L - Electrical Engineering I Laboratory	1
ESCI 202 - Solid Mechanics	3
ESCI 206 - Fluid Mechanics	3
MATH 345 - Differential Equations and Matrix Methods	4
Humanities - Lower Level	3
Semester Hours	16

Total Credits

Total Hours for All Requirements: 33

Year Three

Requirements	Credits
ELEC 334 - Electrical Engineering for Mechanical Engineers	3
ESCI 204 - Dynamics	3
ESCI 324 - Measurements and Instrumentation	2
ESCI 324L - Measurements and Instrumentation Laboratory	1
ESCI 403 - Heat Transfer	3
MECH 360 - Airbreathing and Rocket Propulsion	3
Semester Hours	15

Requirements	Credits
AERO 430 - Control System Analysis and Design	3
ESCI 320 - Engineering Materials Science	2
ESCI 320L - Engineering Materials Science Laboratory	1
MECH 405 - Thermal-Fluid Science and Energy Measurement	1
MECH 405L - Thermal-Fluid Science and Energy Measurement Laboratory	1
MECH 440 - Thermal Power Systems	3
Area of Concentration	3
Math/Science Elective	3
Semester Hours	17

Total Credits

Total Hours for All Requirements: 32

Year Four

Requirements	Credits
COMM 420 - Advanced Technical Communication I and COMM 430 - Advanced Technical Communication II	3
MECH 304 - Introduction to Machine Design	3
MECH 304L - Machine Design Laboratory	1
MECH 468 - Propulsion System Preliminary Design	4
Area of Concentration	3
Technical Elective	3
Semester Hours	17

Requirements	Credits
MECH 400 - Mechanical Vibrations	3
MECH 449 - Energy Systems Detail Design	4
Humanities/Social Sciences - Upper Level	3
Technical Elective	3
Semester Hours	13

Total Credits

Total Hours for All Requirements: 30