

# B.S. in Mechanical Engineering

## Degree Requirements

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 assuming appropriate background and full-time enrollment. A minimum cumulative grade point average of 2.00 is needed for all required AE, EGR, ES, and ME courses, excluding technical electives. The courses necessary to earn this degree are listed below.

Students should be aware that many courses have prerequisites and/or co-requisites. **Students must have a C or better in all pre-requisites for all required AE, COM 221, EGR, EP, ES, ME, and SYS courses.**

## Program Requirements

### General Education

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 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 Theory and Skills                                    | 9         |
| Computer Science/Information Technology                            | 3         |
| Mathematics  | 6         |
| Physical and Life Sciences (Natural Sciences)                      | 6         |
| Humanities and Social Sciences                                     | 12        |
| 3 hours of lower-level Humanities                                  |           |
| 3 hours of lower-level Social Science                              |           |
| 3 hours of lower-level or upper-level Humanities or Social Science |           |
| 3 hours of upper-level Humanities or Social Science                |           |
| <b>Total Credits</b>   | <b>36</b> |

### Mechanical Engineering Core (94 Credits)

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.

Courses in the core with a # will satisfy general education requirements.

|         |  |   |
|---------|--|---|
| AE 430  | Control System Analysis and Design                                   | 3 |
| CHM 113 | General Chemistry for Engineering #                                  | 3 |
| COM 122 | English Composition #  | 3 |
| COM 221 | Technical Report Writing (Must Earn a C or better to pass COM 221) # | 3 |
| COM 420 | Advanced Technical Communication I #                                 | 1 |
| COM 430 | Advanced Technical Communication II #                                | 2 |
| EC 225  | Engineering Economics #  | 3 |
| EE 335  | Electrical Engineering I   | 2 |
| EE 336  | Electrical Engineering I Laboratory                                  | 1 |
| EGR 101 | Introduction to Engineering  | 2 |
| EGR 115 | Introduction to Computing for Engineers #                            | 3 |
| EGR 201 | Computer Aided Design of Mechanical Systems                          | 3 |
| ES 201  | Statics  | 3 |

|   |  |   |
|---|--|---|
| ES 202  | Solid Mechanics  | 3 |
| ES 204  | Dynamics   | 3 |
| ES 206  | Fluid Mechanics  | 3 |
| ES 208  | Thermodynamics   | 3 |
| ES 320  | Engineering Materials Science  | 2 |
| ES 321  | Engineering Materials Science Laboratory   | 1 |
| ES 403  | Heat Transfer  | 3 |
| General Education - lower-level or upper-level Humanities or Social Science # |  | 3 |
| General Education - lower-level Humanities #                                  |  | 3 |
| HU 330  | Values and Ethics (OR Study Abroad in HU/SS Upper-Level) #   | 3 |
| or HU 335   | Technology and Modern Civilization   |   |
| MA 241  | Calculus and Analytical Geometry I #   | 4 |
| MA 242  | Calculus and Analytical Geometry II #  | 4 |
| MA 243  | Calculus and Analytical Geometry III   | 4 |
| MA 335  | Introduction to Linear and Abstract Algebra (For Robotics Option) ** Other Options can take: Math or Natural Science Upper-Level Elective )<br>**^ | 3 |
| MA 345  | Differential Equations and Matrix Methods  | 4 |
| PS 161  | Physics I & II for Engineers   | 4 |
| PS 250  | Physics for Engineers III #  | 3 |
| PS 253  | Physics Laboratory for Engineers #   | 1 |
| ME 200  | Machine Shop Laboratory  | 1 |
| ME 304  | Introduction to Machine Design *   | 3 |
| ME 305  | Machine Design Laboratory *  | 1 |
| ME 400  | Mechanical Vibrations **   | 3 |

## Options

### Energy Option (20 Credits)

|                      |  |           |
|----------------------|--|-----------|
| EE 334               | Electrical Engineering for Mechanical Engineers            | 3         |
| Energy Electives     |  | 6         |
| ES 324               | Measurements and Instrumentation                           | 2         |
| ES 325               | Measurements and Instrumentation Lab                       | 1         |
| ME 312               | Alternative Energy I **                                    | 3         |
| ME 403               | Thermal Power Systems                                      | 3         |
| ME 446               | Thermal-Fluid Science and Energy Measurement **            | 1         |
| ME 446L              | Thermal-Fluid Science and Energy Measurement Laboratory ** | 1         |
| <b>Total Credits</b> |  | <b>20</b> |

### Propulsion Option (20 Credits)

|                      |  |           |
|----------------------|--|-----------|
| EE 334               | Electrical Engineering for Mechanical Engineers            | 3         |
| ES 324               | Measurements and Instrumentation                           | 2         |
| ES 325               | Measurements and Instrumentation Lab                       | 1         |
| ME 309               | Airbreathing and Rocket Propulsion                         | 3         |
| ME 403               | Thermal Power Systems                                      | 3         |
| ME 446               | Thermal-Fluid Science and Energy Measurement **            | 1         |
| ME 446L              | Thermal-Fluid Science and Energy Measurement Laboratory ** | 1         |
| Propulsion Electives |  | 6         |
| <b>Total Credits</b> |  | <b>20</b> |

**Robotics Option (20 Credits)**

|         |   |   |
|---------|---|---|
| CEC 220 | Digital Circuit Design                  | 3 |
| CEC 222 | Digital Circuit Design Laboratory       | 1 |
| CS 125  | Computer Science I                      | 4 |
| ME 302  | Introduction to Robotics I *            | 3 |
| ME 302L | Introduction to Robotics I Laboratory * | 1 |
| ME 404  | Mechatronics                            | 3 |
| ME 404L | Mechatronics Laboratory                 | 1 |
| ME 406  | Robotics II **                          | 3 |
| ME 406L | Robotics II Laboratory **               | 1 |

**Capstone Design Sequence, Preliminary and Detail Design**

ME students have five possible sequences for their capstone sequence:

**Aeronautics (8 Credits)**

|        |                             |   |
|--------|-----------------------------|---|
| AE 420 | Aircraft Preliminary Design | 4 |
| AE 421 | Aircraft Detail Design      | 4 |

**Astronautics (8 Credits)**

|        |                               |   |
|--------|-------------------------------|---|
| AE 427 | Spacecraft Preliminary Design | 4 |
| AE 445 | Spacecraft Detail Design      | 4 |

**Energy (8 Credits)**

|        |   |   |
|--------|---|---|
| ME 435 | Energy Engineering Preliminary Design * | 4 |
| ME 440 | Energy Engineering Detail Design **     | 4 |

**Propulsion (8 Credits)**

|        |  |   |
|--------|--|---|
| ME 429 | Propulsion System Preliminary Design * | 4 |
| ME 431 | Propulsion System Detail Design **     | 4 |

**Robotics (8 Credits)**

|        |  |   |
|--------|--|---|
| ME 407 | Preliminary Design for Robotic Systems with Laboratory | 4 |
| ME 420 | Detail Design of Robotic Systems with Laboratory       | 4 |

**Technical Electives (6 Credits)**

|                     |   |
|---------------------|---|
| Technical Electives | 6 |
|---------------------|---|

**Total Credits** 128

**Three credit hours of technical elective credit must be taken from available upper-level College of Engineering courses not specifically listed in the student's degree requirements.**

**AE**

Upper-level, except Directed Studies

**Cooperative Education courses**

With prior approval of the Aerospace Engineering department.  
See Career Advisor for more information.

**CEC**

Upper-Level, except Directed Studies. (Must be approved by the Aerospace Engineering department before taking this course.)

**CS**

|        |                     |
|--------|---------------------|
| CS 325 | Programming in ADA  |
| CS 420 | Operating Systems * |

**EE**

Upper-Level, except Directed Studies

**EGR**

Upper-Level

**EP**

Upper-Level, except Directed Studies

**ES**

Upper-Level, except Directed Studies

**MA**

|        |   |
|--------|---|
| MA 348 | Numerical Analysis I                                |
| MA 432 | Linear Algebra                                      |
| MA 441 | Mathematical Methods for Engineering and Physics I  |
| MA 442 | Mathematical Methods for Engineering and Physics II |
| MA 443 | Complex Variables                                   |

**ME**

Upper-Level, except Directed Studies

**PS**

|        |                           |
|--------|---------------------------|
| PS 303 | Modern Physics **         |
| PS 321 | Classical Mechanics I *   |
| PS 322 | Classical Mechanics II ** |
| PS 350 | Quantum Mechanics I **    |
| PS 375 | Planetary Science         |
| PS 420 | Remote Sensing            |

**SE**

SE 300 Software Engineering Practices \*\*

**SYS**

|         |  |
|---------|--|
| SYS 301 | Introduction to Systems Engineering                  |
| SYS 304 | Trade Studies, Risk and Decision Analysis            |
| SYS 415 | Systems Engineering Practices: Specialty Engineering |

\* Offered in Fall Only

\*\* Offered in Spring Only

^ This course could be filled by any 300/400 level MA/PS/CHM/BIO/WX course (or approved by the department chair).

# General Education Courses

UNIV 101 is taken in excess of degree requirements or meets open elective credit.

All Army ROTC students are required to complete SS 321 - U.S. Military History 1900-Present (3 credits) in order to commission.