
Engineering

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[Print Version of Catalog](#) ■

Department of Engineering

Mission Statement

Through an engineering curriculum grounded in effective instructional practices, we nurture an engaged educational community of conscientious and adaptable learners who develop solutions for the betterment of society.

Objectives

The JMU Engineering program provides an eight-semester project-driven platform for students to contribute engineering work for sustainable societies. We seek engineers who are eager to:

- understand the needs of people and communities, effectively communicate with project partners, and provide leadership for diverse teams,
- make beneficial solutions for society and the planet using innovation, design thinking, engineering analyses, and an understanding of complexities involved in real projects.
- function effectively in the work environment with integrity and professionalism, and
- demonstrate a commitment to professional development through self-motivated learning, career advancement, or advanced studies.

The Bachelor of Science in Engineering is a single cross disciplinary engineering degree that integrates many traditional engineering disciplines with course work in

business, project management, engineering, design and liberal arts. The foci of the program are sustainability, engineering design and project delivery.

Engineering for a sustainable world is, in short, a body of knowledge and set of holistic analytical design skills that contribute to the development of products, processes, services and infrastructure that simultaneously protect the environment, conserve resources and meet human needs at an acceptable financial cost. By reframing traditional engineering practice, sustainability provides a way of moving toward the development of sustainable societies, where human quality of life is advanced with a minimum impact on finite resources and the environment. Traditional approaches to engineering, such as mechanical, electrical or chemical are not offered in this program.

Rather, this modern, project-based, engineering curriculum spans many areas of engineering to create adaptable engineers with practical know-how.

The curriculum is ABET accredited and prepares students for the Fundamentals of Engineering (FE) pre-licensure examination. Graduates will be prepared to succeed in the engineering workforce or in advanced engineering degree programs by accumulating a professional portfolio of engineering project experiences throughout the curriculum.

Career Opportunities

Upon graduation, alumni will be prepared for a wide range of opportunities in the engineering workforce or in graduate school. Typical fields of engineering that students will be prepared to enter include sustainable design, process design, product design, process engineering, project management and systems engineering. Other industry options include product service system design, technical sales, management training and technical marketing.

A wide range of graduate school options include master's and doctoral programs in civil engineering, environmental engineering, industrial engineering, materials engineering, mechanical engineering and systems engineering. Other post-graduation options include business school, law school, AmeriCorps, Peace Corps, military service, entrepreneurship (starting a small business), applied science fields, international experiences, medical school and careers in politics/public policy.

Some examples of the industries that hire engineers include, among others, design and build companies, aeronautic firms, automobile manufacturers, colleges and universities, computer service and software firms, consulting firms, energy systems firms, federal contractors, federal, state and local governments (e.g., NASA, EPA, NIST, DOD, DOE), non-profit agencies, manufacturing firms, inspection agencies, mining and petroleum firms, pharmaceutical and medical research companies, research and development laboratories, telecommunication companies, and waste management and recycling firms.

Admission to the Major

The B.S. in engineering admits a limited number of students each year. To be eligible to apply for admission, students must have completed the following:

All courses (or approved equivalents) required for the engineering major with a grade of "C" or higher:

- [MATH 235](#), [236](#), [237](#), [238](#)
- [PHYS 140L](#), [150L](#), [240](#), [250](#)
- [CHEM 131](#), [131L](#) and [CHEM 132](#), [132L](#) or [CHEM 133E](#), [133LE](#)
- [ENGR 112](#), [212](#), [221](#), [231](#), [232](#)

Any of the preceding courses may only be repeated once to be considered for admission.

No more than 85 students (including transfer students with qualifying transcripts) will be admitted to the major at the junior-level. If more than 85 students meet the above standards, enrollment will be limited to the top 85 students. For on-campus students, the admission criterion will be grade point average (GPA) in the five ENGR courses ([112](#), [212](#), [221](#), [231](#), [232](#)). In the event of a tie, GPA in the lower-division MATH, CHEM and PHYS courses required for the engineering major (listed in #1) will be used as a tie-breaker. The student coordinator will work with the engineering Academic Unit Head to assess the relative merit of transfer students. Students who are not among the top 85 in their cohort may elect to wait one year and be considered with the next cohort, if they so choose, though the same selection criteria applies.

Progressing in the Major

Once admitted to the engineering program, students must maintain an in-major and cumulative GPA of 2.0 or higher.

Once admitted, any course required as part of the engineering major may only be repeated once.

Degree and Major Requirements

Bachelor of Science in Engineering

Required courses	Credit Hours
General Education ¹	41
Quantitative requirement ²	3
Scientific Literacy requirement ²	3
Major requirements (listed below) and electives	80
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	127

1 The [General Education program](#) contains a set of requirements each student must fulfill. The number of credit hours necessary to fulfill these requirements may vary.

2 In addition to course work taken to fulfill [General Education](#) requirement.

Recommended Schedule for Majors

First Year

Fall Semester

[MATH 235](#). Calculus I¹

[PHYS 240](#). University Physics I and [PHYS 140L](#). Lab²

[General Education](#)³

Credit Hours

4

4

6

14

Spring Semester

[MATH 236](#). Calculus II

[PHYS 250](#). University Physics II and PHYS 150L. Lab

[ENGR 112](#). Introduction to Engineering (Engineering Decisions)

[General Education](#)³

Credit Hours

4

4

3

3

14

Second Year

Fall Semester

[MATH 237](#). Calculus III

[CHEM 131-131L](#). General Chemistry I + Lab

[ENGR 231](#). Engineering Design I

[General Education](#)⁴

Credit Hours

4

4

2

6

16

Spring Semester

[MATH 238](#). Linear Algebra and Differential Equations

[ENGR 212](#). Engineering Statics & Dynamics

[ENGR 232](#). Engineering Design II

[ENGR 221](#). Engineering Management I

[CHEM 132-132L](#). General Chemistry II + Lab

Credit Hours

4

4

2

3

4

17

Third Year

Fall Semester

[ENGR 311](#). Thermal-Fluids I + Lab

[ENGR 313](#). Circuits and Instrumentation + Lab

[ENGR 322](#). Engineering Management II

[ENGR 331](#). Engineering Design III

[General Education](#)

Credit Hours

4

4

3

3

3

17

Spring Semester

Credit Hours

ENGR 312 . Thermal-Fluids II + Lab	4
ENGR 314 . Materials and Mechanics + Lab	4
ENGR 332 . Engineering Design IV	3
Approved engineering Elective	3
General Education	3
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	17

Fourth Year

Fall Semester

	Credit Hours
ENGR 411 . Sustainability I	3
ENGR 413 . Systems Analysis	3
ENGR 431 . Engineering Design V	3
Approved engineering elective	3
General Education	6
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	18

Spring Semester

	Credit Hours
ENGR 412 . Sustainability II	3
ENGR 432 . Engineering Design VI	3
Approved engineering elective	3
General Education	7
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	16

1 Also fulfills General Education requirement for [Cluster Three, Group 1](#).

2 Also fulfills General Education requirement for [Cluster Three, Group 2](#).

3 Fulfills General Education requirement for [Cluster One](#).

4 Engineering students are required to take either [BIO 222](#) or [GEOL 210](#) to meet engineering requirements as well as [Cluster Three, Group 3](#) requirements.

Bachelor of Science in Engineering with a Minor in General Business

This program prepares the student for entry-level engineering management and project management positions. The student is prepared to plan, organize, direct and control engineering projects, programs and/or facilities. Also, the program provides a foundation for graduate study in engineering management.

A grade point average of 2.0 in the business minor is required for graduation. This program of instruction also will require a total of 126 credit hours. The engineering major with business minor program is coupled and must be completed together; if a student does not receive a degree in engineering, the business minor will not be awarded. Additionally, there is a limit of 27 College of Business credit hours that can be taken, which includes the [ENGR 221](#) and [ENGR 322](#) courses.

Required courses	Credit Hours
General Education ¹	41
Quantitative requirement ²	4

Scientific Literacy requirement ²	3-4
General business minor	21
Major requirements (listed below) and electives	75
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1 The [General Education program](#) contains a set of requirements each student must fulfill. The number of credit hours necessary to fulfill these requirements may vary.

2 In addition to course work taken to fulfill General Education requirement.

Recommended Schedule for Majors

First Year

Fall Semester	Credit Hours
MATH 235 . Calculus I ¹	4
PHYS 240 . University Physics I and PHYS 140L . Lab ²	4
General Education ³	6
	<hr/> 14

Spring Semester	Credit Hours
MATH 236 . Calculus II	4
PHYS 250 . University Physics II and PHYS 150L . Lab	4
ENGR 112 . Introduction to Engineering	3
General Education ³	3
	<hr/> 14

Second Year

Fall Semester	Credit Hours
MATH 237 . Calculus III	4
CHEM 131-131L . General Chemistry I + Lab	4
ENGR 231 . Engineering Design I	2
General Education ⁴	6
	<hr/> 16

Spring Semester	Credit Hours
MATH 238 . Linear Algebra and Differential Equations	4
ENGR 212 . Statics and Dynamics	4
ENGR 221 . Engineering Management I	3
ENGR 232 . Engineering Design II	2
CHEM 132-132L . General Chemistry II + Lab	4
ECON 201 . Principles of Economics (Micro)	3
	<hr/> 20

Third Year

Fall Semester

	Credit Hours
ENGR 311 . Thermal-Fluids I and Lab	4
ENGR 313 . Circuits and Instrumentation and Lab	4
ENGR 331 . Engineering Design III	3
COB 204 . Computer Information Systems	3
ENGR 322 . Engineering Management II	3
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	17

Spring Semester

	Credit Hours
ENGR 312 . Thermal-Fluids II + Lab	4
ENGR 314 . Materials and Mechanics + Lab	4
ENGR 332 . Engineering Design IV	3
ACTG 244 . Accounting for Non-Business Majors	3
General Education	3
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	17

Fourth Year

Fall Semester

	Credit Hours
ENGR 411 . Sustainability Fundamentals	3
ENGR 413 . Systems Analysis	3
ENGR 431 . Engineering Design V	3
FIN 345 . Finance for the Non-Financial Manager	3
General Education	4
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	16

Spring Semester

	Credit Hours
ENGR 412 . Sustainability II	3
ENGR 432 . Engineering Design VI	3
MKTG 380 . Principles of Marketing	3
General Education	9
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	18

1 Also fulfills General Education requirement for [Cluster Three, Group 1](#).

2 Also fulfills General Education requirement for [Cluster Three, Group 2](#).

3 Fulfills General Education requirement for [Cluster One](#).

4 Engineering students are required to take either [BIO 222](#) or [GEOL 210](#) to meet engineering requirements as well as [Cluster Three, Group 3](#).