Specifi c topic of interest may dictate prerequisites. Students should consult engineering topics currently not covered in the standard curriculum. This course is designed to provide students with the opportunity to explore the course.

Prerequisite: Permission of the instructor.

ENGR 311. Thermal-Fluids I 4 credits. (Offered fall)
The first course of a two-part sequence focuses on the fundamental principles of thermodynamics, heat transfer, and fluid mechanics in a unified approach. Coverage includes the 1st law of thermodynamics, basic heat transfer, and fluid statics. Wide-ranging applications of these principles to thermal-fluid systems across engineering disciplines are emphasized. An included laboratory component provides reinforcement of course material through experiments and computational modeling. Prerequisite: PHYS 240/140L. Grade of “C-” or better in ENGR 231. Grade of “C-” or better in MATH 237. Grade of “C-” or better in MATH 238.

ENGR 312. Thermal-Fluids II 4 credits. (Offered spring)
The second of a two-part sequence focuses on the fundamental principles of thermodynamics, heat transfer and fluid mechanics in a unified approach. Builds on concepts covered in ENGR 311 and incorporates the 2nd law of thermodynamics, transient heat transfer and fluid motion. Applications of principles to thermal-fluid systems across engineering disciplines are emphasized. Laboratory component provides reinforcement of course material through experiments and computational modeling. Prerequisite: Grade of “C-” or better in ENGR 311.

ENGR 313. Circuits and Instrumentation. 4 credits. (Offered fall, spring)
This course presents the fundamentals of circuit analysis and measurement of physical phenomena. Circuit related topics include Ohm’s law, Kirchoff’s laws, complex impedance analysis, Laplace transforms and an introduction to AC circuits. Instrumentation topics include A/D conversion and common instruments such as strain gauges, thermocouples and accelerometers. Laboratory investigations will provide exposure to common electronics laboratory equipment, tools and measurement techniques. Prerequisites: PHYS 250/150L. Grade of “C-” or better in MATH 238.

ENGR 314. Materials and Mechanics. 4 credits. (Offered fall, spring)
The course explores the governing principles of materials science and mechanics of materials with an emphasis on materials selection in the engineering design process. Topics include process-structure-property relationships, crystalline structures, mechanical properties, strength of materials, mechanical design, failure mechanisms, and an introduction to materials processing. Prerequisites: PHYS 240/140L. Grade of “C-” or better in ENGR 212.

ENGR 322. Engineering Management II: Engineering Project Management. 3 credits. (Offered fall)
This is the second of a two-course sequence introducing students to management of technology. The course will include general business functions (management, marketing, finance, accounting, and operations), systems analysis skills, and project management skills. Students will develop an understanding and appreciation for the importance of technology and innovation in organizations. Prerequisite: Grade of “C-” or better in ENGR 312.

ENGR 323. Engineering Design III. 2 credits. (Offered fall, spring)
This course is the second course in the engineering design sequence. This course provides instruction in sustainable engineering design concepts and hands-on practice; individual cognitive processes, thinking and communication skills, and decision making; introduction to sustainability contexts (environmental, social, economic, and technical); and technical project design skills. Prerequisite: Grade of “C-” or better in ENGR 312. Grade of “C-” or better in ENGR 231.

ENGR 324. Engineering Design IV. 3 credits. (Offered fall, spring)
This course is fourth in the six-course 10-credit developmental design sequence. This project-based course provides instruction in holistic design principles, aesthetics and human interface in design, structured and unstructured problem solving, collaborative design, writing and communications, product modeling, and analytical prototyping. Prerequisite: Grade of “C-” or better in ENGR 311.

The instructor prior to enrolling in the course.

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http://www.jmu.edu/catalog/13
ENGR 360. Water in Africa. 4 credits. Offered summer.
This course has a three-part focus: cross-cultural training, promoting health in developing countries, and using appropriate technologies for eradicating water-related illnesses. Project teams use course content as the foundation for developing and implementing service projects. This course is a service-learning course and addresses issues of social justice in West Africa.

ENGR 411. Fundamentals of Sustainable Engineering and Design. 3 credits.
This course is the first in a two-course sequence that provides a foundation in evaluating sustainable design and engineered systems. The material presented is a prerequisite for understanding the environmental, social, and economic impacts of design and technology. The topics may be covered in a systematic manner in both courses, integrating the economic, environmental, social, and technical components throughout ENGR 411 and ENGR 412. Prerequisites: CHEM 131/131L, 132/132L; or 139E/139LE, MATH 231-232 or 235.

ENGR 412. Sustainable Engineering and Design II. 3 credits. Offered fall, spring.
This course is the second in a two-course sequence that provides a foundation in evaluating sustainable design and engineered systems. The material presented further reflects the understanding of the environmental, social, and economic impacts of design and technology by exploring the relationships between industrial and ecological systems. Prerequisites: Grade of "C-" or better in ENGR 411.

ENGR 413. Systems Analysis. 3 credits. Offered fall.
This course focuses on the concepts of systems thinking and analysis for complex engineered systems. Students will develop basic knowledge and tools to identify a system, decompose it into parts, define interactions, perform analysis and apply control measures if necessary. Application of computational tools and mathematical modeling will be emphasized. Corequisite: ENGR 431.

ENGR 431. Engineering Design V. 3 credits. Offered fall.
This course is the fifth in the six-course 10-credit developmental design sequence. This project-based course provides instruction in collaborative project management, holistic design evaluation, social and community sustainability, design testing and marketing, principles of design marketing and accounting, problem solving analyses; software tools; project management, and testing and analysis of prototypes. Prerequisite: Grade of "C-" or better in ENGR 332.

ENGR 432. Engineering Design VI. 3 credits. Offered spring.
This course is the sixth in the six-course 10-credit developmental design sequence. This project-based course provides instruction in collaborative design practices, capstone design project completion, holistic design analysis and design accounting and manufacturing. Prerequisite: Grade of "C-" or better in ENGR 431.

ENGR 472. Biological Treatment Processes and Reactor Design. 3 credits.
For engineering and environmental science students interested in biological reactor design. Water, wastewater and air treatment are emphasized. Students must be proficient in mathematics, chemistry and thermal sciences. Quantitative relationships are derived for characterizing water quality, designing biological reactors and modeling treatment systems. Systems are described by mass and energy balances that relate pollutant removal efficiency to process input parameters. Prerequisites: CHEM 131, CHEM 131L, and either MATH 231 or MATH 235.

ENGR 474. Physical Chemical Treatment Processes. 3 credits.
For engineering and environmental science students interested in physical/chemical waste treatment. Wastewater, groundwater, air and hazardous waste treatment is emphasized. Students must be proficient in mathematics, chemistry and thermal sciences. Quantitative relationships are derived for characterizing wastes, designing treatment processes, and modeling treatment systems. Systems are described by mass and energy balances that relate pollutant removal efficiency to process input parameters. Prerequisites: CHEM 131, CHEM 131L, and either MATH 231 or MATH 235.

ENGR 478. Water Resources Engineering. 3 credits.
This course will provide an introduction to basic engineering principles used in both water supply management and water excess management. Hydrologic and hydraulic processes will be investigated using the fundamentals of fluid mechanics. Specific emphasis will be placed on water sources flows, distribution and control. Prerequisite: ENGR 311.

ENGR 480. Advanced Projects in Engineering. 1-4 credits. Offered fall, spring, summer.
Research projects, design projects or special topics in engineering which are of interest to the upper-division student. May be repeated for credit when course content changes. Projects or topics selected may dictate prerequisites. Students should consult the instructor prior to enrolling in the course. Prerequisite: Permission of the instructor.

ENGR 489A. Honors Engineering Design IV. 3 credits. Offered fall, spring.
Engineering 499A is fourth in the six-course 10-credit developmental design sequence and first in the three-course 6-credit Honors Capstone project. This project-based course provides instruction in 1) Holistic design principles 2) Aesthetics and human interface in design, 3) Structured and unstructured problem solving, 4) Collaborative design, 5) Writing and communications, 6) Product modeling and Analytical prototyping.

ENGR 499B. Honors Engineering Design V. 3 credits. Offered fall.
ENGR 499B is the fifth in the six-course, ten-credit developmental design sequence and second in the three-course, six-credit Honors Capstone project. This project-based course provides instruction in collaborative project management; holistic design evaluation; social and community sustainability; design testing and marketing; principles of design marketing and accounting; problem solving analyses; software tools; project management; and testing and analysis of prototypes.

ENGR 499C. Honors Engineering Design VI. 3 credits. Offered spring.
Engineering 499C is the sixth in the six-course, ten-credit developmental design sequence and third in the three-course, six-credit Honors Capstone project. This project-based course provides instruction in collaborative design practices; capstone design project completion; holistic design analysis; and design accounting and manufacturing.

English

Department of English

GENG 221. Literature/Culture/Ideas. 3 credits.
This course will take a thematic approach to literature by examining multiple literary texts that engage with a common course theme concerned with the human experience. Themes address cultural, political, social, religious or philosophical aspects through literature. Specific topics will vary.

GENG 222. Genre(s). 3 credits.
An examination of representative works in a literary genre, in a set of related literary subgenres, or in both a literary genre and one or more closely connected genres in other humanities disciplines.

GENG 235. Survey of English Literature: From Beowulf to the Eighteenth Century. 3 credits.
A general survey presented chronologically.

GENG 236. Survey of English Literature: Eighteenth Century to Modern. 3 credits.
A general survey presented chronologically.

GENG 239. Studies in World Literature. 3 credits.
Introduction to masterpieces of world literature with emphasis on non-Western literature. (May be focused regionally or topically.)

GENG 247. Survey of American Literature: From the Beginning to the Civil War. 3 credits.
A general survey presented chronologically.

GENG 248. Survey of American Literature: From the Civil War to the Modern Period. 3 credits.
A general survey presented chronologically.

GENG 260. Survey of African-American Literature. 3 credits.
Survey of literature by African-American authors from the 18th century to the present.