Education

College of Education

EDUC 100. The Study of the Future: An Interdisciplinary Approach. 3 credits.
Introduces the students to an interdisciplinary study of the future within the context of education. Various topic areas, such as population, science/technology, lifestyle, economics, international relations, energy and religion will explored in terms of future trends and how education responds to these trends and their impacts.

EDUC 300. Foundations of American Education. 3 credits.
A study of the practices and issues that affect American education. Consideration is given to such topics as philosophical approaches to education, history of American education, and the organizational and cultural aspects of schools which influence educational practices.

EDUC 310. Teaching in a Diverse Society. 3 credits.
This course will examine how personal and professional values, attitudes, beliefs and behaviors affect teaching and learning. The pre-service teachers will develop an understanding of similar unique characteristics of Pre-K to 12 grade students and their families, including culture, race, ethnicity, heritage language and learning abilities, gender, socialization and sexual orientation. Corequisites: MIED 311 and READ 312 for middle students.

EDUC/EXED 312. Field Experience in Special Education and Diversity. 1 credit.
Students devote 30 clock hours to activities in school and nonschool settings that emphasize diversity of individuals and families. Corequisite: EDUC 310.

EDUC 370. Instructional Technology. 3 credits.
This course introduces educators to the concept of content knowledge, pedagogical knowledge and technological knowledge acting together as one unit to provide successful learning opportunities with educational technology. Learners will develop competencies that will enable them to appropriately select and integrate technology into the teaching and learning process.

EDUC 381. Field Experience in English as a Second Language. 3 credits.
The course provides supervised field experiences in working with English as a Second Language students, NK-12. Preservice teachers will demonstrate competencies developed in the English as a Second Language endorsement program and in consultation with a field supervisor. Prerequisite: Completion of ESL requirements.

EDUC 401. Problems in Education. 1-3 credits.
Workshop experiences for the development and training of teachers. Prerequisites: EDUC 360 and permission of the program coordinator.

EDUC 416. School Discipline and Classroom Management. 1 credit.
Theory and practices in classroom management and discipline, including specific models and the various legal aspects will be examined.

EDUC 430. General Education Curriculum K-12 Overview. 1 credit.
This course will provide an overview of curriculum in grades K-12. An understanding of objectives, content, materials and trends associated with curriculum will be addressed. Corequisites: READ 430, MIED 350 and EXED 410.

EDUC 480. Student Teaching. 3-12 credits.
Enables students to apply, in the public school classrooms and the comprehensive child development programs, those skills and attitudes acquired in all components of teacher education. Under the guidance of university supervisors, students are provided activities designed to familiarize them with the classroom teacher's role. Prerequisites: GPSYC 160, EDUC 300 or EDUC 360, appropriate methods courses, and permission of the coordinator of field experiences.

EDUC 482. Professional Development, Partnership and Advocacy. 3 credits.
This course examines opportunities for professional development from professional associations, universities and other organizations across Pre-K-16. Strategies to build partnerships with colleagues, families and communities are presented. Important social and political issues affecting education of majority and minority students and models of advocacy for students and their families are presented.

EDUC 490. Special Topics in Education. 1-4 credits.
In-depth examination of selected topics which are of current importance in the field of education. Offered only with approval of School of Education director. May be repeated for credit when course content changes. Prerequisites: At least junior standing and consent of the instructor.

EDUC A B C, Honors. 1-6 credits.
Independent research topic initiated and completed by qualified upper-division students. See catalog descriptions entitled “Graduation with Distinction” and “Graduation with Honors.”

Elementary Education

College of Education

ELED 308. Child Development: Birth Through Adolescence. 3 credits.
Skills for observing, recording and interpreting the behavior of children ages three through 12 will be developed so that adult intervention and guidance is appropriate and meaningful. Prerequisites: GPSYC 160 and admission to teacher education. Corequisites: ECED 372, ELED 310, ELED 311 and READ 366.

ELED 310. Diversity in Elementary Education with Service Learning. 3 credits.
This course guides students in critically examining their own perspectives regarding diversity in our society. Through this course, students will expand their awareness and understanding of individuals and groups apparently different from themselves. Students will explore pedagogical issues and practices in the classroom that embrace the whole community of learners and their families. Prerequisite: Admission to teacher education. Corequisites: ECED 372, ELED 308, ELED 311 and READ 366.

ELED 311. Practicum with a Focus on Learners and Learning. 3 credits.
This field experience and seminar support the study of child development and learning in an organized environment. Through direct observation and interactions with children in a classroom setting, candidates will examine and reflect on how children develop and learn. Candidates will explore how their own personal attitudes, assumptions, behaviors toward students and their families are influenced by class, cultural and linguistic backgrounds. Prerequisite: Admission to teacher education. Corequisites: ECED 372, ELED 308, ELED 310 and READ 366.

ELED 411. Practicum with a Focus on Curriculum Integration and Guiding Behavior. 3 credits.
This course is a study of content, processes, pedagogy and materials for teaching science in the elementary classroom. Knowledge of cognitive development as applied to the selection of content and methodology for elementary learners will be examined. Prerequisites: ELED 308, ECED 372, ELED 310, ELED 311 and READ 366. Corequisites: READ 430, ELED 432, ELED 433 and ELED 434.

ELED 432. Children and Science. 3 credits.
ELED 433. Children and Mathematics: Number, Operations, Algebraic and Geometric Reasoning. 3 credits.
The first of two courses that provides students with knowledge, skills and understanding of design and implementation for effective, developmentally appropriate mathematics instruction for grades PreK-6. Emphasis on children's mathematical learning and pre-numerical stages through the acquisition of advanced numerical processes and operations and connections to geometric and algebraic reasoning. Prerequisites: MATH 107, MATH 108, MATH 207 and READ 366. Corequisites: READ 430, ELED 411, ELED 433 and ELED 434.

ELED 434. Children and Social Studies. 3 credits.
This course focuses on the content, processes, pedagogy and materials for teaching social studies in the elementary classroom. Knowledge of cognitive development as applied to the selection of content, methods, and materials and strategies for organizing the learning environment for elementary learners will be examined. Prerequisite: ELED 311. Corequisites: ELED 411, ELED 432, ELED 433 and READ 366.

ELED 490. Special Studies in Elementary Education. 1-3 credits.
Designed to give students opportunities to complete independent research on educational problems under faculty guidance. The plan for the study must be presented to the department head in prescribed form for approval prior to registration.

Engineering

Department of Engineering

ENGR 101. Engineering First Year Student Seminar. 1 credit. Offered Fall.
This seminar course will introduce the engineering curriculum and career options to first year students and will describe how various elements of the curriculum and available electives in other disciplines relate to the goals and objectives of the program. This course will not only describe the engineering curriculum, but it will also contextualize the engineering profession with practical examples to help students determine if they want to pursue a career in the engineering profession.

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ENGR 112, Introduction to Engineering 1, 2, 3 credits. Offered spring.
ENGR 112 is the first course in the engineering curriculum; its purpose is to introduce students to some of the over-arching themes and culture in engineering and in our curriculum. Topics of coverage include professionalism, engineering and society, sustainable development, engineering fundamentals, systems approach in engineering problem solving, as well as creative problem solving practices.

ENGR 212, Statics and Dynamics 3, 4 credits. Offered fall, spring.
ENGR 212 provides the fundamental governing principles of particles and rigid bodies for the analysis of these structures at rest (statics) and in motion (dynamics). Topics will include equilibrium of particles and rigid bodies, force and moment vectors, moments of inertia, kinematics of particles, work and energy. Prerequisites: Grade of "C" or better in ENGR 112, PHYS 240 and PHYS 140L and MATH 237.

ENGR 221, Management of Technology I: Product Development and Entrepreneurial Engineering, 3 credits. Offered spring.
ENGR 221 is the first 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. Corequisite: ENGR 222. Prerequisite: Grade of "C" or better in ENGR 112 and ENGR 231.

ENGR 231, Engineering Design I, 2 credits. Offered fall.
This course is the first of six courses in the engineering design sequence. This course provides students with an overview of sustainable engineering design including history, concepts and practices; and an introduction to cognitive processes and interpersonal communication skills that lead to effective problem solving, idea generation and decision making; and basic technical design skills. Prerequisite: Grade of "C" or better in ENGR 112.

ENGR 232, Engineering Design II, 2 credits. Offered 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 231.

ENGR 280, Projects in Engineering, 1-4 credits. Offered fall, spring, summer.
Research projects, design projects, or special projects in engineering which are of interest to the lower-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 298, Topics in Engineering, 1-3 credits.
This course is designed to provide students with the opportunity to explore engineering topics currently not covered in the standard curriculum. The specific topic of interest may dictate prerequisites. Students should consult the instructor prior to enrolling in the course.

ENGR 301, Engineering Bridge Course for Transfer Students, 3 credits. Offered fall, spring.
This course provides transfer students with an introduction to the JMU engineering curriculum. The purpose is to familiarize our students with our curriculum and sustainability vision. The course will also provide design instruction while introducing transfer students to the specific software tools and machine tools they will use over the remainder of their curriculum. Prerequisite: Permission of the instructor.

ENGR 311, Thermal-Fluids I, 4 credits. Offered fall.
The first part 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. Prerequisites: Grade of "C" or better in ENGR 212 and 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. An included laboratory component provides reinforcement of course material through experiments and computational modeling. Prerequisites: Grade of "C" or better in ENGR 311.

ENGR 313, Circuits and Instrumentation, 4 credits. Offered fall, spring.
This course provides the fundamentals of circuit analysis and measurement of physical phenomena. Circuit related topics include Ohm's law, Kirchoff's laws, complex impedance analysis, Laplace techniques 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: Grade of "C" or better in MATH 238, PHYS 250 and PHYS 150L.

ENGR 314, Materials and Mechanics, 4 credits. Offered fall, spring.
This 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: 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 and the principles of entrepreneurial engineering. Corequisite: ENGR 331. Prerequisite: Grade of "C" or better in ENGR 221.

ENGR 331, Engineering Design III, 3 credits. Offered fall.
This course is third in the six-course developmental design sequence. This project-based course provides instruction in life-cycle analysis, sustainability (environmental, social, technical, economic), design and construction, failure analysis and problem solving. Corequisite: ENGR 222. Prerequisite: Grade of "C" or better in ENGR 212 and ENGR 232.

ENGR 332, Engineering Design IV, 3 credits. Offered 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 331.

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. Offered fall, spring.
This course is the first in a part of 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 developmental manner in both courses, integrating the economic, environmental, social and technical components throughout ENGR 411 and ENGR 412. Prerequisites: Grade of "C" or better in CHEM 132 and 132L or CHEM 133E and CHEM 133EL.

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 furthers 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 312.

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.

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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 project completion, holistic design analysis and design accounting and manufacturing. Prerequisite: Grade of "C-" or better in ENGR 431.

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 432.

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 topics are 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 476. Principles of Chemical Processes. 3 credits.
An introduction to basic principles used in chemical, petroleum and environmental engineering. Emphasis on formulating and solving material and energy balances for simple and complex systems. Quantitative models and equilibrium concepts for chemical process systems will be developed and applied to assess product quality, economics, safety, and environmental issues. For students interested in careers or graduate studies in chemical, environmental, biochemical, and petrochemical engineering.

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 498. Advanced Topics in Engineering. 1-3 credits.
This course is designed to provide upper-division students with the opportunity to explore engineering topics in greater depth. The specific topic of interest may dictate prerequisites. Students should consult the instructor prior to enrolling in the course.

ENGR 499A. Engineering Honors I. 1 credit. (Offered spring.)
First course in a three-course sequence. Student generates an idea for and writes a proposal for an independent research project that meets the requirements set forth by the Honors Program and the Department of Engineering. Student must identify and analyze an engineering-based problem, identify potential solutions, recommend an approach and prepare a written proposal.

ENGR 499B. Honors Engineering Design II. 1-3 credits. (Offered fall.)
Second course in a three-course sequence. Student completes the research for an prepares an oral and written presentation of their results for an independent research project that meets the requirements set forth by the Honors program and the Department of Engineering. Student completes and presents (in written and oral form) the project described in his or her proposal from ENGR 499A. Prerequisite: ENGR 499A or permission of the Engineering Honors Director/Department Head.

ENGR 499C. Honors Engineering Design III. 2-3 credits. (Offered spring.)
Third course in a three-course sequence. Student completes the research for and prepares an oral and written presentation of their results for an independent research project that meets the requirements set forth by the Honors program and the Department of Engineering. Student completes and presents (in written and oral form) the project described in his or her proposal from ENGR 499A. Prerequisite: ENGR 499B

English
Department of English
ENG 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.

ENG 222. Genres(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.

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

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

ENG 238. Studies in World Literature. 3 credits.
Introduction to masterpieces of world literature with emphasis on non-Western literature. (May be focused regionally or topically.)

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

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

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

ENG/WRTC 290. Intermediate Composition. 3 credits.
This course stresses the argumentative and persuasive essay as well as grammar and usage. Prerequisites: WRTC 103 or equivalent and junior or senior standing, or permission of the instructor.

ENG 293. Exploring Careers in English. 2 credits.
An introduction to academic and career opportunities in English. Students will research and shape academic and career interests, with particular attention to articulating the relationship between the reading, writing and analytical skills they develop as majors and their long-term career plans. Does not count as an English elective.

ENG 294. Internship in English. 1-3 credits.
Provides English majors with work experience in career fields they are interested in pursuing. A journal, internship report, research paper, bibliography and evaluation from the intern provider are required. Does not count as an English elective. Prerequisites: Major or minor status and approval of the internship director.

ENG 299. Writing About Literature. 3 credits.
This course will provide students with the skills and knowledge necessary for interpreting, researching and writing about literature. Students will learn basic literary terms, acquire an understanding of canon formation and transformation, and gain a knowledge of literary theories. Fulfills the College of Arts and Letters writing-intensive requirement for the major. Prerequisite: Declared English major.

ENG 301. Old English Language and Literature. 3 credits.
An introduction to the Old English language through selected readings in poetry and prose. Formerly ENG 418.

ENG 302. Special Topics in Literature and Language. 3 credits.
Study of a particular literary or linguistics topic. May be repeated for credit when course content changes but not more than once, except with the approval of the department head.

ENG 303. History of the English Language. 3 credits.
Introduction to the historical study of English including its Indo-European origins. May be repeated for credit when course content changes.

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