ENGINEERING PHYSICS

Faculty: McLeskey, Head of Engineering Programs; Cullingsworth, Hiscott, and Woolard.
(Department of Physics, Engineering, and Astrophysics)

Engineering Physics is a multidisciplinary field of study with a curriculum that has the essential core coursework in engineering, coupled with elective courses in physics, biology, chemistry, computer science, or environmental studies that will complement your intended engineering field of interest. You will be able to explore the various fields of engineering through one-on-one interactions with faculty and practicing engineers.

The department strongly encourages students to participate in research opportunities outside of their normal course work. Examples of unique research experiences include Randolph-Macon College's SURF Program, The National Science Foundation Research Experience for Undergraduates (REU) Program, and PHYS 271-PHYS 274. Additionally, it is highly recommended that engineering physics students participate in the Basset Internship program to gain further perspectives of engineering that cannot be obtained from classroom or research opportunities.

- Engineering Physics Major (https://catalog.rmc.edu/programs/engineering-physics/engineering-physics-major/)
- Engineering Physics Minor (https://catalog.rmc.edu/programs/engineering-physics/engineering-physics-minor/)

EPHY 140 - Engineering for Developing Areas (4 Hours)
This interdisciplinary travel course will utilize a project-based team approach to design and evaluate solutions to a real-world engineering problem in a developing region of the world. The course begins with a series of lectures and laboratory exercises where students gain the necessary scientific and engineering background and skills for the particular project. They will then work in teams (first on campus and then in the developing country) to understand the problem criteria, develop conceptual solutions, analyze those concepts, and choose the best initial solution. The solution will be optimized and a final design prepared in the form of a complete written project report and mitigation plan in a construction-ready format. This report will be presented to the local community. The course will include a strong cultural component in order for students to learn how local customs, beliefs, availability of technology and culture impact engineering solutions. This course partially fulfills the Area of Knowledge requirement as a natural science with a laboratory. It also fulfills the Cross-Area requirement as an experiential (travel) course.
Curriculum: EL

EPHY 150 - Introduction to Engineering:Stress, Strain, and Fluids (3 Hours)
This course will investigate the effects of applied forces on solids and fluids. The student will explore conditions for static equilibrium, elastic and plastic deformations, stress, strain, and laminar fluid flow.
Prerequisite(s): PHYS 151

EPHY 250 - Engineering Mechanics:Statics (3 Hours)
This course will be a rigorous treatment of rigid-body mechanics associated with objects at rest or moving at constant velocity. A problem-solving approach will be used to provide students a thorough understanding of the theory involving equilibrium, frame and truss analysis, fric-tion, centroid and moments of inertia.
Prerequisite(s): PHYS 152 and MATH 131

EPHY 255 - Engineering Mechanics: Dynamics (3 Hours)
This course will be a rigorous treatment of rigid-body mechanics associated with accelerating objects in one, two, and three dimensions. A problem-solving approach will be used to provide students a thorough understanding of the theory involving coordinate system transformations, Newton's Laws, work-energy, impulse and momentum, periodic motion, and coupled oscillations (vibrations) that will go beyond PHYS 151-152.
Prerequisite(s): EPHY 250 and PHYS 250

EPHY 300 - Mechanics of Solids (3 Hours)
Mechanics of Solids is the study of stress, deformation, and failure of solid materials. The fundamentals of stress, strain, and elastic theory will be presented along with a study of material properties and deformations caused by shear, bending, torsion, and axial loads.
Prerequisite(s): EPHY 250 and MATH 203 or permission of the instructor

EPHY 350 - Fluid Mechanics (3 Hours)
A fluid is defined as any material that possesses the ability to flow. This course will be an intermediate study of the forces, energy, momentum, and motion of fluids. In particular, the study of pressure, Bernoulli's Equation, laminar and turbulent flow, and drag and lift theory will be explored.
Prerequisite(s): EPHY 300 and MATH 203 or permission of the instructor

EPHY 381 - Special Topics (3 Hours)

EPHY 391 - Independent Study (3 Hours)
An independent exploration of a specialized area of physics under the guidance of a member of the department.
Prerequisite(s): permission of the instructor, a cumulative GPA of 3.25 or greater, and approval of the Committee on the Curriculum

EPHY 455 - Internship in Engineering Physics (Unpaid) (3 Hours)
Students in this course are placed in an industrial or research facility and follow an arranged set of readings relevant to their internship experience. Students will be expected to demonstrate through a written report upon completion of the internship an understanding of the physical phenomena used and their applications. Application required; see Internship Program. Offered as needed. A special fee ($200) is charged for this course.
Curriculum: EL

EPHY 491 - Independent Study (3 Hours)
An independent exploration of a specialized area of physics under the guidance of a member of the department.
Prerequisite(s): permission of the instructor, a cumulative GPA of 3.25 or greater, and approval of the Committee on the Curriculum

EPHY 496 - Engineering Physics Capstone (3 Hours)
The senior capstone project in engineering physics will provide students the opportunity to conduct original research under faculty supervision. A proposal (including a literature review and a research plan) must be submitted to the faculty member no later than the second week of the term in which the research is to be completed. The project will culminate in a formal written report and oral presentation.
Prerequisite(s): ENGR 400 or ENGR 401 and permission of the instructor

Curriculum: CS,EL