EN.500 (GENERAL ENGINEERING)

Courses

EN.500.101. What Is Engineering?. 3 Credits.
This is a course of lectures, laboratories, and special projects. Its objective is to introduce students not only to different fields of engineering but also to the analytic tools and techniques that the profession uses. Assignments include hands-on and virtual experiments, oral presentations of product design, and design/construction/testing of structures. Freshmen only or Permission Required.
Distribution Area: Engineering
AS Foundational Abilities: Science and Data (FA2)

EN.500.103. Hopkins Engineering Sampler Seminar. 1 Credit.
This course provides students with an overview of the undergraduate programs in the Whiting School of Engineering. Faculty from various departments will introduce students to their discipline including aspects of their personal research. Freshmen only.
Distribution Area: Engineering
AS Foundational Abilities: Science and Data (FA2)

EN.500.111. Hopkins Engineering Applications & Research Tutorials. 1 Credit.
The Hopkins Engineering Applications & Research Tutorials (HEART) program provides new undergraduate students with a window on cutting-edge engineering research and its applications to society. These small classes are taught by advanced graduate students and postdoctoral fellows. Students will be introduced to cutting-edge engineering research and learn how that research impacts society. These tutorials will be useful to students as they evaluate their potential role in research projects.
Distribution Area: Engineering
AS Foundational Abilities: Science and Data (FA2)

EN.500.112. Gateway Computing: JAVA. 3 Credits.
This course introduces fundamental programming concepts and techniques, and is intended for all who plan to develop computational artifacts or intelligently deploy computational tools in their studies and careers. Topics covered include the design and implementation of algorithms using variables, control structures, arrays, functions, files, testing, debugging, and structured program design. Elements of object-oriented programming. algorithmic efficiency and data visualization are also introduced. Students deploy programming to develop working solutions that address problems in engineering, science and other areas of contemporary interest that vary from section to section. Course homework involves significant programming. Attendance and participation in class sessions are expected.
Prerequisite(s): Students may only receive credit for one of the following courses: EN.500.112 OR EN.500.113 OR EN.500.114 OR EN.500.132 OR EN.500.133 OR EN.500.134
Distribution Area: Engineering
AS Foundational Abilities: Science and Data (FA2)

EN.500.113. Gateway Computing: Python. 3 Credits.
This course introduces fundamental programming concepts and techniques, and is intended for all who plan to develop computational artifacts or intelligently deploy computational tools in their studies and careers. Topics covered include the design and implementation of algorithms using variables, control structures, arrays, functions, files, testing, debugging, and structured program design. Elements of object-oriented programming. algorithmic efficiency and data visualization are also introduced. Students deploy programming to develop working solutions that address problems in engineering, science and other areas of contemporary interest that vary from section to section. Course homework involves significant programming. Attendance and participation in class sessions are expected.
Prerequisite(s): Students may only receive credit for one of the following courses: EN.500.112 OR EN.500.113 OR EN.500.114 OR EN.500.132 OR EN.500.133 OR EN.500.134
Distribution Area: Engineering
AS Foundational Abilities: Science and Data (FA2)

EN.500.114. Gateway Computing: Matlab. 3 Credits.
This course introduces fundamental programming concepts and techniques, and is intended for all who plan to develop computational artifacts or intelligently deploy computational tools in their studies and careers. Topics covered include the design and implementation of algorithms using variables, control structures, arrays, functions, files, testing, debugging, and structured program design. Elements of object-oriented programming. algorithmic efficiency and data visualization are also introduced. Students deploy programming to develop working solutions that address problems in engineering, science and other areas of contemporary interest that vary from section to section. Course homework involves significant programming. Attendance and participation in class sessions are expected.
Prerequisite(s): Students may only receive credit for one of the following courses: EN.500.112 OR EN.500.113 OR EN.500.114 OR EN.500.132 OR EN.500.133 OR EN.500.134
Distribution Area: Engineering

EN.500.115. Gateway Data Science. 3 Credits.
This course introduces fundamental data science concepts and techniques. It is intended for all who plan work on data driven projects, and will serve as a prerequisite for advanced courses in data science and machine learning. Topics covered include linear and nonlinear regression, classification, clustering, and dimensionality reduction. Students deploy Python packages on data sets and apply data science methods on engineering and science problems. Course homework involves significant programming. Attendance and participation in class sessions are expected.
Prerequisite(s): EN.500.113 OR EN.500.133
Distribution Area: Engineering, Quantitative and Mathematical Sciences
AS Foundational Abilities: Science and Data (FA2)

EN.500.132. Bootcamp: Java. 1 Credit.
This on-line course provides students who have already achieved a basic understanding of programming and computational thinking in one programming language with an opportunity to apply these skills in another programming language. Students will be expected to complete projects to demonstrate proficiency in the new language. Satisfactory/unsatisfactory only.
Prerequisite(s): Students can only take EN.500.112 OR EN.500.132, but not both.;EN.500.113 OR EN.500.114 OR EN.520.123 OR EN.601.220
Distribution Area: Engineering
AS Foundational Abilities: Science and Data (FA2)

EN.500.133. Bootcamp: Python. 1 Credit.
This on-line course provides students who have already achieved a basic understanding of programming and computational thinking in one programming language with an opportunity to apply these skills in another programming language. Students will be expected to complete projects to demonstrate proficiency in the new language. Satisfactory/unsatisfactory only
Prerequisite(s): Students can take EN.500.113 OR EN.500.133, but not both.;EN.500.112 OR EN.500.114 OR EN.520.123 OR EN.601.220
Distribution Area: Engineering
AS Foundational Abilities: Science and Data (FA2)

EN.500.134. Bootcamp: MATLAB. 1 Credit.
This on-line course provides students who have already achieved a basic understanding of programming and computational thinking in one programming language with an opportunity to apply these skills in another programming language. Students will be expected to complete projects to demonstrate proficiency in the new language. Satisfactory/unsatisfactory only.
Prerequisite(s): Students can take EN.500.114 OR EN.500.134, but not both.;EN.500.112 OR EN.500.113 OR EN.520.123 OR EN.601.220
Distribution Area: Engineering
AS Foundational Abilities: Science and Data (FA2)

EN.500.215. Principles of Data Science. 3 Credits.
This course introduces fundamental data science concepts and techniques. It is intended for all who plan work on data driven projects, and will serve as a prerequisite for advanced courses in data science and machine learning. Topics covered include linear and nonlinear regression, classification, clustering, and dimensionality reduction. Students deploy Python packages on data sets and apply data science methods on engineering and science problems. Course homework involves significant programming. Attendance and participation in class sessions are expected.
Prerequisite(s): Students who have taken EN.500.115 are not eligible to take EN.500.215.
Distribution Area: Engineering, Quantitative and Mathematical Sciences
AS Foundational Abilities: Science and Data (FA2)

EN.500.312. Hopkins Engineering Research-Opened Investigation Courses. 2 Credits.
The HEROIC program provides upper-division undergraduates with a chance to learn about the frontiers of research being explored in Hopkins laboratories. These small classes are taught by advanced PhD students and postdoctoral fellows working on engineering-related projects across the institution who have distinguished themselves as exemplary instructors in the HEART program. Like HEART courses, HEROIC courses are kept small—with a limit of about 12 in each section—so students will have ample time to interact with their instructor and each other. Section titles will vary according to the research topic examined in that section.
Distribution Area: Engineering
AS Foundational Abilities: Science and Data (FA2)

EN.500.501. SAB/JHU General Engineering Research (Abroad). 3 Credits.
General Engineering Research Project Abroad for undergraduate participating on summer projects with NUS, EPFL, SJTU, and DTU. Permission required.
Prerequisite(s): You must request Customized Academic Learning using the Customized Academic Learning form found in Student Self-Service: Registration > Online Forms.

EN.500.502. Undergraduate Research. 3 Credits.
Student participation in ongoing research activities. Research is conducted under the supervision of a faculty member and often in conjunction with other members of the research group.
Prerequisite(s): Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;You must request Customized Academic Learning using the Customized Academic Learning form found in Student Self-Service: Registration > Online Forms.

EN.500.551. Engineering Research Practicum.

EN.500.601. Research Laboratory Safety. 1 Credit.
This course covers physical, chemical, radiation, and biological hazards typically found in Johns Hopkins University research laboratories. It will use the "RAMP" (Recognize, Assess, Minimize, Prepare) framework originating in (Hill, R.H. Finster, D.C. Laboratory Safety For Chemistry Students, Wiley, 2nd Edition, 2016, 576pp.) and adopted by the American Chemical Society as a core concept for teaching laboratory safety. This framework does not depend on chemistry-specific practices (although it encompasses them as well as other disciplines), so it transfers well to general university-level research. The course also discusses the concepts of Inherently Safer Design of experiments. The course begins with a RAMP analysis of an assigned paper from the literature and concludes with a project analyzing a paper of the student's choice.

EN.500.602. Seminar: Environmental and Applied Fluid Mechanics. 1 Credit.
The Center for Environmental and Applied Fluid Mechanics (CEAFM) fosters research and teaching involving fluid mechanics by bringing together students, faculty, and researchers from the Whiting School of Engineering, the Krieger School of Arts and Sciences, and the Applied Physics Laboratory. Research areas of the CEAFM faculty and students include fluid flow phenomena in engineering and science covering a wide range of spatial and temporal scales. This includes fluid flows that occur in industrial, transportation, and manufacturing applications, in ocean and coastal engineering, in the treatment of aquatic and air-borne contaminants, in planetary atmospheres and oceans, rivers, subsurface waters, and fluids deep in the earth's interior, in biological systems, and in the microscopic environments relevant to micro-fluidic engineering applications and to aquatic and atmospheric chemistry and biology.

EN.500.603. Graduate Academic Ethics.

EN.500.604. AI for Global Good: Applications in Medicine, Environment, Systems, Security, and Beyond. 2 Credits.
This intensive 2 week, 2 credit course introduces students to the transformative field of Artificial Intelligence through an engaging blend of lectures, hands-on activities, and collaborative projects. Students will explore topics ranging from AI fairness, bias, and ethics to applications in healthcare, computer vision, neuroscience, and large language models. Each day features interactive sessions and lectures. The program culminates in graded poster presentations, allowing students to showcase their insights and based on a coding project course. This course helps prepare the next generation of leaders to navigate the complexities of AI-driven innovation

EN.500.851. Engineering Research Practicum. 1 - 9 Credits.