EN.500 (GENERAL ENGINEERING)

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.
Area: Engineering

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.
Area: Engineering

EN.500.110. Engineering Innovation. 3 Credits.
To introduce engineering ideas, thoughts, and problem-solving to potential engineering students. The course is intended to establish the framework within which engineers typically operate. Registration Requirement: Algebra II with Trig. Open only to high school students admitted to the Engineering Innovation Summer Program. Undergraduates should refer to EN.500.101.

EN.500.111. Hopkins Engineering Applications & Research Tutorials. 1 Credit.
Area: Engineering

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 not have earned credit in courses: EN.500.113 OR EN.500.114 OR EN.510.202 OR EN.530.112 OR EN.580.200 OR EN.601.107.
Area: Engineering

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 not have earned credit in: EN.500.112 OR EN.500.114 OR EN.510.202 OR EN.530.112 OR EN.580.200 OR EN.601.107
Area: Engineering

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 not have earned credit in: EN.500.112 OR EN.500.113 OR EN.510.202 OR EN.530.112 OR EN.580.200 OR EN.601.107
Area: Engineering

EN.500.130. Biomedical Engineering Innovation. 3 Credits.
To introduce biomedical engineering ideas, thoughts, and problem-solving to potential engineering students. The course is intended to establish the framework within which engineers typically operate. Registration Requirement: Algebra II with Trig.
Area: Engineering, Natural Sciences

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): Not open to students who have completed EN.601.107, EN.600.107, or EN.500.112;Students must have completed: EN.500.113 OR EN.500.114 OR EN.510.202 OR EN.580.200 OR EN.530.112 OR EN.520.123 OR EN.601.220
Area: Engineering

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): Not open to students who have completed EN.500.113 or EN.580.200;Students must have completed: EN.500.112 OR EN.500.114 OR EN.601.107 OR EN.510.202 OR EN.530.112 OR EN.520.123 OR EN.601.220
Area: Engineering

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): Not open to students who have completed EN.500.114 OR EN.580.200.;Students must have completed: EN.500.112 OR EN.500.113 OR EN.601.107 OR EN.510.202 OR EN.530.112 OR EN.520.123 OR EN.601.220
Area: Engineering

EN.500.307. Foundations of Multidisciplinary Design. 3 Credits.
Students will be introduced to a human-centered design process and creative ways of thinking, which they will use to tackle a design challenge for a project partner. While working on teams with classmates from different engineering disciplines, teams will understand the essential need behind the problem, prototype solutions, test their prototypes, and present a final solution to their project partner. In addition to project work, students will learn to collaborate among different working styles. They will build on their own skills from their discipline while gaining familiarity with skills practiced in other engineering disciplines.
Prerequisite(s): Students may earn credit for EN.500.307 or EN.500.308, but not both
Area: Engineering

EN.500.308. Multidisciplinary Engineering Design. 3 Credits.
Students will work on teams with colleagues from different engineering disciplines to tackle a challenge for a clinical, community, or industry project partner. Through practicing a creative, human-centered design process, teams will understand the essential need behind the problem, prototype solutions, test their prototypes, and present a final solution to their project partner. In addition to project work, students will learn to collaborate among different working styles. They will contribute expertise from their discipline to the project while learning new skills from their peers.
Area: Engineering

EN.500.309. Advanced Multidisciplinary Design. 3 Credits.
Students will continue working on teams with classmates from different engineering disciplines to tackle a challenge for a clinical, community, or industry project partner. Teams will continue to develop their technical and usability prototypes into a final solution as they move closer to theimplementation of their projects.
Prerequisite(s): EN.500.307 OR EN.500.308
Area: Engineering

EN.500.496. Practical Ethics for Future Leaders. 3 Credits.
This is a new interdisciplinary course on leadership, decision making, and the application of ethics to real world problems. JHU students are future leaders of innovation across many fields, including but not limited to engineering, business, law, journalism, government, science and medicine. The goal of this new course is to give students a deep and practical grounding in how leaders make decisions, and in particular difficult decisions where there is no clearly right answer. In the first part of the course, we will cover important concepts in the practical application of ethics; in decision making; and leadership. In the second part of the course, we will take a deep look at major ethical issues resulting from the newfound capabilities made possible by emerging technologies. This term, the main question will be, should humans eliminate disease-carrying mosquitoes using gene editing technology? In future terms, the question will be different.The awesome power of emerging technologies to modify our world - our food supply, our health, even people - will only increase and become more pressing in coming years. Questions include: Is modifying wild animals ethical, on its face? Who gets to decide this, and how do they decide? Animals interact with humans and cross borders - can one jurisdiction (county, state or country) make changes to wild populations that would impact others? Both EN.500.496 and EN.500.497 are primarily a combination of online lectures, readings and substantial discussion components during the first 2/3rds of the semester. EN.500.496.01 also incorporates several small group meetings in the final weeks of the semesters.
Prerequisite(s): If you have already taken EN.500.497, you cannot take EN.500.496.
Area: Humanities, Social and Behavioral Sciences

EN.500.497. Practical Ethics for Future Leaders. 2 Credits.
This is a new interdisciplinary course on leadership, decision making, and the application of ethics to real world problems. JHU students are future leaders of innovation across many fields, including but not limited to engineering, business, law, journalism, government, science and medicine. The goal of this new course is to give students a deep and practical grounding in how leaders make decisions, and in particular difficult decisions where there is no clearly right answer. In the first part of the course, we will cover important concepts in the practical application of ethics; in decision making; and leadership. In the second part of the course, we will take a deep look at major ethical issues resulting from the newfound capabilities made possible by emerging technologies. This term, the main question will be, should humans eliminate disease-carrying mosquitoes using gene editing technology? In future terms, the question will be different. The awesome power of emerging technologies to modify our world - our food supply, our health, even people - will only increase and become more pressing in coming years. Questions include: Is modifying wild animals ethical, on its face? Who gets to decide this, and how do they decide? Animals interact with humans and cross borders - can one jurisdiction (county, state or country) make changes to wild populations that would impact others? Both EN.500.496 and EN.500.497 are primarily a combination of online lectures, readings and substantial discussion components during the first 2/3rds of the semester. EN.500.496.01 also incorporates several small group meetings in the final weeks of the semesters.
Prerequisite(s): If you have already taken EN.500.496, you cannot take EN.500.497.
Area: Humanities, Social and Behavioral Sciences

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 Independent Academic Work using the Independent Academic Work 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 provides practical exercises in laboratory safety, employing information on chemical, physical, radiation, and biological hazards. Exercises include topics such as ethics, inherently safer design, and application of safety knowledge and analysis to analyze real and/or constructed experiments. The course is suitable for experienced researchers and for graduate students who have not yet begun working in a research laboratory in Homewood Schools. The course is given on six consecutive weeks in the latter half of the semester to allow time for students to study preliminary materials and take online exams on Blackboard. The preliminary material must be completed before the first class in order to progress in the course unless permission is obtained from the instructor. Offered Spring and Fall semesters.

EN.500.602. Seminar: Environmental and Applied Fluid Mechanics. 1 Credit.

EN.500.603. Graduate Orientation and Academic Ethics.

EN.500.745. Seminar in Computational Sensing and Robotics. 1 Credit.
Seminar series in robotics. Topics include: Medical robotics, including computer-integrated surgical systems and image-guided intervention. Sensor based robotics, including computer vision and biomedical image analysis. Algorithmic robotics, robot control and machine learning. Autonomous robotics for monitoring, exploration and manipulation with applications in home, environmental (land, sea, space), and defense areas. Biorobotics and neuromechanics, including devices, algorithms and approaches to robotics inspired by principles in biomechanics and neuroscience. Human-machine systems, including haptic and visual feedback, human perception, cognition and decision making, and human-machine collaborative systems.Cross-listed Mechanical Engineering, Computer Science, Electrical and Computer Engineering, and Biomedical Engineering.

EN.500.781. Preparation for University Teaching. 1.5 Credits.
This course will prepare graduate students to teach at the university level. Topics covered include large and small class teaching, characteristics of student learning, syllabus construction, grading students, and developing a teaching portfolio. Full-time EN Graduate Students only. Co-listed with AS.360.781.

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