JOHNS HOPKINS
UNIVERSITY

Department of Electrical and Computer Engineering

Undergraduate Student Advising Manual

Electrical Engineering

(Updated 8/20/2024)

TABLE OF CONTENTS

1. INTRODUCTION

The Department of Electrical and Computer Engineering offers two bachelor's degree programs: one in Electrical Engineering and one in Computer Engineering (with close collaboration of the Computer Science Department).Typically, introductory courses are taken in the first two years of study. These courses are: First Year ECE Design (520.137) in spring, 1st year; Digital System Fundamentals (520.142) in spring, 1st year; Introduction to Electromagnetics (520.219) and Mastering Electronics/Lab (520.230 & 231) in fall, 2nd year; Signals and Systems (520.214) and Intro. to VLSI (520.216) in spring, 2nd year. Additional courses in the undergraduate program are then selected in accordance with the student's interests and departmental advising procedures to meet the requirements of the Bachelor of Science (B.S.) degree. The Department also offers a combined B.S. / M.S.E. degree program for undergraduate majors. Students are encouraged to engage in independent projects or study, and to participate in research programs with the faculty. The facilities and resources available to students are considerable. The electronics prototyping facility in the Department of Electrical & Computer Engineering utilizes state of the art technology to support the design, fabrication, and other technical aspects of research and academic projects.

The prototyping facility consists of state of the art surface mount technology (SMT) equipment; a printed circuit board (PCB) milling machine to fabricate PCBs; a multilayer press to produce multilayer PCB that can be milled on the milling machine; Stencil Printer to apply solder paste selectively on the milled PCBs; a pick and place machine to accurately place surface mounted devices (SMD) on the finished PCB; reflow oven for lead free soldering; and two sophisticated, ergonomically designed Mantis microscopes for SMD component assembly.

Additional facilities include a Basic Electronics Laboratory, Cadence Computing Laboratory, ECE Undergradute Design Studio, Biophotonics Teaching Laboratory, a Microprocessor/ FPGA Laboratory, and Makerspace in the Pava Center.

The Electrical and Computer Department employs a **Senior Lab Engineer & Lecturer,** Sathappan Ramesh, sramesh@jhu.edu. All students, faculty and staff must complete a specific lab safety training course dependent on which facility access is required or preferred.

1.1. Objectives

Educating students is the main objective of our department. We believe the best way to achieve this is to expose our students to the scholastically and societally important questions being researched by our faculty. We strive to involve students in significant hands-on ECE team projects in which teams, including freshmen to seniors, build complex systems using in-depth engineering principles, modern design and execution tools, and real-life validation and application environments. These projects promote cooperation and team-based problem solving, leadership, and mentoring, while exposing students to engineering best practices that are invaluable for any successful career choice. Furthermore, we value interdisciplinary research and activities that allow our students to interact and learn from their peers from other departments.

1.2. Academic Program

ABET Criteria. The B.S. degree in Electrical Engineering is accredited by ABET, http://www.abet.org. As part of the ABET requirements, the Electrical Engineering B.S. degree program has established the following:

1.2.1. Electrical Engineering Program Educational Objectives

The Program Educational Objectives (PEOs) for the electrical engineering (EE) at the Johns Hopkins University describe what EE graduates are expected to attain with a few years of graduation. The PEOs are determined in consultation with the Electrical and Computer Engineering External Advisory Committee and approved by the ECE faculty.

The educational objectives of the EE program are:

1. Our graduates will become successful practitioners in engineering and other diverse careers.

2. Some graduates will pursue advanced degree programs in engineering and other disciplines.

Faculty members will assess student performance to ensure that our educational outcomes and objectives are met. Students will also have an opportunity to provide feedback on their educational experience through course evaluations, as well as by meeting with internal (Academic Council) and external review boards (departmental advisory board, ABET review board). Before and after graduation, students will have the opportunity to assess their own educational progress and achievements by means of an exit interview and alumni surveys. The faculty will use the feedback obtained from these various assessment processes to improve the content and delivery of the program.

1.2.2. Electrical Engineering Student Outcomes

The program has student outcomes (1) through (7) that prepare graduates to attain the program educational objectives:

(1) An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

(2) An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

(3) An ability to communicate effectively with a range of audiences.

(4) An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

(5) An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

(6) An ability to develop and conduct appropriate experimentation, analyze, and interpret data, and use engineering judgment to draw conclusions.

(7) An ability to acquire and apply new knowledge as needed, using appropriate learning strategies

1.2.3. Undergraduate Research Opportunities

The faculty welcomes undergraduate student participation in their research, which greatly enhances the educational experience beyond coursework. Opportunities are available during the academic semesters, intersession, and summer through independent study and research courses or through paid research positions.

Undergraduates at all levels are strongly encouraged to contact faculty members directly to participate in the Department's research programs.

1.2.4. "Responsible Conduct of Research Course" May Be Required

Many undergraduate students participating in research will be required to take the "Responsible Conduct of Research" course.

- Students receiving payment for research or who are conducting research used to help complete degree requirements (such as in an Independent Research or Independent Study course) must first complete the online training course (360.624) before conducting research and receiving payment or credit.
- Students receiving payment from NIH Training Grants must take the in-person training course (360.625).

Information is available at https://engineering.jhu.edu/undergraduate-studies/research-opportunities-for-students/ . Successful completion of this course must be verified before a student's diploma is issued.

1.3. Advising

The Department's faculty coordinator for undergraduate advising is the Director of Undergraduate Studies, Professor Lucas Buccafusca, whose office is in 213 Barton Hall. His email address is LBuccafusca@jhu.edu.

The success of each student's program will depend on effective faculty advising. Every undergraduate student in the Electrical Engineering program must follow a program approved by faculty advisors. Each student and faculty mentor must consider our objectives and outcomes in planning a set of courses and projects that will satisfy degree requirements. The sample programs and the program checklist used by the faculty advisors illustrate course selections that will help students meet the program objectives and outcomes.

1.3.1. Visit Your Advisor Often

There is a change in advising. All students are randomly assigned a faculty mentor their first year (or transfer) and keep the same mentor for the rest of their academic career. A student may change a faculty mentor at any time by contacting Malik Johnson. His office is in Barton Hall 117B, email: malik.johnson@jhu.edu .Both the ECE Chair and the Director of Undergraduate Studies must certify each student's program as having met the requirements for graduation.

The faculty mentor assists the student in developing an approved program, including assignment of credits to the proper categories and judging the appropriateness of area designators. However, it should be understood that satisfaction of degree requirements is ultimately the responsibility of the student. The student is expected to understand the degree requirements and engage in careful program planning with the faculty mentor. Students should also be familiar with the University's undergraduate policies outlined in the university catalogue https://e-catalogue.jhu.edu/, and WSE advising policies found at https://engineering.jhu.edu/advising/.

Faculty advisors may also help with other aspects of the student's academic career, such as admission to graduate and professional schools or career planning. They may be able to direct students to other advising and counseling resources that provide information on internship opportunities, and direct students to independent research and guided independent studies. Faculty advisors are also a means for undergraduate students to provide valuable feedback on all aspects of their educational experiences to improve the undergraduate education for all students.

The Electrical and Computer Engineering faculty make every effort to be available to their advisees, particularly during the scheduled fall and spring term advising weeks. The student is required to meet with his/her advisor at least once – and preferably more – each semester. It is the responsibility of the student to initiate these meetings with the advisor. It is important that students remain in close contact with their advisors and consult with them before making changes in their program.

1.3.2 Advising Holds on Registration

The faculty mentor must release advising holds on your registration record in SIS before you can register for classes. This is typically done during Advising Week which is the week just before registration begins. *Your advising hold will not be released until you have reviewed your course plans with the advisor.* The faculty mentor will also sign add/drop forms. Please note that unless prior arrangements have been made, no faculty member other than the student's own advisor can sign the required forms

2. ELECTRICAL ENGINEERING CURRICULUM

2.1 Mission Statement

The Faculty of the Electrical Engineering Program at Johns Hopkins are committed to providing a rigorous educational experience that prepares students for further study and to practice engineering professionally and ethically in a competitive global environment. The mission of the program is to provide a stimulating and flexible curriculum in fundamental and advanced topics in electrical engineering, basic sciences, mathematics, and humanities, in an environment that fosters development of analytical, computational, and experimental skills and that involves students in design projects and research experiences; and to provide our electrical engineering graduates with the tools, skills and competencies necessary to understand and apply today's technologies and become leaders in developing and deploying tomorrow's technologies. From this mission statement, the Electrical Engineering faculty has established student outcomes and educational objectives for the B.S. in Electrical Engineering degree program.

2.2. Educational Objectives

The educational objectives of the EE program are:

1. Our graduates will become successful practitioners in engineering and other diverse careers.

2. Some graduates will pursue advanced degree programs in engineering and other disciplines.

2.3. Electrical Engineering Curriculum

The B.S. degree in Electrical Engineering requires a minimum of one hundred and twenty-six (126) credits that must include:

- Forty-five (45) credits of ECE courses including First Year ECE design (520.137), Digital System Fundamentals (520.142), Introduction to Electromagnetics (520.219), Mastering Electronics/Lab (520.230 & 231), Signals and Systems (520.214), and 12 credits of advanced laboratory, design intensive, or senior design project courses, with no less than six credits coming from ECE.

- EN.601.220 Intermediate Programming; If a student needs to take Gateway Computing as a pre-requisite to Intermediate Programming, they should take Python (EN.500.113). Up to six (6) credits of Computer Science courses may be used to satisfy the 45-credit requirement. If you take Gateway Computing: Python (500.113), it will count as a CS credit, even though it has a general engineering number (500.xxx). Please be sure to register for the section of Gateway Computing reserved for ECE students. You are also permitted to take Bootcamp classes (EN.500.132-134) and apply them to this section, even though they are S/U courses. A GPA of at least 2.0 must be maintained in ECE courses. **Courses in this group may not be taken Pass/Fail**.

- Six (6) credits of engineering courses from School of Engineering departments other than ECE, Applied Mathematics and Statistics, or General Engineering. Students must complete enough of the approved non-ECE advanced design labs so that they have at least twelve (12) credits of combined ECE and non-ECE advanced laboratory, design intensive, or senior design project courses. Courses in this group must be taken for a grade. In order to count for this requirement, they cannot be taken as Pass/Fail. Entrepreneurship and Management

courses in the Center for Leadership Education CANNOT be counted as "other engineering courses".

- Twenty (20) credits in mathematics courses taken from the Mathematics Department or the Applied Mathematics and Statistics Department. **Calculus II (110.109), Calculus III (110.202), Linear Algebra (110.201) or or Linear Algebra for Data Science (EN.553.295), Differential Equations (110.302), Probability and Statistics (553.311) or Introduction to Probability (553.420) must be taken**. Elementary or pre-calculus courses, such as 110.105 or 553.111-112, are not acceptable. **Courses in this group must be taken for a grade. In order to count for this requirement, they cannot be taken as Pass/Fail.** Calculus I may be waived through an examination taken during freshman orientation. If not waived, it must be taken as a prerequisite to Calculus II.

- Sixteen (16) credits of natural sciences (physics, astronomy, chemistry, biology, biophysics, earth and planetary sciences) which must include General Physics (171.101-102), General Physics Laboratory (173.111-112) (active learning versions are also acceptable), and Introductory Chemistry (030.101). If Physics labs are waived, no credits are awarded, and students must complete additional coursework to reach 16 credits. Other courses with a "N" designation code will be considered on a case-by-case basis. However, courses coded as "NS" from Psychology, Cognitive Science, and Neuroscience cannot towards this area. Additionally, Intro. to Computing Courses coded as N also cannot count towards this requirement. **Courses in this group must be taken for a grade. In order to count for this requirement, they cannot be taken as Pass/Fail.**

- At least six (6), three-credit courses in humanities and social sciences, for a total of 18 credits. The humanities and social sciences courses are one of the strengths of the academic programs at Johns Hopkins. They represent opportunities for students to appreciate some of the global and societal impacts of engineering, to understand contemporary issues, and to exchange ideas with scholars in other fields. Some of the courses will help students to communicate more effectively, to understand economic issues, or to analyze problems in an increasingly international world.

  o The selection of courses should not consist solely of introductory courses but should have both depth and breadth. This means that students must take at least three (3) courses in a specific area with at least one of them at an advanced level (300 or 400 level). Courses in this group can be taken as Pass/Fail if they are not being used to fulfill the writing intensive requirement.

  o One of the following courses to fulfill the departmental Ethics requirement:
    ➢ 661.315 Culture of the Engineering Profession (S designation) - offered F/S/Su
    ➢ 660.310 Cases in Workplace Ethics (H designation) - will be offered in S24
    ➢ 660.463 Engineering Management & Leadership - offered F
    ➢ 660.455 Reimagining the City in the Face of Climate Change - offered F

  o Two (2) writing intensive (W) courses (at least 3 credits each) are required. **The writing intensive courses cannot be taken Pass/Fail and require a C- or better grade.** Students may wish to consider a course in Technical Communications to fulfill one of the writing intensive requirements. The course **661.315, The Culture**

of the Engineering Profession, is recommended by the ECE Faculty as a writing intensive course. It can also be used to fulfill the Ethics requirement.

Most courses are not offered every semester, so you should be mindful of when they are offered and if they are pre-requisites for other courses. All programs are subject to the following guidelines:

- All advanced placement credits must be applied to the category of the corresponding Homewood course.

- Transfer students from other institutions must complete at least 21 credits from the Electrical and Computer Engineering Department at Johns Hopkins to be eligible for the B.S. degree. Courses taken through the School of Professional Studies in Business and Education (either evening or summer session) or the JHU/WSE Engineering Programs for Professionals may be counted only if taken with the advisor's prior written approval.

2.4 Advanced Labs

Starting for the Fall 2023 entering class of Electrical Engineering majors, the ECE Department is recommending that all students take at least one Advanced Lab course that is software-focused, one Advanced Lab course that is hardware-focused, and one Advanced Lab course that focuses on systems combining both hardware and software components, with the fourth required Advanced Lab two semesters of Senior Design (520.498/499). Although previous cohorts of students were also getting this diversity of lab experiences, the formal recommendation will ensure that all students have at least one advanced design experience in each of the three areas. To facilitate this, the ECE Undergraduate Curriculum Committee classified all approved Advanced Lab courses into four categories:

1. Software-focused (>80% emphasis on software design): The emphasis is on software topics, including algorithm, model, and/or user interface development.
2. Hardware-focused (>80% emphasis on hardware design): The emphasis is on physical systems, including electronics, devices, and associate machinery for computing systems and other types of optical and/or electronic devices.
3. Systems combining hardware and software (>20% emphasis software design and >20% emphasis on hardware design).
4. Flexible: the course can be counted in category 1, 2, or 3 depending on the individual student project.

The tables below contain a list of all approved Advanced Laboratory classes in ECE and other engineering departments including their associated categories.

Approved ECE Advanced Labs and Categorization

Course Number	Course Title	CATEGORY
EN.520.412	Machine Learning for Signal Processing	Software
EN.520.424	FPGA Synthesis Laboratory	Combination
EN.520.427	Design of Biomedical Instruments and Systems	Flexible
EN.520.433	Medical Image Analysis	Software
EN.520.440	Machine Intelligence on Embedded Systems	Combination

EN.520.448	Electronics Design Laboratory	Combination
EN.520.450	Advanced Microprocessor Laboratory	Software
EN.520.454	Control Systems Design	Software
EN.520.463	ECE Ideation & Design Lab (Fourth Year)	Flexible
EN.520.483	Bio-Photonics Laboratory	Hardware
EN.520.487	Clinical Diagnostic Devices and Methods	Flexible
EN.520.491	CAD of Digital VLSI Systems	Combination
EN.520.492	Mixed Mode VLSI Systems	Hardware
EN.520.495*	Microfabrication Laboratory	Hardware
EN.520.498	Senior Design Project	Flexible

*520.495 Can be used as either a ECE or MECHE advanced lab. Please notify the academic program coordinator if you want to use this course as "Other Engineering" advanced lab so that your degree audit can be adjusted.

Approved Non-ECE Advanced Labs and Categorization

Number	Title	CATEGORY
EN.510.433	Senior Design in Materials Science & Engineering I	Flexible
EN.510.434	Senior Design in Materials Science & Engineering II	Flexible
EN.530.420	Robot Sensors and Actuators	Hardware
EN.530.421	Mechatronics	Combination
EN.530.474	Effective & Economic Design for Biomedical Instrumentation	Hardware
EN.530.495	Microfabrication Laboratory	Hardware
EN.540.400	Project in Design: Pharmacokinetics	Hardware
EN.540.418/419	Projects in the Design of a Chemical Car	Hardware
EN.540.421	Project in Design: Pharmacodynamics	Hardware
EN.580.311/312	Junior BME Design	Flexible
EN.580.411/412	Senior BME Design Team	Flexible
EN.580.437/438	Biomedical Data Design I and II	Software
EN.580.457	Intro to Rehabilitation Engineering Design Lab	Combination
EN.580.471	Principles of Design of BME Instrumentation	Hardware
EN.580.480/481	Precision Care Medicine	Combination
EN.580.493	Medical Imaging	Software
EN.601.315/415	Databases	Software
EN.601.411	CS Innovation & Entrepreneurship	Software
EN.601.417	Distributed Systems	Software
EN.601.421	Object Oriented Software Engineering	Software
EN.601.443	Security & Privacy in Computing	Software
EN.601.447	Computational Genomics	Software
EN.601.454	Augmented Reality	Software
EN.601.456	Computer Integrated Surgery II	Combination
EN.601.461	Computer Vision	Software
EN.601.466	Information Retrieval & Web Agents	Software
EN.601.468	Machine Translation	Software
EN.601.471	NLP: Self-Supervised Models	Software
EN.601.476	Machine Learning: Data to Models	Software
EN.601.482	Machine Learning: Deep Learning	Software

| EN.601.484 | ML: Interpretable Machine Learning Design | Software |
| EN.601.496 | Computer Integrated Surgery II – Teams | Combination |

Advanced Labs Categorization Summary

CATEGORY	# ECE	# Non-ECE	# Total
1. Software	4	16	20
2. Hardware	3	7	10
3. Combination	4	5	9
4. Flexible	4	4	8
Total	15	32	52

3. THE COMBINED FIVE-YEAR BACHELOR'S / MASTER'S PROGRAM

The Electrical and Computer Engineering department offers a combined five-year Bachelor's/Master's (B.S. / M.S.E.) program for Electrical Engineering and Computer Engineering majors. This is an excellent program for individuals who would like to earn the master's degree quickly. The degree will generally increase a student's chances for higher quality employment than would a bachelor's degree.

The Electrical and Computer Engineering Department and the Computer Science Department offer a joint B.S. / M.S.E. program in which candidates may seek a combined B.S. degree in ECE and an M.S.E. degree in Computer Science. Applicants should apply directly to the Computer Science Department for admission to the M.S.E. program. Students in this program will have two
(2) advisors: one for the undergraduate degree program and one for the graduate degree program.

3.1. Eligibility and Application Process

This program is available to Engineering majors at Johns Hopkins University. Typically, successful candidates who apply have a GPA of 3.5 or higher.

The latest deadline to apply is the end of your second to last semester.

The application process is explained at
https://engineering.jhu.edu/ece/undergraduate-studies/concurrent-bachelorsmasters/ .

3.2. Whiting School 50% Tuition Fellowship

Combined bachelor's/master's students will earn graduate student status and receive a Dean's Master's Fellowship, covering 50 percent of tuition, when they have full-time, resident status in a fall/spring semester, have been admitted to a full-time WSE master's program, and have completed eight full-time semesters of study at JHU. Please visit
https://engineering.jhu.edu/education/combined-degrees/deans-masters-fellowship/ for more information.

3.3 *MSE Requirements*

The requirements for the M.S.E. degree in Electrical and Computer Engineering (ECE) are as follows:

1. Satisfactory completion of eight one-semester 3-4 credit graduate courses (xxx.400 - xxx.799) approved by the advisor.

    a) At least five of these courses must come from the full-time ECE department (EN.520.XXX).

    b) Courses that are primarily Independent Study or Dissertation Research may not count as part of these five courses. These courses include 520.806-Master's Research, 520.800- Independent Study, and 520.802-Dissertation Research. Students may count one of these primarily research courses as one of the additional 3 courses that make up the 8 3-4 credit courses required. Students must submit a research report for this course.

    c) The ECE Seminar Course (520.895) and Special Studies courses cannot count towards the 5 ECE courses.

    d) Students are required to take EN.520.895 ECE Seminar for two semesters.

2. In addition to the eight courses above, students must also fulfill <u>one</u> of the following three requirements:

    a) Satisfactory completion of two additional one-semester 3-4 credit graduate courses (xxx.400 - xxx.799) approved by the advisor. At least one of these courses must come from the full-time ECE department (520.XXX). These can include Independent Study and Dissertation or Master's Research, accompanied by the research report.

    b) Write an M.S.E. essay (the official name of the master's theses at Johns Hopkins) acceptable to a member of the ECE faculty. The M.S.E. essay must be submitted to the library and must follow the guidelines described in http://www.library.jhu.edu/library-services/electronic-theses-dissertations/; or

    c) Completion of a special project acceptable to a member of the ECE faculty and writing a corresponding report. A copy of this report must be submitted to the ECE office and becomes a permanent part of the student's record.

- Every graduate course designated Independent Study, Dissertation Research, or Special Studies counted toward the M.S.E. degree must include a written report. A copy of the report will become a part of the student's permanent file.

- Full-time MSE students are expected to take at least three, 3-4 credit courses for each of their first two semesters.

- To fulfill requirements 1 or 2, a course is satisfactorily completed if a grade from A+ to C- or a "P" is obtained. No more than one C+, C, or C- and/or "P/S" grade can be counted toward the degree requirements.

4. ACADEMIC AND PROFESSIONAL ETHICS

Students at the Johns Hopkins University are expected to uphold high ethical standards. The Constitution of the Undergraduate Academic Ethics Board of the Krieger School of Arts and Sciences and the GWC Whiting School of Engineering states that:

"Undergraduate students enrolled in the School of Arts and Sciences or the GWC Whiting School of Engineering at the Johns Hopkins University assume a duty to conduct themselves in a manner appropriate to the University's mission as an institution of higher learning. Students are obliged to refrain from acts, which they know, or under the circumstances have reason to know, violate the academic integrity of the University. Violations of academic ethics include, but are not limited to: cheating, plagiarism, altering academic documents or transcripts, submitting the same or substantially similar work to satisfy the requirements of more than one course without permission; submitting as one's own the same or substantially similar work of another; knowingly furnishing false information to any agent of the University for inclusion in academic records; falsification, forgery, alteration, destruction or misuse of official University documents or seal."

The constitution further states in "Responsibilities of Students & Faculty, section B, that "It is the responsibility of each student to report to the professor in charge of the course or to the Ethics Board any suspected violations of academic ethics as outlined in, "Violations of Academic Integrity." Students can find the "Homewood Undergraduate Academic Ethics Policy" at https://studentaffairs.jhu.edu/policies-guidelines/undergrad-ethics/.

Students should also be aware that professional societies, industries, and government agencies all have ethical codes and standards to ensure both good business practices and to maintain the public trust. The Institute of Electrical and Electronics Engineers (IEEE) represents the profession of Electrical Engineering, and students should read that organization's code of ethics published on the web site: http://www.ieee.org/about/corporate/governance/p7-8.html.

5. PROFESSIONAL SOCIETIES, HONORS SOCIETIES & AWARDS

5.1 Institute of Electrical and Electronics Engineers

Undergraduates are encouraged to join the student chapter of the Institute of Electrical and Electronics Engineers (IEEE). Go to https://engineering.jhu.edu/ece/ieee-student-chapter/ for more information.

5.2. Eta Kappa Nu

The department sponsors a chapter of Eta Kappa Nu, the Electrical Engineering Honor Society. Membership is by invitation only. Juniors must be in the top quarter of their class, and Seniors must be in the top third of their class, based on their cumulative scholastic rank.

5.3. Awards

Each year, the ECE Department honors the graduating senior with the highest GPA with the John Boswell Whitehead Award for excellence in academic achievement. One CE and one EE senior is awarded the Charles A Conklin Award and the William H. Huggins Award for outstanding academic achievement. The Huggins Award is also given to one CE and one EE junior with the highest GPA. Additionally, a student is awarded the Electrical and Computer Engineering Student Leadership & Service Award for leadership and service to the department. The Muly Family Undergraduate Research Award is given to an exceptional student for

outstanding research contributions made in the department. Occasionally, the Innovative Design Award is given to a team who has created an exceptional product in one of our advanced design lab courses.

6. SENIOR EXIT INTERVIEWS

Several weeks before commencement, seniors are required to complete an online Senior Exit Interview survey and arrange an exit interview with the Department Chair. Seniors CANNOT graduate unless these two things have been completed.

7. GENERAL INFORMATION

7.1 WSE Office of Academic Affairs

The Office of Academic Affairs (Wyman Hall, first floor) has general responsibilities for all engineering majors in the Whiting School of Engineering: https://engineering.jhu.edu/advising/. The Vice Dean and his staff coordinate faculty advising, maintain student records, and handle academic problems that fall outside the scope of the faculty mentor. The office also provides support for non-department student organizations, such as the Society of Women Engineers and the Johns Hopkins Organization for Minority Engineers and Scientists. In addition, the office maintains and distributes undergraduate advising manuals for each of the engineering majors. Additional responsibilities include:

- Informing students regarding leaves of absence and withdrawals.
- Determine advanced standing and acceptance of coursework done at another college/university.
- Advise students on graduation eligibility.
- Inform students regarding proper procedures for taking summer school courses.
- Report unsatisfactory course performance to freshmen.
- Place students on academic probation, removing students from academic probation, monitoring students on probation, and identifying students who are required to withdraw from the University.
- Interpret University academic policy and departmental policy.
- Provide information about internship and study abroad opportunities in engineering.
- Coordinate tutoring for students in engineering courses.
- Inform students regarding the tutoring, study skills and pre-professional counseling services of the Office of Academic Advising.
- Authorize repeating a course for the third time.
- Complete final graduation clearance.

7.2. JHU Office of Engineering Advising

The Office of Academic Advising (Wyman Hall, 125) provides the following services for engineering students: https://engineering.jhu.edu/advising/

- Coordinating premedical, pre-law and public health advising
- Assisting students with disabilities in meeting their academic needs
- Teaching effective study skills

- Offering tutoring in many required courses
- Maintaining a reference library of graduate and professional school publications
- Providing information about national and international scholarships and fellowships, as well as summer internships
- Providing information on study abroad
- Give students approval to overload or retake courses

7.3. *Notice of Nondiscriminatory Policy*

The Johns Hopkins University admits students of any race, color, sex, religion, national or ethnic origin, age, disability, or veteran status to all of the rights, privileges, programs, benefits and activities generally accorded or made available to students at the University. It does not discriminate based on race, color, sex, religion, sexual orientation, national or ethnic origin, age, disability or veteran status in any student program or activity, including the administration of its educational policies, admission policies, scholarship and loan payments, and athletic and other University-administrated programs or in employment. Accordingly, the University does not take into consideration personal factors that are irrelevant to the program involved. The Johns Hopkins University admits students of any race, color, gender, religion, age, national or ethnic origin, disability, marital status or veteran status to all of the rights, privileges, programs, benefits, and activities generally accorded or made available to students at the university. It does not discriminate on the basis of race, color, gender, marital status, pregnancy, ethnicity, national origin, age, disability, religion, sexual orientation, gender identity or expression, veteran status, or other legally protected characteristic in any student program or activity administered by the university, including the administration of its educational policies, admission policies, scholarship and loan programs, and athletic and other university administered programs or in employment.

To view the full document, please visit https://oie.jhu.edu/wp-content/uploads/sites/22/Discrimination-and-Harassment-Policy-and-Procedures-effective-October-1-2022-Present.pdf . Questions regarding Title VI, Title IX, and Section 504 should be referred to the Office of Institutional Equity, Wyman Park Building, Suite 515, Telephone: (410) 516-8075, (TTY): (410)516-6225.

7.4. *Office of Student Disability Services*

The Office of Student Disability Services (SDS) assists full-time undergraduate and graduate students in the Krieger School of Arts and Sciences and the Whiting School of Engineering with disability concerns, in compliance with the provisions of the Americans with Disabilities Act of 1990 (ADA) and Section 504 of the Rehabilitation Act of 1973.

SDS assists the University community in understanding the effects of disabilities and in eliminating the physical, technical, attitudinal and programmatic barriers that limit the range of opportunities for students with disabilities, as well as provides individuals with reasonable accommodations. The SDS maintains and protects the confidentiality of individual records as required by law.

For additional information and to access the services of the SDS office, please see their website at https://studentaffairs.jhu.edu/disabilities/ or contact them at 410-516-4720 or studentdisabilityservices@jhu.edu. You may also visit their office at 3400 N. Charles St, Shaffer Hall, Suite 101.

If you are a student with a disability or believe you might have a disability that requires accommodations, please contact Dr. Terri Massie - Burrell**,** Director, Student Disability Services, in the Office of Institutional Equity, (410) 516-4720, tmassie1@jhu.edu.

8. GRADUATION PROCESS: B.S. IN ELECTRICAL ENGINEERING

In the second to last semester your transcripts will be audited to ensure that you are on track to graduate the following semester. You will receive a copy of your degree audit via email along with an email that outlines the completed requirements and the requirements that remain. You will receive a similar e-mail again in your final semester outlining any outstanding requirements and notifying you that you are either eligible or ineligible to graduate.

You will complete an "Application for Graduation" form online in SIS under their Program of Study (Note: any subsequent changes must be done on a hardcopy obtained from the Registrar's Office). This form is then used by the Office of Academic Affairs to generate a list of candidates that is sent to the ECE Department. If you need to apply for graduation after the deadline has passed, you will be required to submit a paper form to the Registrar.

The undergraduate program coordinator will audit your file and ensure that all requirements will be met by the end of the semester. Your degree audit will also be reviewed by the Chair, and then forwarded to WSE Undergraduate Studies for final conferral. Any exceptions and waivers of policy must be noted on your degree audit. If something is missing, you should notify the undergraduate program coordinator.

Next, you will receive an e-mail asking you to complete the "Senior Exit Survey for the Electrical Engineering Program". You will also receive an invitation to meet with the ECE Chair to discuss your experience at Hopkins. You are required to complete this survey and interview and will not be permitted to graduate unless you have completed these things. Please note the following:

- The deadlines to apply for graduation are posted on the Registrar's website at https://studentaffairs.jhu.edu/registrar/students/graduation/

- Departmental Honors are only given for **first majors**, and only when the GPA is 3.5 or higher in ECE coursework.

9. FOCUS AREAS 7 SAMPLE PROGRAMS

ECE Signals, Systems and Communication Electives
520.344 Introduction to Digital Signal Processing
520.353 Control Systems
520.370 Introduction to Renewable Energy Engineering
520.390 Music Signal Processing
520.412 Machine Learning for Signal Processing

520.414 Image Processing and Analysis I
520.415 Image Processing and Analysis II
520.418 Modern Convex Optimization
520.427 Design of Advanced Instruments and Systems
520.432 Medical Imaging Systems
520.433 Medical Image Analysis
520.438 Deep Learning
520.445 Audio Signal Processing
520.447 Information Theory
520.454 Control Systems Design
520.465 Machine Perception
520.497 Data Communication & Networking

ECE Photonics and Optoelectronics Electives
520.150 Light, Image, and Vision
520.219 Introduction to Electromagnetics
520.220 Electromagnetic Waves
520.370 Introduction to Renewable Energy Engineering
520.403 Introduction to Optical Instruments
520.405 Advanced Optical and Optoelectronic Instruments and Devices
520.407 Introduction to the Physics of Electronic Devices
520.457 Quantum Mechanics for Engineering
520.482 Introduction to Lasers
520.483 Bio-Photonics Laboratory
520.485 Advanced Semiconductor Devices
520.486 Physics of Semiconductor Electronics Devices
520.495 Microfabrication Lab580.478 Biomedical Photonics

9. Focus Areas

The Department of Electrical and Computer Engineering (ECE) offers classes in many different intellectual areas within ECE's fields. Here, elective classes are organized into overlapping focus areas to help students plan their courses of study. Specializing in a focus area is optional, and students are encouraged to work with their academic advisor to tailor a program to their individual interests. Note that not all courses listed are guaranteed to be taught every year.

9.1 Computing System

Course #	Term	Course Name
520.216	S	Introduction to VLSI
520.344	F	Introduction to Digital Signal Processing
520.349	F	Microprocessor Lab I
520.353	S	Control Systems
520.412	F	Machine Learning for Signal Processing
520.417	S	Computation for Engineers
520.418	F	Modern Convex Optimization
520.424	F	FPGA Synthesis Lab
520.440	S	Machine Intelligence on Embedded Systems
520.447	F	Information Theory
520.448	S	Electronics Design Laboratory

520.450	S	Advanced Micro-Processor Lab
520.485	S	Advanced Semiconductor Devices
601.414	S	Computer Networks
601.415	F	Databases
601.417	F	Distributed Systems
601.418	F	Operating Systems
601.420	F	Parallel Programming
601.421	F/S	Object Oriented Software Engineering
601.428	F	Compilers and Interpreters
601.433	F/S	Introduction to Algorithms
601.476	S	Machine Learning: Data to Models

9.2 Integrated Circuits & Microsystems

Course #	Term	Course Name
520.216	S	Introduction to VLSI
520.302	S	Internet of Things Project Lab
520.340	F	Introduction to Mechatronics
520.349	F	Microprocessor Lab I
520.424	F	FPGA Synthesis Lab
520.440	S	Machine Intelligence on Embedded Systems
520.448	S	Electronics Design Laboratory
520.450	S	Advanced Micro-Processor Lab
520.491	F	CAD Design of Digital VLSI
520.492	S	Mixed Signal VLSI Systems
530.495	F	Microfabrication Lab
601.414	S	Computer Networking Fundamentals
601.418	F	Operating Systems

9.3 Machine Learning & Artificial Intelligence

Course #	Term	Course Name
520.302	S	Internet of Things Project Lab
520.315	F	Introduction to Bio-Inspired Processing of Audio-Visual Signals
520.344	F	Introduction to Digital Signal Processing
520.353	S	Control Systems
520.385	S	Signals, Systems & Learning
520.412	F	Machine Learning for Signal Processing
520.414	F	Image Processing & Analysis
520.415	S	Image Processing & Analysis II
520.417	S	Computation for Engineers
520.418	F	Modern Convex for Optimization
520.438	S	Deep Learning
520.440	S	Machine Intelligence on Embedded Systems
520.445	F	Audio Signal Processing
520.447	F	Information Theory
520.454	F	Control Systems Design
520.465	F	Machine Perception
520.471	F/S	Speech Technologies Reading Group

Course #	Term	Course Name
601.454	S	Augmented Reality
601.464	F/S	Artificial Intelligence
601.465	F	Natural Language Processing

9.4 Medical Imaging

Course #	Term	Course Name
520.150	S	Light, Image, and Vision
520.220	S	Electromagnetic Waves
520.315	F	Introduction to Bio-Inspired Processing of Audio-Visual Signals
520.344	F	Introduction to Digital Signal Processing
520.385	S	Signals, Systems & Learning
520.403	F	Introduction to Optical Instruments
520.405	S	Advanced Optical and Optoelectronic Instruments and Devices
520.412	F	Machine Learning for Signal Processing
520.414	F	Image Processing and Analysis I
520.415	S	Image Processing and Analysis II
520.417	S	Computation for Engineers
520.418	F	Modern Convex Optimization
520.427	F	Design of Biomedical Instruments and Systems
520.432	F	Medical Imaging Systems
520.433	S	Medical Image Analysis
520.439	S	Machine Learning for Medical Applications
520.465	F	Machine Perception
520.483	S	Bio-Photonics Laboratory

9.5 Photonics & Optoelectronics

Course #	Term	Course Name
520.150	S	Light, Image, and Vision
520.220	S	Electromagnetic Waves
520.370	F	Introduction to Renewable Energy Engineering
520.403	F	Introduction to Optical Instruments
520.405	S	Advanced Optical and Optoelectronic Instruments and Devices
520.407	F	Introduction to the Physics of Electronic Devices
520.457	F	Quantum Mechanics for Engineering
520.470	F	Infra-Red Sensing and Technologies
520.482	S	Introduction to Lasers
520.483	S	Bio-Photonics Laboratory
520.485	S	Advanced Semiconductor Devices
520.486	S	Physics of Semiconductor Electronic Devices
520.495	F	Microfabrication Lab

9.6 Robotics

Course #	Term	Course Name
520.302	S	Internet of Things Project Lab
520.315	F	Introduction to Bio-Inspired Processing of Audio-Visual Signals
520.340	F	Introduction to Mechatronics

Course	Term	Course Name
520.344	F	Introduction to Digital Signal Processing
520.349	F	Microprocessor Lab I
520.353	S	Control Systems
520.412	F	Machine Learning for Signal Processing
520.424	F	FPGA Synthesis Lab
520.440	S	Machine Intelligence on Embedded Systems
520.445	F	Audio Signal Processing
520.448	S	Electronics Design Lab
520.450	S	Advanced Microprocessor Lab
520.454	F	Control Systems Design
520.465	F	Machine Perception
520.471	F/S	Speech Technologies Reading Group
530.420	F	Robots, Sensors and Actuators
530.421	S	Mechatronics
601.461	F	Computer Vision
601.463	F/S	Algorithms for Sensor-Based Robotics
601.464	F/S	Artificial Intelligence

9.7 Signals, Systems, & Communication

Course	Term	Course Name
520.315	F	Introduction to Bio-Inspired Processing of Audio-Visual Signals
520.344	F	Introduction to Digital Signal Processing
520.353	S	Control Systems
520.370	F	Introduction to Renewable Energy Engineering
520.385	S	Signals, Systems, and Learning
520.412	F	Machine Learning for Signal Processing
520.414	F	Image Processing and Analysis I
520.415	S	Image Processing and Analysis II
520.418	F	Modern Convex Optimization
520.427	F	Design of Biomedical Instruments and Systems
520.432	F	Medical Imaging Systems
520.433	S	Medical Image Analysis
520.438	S	Deep Learning
520.445	F	Audio Signal Processing
520.447	F	Information Theory
520.454	F	Control Systems Design
520.465	F	Machine Perception

The following tables show two sample programs fulfilling the requirements of the B.S. degree in Electrical Engineering. The programs are oriented toward two different concentrations of interest for illustrative purposes only. If you are interested in taking other courses in either of these two areas, the following classes emphasize signals, systems, & communication and photonics & optoelectronics. All students are expected to plan, in consultation with their faculty advisors, programs best suited to their own interests. You are not required to focus on anyone one area.

9.8 *Sample BSEE Program*

Sample Bachelor of Science in Electrical Engineering Program
(Courses in **Bold** are required)

Fall - Year 1			Spring - Year 1		
Number	*Course*	*Credits*	*Number*	*Course*	*Credits*
110.109	**Calculus II**	**4**	**110.201**	**Linear Algebra**	**4**
171.101	**Physics I**	**4**	**171.102**	**Physics II**	**4**
173.111	**Physics Lab I**	**1**	**173.112**	**Physics Lab II**	**1**
520.124	**FYS: Design Cornerstone**	**2**	**520.142**	**Digital System Fundamentals**	**3**
500.112	**Gateway Computing**	**3**	**520.137**	**First Year ECE Design**	**4**
	HEART Seminar	**1**	**500.132**	**Bootcamp: Java**	**1**
Total Credits		**15**	**Total Credits**		**17**

Fall - Year 2			Spring - Year 2		
Number	*Course*	*Credits*	*Number*	*Course*	*Credits*
110.202	**Calculus III**	**4**	**110.302**	**Differential Equations**	**4**
030.101	**Intro to Chemistry**	**3**	**520.214**	**Signals & Systems**	**4**
520.230 & 231	**Mastering Electronics**	**4**	**601.220**	**Intermediate Programming**	4
520.219	**Intro to Electromagnetics**	**4**	520.216	Introduction To VLSI	3
	Writing Intensive	3		H&S Elective 2	3
Total Credits		**18**	**Total Credits**		**17**

Fall - Year 3			Spring - Year 3		
Number	*Course*	*Credits*	*Number*	*Course*	*Credits*
553.311	**Prob. & Stats.**	**4**		H&S Elective 3	**3**
	ECE Elective	3		ECE Elective	3
520.344	Digital Signal Processing	3		**Basic Science Elective (N)**	**3**
	ECE Elective	3		Non-ECE Eng. Elective	3
	H&S Elective 4	3		H&S Elective 5	3
Total Credits		**16**	**Total Credits**		**15**

Fall - Year 4			Spring - Year 4		
Number	*Course*	*Credits*	*Number*	*Course*	*Credits*
	H& S Elective 6	3		Non-ECE Eng. Elective	3
520.498	Senior Design Project I	3	520.499	Senior Design Project II	3
	ECE Advanced Lab	3		ECE Advanced Lab	3
	ECE Elective	3		H& S Elective 6	3
	Non-ECE Eng. Elective	3		ECE Elective	3
Total Credits		**15**	**Total Credits**		**15**

10. REQUIRED COURSEWORK

10.1 Distribution

The following courses are required for the B.S. in Electrical Engineering and count towards the required 45 (E) credits:

- EN.520.137   First Year ECE Design (spring)
- EN.520.142   Digital System Fundamentals (spring)
- EN.520.214   Signals & Systems (spring)
- EN.520.219   Introduction to Electromagnetics (fall)
- EN.520.230/231 Mastering Electronics & Lab (fall)
- A minimum of six credits of ECE Advanced Labs

Electrical Engineering majors must complete 20 credits of Q courses including:
- AS.110.109   Calculus II
- AS.110.202   Calculus III
- AS.110.201   Linear Algebra
- AS.110.302   Differential Equations
- EN.553.311   Probability & Statistics OR Introduction to Probability EN.553.420

Electrical Engineering majors must complete 16 credits of N courses including:
- AS.171.101   General Physics I
- AS.173.111   General Physics Lab I
- AS.171.102   General Physics II
- AS.173.112   General Physics Lab II
- AS.030.101   Introductory Chemistry

Electrical Engineering majors must also complete additional requirements:
- EN.601.220 Intermediate Programming; If a student needs to take Gateway Computing as a pre-requisite to Intermediate Programming, they should take Python (EN.500.113), followed by Bootcamp Java (EN.500.132).
- Six credits from "Other Engineering" disciplines (coded as E). Up to six credits of "Other Engineering Advanced Labs" can also be used to fulfill the advanced lab requirement (essentially fulfilling two different requirements).
- Total of 12 Advanced Labs, with no less than six credits coming from ECE
- One of the following courses to fulfill the departmental Ethics requirement:
  - 661.315 Culture of the Engineering Profession (S designation) - offered F/S/Su
  - 660.310 Cases in Workplace Ethics (H designation) - will be offered in S24
  - 660.463 Engineering Management & Leadership - offered F
  - 660.455 Reimagining the City in the Face of Climate Change - offered F

10.2 Checklist

Core Electrical Engineering Courses*		45
Must include the following:		
EN.520.137	First-Year ECE Design	4

EN.520.142		Digital Systems Fundamentals	3
EN.520.214		Signals and Systems	4
EN.520.219		Introduction to Electromagnetics	3
EN.520.230		Mastering Electronics	3
EN.520.231		Mastering Electronics Laboratory	2
Additional Required ECE Electives* 1			**15 - 21**
Advanced Laboratory and Design Experience Component * 2			
Select 6 credits of ECE Senior Design			6
Select 6 credits of ECE or Other Engineering Advanced Labs (see below).			6
"Other Engineering" Courses*			
Courses with E area designation from KSAS or other School of Engineering departments other than ECE, AMS, CLE or General Engineering. Any "Other Engineering" Advanced Labs from the approved list below can be used to also satisfy this requirement. Check with the department for any exceptions.			6
Programming Language Requirement*			
EN.601.220		Intermediate Programming	4
Mathematics Courses*			**20**
Must include the following:			
AS.110.109		Calculus II (For Physical Sciences and Engineering)	4
AS.110.202		Calculus III	4
or AS.110.211		Honors Multivariable Calculus	
AS.110.201		Linear Algebra	4
or EN.553.295		Linear Algebra for Data Science	
AS.110.302		Differential Equations and Applications	4
EN.553.311		Intermediate Probability and Statistics	4
or EN.553.420		Probability	
Basic Sciences* 3			**16**
Courses coded NS are not allowed. Introduction to Computing courses may not be used to fulfill the requirement. Must include the following:			
AS.030.101		Introductory Chemistry I	3
AS.171.101		General Physics: Physical Science Major I	4
or AS.171.107		General Physics for Physical Sciences Majors (AL)	

AS.171.102	General Physics: Physical Science Major II	4
or AS.171.108	General Physics for Physical Science Majors (AL)	
AS.173.111	General Physics Laboratory I	1
AS.173.112	General Physics Laboratory II	1
Additional N credits		3
Humanities and Social Sciences		**18**
Select at least six (6), three-credit courses in Humanities or Social Sciences (H/S) including:		
Breath/Depth Requirement		**9**
At least three courses with H/S designation, in a specific area or theme; with at least one course at a 300 level or higher.		
Writing-Intensive Requirement*		**6**
At least 2 courses/6 credits are required. Courses coded as an H/S can count towards the 18 credit requirement. A grade of C- or better is required.		
Ethics Requirement*		**3**
Students must take one of these courses. Only EN.661.315 and EN.660.310 can be used to fulfill H/S, Breadth/Depth, and/or Writing Intensive requirements.		
EN.660.310	Cases in Workplace Ethics	3
EN.660.455	Reimagining The City to Resist Climate Change (No designation code, elective only)	3
EN.660.463	Engineering Management & Leadership (No designation code, elective only)	3
EN.661.315	Culture of the Engineering Profession	3
Electives		
Additional credits to reach 126 credits		
	Total Credits	**126**

10.3 ECE Advanced Laboratory or Design Intensive Courses

ECE Advanced Laboratory or Design Intensive Courses

Course	Course Title	Category
520.412	Machine Learning for Signal Processing	Software
520.424	FPGA Synthesis Laboratory	Combination
500.427	Product Design Laboratory	Flexible
520.433	Medical Image Analysis	Software
520.440	Machine Intelligence on Embedded Systems	Combination
520.448	Electronics Design Laboratory	Combination
520.450	Advanced Microprocessor Laboratory	Software
520.454	Control Systems Design	Software
520.363/463	Leading Innovation Design Team (LIDT)	Flexible
520.483	Bio-Photonics Laboratory	Hardware
520.487	Clinical Diagnostic Devices and Methods	Flexible
520.491	CAD Design of Digital VLSI Systems	Combination
520.492	Mixed-Mode VLSI Systems	Hardware
520.495*	Microfabrication Lab	Hardware
520.498	Senior Design Project I	Hardware
		Flexible

520.495 Can be used as either a ECE or MECHE advanced lab. Please notify the academic program coordinator if you want to use this course as "Other Engineering" advanced lab so that your degree audit can be adjusted.

Other Advanced Laboratory Courses

Number	Title	CATEGORY
EN.510.433	Senior Design in Materials Science & Engineering I	Flexible
EN.510.434	Senior Design in Materials Science & Engineering II	Flexible
EN.530.420	Robot Sensors and Actuators	Hardware
EN.530.421	Mechatronics	Combination
EN.530.474	Effective & Economic Design for Biomedical Instrumentation	Hardware
EN.530.495	Microfabrication Laboratory	Hardware
EN.540.400	Project in Design: Pharmacokinetics	Hardware
EN.540.418/419	Projects in the Design of a Chemical Car	Hardware
EN.540.421	Project in Design: Pharmacodynamics	Hardware
EN.580.311/312	Junior BME Design	Flexible
EN.580.411/412	Senior BME Design Team	Flexible
EN.580.437/438	Biomedical Data Design I and II	Software
EN.580.457	Intro to Rehabilitation Engineering Design Lab	Combination
EN.580.471/571	Biomedical Instrumentation II	Hardware
EN.580.480/481	Precision Care Medicine	Combination
EN.580.493	Medical Imaging	Software
EN.601.315/415	Databases	Software

EN.601.411	CS Innovation & Entrepreneurship	Software
EN.601.417	Distributed Systems	Software
EN.601.421	Object Oriented Software Engineering	Software
EN.601.443	Security & Privacy in Computing	Software
EN.601.447	Computational Genomics	Software
EN.601.454	Augmented Reality	Software
EN.601.456	Computer Integrated Surgery II	Combination
EN.601.461	Computer Vision	Software
EN.601.466	Information Retrieval & Web Agents	Software
EN.601.468	Machine Translation	Software
EN.601.471	NLP: Self-Supervised Models	Software
EN.601.476	Machine Learning: Data to Models	Software
EN.601.482	Machine Learning: Deep Learning	Software
EN.601.484	ML: Interpretable Machine Learning Design	Software
EN.601.496	Computer Integrated Surgery II – Teams	Combination

10.4 Multi-Term Classes

For multiterm courses, enrollment in part I necessitates enrollment in subsequent parts. Students must be enrolled in SIS, the system of record. If a student subsequently drops or fails to register for subsequent parts of a multiterm course, a grade of W (withdrawn) will be assigned for the first part. Students may not register for subsequent parts of the course without having enrolled in part I.

11. FREQUENTLY ASKED QUESTIONS

Q: If this is my second major which requirements do I have to complete for my EE degree?

A: You must complete your ECE, Other Engineering, Programming, Q, N, and Ethics requirements. You do not need to fulfill ECE's writing intensive, H/S, or Breadth and Depth requirements. Follow the guidelines of your primary major.

Q: How do I count Business courses offered in the Applied Mathematics and Statistics Department?

A: Count these courses as electives. Please note: these courses **CANNOT** be counted as "other engineering" courses.

Q: Can I use an ECE cross-listed course as "Other Engineering"?

A: No, ECE (520) courses cross-listed in other departments cannot be counted as "other engineering" *except* EN.520.495 Microfabrication Lab. This course can count as ECE or MECHE. Please let the academic program coordinator know how you wish to apply this class.

Q: How do I get a senior design project? And is it necessary that the project be done in the ECE department and/or under the guidance of an ECE faculty member?

A: In order to get a senior design project, you must find a subject for your project and a faculty member willing to supervise you. As both subject matter and faculty sponsorship (not necessarily by an ECE faculty member) of senior design projects must be approved by your faculty mentor, you must discuss your plan with your advisor prior to undertaking the project.

Q: Can Computer Science credits fulfill the requirement of 6 credits of "Other Engineering" courses?

A: Yes. Please notify the academic program coordinator of how you would like to apply the credits, since you can use CS credits to fulfill "Other Engineering" or use up to 6 credits towards ECE credits. Remember, Gateway Computing (500.112-114) and Bootcamp (500.132-134) can also count as a CS courses.

Q: How can I get Gateway Computing waived?

A: You must earn a 5 on the AP exam or a 6 & 7 on the IB Computer Science exam. ECE students are required to complete Intermediate Programming, so this will only waive the pre-requisite, not the programming requirement.

Q: I am majoring in EE. Can I take an ECE course pass/fail?

A: A student can (but not encouraged) to take an ECE course pass/fail. In this case, the course **CANNOT** be counted toward the 45-credit ECE requirement. It can only be counted as an **ELECTIVE** (area VI). Do not take any required courses as S/U. If you retake the course, it can only be graded as S/U and you will be unable to fulfill the requirement.

Q: Am I allowed to take humanities courses pass/fail?

A: In general, humanities courses can be taken pass/fail. The only exceptions are the two courses that count toward the writing intensive (W) course requirement. These may not be taken as pass/fail. You must also earn a grade of C- or higher in order to count it.

Q: Can I have a grade "uncovered" after I take it as an S/U?

A: You can only have an "uncovered" grade switch from S/U to a letter grade if you have changed to a major where a grade is required in the course.

Q: If I take a class as a S/U, can I improve my grade in a course by taking it again?

A: If you retake a S/U graded course, the same grading method will apply if you re-take it.

Q: Can I retake a class to improve my grade?

A: You can only retake the course if you scored lower than C+.

Q: Do add/drops show on my transcript?

A: No, but withdrawals (W) do. However, they do not affect your GPA.

Q: Do I need permission to retake a class?

A: You do not need permission to retake one class. However, if you have more than one class to retake, you will need to get permission from your WSE professional advisor. If you are retaking a course for a third time you will also need the approval of your professional advisor.

Q: How should I handle requirement changes in the program?

A: You are bound to the requirements of the catalog under which you entered. If you are unsure about your requirements, check with the academic program coordinator or our faculty mentor.

Q: For my humanity/social sciences requirement, can I take courses coded NS or must they be only H or S?

A: Courses coded NS can be counted as Social Science (S), but not as natural science courses (N)

Q: Why is there an advisor hold alert on my account?

A: All WSE students have a hold placed on their accounts after the second week of classes. Students are required to get permission from their advisors to drop courses and to register for the following semester.

Q: Can I count writing intensive courses (W) that **do not** carry an (H) or (S) descriptor as humanities and social science electives?

A: No.

Q: Can I count the first two courses in a foreign language as (H) credits if I am an engineering major?

A: Yes.

Q: How many credit hours of 520.xxx Independent Study can I count towards the 45 required EE credits or 42 required EE/CS credits for the BS/CE?

A: No more than 6.

Q: What are the prerequisites for Mastering Electronics/Lab (520.230/231)?

A: Physics II (171.102) and Physics II Lab (173.112) and Calculus II.

Q: Can BME Systems and Controls count toward my EE credit requirement as a substitute for Control Systems?

A: No.

Q: I have a score of 3 on the AP Calculus BC exam, which gives me 4 credits and exempts me from Calculus I (110.108). May I count my 4 credits from the AP Calculus exam towards fulfilling the mathematical requirements for my degree?

A: Yes, you may count the 4 credits from AP Calculus as part of the Mathematics and Mathematical Science Requirements if they show up on your transcript.

Q: Can I double-count graduate courses for both my B.S. and M.S.E. degrees?

A: No, you may count the course for either the B.S. or the M.S.E. degree, but not both.

Q: Calculus II and III were waived, but do not appear on my transcript. Can I use these courses to fulfill the Mathematics and Mathematical Science requirements?

A: If a course is waived, but does not appear on your transcript, it cannot be used to fulfill courses requirements. The only advantage of a course being waived is that you may be able to take more advanced courses.

Q: Is there a particular computer I should have to complete my ECE work?

A: 8GB RAM minimum, 16GB RAM preferable; Intel i5 or AMD Ryzen3 minimum, Intel i7 or AMD Ryzen 5 preferable; 256Gb SSD minimum, 512 GB SSD preferable; 13.3 inch minimum, 14-15 inch preferable; Windows 10 Home minimum, Windows 10 Pro 64 preferable or Mac OSX; Chromebooks are not recommended.

Q: Which Gateway Computing class should I register for?
A: EN.520.113 Gateway/Python. Be sure to look for the sections reserved for ECE students.

Q: Is it possible for a freshman to take more than 18.5 credits a semester in the first semester?

A: No, Academic Advising will not permit you to take more than 18.5 credits in the first semester.

Q: As an entering freshman with advanced placement in Physics, do I have to take Physics Lab I and Physics Lab II?

A: As of March 10, 2005, students who earned credit for Physics I and/or Physics II through their scores on acceptable exams (Advanced Placement, GCE A-levels, or IB exams) are

eligible to have Physics labs 173.111 and/or 173.112 waived. If you have credit for Physics I through one of the exams listed above and you have not already taken 173.111 at JHU, a notation will be added to your transcript "Physics Lab I waived." If you have credit for Physics II through one of the exams listed above and you have not already taken 173.112 at JHU, a notation will be added to your transcript "Physics lab II waived." You may take just the Physics Lab Courses 173.111, 173.112 if you have received AP credit for Physics I and/or Physics II, but you are not required to do so.

Q: If Physics Lab was waived, do I still need (A) one year of a lab in a natural science and/or (B) only 15 credits of (N) courses rather than 16?

A: No, if Physics Lab was waived, you DO NOT need one year of a lab in a natural science, but you still need 16 credits of (N) courses.

11.1 Useful Web Sites

https://engineering.jhu.edu/ece/

https://engineering.jhu.edu/undergraduate-studies/

https://engineering.jhu.edu/advising/

https://e-catalogue.jhu.edu/engineering/

https://studentaffairs.jhu.edu/registrar/students/course-schedule/

11.2 Campus Support Services

- Center for Student Success supports students through coaching, mentoring, collaborations with campus partners, and community-building programs.
- Counseling Center's licensed therapists, doctoral interns, and psychiatrists assist undergraduate students with their personal, interpersonal, and emotional development through various services and outreach programs.
- Office of Dean of Student Life aims to cultivate an inclusive and healthy community that fosters growth, exploration, and engagement. They oversee student involvement, campus programming, diversity initiatives, and housing and dining services.
- Office of Multicultural Affairs (OMA) is committed to enhancing the educational experience of students from underrepresented populations through events and programs designed to support, challenge, and engage.
- Student Financial Support helps students and their families learn how to secure need- and merit-based aid, understand aid requirements, and find other ways to make a Hopkins education affordable. Johns Hopkins is committed to meeting 100 percent of students' financial needs through scholarships, loans, and other sources.

- Life Design Lab supports and serves all Krieger and Whiting undergraduates and masters students. Through the LDL students have access to a variety of resources such as life design programs and courses, experiential learning opportunities, career search and development

programs and guidance, as well as networking opportunities and connections with alumni and employers.

- [Hour](#) (Hopkins Office for Undergraduate Research) builds upon Johns Hopkins University's strengths and goals as America's first research university by taking advantage of the thousands of faculty, staff, and graduate students involved in research and creative projects promoting a culture of research and scholarship that enriches the undergraduate experience.

Tutoring and Mentoring Resources

A number of tutoring and mentoring resources are available to JHU undergraduates.

- [Help Room and Study Space](#) along with study space available across campus during reading period and final exam period, help rooms are available on campus to students taking math courses and the Introductory Chemistry lecture and lab.
- [Learning Den](#) provides tutoring for small groups (a maximum of six students in each group), for all registered Krieger School of Arts and Sciences and Whiting School of Engineering students.
- [PILOT](#) students are organized into study teams of six to 10 members who meet weekly with a trained student leader who facilitates the meetings.
- [Study Consulting](#) pairs undergraduate students with an accomplished senior or graduate student who serves as a consultant.

  [Writing Center](#) offers undergraduate and graduate students free, individual conferences with experienced tutors, all of whom are trained to consult on written work in the humanities and social sciences.

Academic Affiliated Offices

- [Office of Krieger Arts and Sciences Advising](#) supports undergraduates with primary or secondary majors and minors within the Krieger School with their academic planning and goals.
- [Office of International Services](#) assists international students, scholars, researchers, clinicians, staff, and faculty with visas and immigration information.
- [Office of Pre-Professional Advising](#) serves current students and alumni pursuing career interests in the health care or law professions.
- [Office of the Registrar](#) coordinates course registration, grading, veteran's education benefits, and student health benefits. This office also publishes the e-catalog and provides transcripts and enrollment and degree verifications. In addition, visit this website if you need information about class schedules and final exams.
- [Office of Student Disability Services](#) advises students with disabilities on available services, assists with registrations on accommodations and assistive technology, and liaises with students' instructors. Additionally, they work with the university's central ADA Compliance Officer and comply with federal, state, and local disability regulations.
- [Office of Study Abroad](#) promotes international travel and education through academic exchanges, programs abroad, and cooperative agreements.