

The Johns Hopkins University
Department of Electrical and Computer Engineering
Electrical Engineering Program
Undergraduate Advising Manual for 2007-2008 (02/05/2008)

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Useful Web Sites

www.advising.jhu.edu
www.wse.jhu.edu
www.ece.jhu.edu

Introduction

The Department of Electrical and Computer Engineering offers two bachelors degree programs: one in Electrical Engineering and one in Computer Engineering (with the close collaboration of the Computer Science Department). Electrical Engineering is concerned with a wide variety of topics in signals, systems and communications, solid state and quantum electronics, and computer hardware. Typically, introductory courses are taken in the first two years of study. These courses are Introduction to Electrical and Computer Engineering (520.137) and Digital System Fundamentals (520.142), usually taken in the freshman year; Circuits (520.213), Signals and Systems (520.214), Fields, Matter, and Waves (520.219-220), usually taken in the sophomore 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 either the Bachelor of Arts (BA) or Bachelor of Science (BS) degrees. The Department also offers a concurrent BS/MSE 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. Computing facilities include a departmental CAD laboratory and numerous workstations in addition to the Homewood Information Technology Services (Hopkins ITS) machines. Undergraduates may obtain accounts (called entitlement accounts) on any of the Hopkins ITS computers. Additional information is available from the Krieger Hall computing facility. Accounts on the departmental machines are usually established through ECE faculty members when their use is needed for courses or independent study. Students who need to use a computer for an ECE course may use the computers in Barton 120A with the instructor's permission.

2. Degree Requirements

2.1. ABET Criteria

The BS degree in Electrical Engineering is accredited by the Accreditation Board for Engineering and Technology (ABET). As part of the ABET requirements, the Electrical Engineering BS Degree Program has established the following:

2.1.1 Mission Statement. The Faculty of the Electrical Engineering Program at Johns Hopkins is committed to providing a rigorous educational experience that prepares students for further study and to professionally and ethically practice engineering 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 educational outcomes and objectives for the BS in Electrical Engineering degree program.

2.1.2. Program Outcomes. Students graduating with a B.S. in Electrical Engineering will have demonstrated the ability to

1. Understand advanced mathematics, probability and statistics, basic science, and computer science, and apply this knowledge to electrical engineering disciplines,
2. Design, conduct, evaluate and report experiments, including analysis and statistical interpretation of data,
3. Identify, formulate and solve electrical engineering problems,
4. Use basic concepts and modern engineering tools (laboratory instrumentation and computer hardware and software) to design electrical engineering systems, components and processes to meet specifications, taking into account cost, safety, environmental and socio-political constraints,
5. Communicate effectively and work on multidisciplinary teams,
6. Be aware of professional and ethical responsibilities, and contemporary issues, and appreciate the societal, economic, and environmental impacts of engineering,
7. Enter professional practice or graduate school with the recognition of the need for life-long learning and the ability to pursue it.

2.1.3. Program Objectives. Educate students who, after graduation, will be successful engineers in industry, government laboratories and other organizations, or advanced students in the best graduate programs. In these endeavors, they will:

1. Apply their understanding of the fundamental scientific, engineering, and professional principles at the foundation of Electrical Engineering,
2. Apply advanced mathematical, computational and experimental techniques to respond to technological demands in an economical and efficient manner,
3. Contribute to society as broadly educated, articulate, and ethical citizens who are at ease in multidisciplinary teams, and
4. Strive to continually update and renew their knowledge throughout their careers in order to meet the needs of a rapidly changing world.

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.

2.2 Faculty Advising

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 a faculty advisor. Each student and faculty advisor 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. Faculty members who can serve as advisors are:

Andreas G. Andreou, Professor and Director, Comp. Eng. Prog.
Frederic M. Davidson, Professor
Mounya Elhilali, Assistant Professor
Ralph Etienne-Cummings, Associate Professor
John Goutsias, Professor
Pablo A. Iglesias, Professor
Frederick Jelinek, Professor
Jin U. Kang, Professor
Alexander E. Kaplan, Professor
Sanjeev Khudanpur, Assistant Professor
Jacob B. Khurgin, Professor
Gerard G.L. Meyer, Professor and Department Chair
Jerry L. Prince, Professor
Trac Duy Tran, Associate Professor
Howard L. Weinert, Professor

A student may change faculty advisors. The EE Undergraduate Advising Coordinator, Dr. Fred Davidson, makes initial assignments, and arranges all changes.

The faculty advisor 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 advisor. Students should also be familiar with requirements outlined in the University's Undergraduate Academic Manual. It is important that students remain in close contact with their advisors and consult with them before making changes in their program. The

faculty advisor's signature is required for all registration and add/drop forms. Note that, unless prior arrangements have been made, no faculty member other than the student's own advisor can sign the required forms.

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 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 Engineering Program faculty makes every effort to be available to their advisees, particularly during the scheduled fall and spring term advising periods. Students are encouraged to arrange meetings with their advisors in these scheduled periods to discuss their course program for the coming semester and their progress toward the completion of degree requirements.

2.3. Bachelor of Science in Electrical Engineering Degree

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

1. Forty-five (45) credits of ECE courses including Circuits (520.213), Signals and Systems (520.214), Fields, Matter and Waves I (520.219), one (1) introductory laboratory course (520.345, 520.349 or 520.372), and at least six (6) credits of advanced laboratory, design intensive, or senior design project courses from those given in the attached advising check-list. Up to six (6) credits of Computer Science courses may be used to satisfy the 45-credit requirement. A GPA of at least 2.0 must be maintained in ECE courses. Courses in this group may not be taken Pass/Fail.
2. Six (6) credits of engineering courses from School of Engineering departments other than ECE or 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 may not be taken Pass/Fail.
3. Twenty (20) credits of mathematics courses taken from the Mathematics Department or the Applied Mathematics and Statistics Department. Students must take Calculus II (110.109), Calculus III (110-202), Linear Algebra (110.201), Differential Equations (110.302), and Probability and Statistics (550.310/311) or Introduction to Probability (550.420). Courses in this group may not be taken Pass/Fail. Elementary or precalculus courses such as 110.105 or 550.111-112 are not acceptable. (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.)

4. Sixteen (16) credits of basic sciences (physics, chemistry, biology, earth and planetary sciences), which must include General Physics (171.101-102), General Physics Laboratory (173.111-112), and Introductory Chemistry (030.101). Courses in this group may not be taken Pass/Fail.

5. At least six (6), three-credit courses in humanities and social sciences. 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 and an increasingly international world. The selection of courses should not consist solely of introductory courses, but should have both depth and breadth. Typically, this means that students should take at least three (3) courses in a specific area with at least one of them at an advanced level.

6. A programming language requirement must be met by taking Introduction to Java (600.107) or Introduction to Programming in C/C++ (600.109).

7. Two (2) writing intensive (W) courses (at least 3 credits each) are required. The writing intensive courses may not 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 W requirements.

2.4. Bachelor of Arts Degree

To meet the requirements for the BA degree, the program must include:

1. Thirty (30) credits of ECE courses. Three credits of computer science courses may be counted towards this requirement.
2. Twenty (20) credits of mathematics or mathematical statistics courses. Typically these include Calculus I (110.108), Calculus II (110.109) and Calculus III (110.202), or equivalent, and Linear Algebra (110.201). Elementary or pre-calculus courses such as 110.105 or 550.111-112 are not acceptable.
3. Eighteen (18) credits of humanities and social sciences courses.
4. Four (4) writing intensive (W) courses.
5. Additional credits giving a total of at least one hundred twenty (120) credits.

Students should be aware that the BA degree program is not accredited by the Accreditation Board for Engineering and Technology (ABET).

2.5. Bachelor of Science/Master of Science in Engineering Degree

1. Eight (8), one-semester graduate (400-799 level) courses approved by the advisor must be satisfactorily completed. These eight (8) courses cannot include Independent Study, Dissertation Research or Special Studies.
2. Further depth of understanding must be demonstrated by satisfactorily completing two (2) additional one-semester courses approved by the advisor, or by writing an MSE essay acceptable to a member of the ECE faculty, or by a special project acceptable to a member of the ECE faculty.
3. A course (including independent study) is satisfactorily completed if a grade of A, B, C, or P is obtained. No more than one C grade can be counted toward the requirements and a D or F or second C grade results in probation. A second D or F or a third C grade results in termination from the program.
4. At least six (6) one-semester courses in the MSE program must be ECE Department day-school courses that are not independent study, and no more than two (2) one-semester courses in the program can be from outside Johns Hopkins' full-time programs.
5. Every graduate course designated Independent Study, Dissertation Research, or Special Studies counted toward the MSE degree must include a written report. A copy of the report will become part of the student's permanent file.

The MSE portion of the program is to be designed in consultation with the MSE advisor, often the same faculty member as the undergraduate advisor. Students interested in the concurrent program should consider the advantages or disadvantages of such a program, particularly the financial aspects. For example, a qualified student interested in the PhD degree can often obtain full financial support for the MSE and PhD at Johns Hopkins or elsewhere.

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

3. Advanced Standing

Advanced standing credit is granted in two cases: for acceptable college-level work completed in a college setting, and for credits earned through the Advanced Placement Program. College courses taken in a high school setting, by correspondence, or through the College Level Examination Program (CLEP) are not accepted for advanced standing credit. No more than twelve (12) credits from other institutions may be applied toward a Johns Hopkins degree for students entering from high school. Under current freshman

grading procedures, first-semester courses satisfactorily completed at Johns Hopkins are listed on the permanent academic record without grades. However, a freshman that enters with fourteen (14) to twenty-three (23) credits may receive advanced standing at the end of the first semester. All first semester grades are then entered on the permanent academic record.

A student who enters with 24 or more credits of advanced standing from Advanced Placement examinations and acceptable college-level courses completed before matriculation at Johns Hopkins is granted sophomore standing upon entering. Therefore, the student's first college level courses or any advanced placement reports must be filed with the Office of Undergraduate Affairs (Engineering) no later than the beginning of the sophomore year.

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, 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 Article IV 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 Article III." Students may obtain a copy of the Constitution of the Ethics Board from the Office of Academic Advising, Garland Hall, Suite 3A.

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 Engineers (IEEE) represents the profession of Electrical Engineering, and students should read that organization's code of ethics on the web site: <http://www4.ncsu.edu/unity/users/j/jherkert/ethics.html>

5. Professional Societies, Honor Societies, and Awards

Undergraduates are encouraged to join the student chapter of the IEEE. Applications are available in 105 Barton Hall or at any of the regular meetings of the chapter.

The department sponsors a Chapter of Eta Kappa Nu, the Electrical Engineering honor society. Students with outstanding academic records are invited to join during their junior and senior years.

Each year, the ECE Department honors its outstanding graduating seniors with the Whitehead Award for excellence in academic achievements and with the W.H. Huggins Award. The latter award is based on service to the department and to fellow students and on academic achievements. An additional W.H. Huggins Award is given to an outstanding junior.

6. General Information

6.1 WSE Office of Academic Affairs

The Office of Academic Affairs (126 New Engineering Building) has general responsibilities for all engineering majors in the Whiting School of Engineering. The Associate Dean and his staff coordinate faculty advising, maintain student records, and handle academic problems that fall outside the scope of the faculty advisor. 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.
- Determining advanced standing and acceptance of coursework done at another college/university.
- Advising students on graduation eligibility.
- Informing students regarding proper procedures for taking summer school courses.
- Reporting unsatisfactory course performance to freshman.
- Placing students on academic probation, monitoring students on probation and identifying students who are required to withdraw from the University.
- Interpreting University academic policy and departmental policy.
- Providing information about internship and study abroad opportunities in engineering.
- Coordinating tutoring for students in engineering courses.
- Informing students regarding the tutoring, study skills and pre-professional counseling services of the Office of Academic Advising.

6.2 JHU Office of Academic Advising

The Office of Academic Advising (Garland Hall, Suite 3A) provides the following services for engineering students:

- Coordinating the premedical, pre-law and public health advising, as well as the recommendations committees for those areas.
- 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.

6.3 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 on the basis of 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.

Questions regarding access to programs following Title VI, Title IX, and Section 504 should be referred to Peggy Hayeslip, Director, ADA Compliance & Disability Services, who is responsible for coordination of equal opportunity programs, 130 Garland Hall, (410) 516-8075.

6.4 Policy on the Reserve Officer Training Corps

Present Department of Defense policy governing participation in University-based ROTC programs discriminates on the basis of sexual orientation. Such discrimination is inconsistent with The Johns Hopkins University non-discrimination policy. Because ROTC is a valuable component of the University that provides an opportunity for many students to afford a Johns Hopkins education, to train for a career and to become positive forces in military, the University, after careful study, has decided to continue the ROTC program and to encourage a change in Federal policy that brings it into conformity with the University's policy.

7. Graduation Process: B.S. in Electrical Engineering

1. The student obtains

- An "Application for Graduation, Baccalaureate Candidates" form from the registrar
- An "Assessment Questionnaire for the Electrical Engineering Program", and an "Advising Check-List for the Electrical Engineering B.S. Degree" from the ECE Departmental office or the web (www.ece.jhu.edu)

2. The student completes the forms and

- Returns the "Application for Graduation, Baccalaureate Candidates" form to the registrar in the basement of Garland Hall. Note that the form is then used by the Office of the Associate Dean for Academic Affairs to generate a list of candidates for B.S./B.A degree that is sent to Dr. Davidson, the ECE Undergraduate Advising Coordinator
- Meets with his academic advisor to have the "Advising Check-List for the Electrical Engineering B.S. Degree" approved
- Returns the "Assessment Questionnaire for the Computer Engineering Program" to Dr. Davidson
- Meets with the ECE chair to discuss his experience at Hopkins

3. The academic advisor

- Receives a "CANDIDATE FOR B.S./B.A." form and transcript for each of his advisees from Dr. Davidson, the ECE Undergraduate Coordinator
- Meets with his advisees to review and approve their "Advising Check-List for the Electrical Engineering B.S. Degree". If necessary the advisor fills out a "SUBSTITUTION/EXCEPTION/Waiver FORM" to justify the request of an substitution and/or exception and/or waiver of a requirement
- The academic advisor returns the "Advising Check-List for the Electrical Engineering B.S. Degree", "SUBSTITUTION/EXCEPTION/Waiver FORM" if applicable, transcript, and "CANDIDATE FOR B.S./B.A." form completed and signed to Dr. Davidson

4. Notes

- The deadline to apply for spring term graduation is January 31
- Departmental Honors are only given for first majors, and only when $GPA \geq 3.5$

8. Sample Programs

The following tables show two sample programs fulfilling the requirements of the BS Degree in Electrical Engineering. The programs are oriented toward two different concentrations of interest for illustrative purposes only. All students are expected to plan, in consultation with their faculty advisors, programs best suited to their own interests.

All programs are subject to the following guidelines:

1. All advanced placement credits must be applied to the category of the corresponding Homewood course.
2. Transfer students from other institutions must complete at least 21 credits from the Electrical and Computer Engineering Department at Johns Hopkins in order to be eligible for the BS degree.
3. Courses taken through the School of Professional Studies in Business and Education (either evening or summer session) or the GWC Whiting School's Part-Time Programs in Engineering and Applied Physics may be counted only if taken with the advisor's prior written approval.
4. Courses taken without the faculty advisor's written approval on the registration or add/drop form may not be counted.

ECE Signals, Systems and Communication Electives

520.401 Basic Communications
520.414 Image Processing and Analysis I
520.415 Image Processing and Analysis II
520.419 Theory of Iterative Algorithms I
520.432 Topics in Medical Imaging Systems
520.435 Digital Signal Processing
520.447 Introduction to Information Theory and Coding

ECE Solid State and Quantum Electronics Electives

520.407 Optical and Electronic Properties of Materials
520.410 Fiber Optics and Photonics
520.413 Physical Optics
520.457 Basic Quantum Mechanics for Engineers
520.481 Microwaves and High Speed Circuits
520.482 Introduction to Lasers
520.485 Semiconductor Devices

ECE Advanced Laboratory or Design Intensive Courses

520.424 FPGA Synthesis Laboratory
520.425 FPGA Projects Laboratory
520.448 Electronics Design Laboratory
520.450 Advanced Microprocessor Laboratory
520.454 Control Systems Design
520.483 Bio-Photonics Laboratory
520.484 Optoelectronics Laboratory
520.487 Introduction to Microelectromechanical Systems (MEMS)
520.490 Analog and Digital VLSI Systems and Architecture
520.491 CAD Design of Digital VLSI Systems
520.495 Microfabrication Laboratory
520.498 Senior Design Project I
520.499 Senior Design Project II

Other Advanced Laboratory Courses

530.420 Robot Sensors and Actuators
530.421 Mechatronics
530.487 Introduction to MEMS
580.471 Biomedical Instrumentation
600.445 Computer Integrated Surgery I
600.446 Computer Integrated Surgery II
600.457 Computer Graphics
600.461 Computer Vision

Sample Bachelor of Science in Electrical Engineering Program Emphasis in Signals, Systems and Communications (Courses in Bold are required)					
Fall-Year 1			Spring-Year 1		
Number	Course	Credits	Number	Course	Credits
110.108	Calculus I	4	110.109	Calculus II	4
171.101	Physics I	4	171.102	Physics II	4
173.111	Physics Lab I	1	173.112	Physics Lab II	1
520.137	Introduction to ECE	3	520.142	Digital System Fundamentals	3
	H&S Elective	3		H&S Elective	3
Total Credits		15	Total Credits		15
Fall-Year 2			Spring-Year 2		
Number	Course	Credits	Number	Course	Credits
110.202	Calculus III	4	110.201	Linear Algebra	4
030.101	Intro to Chemistry	3	520.214	Signals & Systems	4
520.213	Circuits	4	600.109	Intro to C/C++	3
520.219	Fields, Matter & Waves I	3		Non-ECE Engineering Elective	3
	H&S Elective	3		H&S Elective	3
Total Credits		17	Total Credits		17
Fall-Year 3			Spring-Year 3		
Number	Course	Credits	Number	Course	Credits
110.302	Differential Equations	4	550.310	Probability & Statistics	4
	ECE Sig/Sys/Com Elect	3	520.372	Programmable Device Lab	3
520.345	ECE Laboratory	3		Basic Science Elective	3
520.353	Control Systems	3		Elective	3
	H&S Elective	3		H&S Elective	3
Total Credits		16	Total Credits		16
Fall-Year 4			Spring-Year 4		
Number	Course	Credits	Number	Course	Credits
	ECE Sig/Sys/Com Elect.	3		ECE Sig/Sys/Com Elect.	3
520.498	Senior Design Project I	3	520.499	Senior Design Project II	3
	ECE Advanced Lab/Design Elect.	3		ECE Advanced Lab/Design Elect.	3
520.435	Digital Signal Processing	4		Elective	3
	NonECE Engineering Elective	3		Engineering Elective	3
Total Credits		16	Total Credits		15

Sample Bachelor of Science in Electrical Engineering Program Emphasis in Solid State and Quantum Electronics (SSE/QE) (Courses in Bold are required)					
Fall-Year 1			Spring-Year 1		
Number	Course	Credits	Number	Course	Credits
110.108	Calculus I	4	110.109	Calculus II	4
171.101	Physics I	4	171.102	Physics II	4
171.111	Physics Lab I	1	171.112	Physics Lab II	1
520.137	Introduction to ECE	3	520.142	Digital System Fundamentals	3
	H&S Elective	3		H&S Elective	3
Total Credits		15	Total Credits		15
Fall-Year 2			Spring-Year 2		
Number	Course	Credits	Number	Course	Credits
110.202	Calculus III	4	110.201	Linear Algebra	4
030.101	Intro to Chemistry	3	520.214	Signals & Systems	4
520.213	Circuits	4	600.109	Intro to C/C++	3
520.219	Fields, Matter & Waves	3		Fields, Matter & Waves II	3
	H&S Elective	3		H&S Elective	3
Total Credits		17	Total Credits		17
Fall-Year 3			Spring-Year 3		
Number	Course	Credits	Number	Course	Credits
110.302	Differential Equations	4	550.310	Probability & Statistics	4
	ECE SSE/QE Elect.	3	520.372	Programmable Device Lab	3
520.345	ECE Laboratory	3		Basic Science Elective	3
	Non-ECE Engineering Elective	3		Non-ECE Engineering Elective	3
	H&S Elective	3		H&S Elective	3
Total Credits		16	Total Credits		16
Fall-Year 4			Spring-Year 4		
Number	Course	Credits	Number	Course	Credits
	ECE SSE/QE Elect.	3		ECE SSE/QE Elect.	3
520.498	Senior Design Project I	3	520.499	Senior Design Project II	3
	ECE Advanced Lab/Design Elect.	3		ECE Advanced Lab/Design Elect.	3
520.435	Digital Signal Processing	4		Elective	3
	Elective	3		Engineering Elective	3
Total Credits		16	Total Credits		15

9. Frequently Asked Questions

Q: I am an Electrical Engineering major planning to graduate. I have been told that I must meet new requirements that differ from the requirements in effect when I was admitted to the program. I cannot meet all the new requirements and do not want to delay graduation. What should I do?

A: Meet with your advisor and try to meet the new requirements as best as you can. Make a list of the new requirements that you cannot meet and ask for a letter from the chairman waiving those requirements

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

A: Count these courses as electives

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 advisor, you must discuss your plan with your advisor prior to undertaking the project

Q: Because the Microfabrication Laboratory is not being offered this year, it is very difficult for the BME double majors to complete both requirements. Will the laboratory 580.471 PRINCIPLES OF DESIGN OF BIOMEDICAL INSTRUMENTATION be counted this year towards the Advanced Laboratory 12 credit requirement?

A: At the 11/01/01 faculty meeting it was decided to allow it for seniors graduating in the 2001-2002 academic year, or until Microfabrication Laboratory is reinstated, whichever comes first

Q: May Computer Science credits fulfill the requirement of 6 credits of engineering courses from other departments?

A: Yes

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

A: A student is allowed to (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)

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 pass/fail

Q: What are the prerequisites for Circuits (520.213)?

A: Calculus I (110.108) and Calculus II (110.109) are required, and Physics I (171.101) and Physics II (171.102) are recommended

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 provided that they show up on your transcript

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

A: You may count the course for either the B.S. or the M.S. 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 it possible for a freshman to take more than 18 credits a semester in the first semester?

A: No, Academic Advising will not permit you to take more than 18 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."

IF YOU HAVE ALREADY SUCCESSFULLY COMPLETED 173.111 OR 173.112, this message does not apply to you. You will retain the credit you've earned and no "waiver" notations are necessary.

IF YOU ARE REGISTERED FOR 173.111 OR 173.112 for Spring 2005, you may be able to drop the course. In order to drop the course, your remaining course load (after the -1 credit) must be, at minimum, 12 credits. You should also discuss dropping the course with your faculty adviser.

IF YOU ARE REGISTERED FOR 173.111 OR 173.112 for Spring 2005 AND YOU WANT TO STAY IN IT, YOU MAY DO SO! This policy does not prohibit you from taking the Physics labs and earning the credit.