Student Handbook

a.k.a. The Gold Book

For

Bachelor of Science in Engineering Program

2020-2021 Academic Year

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ABET Engineering Accreditation Commission

Table of Contents

Overview

This handbook is **NOT** intended as a substitute for the undergraduate catalog or for the academic advisor.

It is important that you read and understand this handbook in preparation for seeing your advisor. Then you can spend the time with your advisor more productively by discussing your individual goals and needs instead of attempting to comprehend everything in the catalog.

This handbook will be updated every year as the engineering program and curriculum evolves. The handbook and related university catalog for the year you enter are the guiding documents for your academic career during your time at ECU. This handbook will also be available to you on the department web page.

Welcome to ECU and congratulations on your accomplishments in being selected for the engineering program.

Program Mission, Outcomes, and Objectives

Mission of the ECU Engineering Program

The mission of the department is to provide a theory-based, application-oriented general engineering education that serves as a basis for career success and lifelong learning. Our graduates demonstrate the engineering and scientific knowledge to analyze, design, improve and evaluate integrated technology–based systems. Our program welcomes a diverse student body and provides the support to foster its success.

Educational Objectives of the ECU Engineering Program

Our five program objectives are consistent with the mission of the program and the university. Graduates of the BS in Engineering program will:

1. Use their education to be successful in a technical career or graduate studies, demonstrating competence in applying classical methods and modern engineering tools.
2. Analyze technical, environmental, and societal issues related to engineering designs and technology systems.
3. Be productive team members and leaders, using skills in human relations and communication.
4. Practice a lifelong commitment to learning and professional development.
5. Demonstrate commitment to the professional and ethical standards of engineering and recognize the importance of community and professional service.

Learning Outcomes of the ECU Engineering Program

To achieve the program objectives, the BS in Engineering degree program has established twelve learning outcomes that will be documented at graduation. ECU engineering graduates will demonstrate:

(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) 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.
(8) An ability to apply engineering concepts to an area of concentrated study, chosen from biomedical engineering, bioprocess engineering, electrical engineering, environmental engineering, industrial and systems engineering, or mechanical engineering.

Why Engineering at ECU?

Accredited Engineering Program

The BS in Engineering program at ECU is accredited by the Engineering Accreditation Commission of ABET, Inc. ABET is the worldwide standard bearer for evaluating and accrediting engineering programs. East Carolina University is proud to be one of only six universities in North Carolina with an ABET-accredited engineering program joining N.C. State, Duke, North Carolina A&T, Western Carolina, and Charlotte.

What is different about the ECU Engineering program?

The BS in Engineering at ECU is unique and provides an approach to engineering education that is significantly different from most other universities.

- It emphasizes the application of engineering theory to real world problems. Our students are engaged in hands-on engineering activities beginning with the first semester.
- The mathematics and science content is integrated with the engineering courses, software, and labs to provide an integrated plan of study that converts theory into practice.
- Students work very closely with the engineering faculty and their classmates in a team-based learning process that promotes learning, success, and teamwork.
- Our class size is relatively small. Our introductory courses typically have 20-24 students in them rather than the large courses with 100+ found at other universities. In the ECU engineering department students truly are treated like individuals, not just a number.

How is the curriculum structured?

The curriculum is composed of a 43-semester hour common core of courses that provides a foundation in general engineering. Each concentration contains 22 semester hours of coursework that builds expertise in that specific discipline area. A more detailed explanation of the coursework is found in the Curriculum section of this handbook.

Is a BS in Engineering program right for you?

Traditional engineering programs, such as mechanical and electrical engineering, produce engineers who focus on a limited technology area or part of a system. ECU's BS in Engineering program gives students a broader engineering perspective and focuses more on understanding how to apply this knowledge to solve problems and to improve entire technology systems as opposed to small components or elements. For example, a mechanical engineer may focus on design or operation of a component of a vehicle transmission. The general engineer has the background to understand a specific component but also has the technological breadth to analyze and understand how that component impacts the operational life cycle of the vehicle and address areas such as operations, performance, test, manufacturing, cost and schedule, training and support, and disposal.

Graduates from BS in Engineering programs are employed in a variety of fields within engineering and can also be found in human resources, health care, banking and finance, insurance, government, tourism, service, transportation, agriculture, and retail.

Which concentration is best for you?

ECU offers a Bachelor of Science (BS) in Engineering with six unique and innovative concentrations: Biomedical Engineering, Bioprocess Engineering, Electrical Engineering, Environmental Engineering, Industrial and Systems Engineering, and Mechanical Engineering. It is generally not possible to complete more than one concentration due to course conflicts.

- *Biomedical Engineering* focuses on improving medical systems to enhance human health. This concentration includes disciplines such as medical instrumentation, imaging, biological materials, and modeling in areas such as biomechanics and the physiological systems of the body. Biomedical engineers are prepared for broad career options, including graduate study and medical school, medical research, and in clinical, sales, and engineering positions in industry.
- *Bioprocess Engineering* is one of the fastest growing segments of the economy. Bioprocess engineers design and develop equipment, methods, and systems for the efficient and environmentally sound manufacturing and processing of medicines, vaccines, organic fuel technology, food products, diagnostics, and biologically-based products. Bioprocess engineers work for food packaging and processing companies, pharmaceutical manufacturers, breweries, vineyards, ethanol production companies, and many other areas where biological agents are involved in large scale production.
- *Electrical Engineering* is a broad field involved in projects of varying scale. Electrical engineers possess the skills to work on very large scale engineering projects such as high power transformers, generators, and electrical distribution grids and very small scale products such as nanoscale transistors. Electrical engineers are involved in the design of any electronic device from music players, digital cameras, and computers to robots, automotive technology, and manufacturing equipment. Electrical engineering is also vital to communication technology such as cell phones, radios, computer networks, and satellites.
- *Environmental Engineering* is one of the fastest growing disciplines. Environmental engineers apply scientific principles of biology, chemistry, hydrology, and soil science to design sustainable solutions for environmental problems. They have the skills to complete projects that improve public health and waste disposal, and control water and air pollution in settings ranging from urban sanitary facilities to industrial facilities to rural agriculture. ECU environmental engineering students study topics such as water quality analysis and treatment, air pollution control, stormwater design and management, and surface and groundwater hydrology.
- *Industrial and Systems Engineering* is the perfect blend of technical engineering skills and people orientation. Industrial and systems engineers focus on the design, analysis, optimization, and operation of systems ranging from a single piece of equipment to large business, social, and environmental systems. Industrial and systems engineering addresses overall system performance and productivity, responsiveness to customers' needs, and the quality of the products or services produced by the enterprise. This field is not just about manufacturing but also encompasses service industries such as government, health care, transportation, logistics, and consulting.
- *Mechanical Engineering* is one of the broadest engineering disciplines. Mechanical engineers have skills to support design and improvement of a wide range of products from supersonic aircraft to toasters and bicycles. Mechanical engineers may specialize in areas like combustion, thermal systems, machine design, and robotics or cross over into advanced technologies such as artificial limbs and nanotechnology. Career opportunities for mechanical engineers exist in a wide range of business and industry including manufacturing, consulting engineering, product design, and research.

Curriculum

This section contains information about the 4-year curricula for each concentration and academic advisor information.

2020-2021 Engineering Catalog Copy

The Department of Engineering offers a BS in engineering with six concentration areas: biomedical engineering, bioprocess engineering, electrical engineering, environmental engineering, industrial and systems engineering, and mechanical engineering. The BS in engineering program is accredited by the Engineering Accreditation Commission of ABET, Inc., 111 Market Place, Suite 1050, Baltimore, MD 21202-4012, telephone: 410-347-7700.

The mission of the department is to provide a theory-based, application-oriented general engineering education that serves as a basis for career success and lifelong learning. Our graduates demonstrate the engineering and scientific knowledge to analyze, design, improve and evaluate integrated technology-based systems. Our program welcomes a diverse student body and provides the support to foster its success.

Graduates of the BS in engineering program will:

1. Use their education to be successful in a technical career or graduate studies, demonstrating competence in applying classical methods and modern engineering tools;
2. Analyze technical, environmental, and societal issues related to engineering designs and technology systems;
3. Be productive team members and leaders, using skills in human relations and communication;
4. Practice a lifelong commitment to learning and professional development; and
5. Demonstrate commitment to the professional and ethical standards of engineering and recognize the importance of community and professional service.

Graduates of the BS program have: (a) an ability to apply knowledge of math, science and engineering; (b) an ability to design and conduct experiments/analyze and interpret data; (c) an ability to design a system, component, or process; (d) an ability to function on multi-disciplinary teams; (e) an ability to identify, formulate, and solve engineering problems; (f) an understanding of professional and ethical responsibility; (g) an ability to communicate effectively; (h) an ability to evaluate the impact of technology in a global/societal context; (i) an appreciation for lifelong learning; (j) knowledge of contemporary issues; (k) an ability to use the techniques, skills, and modern tools for engineering practice; and (l) an ability to apply engineering concepts to an area of concentrated study, chosen from biomedical engineering, bioprocess engineering, electrical engineering, environmental engineering, industrial and systems engineering, or mechanical engineering.

The BS program is distinctive from many other engineering programs in that it: 1) focuses on hands-on project applications of engineering, beginning with the freshman year and continuing throughout the program; 2) promotes a team-based learning approach where students work closely with each other and the faculty; and 3) integrates science, math and engineering content to assure a coordinated presentation of concepts that flow from theory to advanced practice and application.

Engineering students are encouraged to pursue registration as a Professional Engineer (PE). The first step in this process is completion of the Fundamentals of Engineering (FE) Exam. Students are encouraged to take the FE exam during their senior year. Subsequent to graduation, professional licensure requires at least four years of progressive engineering experience and successful completion of the FE Examination.

Admission

Freshmen Admission Requirements

Admission to the engineering program is highly competitive. The admission criteria considered includes:

- Minimum SAT Scores: 620 Math; 540 Verbal
- Minimum 3.0 unweighted high school GPA
- Top 30% of High School class
- Highest math level completed–precalculus or calculus preferred
- Quality of engineering application essay

The department accepts applications every semester. Students who are not initially admitted into the program may apply at a later date (see Transfer Student Requirements).

Transfer Student Admission and Change of Major Requirements

Students transferring into the engineering program from another institution or changing their major from another ECU program must have a minimum cumulative GPA of 3.0 (including both ECU and non-ECU courses) and completed the equivalent of Math 2171 (Calculus 1) with a C or higher, ENGL 1100 and 2201, and CHEM 1150/1151. Students who enter with an Associate's in Engineering will be given preference.

Repeating Engineering Courses

Engineering students are allowed to repeat courses offered by the Department of Engineering (course prefixes ENGR, BIOE, BIME, EENG, ENVE, ISE/ISYS, MENG) one time without question. If a student fails to achieve the minimum required grade in the second attempt, the student must petition the Department of Engineering Admissions and Retention Committee to be allowed to enroll in the course for the third time. As part of the petition process the student must present a plan for success. Description of the petition process, including forms, can be found on the departmental website or at go.ecu.edu/ENGRcourserepeat.

Special Department Programs

Cooperative Education. Students in the industrial and systems and mechanical engineering concentrations may request to participate in the cooperative education (co-op) program that alternates semesters of engineering work and academic enrollment. Co-op students earn money during their periods of employment and also learn how their coursework relates to engineering activities. Furthermore, they have an opportunity to experience different areas of engineering during their co-op work periods. To be eligible for the engineering co-op program, students must have declared a major in engineering, completed a minimum of 24 s.h. including ENGR 1000, ENGR 1012, ENGR 1014 or ENGR 1016, ENGR 2050, and MATH 2152, and have earned a minimum major and overall cumulative GPA of 2.5. Additional eligibility requirements and availability of co-op placements can be obtained from the academic advisor. Interested students should apply for a co-op through the Career Center.

Internships. All engineering students are encouraged to complete internships, service learning projects, and professional practice activities prior to graduation. The department maintains a number of internship relationships at local and regional employers.
Engineering Intended. The Engineering Intended (EI) classification, which is not a degree program, has been set up to ensure quality academic advising of students who have not been accepted into the engineering program, but have good academic potential and continue to have engineering as a goal. Academic advising is provided by the staff of the College of Engineering and Technology Advising Center. EI students are not allowed to take any engineering courses except those previously taken at ECU that can be grade replaced. Admission into Engineering Intended is competitive. Specific requirements include eligibility to enroll in MATH 1083 or higher and an overall GPA requirement. Complete requirements can be found on the Department of Engineering website. A student may be enrolled as EI for a maximum of two semesters. If not accepted into the engineering program at the end of the second semester, the student must change their major. Information on related majors, some of which have historically been good choices for former engineering students, will be provided by the Advising Center. Engineering students who have been suspended from ECU will be readmitted as EI students. Second degree students and students with associate degrees are not eligible for EI.

Engineering Learning Community. Incoming freshmen are encouraged to live in the engineering learning community dormitory on campus. This program builds teamwork and collaboration skills and facilitates the transition to university life. Transfer students can apply to live in the Engineering Learning Community.

Undergraduate Research. Students are strongly encouraged to pursue undergraduate research with a faculty member. Up to 6 semester hours of undergraduate research may be applied toward degree requirements as a technical elective. Information regarding undergraduate research may be obtained from the concentration coordinator.

Transfer Program. The engineering department evaluates transfer credits on a course-by-course basis. Transfer students who have received credit for courses equivalent to ENGR 1000 and ENGR 1012 may be placed in ENGR 1014 in lieu of taking the traditional pathway through ENGR 1016 and ENGR 2000. Students may not receive credit for both ENGR 1014 and either ENGR 1016 or ENGR 2000.

Programs
Accelerated
- Bachelor of Science in Engineering/Master of Science in Biomedical Engineering
- Bachelor of Science in Engineering /Master of Science in Mechanical Engineering

Bachelors
- Engineering, BS

BS in Engineering

Minimum degree requirement for the engineering program is 125 semester hours. Details of the curricula for the different concentrations are shown on the flowsheets. Some students are interested in completing multiple concentrations. We caution you that completing multiple concentrations may not be possible due to course conflicts. We also caution you that if you fail or do not take a course as shown on the flowsheets your graduation date may be delayed by as much as one year.

Academic Advising

ECU Engineering takes a comprehensive view of academic advising. The purpose of the academic advising system is to help the student define the choices that must be made and to give any needed advice related to progression through the academic steps toward graduation. Each engineering student is assigned an academic advisor who will work with him or her on academic matters such as course registration, satisfactory academic progress, preparing for graduation, and choice of concentration and major. Students must meet with their academic advisor at least once a semester in order to track their progress and prepare for registration for the next term. The current engineering curriculum flow sheets outlining the normal progression through the curriculum and catalog information are contained in this booklet.

The College of Engineering and Technology works closely with the ECU Career Center to ensure that students are properly advised about career choices and opportunities. The college has a dedicated career advisor who can address specific career needs of CET students, such as résumé development and interview skills, and can help students learn more about the engineering profession. The Career Development and Leadership Center is located in Science and Technology 239.

Student and Academic Advisor Responsibilities

Table 1 outlines the division of responsibilities between the student and his or her academic advisor for each student's academic success. Note that your academic advisor will not be able to advise you in matters related to financial aid, housing, athlete eligibility, legal matters, or personal counseling. They can give you contact information for people who can advise you on those matters. Students can find out who their advisor is by going to PiratePort, then to Self Service Banner (SSB), and then to Student Information. Appointments can be made through Advisor Central in PiratePort.

Table 1 Academic advisor and student responsibilities

Advisor Responsibilities	Student Responsibilities
• Provide advice to students about ways to be academically successful and provide information to students about available resources and academic programs • Advise students in such a way that all pre- and co-requisites are recognized along with all other University regulations and processes.	• Treat your academic advisor with the same respect you would any other faculty member. They are here to help you navigate the curriculum, and they are on your side. • Take advantage of the resources provided to you including tutoring, professors' office hours, and library study areas. • Each student is solely responsible for his or her own success. • Perform to the best of his or her abilities in each course to ensure that graduation is not delayed. • Maintain good study habits

Advisor Responsibilities	Student Responsibilities
• Meet with each advisee at least once per semester to develop a course plan for the following semester.	• Schedule meeting with advisor using Advisor Central in PiratePort. • Update DegreeWorks Plan (DWP) before meeting • Respect your advisor's time. Show up on time to the meeting. If you show up late your time allocation may be reduced. If you show up early be prepared to wait. • Bring paper and a writing instrument so you can take notes on what your advisor says. • Inform advisor in advance if you are unable to make the scheduled meeting. • Register for the classes agreed upon in the meeting with the advisor. • If adjustments need to be made to the course plan, the student should inform his or her advisor of the change in plans and update the DWP.
• Track student progress through the curriculum and provide help for students who are off track	• Track personal progress through the courses on the flowsheet and your DegreeWorks Plan to ensure that graduation occurs by goal date. • Understand which courses are prerequisites for other courses • While the advisor will help the student develop a reasonable plan, it is the responsibility of the student to keep up with courses and to know when to take each class • Realize that the engineering program is sequenced in such a way that dropping or failing a single course may delay graduation a full year
▪ Works with the various offices on campus to get credit approved for credit from outside the university	▪ Must request documentation of credit received from outside institutions (College Board or other colleges/universities) be sent to ECU
• Field questions from parents and students about academic progress • Ensure that academic issues are only discussed with individuals the student has authorized	• If desired, complete the Buckley form online through PiratePort authorizing other individuals to be able to speak with university officials about academic issues

DegreeWorks Plans

All Engineering students are required to have an up-to-date and "approved" DegreeWorks Plan (DWP) at all times. It is the student's responsibility to create and update their plan as necessary. Information on the creation and maintenance of the DWP can be found at

https://registrar.ecu.edu/what-is-degree-works/. Complete curriculum information is shown on the flowsheets in this document.

General Education Requirements

East Carolina University requires that all degree recipients develop a broad base of knowledge and critical thinking ability that extends beyond their specific area of study. In addition to engineering classes, all ECU engineering students are required to take several electives in the humanities, fine arts, social sciences, health promotion, and physical fitness. The overarching goal of the General Education requirements (formerly the Foundations Curriculum) is to provide students with the fundamental knowledge and abilities essential to their living worthwhile lives both private and public. For more information about the General Education requirements, please consult the undergraduate catalog.

Mathematics Requirements

Mathematics is one of the foundations of the engineering curriculum, and all engineering curricula are calculus-based. Practicing engineers use mathematics every day in their work. The department accepts students with a wide array of backgrounds and abilities. For this reason, it will be imperative that some students start at different math levels. Table 2 depicts the three most common math approaches that can be used for this degree. Students with AP/IB or transfer credit for math courses may have different circumstances and should work with their advisor to develop a personalized plan.

Table 2: Pathways through curriculum based upon math placement

Start in:	Fall of Freshman Year	Spring of Freshman Year	Summer between Freshman and Sophomore	Fall of Sophomore Year
MATH 2171	MATH 2171	MATH 2152	-	MATH 2153
MATH 1083	MATH 1083	MATH 2171	MATH 2152/2172	MATH 2153
MATH 1065 or lower	Typically 5 years or longer needed to graduate			

In order for a student to graduate in four years, he or she must start in MATH 2171 or MATH 1083. Starting with a lower level math will typically require five or more years to graduate. Completion of MATH 2152 (or MATH 2172) prior to the start of the sophomore year is **imperative** for a student to stay on track with the engineering curriculum and **may require some students to take summer classes as outlined in the table above or to delay graduation**. It should be noted that no MATH courses below the level of calculus can count toward an engineering degree in any way.

Academic Integrity

Engineering is a profession in which ethical behavior is absolutely required. When engineers do not behave ethically, the results are often catastrophic and fatal. The practice of ethical behavior begins in the engineering classroom. The faculty of ECU Engineering are serious about ethics and do not tolerate academic dishonesty of any form. The Academic Integrity section of the ECU Faculty Manual includes definitions of cheating, plagiarism, falsification/fabrication,

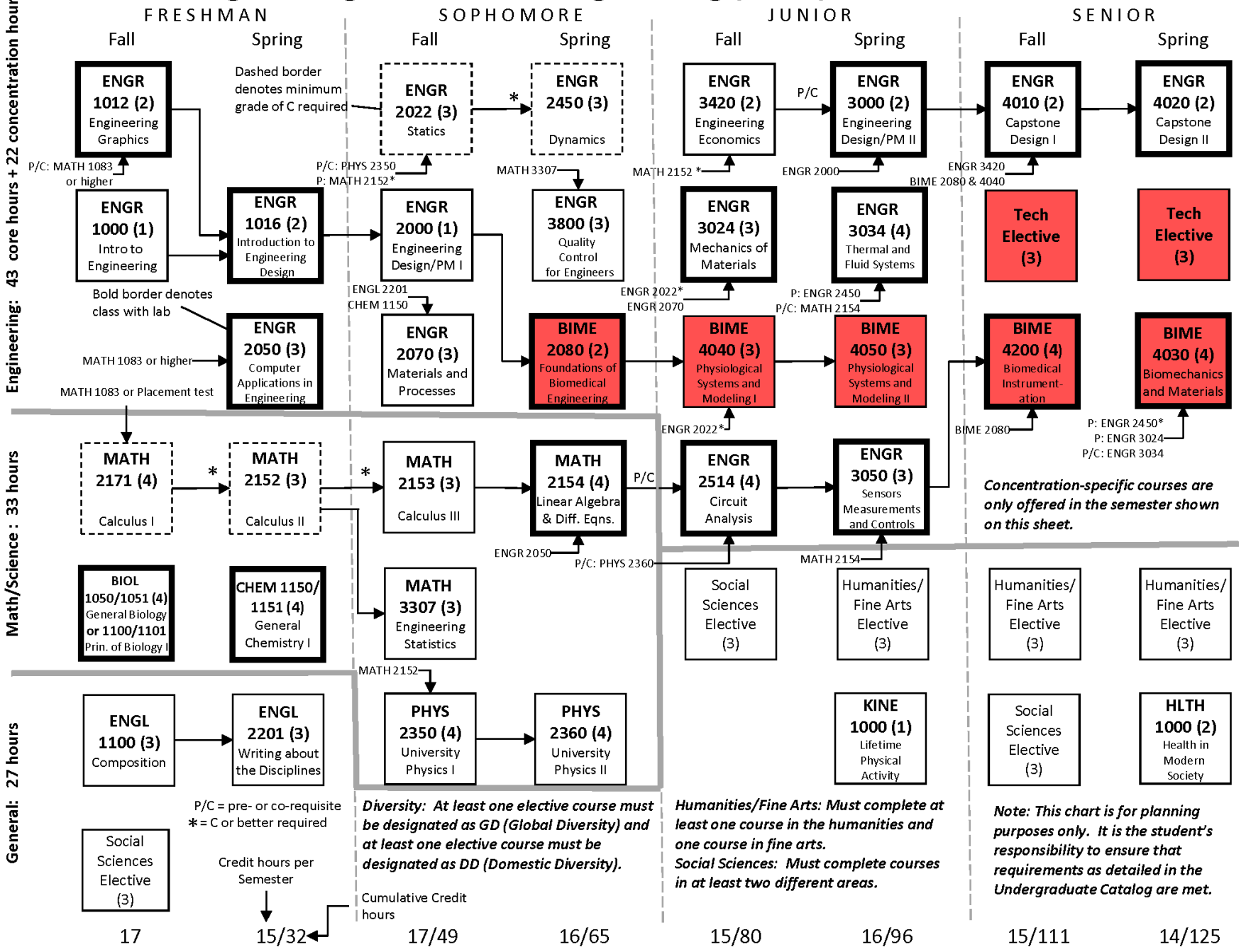
multiple submission, violation assistance, and violation attempts as behaviors that should result in academic penalties.
(http://www.ecu.edu/cs-acad/fsonline/customcf/currentfacultymanual/part6section2.pdf)
If you are not sure if something is a violation, you should ask your instructor to make sure. Academic integrity violations can inhibit your ability to obtain a scholarship, represent the university in various capacities, get a job, or obtain a security clearance.

Curriculum Flowsheets

The attached sheets show the sequence of courses for each of the six concentrations offered by the department. Arrows indicate prerequisite courses. Courses in shaded boxes indicate courses specific to each concentration. Courses with a bold line around the box indicate courses that contain a laboratory component. Some courses require a minimum grade of C in order to progress to the next course. These are indicated on the flowsheets in boxes with dashed lines around them. Information on these sheets is based on the undergraduate catalog and is not meant to be a substitution for the catalog. These flowsheets indicate the typical sequence for students who start in MATH 2171 with no transfer credit. Students who transfer in courses or who do not start in MATH 2171 will follow a modified path toward graduation.

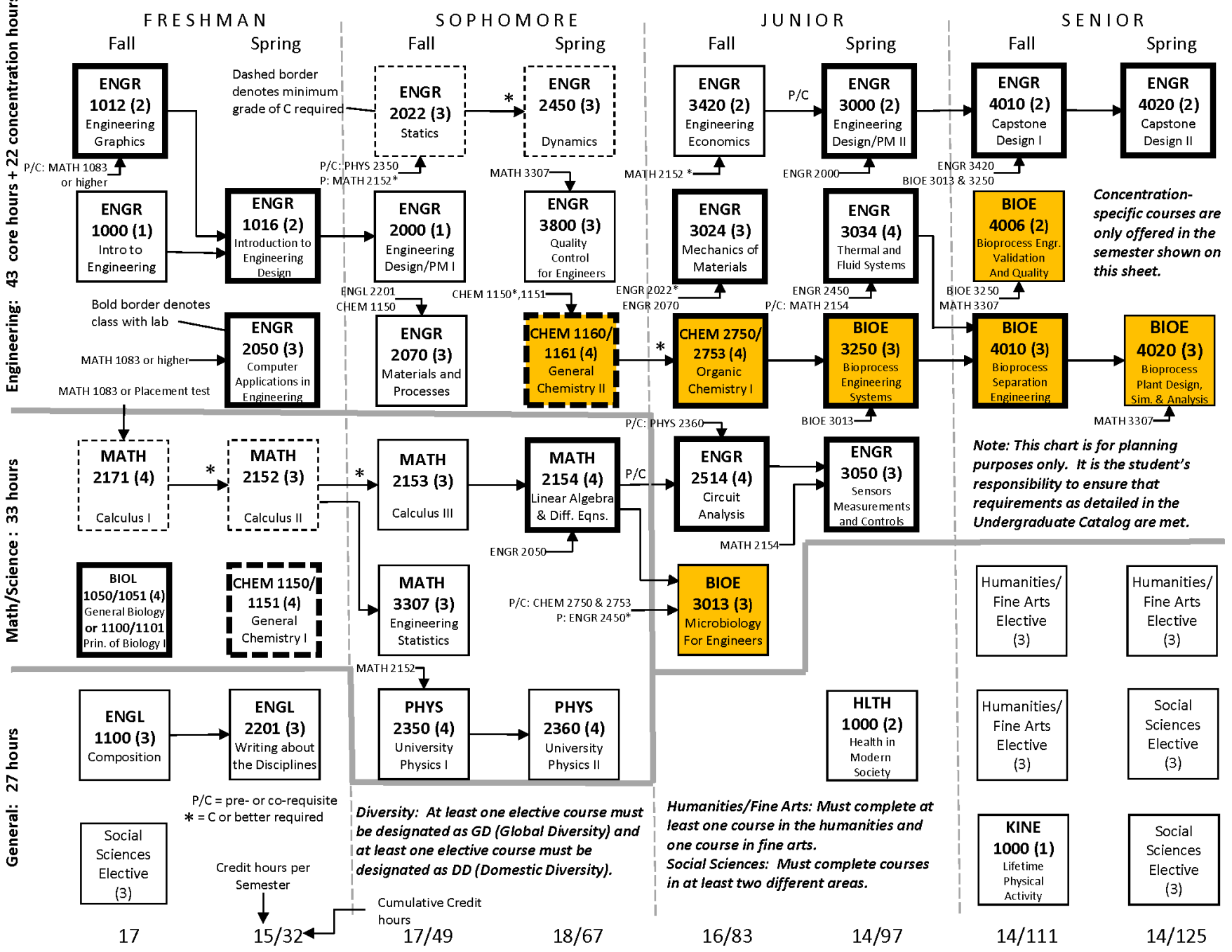
Students often ask, “Can I graduate on time?” The degree requirements are shown on the flowsheets. When those requirements are completed it is “time.” Until the requirements are completed, it is not “time.” In the history of the program, the average time to graduation for entering freshmen is slightly over four years. For transfer and second-degree students, the average time to graduation has ranged from 2.99 to 3.42 years.

BS Engineering – Biomedical Engineering (BIME) Concentration – 2019



Revision Date: June 3, 2019

BS Engineering – Bioprocess Engineering (BIOE) Concentration – 2019



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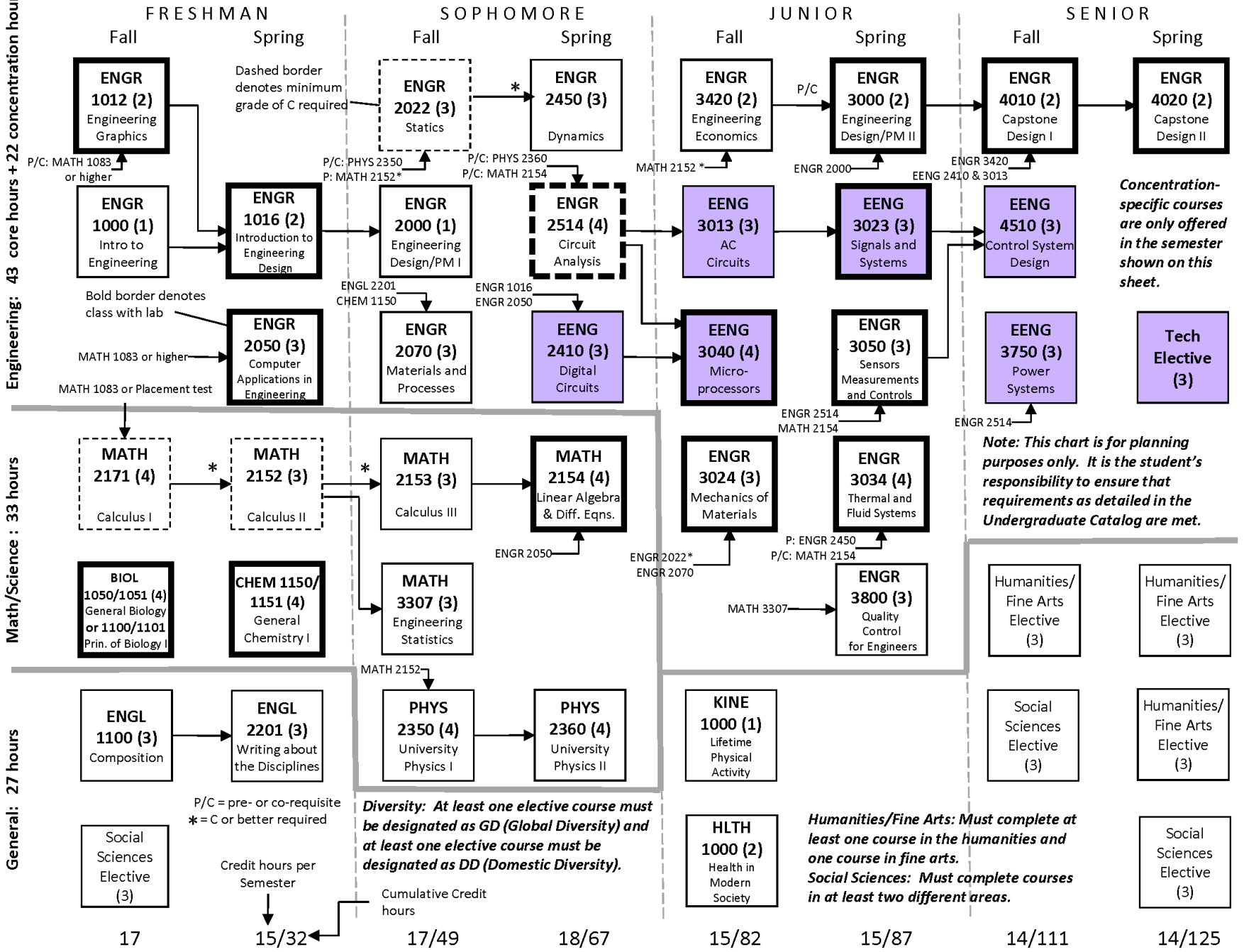
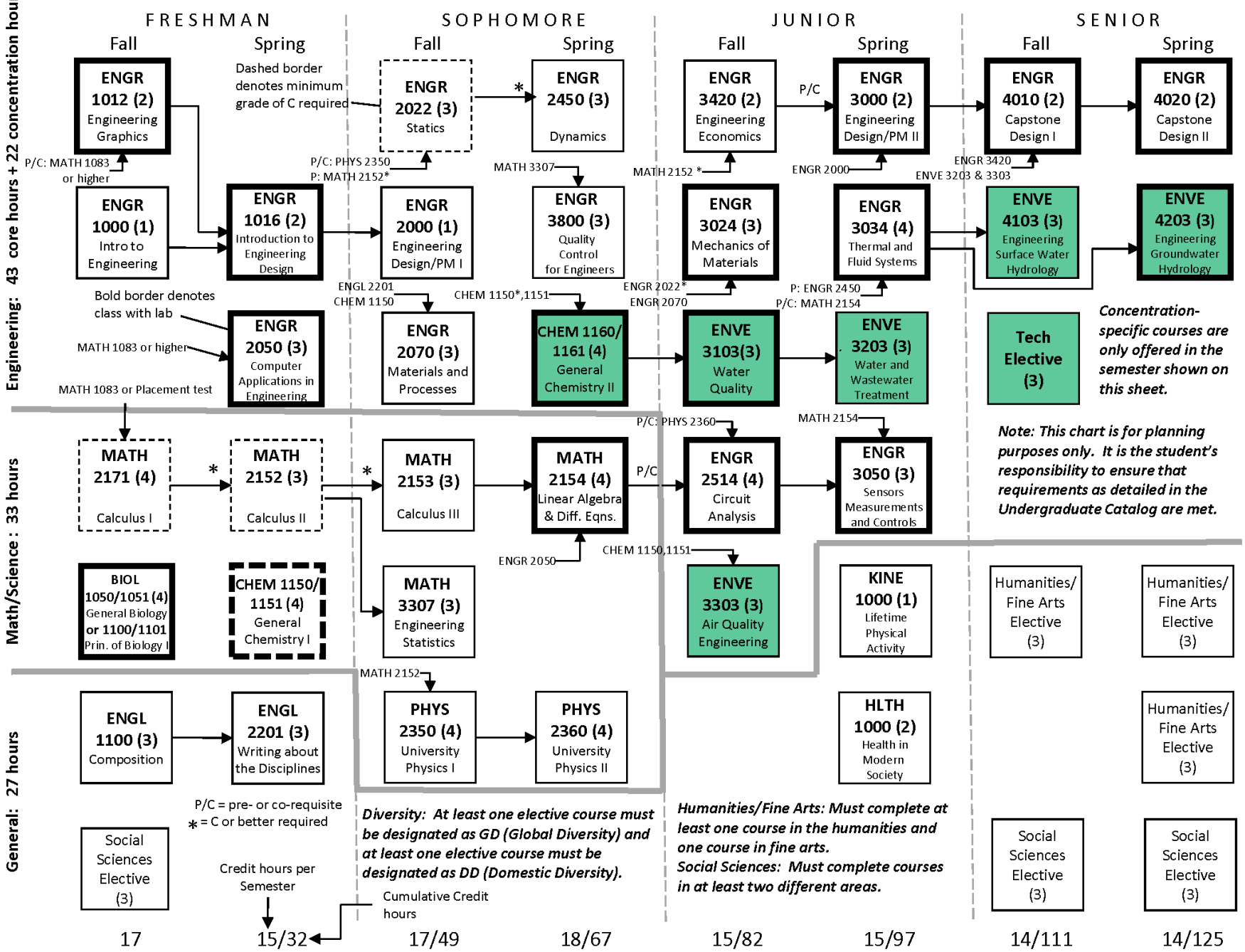
BS Engineering – Electrical Engineering (EENG) Concentration – 2019



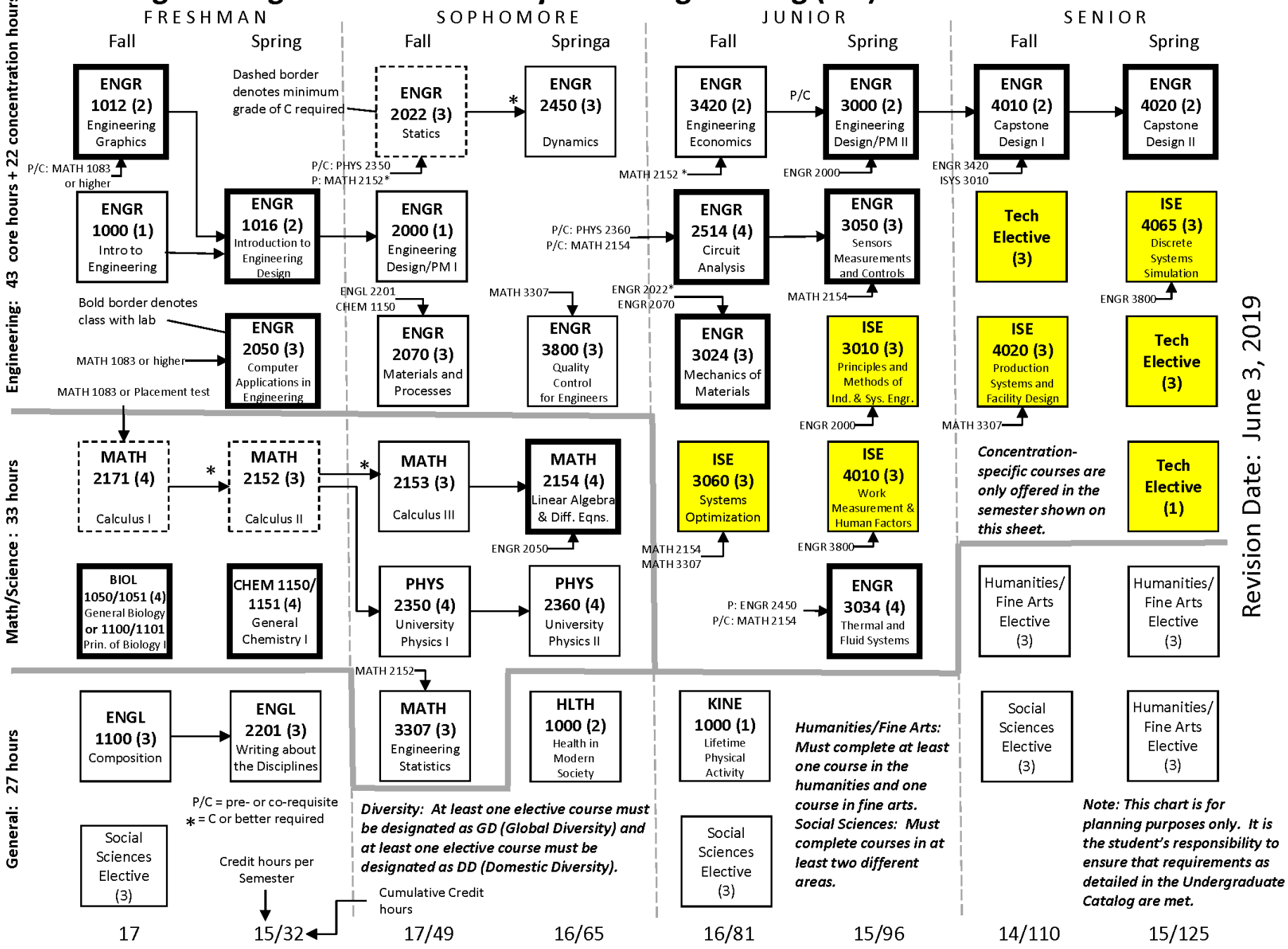
Revision Date: June 3, 2019

BS Engineering – Environmental Engineering (ENVE) Concentration – 2019

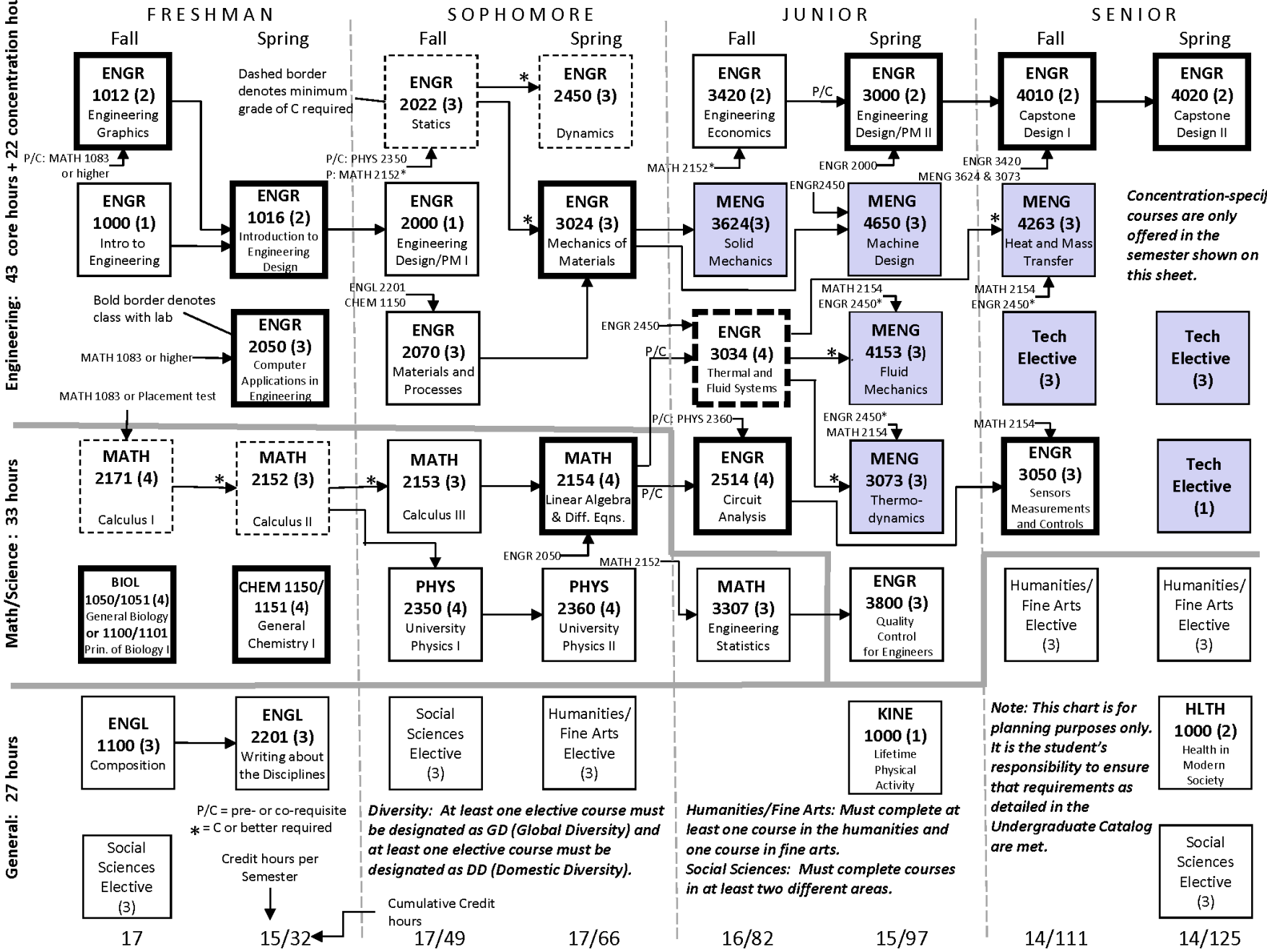


Revision Date: June 3, 2019

BS Engineering – Industrial and Systems Engineering (ISE) Concentration – 2019



BSE – Mechanical Engineering (MENG) Concentration – 2019



Revision Date: June 3, 2019

Electronic Devices

Computer Requirements and Software

The use of computers pervades the engineering discipline and the engineering curriculum makes use of computer technology in nearly every course. Every year the engineering program publishes the specifications for this computer through the Pirate Techs program at https://itcs.ecu.edu/pirate-techs. We recommend purchasing from ECU since this facilitates maintenance and other issues. If you purchase a computer from another source it must have capabilities similar to the unit specified by the department. Engineering students are required to have a laptop computer running the Windows operating system with acceptable graphical and computational capabilities. Students who come with Apple computers will be responsible for loading Windows on their machines (via Boot Camp or virtualization software) and the ECU engineering department will not be responsible for any software or hardware incompatibility that results from this choice. Various courses will also either provide software to you for you to install on your computer or require you to purchase software. Details about individual course software requirements will be announced in the course syllabi. The hardware specifications on the website above showcase the minimum configuration necessary to run all of the software that will be needed throughout the four year engineering sequence.

The ECU engineering program also recommends that students purchase a comfortable laptop backpack or bag because they will be carrying their laptops around campus regularly. In many classes, students will be expected to bring a laptop with them. Students should confirm with their instructor the days that it will be necessary for them to have their computer with them. Students are expected to use technology in a professional manner at all times and to abide by University policies for appropriate use of technology.

Calculators

Engineers will often have a need to perform basic computations using a calculator. Some of the latest models of graphing calculators have the ability to perform many functions. A calculator is not a substitution for learning to do mathematical operations manually. Students should also be aware that many of the more advanced calculators are prohibited on exams such as the Fundamentals of Engineering (FE) Exam (discussed in the subsequent section). Students are encouraged to purchase a calculator that is permitted on the FE exam and to become familiar with its use. A list of acceptable calculators is found here: https://ncees.org/exams/calculator/

Cellular Phones/ PDAs/ Smartphones

Students are encouraged to sign up for ECU alerts. In the event of a campus emergency or weather-related closure the ECU alert system will send a text message to all registered phones allowing students to take appropriate action. The website contains instructions for students to sign up for ECU alerts: https://alertinfo.ecu.edu/.

It is important that students learn the proper professional use of technology. It is expected that when students attend class or meetings with faculty or their academic advisor that their phone will be set to silent so that it is not a disruption. Some faculty members have very strict policies about the use of such technology in their class and grade penalties may be given if a student is found to be using such technology inappropriately.

Preparing for Professional Practice

A major objective of the ECU Engineering program is development of the technical and communication skills required for professional practice. This is achieved through consistent and planned student involvement in engineering design projects involving written and oral reports. This section describes the specifics of the curricular plan for these projects.

ECU Engineering Professional Development Program

The ECU Engineering Professional Development Program emphasizes development of engineering design and critical professional skills during every academic year. The design sequence begins with introductory courses showcasing what design is and some basic tools to use in design and culminates in a yearlong capstone design project in the senior year.

First Year

During the first year, several courses are structured around teamwork, engineering problem solving, and design. In ENGR 1000 Introduction to Engineering, students learn about the engineering profession and the types of work in which engineers are involved. During this course, students are introduced to the engineering design process and engineering problem solving. In ENGR 1012 Engineering Graphics, students learn how to use graphical communication skills to convey visual information about a design. A subsequent course in the second semester, ENGR 1016 Introduction to Engineering Design, provides students the opportunity to develop design requirements and constraints and gives students tools to identify feasible solutions to design problems. ENGR 1016 requires students to design and build several projects and involves elements of graphics, electronics, programming, and mechanical components.

Second Year

In the second year, students expand upon their knowledge of engineering design in ENGR 2000 Engineering Design and Project Management I. This course showcases engineering achievements and failures throughout history and continues development of the design skills obtained during ENGR 1016. ENGR 2000 emphasizes the engineering design process and builds on other work in project staging and proper management of resources and time. Students now have the skills to participate in more challenging projects and are well-prepared for summer industry work experiences.

Third Year

At this stage in the curriculum, students will have completed their related courses and have a solid mathematical foundation to use for problem solving. In the third year, students take ENGR 3000 Engineering Design and Project Management II, which trains them to develop a project plan and design documentation including presentations and reports. During the third year, students are also taking several concentration-specific courses, allowing them to develop technical competencies while working on projects within the concentration area of their choosing.

Fourth Year

Prior to graduation, the ECU engineering student must demonstrate adequate preparation to practice engineering by completing a year-long capstone design project (ENGR 4010 and 4020). The capstone project involves working on a real-world project for an industry, community, or university partner. Students will work with a team of senior engineering students and under the advisement of a faculty mentor/advisor and a project sponsor to complete this design project. This project serves as a culmination of the design skills learned throughout the previous three years.

Fundamentals of Engineering Exam

Engineering students are strongly encouraged to take the Fundamentals of Engineering (FE) Exam during their senior year. This is a full-day test and is the first step to professional licensure as a professional engineer. Information on the test and professional licensing can be found at the web site of the National Council of Examiners for Engineers and Surveyors (NCEES): http://ncees.org/

To prepare students for this test, several engineering courses require students to use the NCEES book of formulas for class tests. A copy of the book of formulas may be downloaded by going to http://ncees.org and creating a MyNCEES account, logging in, and navigating to the FE Manual.

The NCEES only allows certain calculators to be used during the FE exam. The current list of approved calculators is available on the NCEES web site: https://ncees.org/exams/calculator/. *No other models of calculators or variations of the models listed are permitted in the exam room.*

Each year, NCEES will review and revise the approved calculator list and then announce the updated list by November 15. Be sure to check the NCEES website to ensure that your calculator will be permitted in the exam room. It is recommended that students buy one of the permitted calculators their freshman year so they are very accustomed to its features by the time they take the FE exam. Some Engineering faculty will only allow an FE-approved calculator to be used on tests.

Developing the ECU Engineer

Practical experience working in the engineering field is invaluable for students to put the technical knowledge gained through their academic courses to use in a “real world” setting. Engineering students are strongly encouraged to seek out internship and co-op opportunities so that they can see how engineering companies operate on a day-to-day basis. These experiences can be very rewarding and have led to long-term employment for some of our graduates.

The Department of Engineering and the Dean’s Office work with various industry partners in the Eastern North Carolina region to pair teams of students with companies who need work done on short-term projects as well as year-long Capstone design projects.

Each spring and fall, the Department of Engineering puts out a call for student résumés. These résumés are compiled and sent to hundreds of employers who provide internships, coop assignments and post-grad employment. Engineering students are encouraged to participate in this “Résumé Round-up”. Students should meet with the representatives at CET Career Development and Leadership Center for an initial screening of their résumés before submitting their résumés to the Round-up. When received for the Round-up, résumés will be reviewed and lightly edited. If a rework is required students will be requested to meet with reviewers. The completed résumés are converted to *.pdf files and the files are sent to potential employers. This is a unique benefit of Pirate Engineering and has resulted in students getting placed in internships, coop assignments and even jobs. All students are encouraged to participate. Look for an email shortly after the semester starts.

ECU Engineering Student Opportunities

Honors College

Advanced undergraduate students may be invited to join the East Carolina University Honors College. This college requires students to take additional advanced coursework and provides exceptional students with opportunities to enrich their education through participating in more in-depth courses. Honors students should work with both their advisor in engineering and the Honors College advisor to develop an academic plan that meets the requirements of their major and the Honors program requirements. The website address is https://honors.ecu.edu/

Accelerated Bachelor /Master of Science in Biomedical or Mechanical Engineering

The accelerated bachelor's/master's program is intended for outstanding engineering undergraduate students. Graduate student course work begins in the students' fourth year of undergraduate study and is completed with one academic year of study beyond the bachelor's degree.

Students are expected to apply to the program during the fall semester of their junior year. Minimum requirements for students applying to the accelerated bachelor's/master's program:

1. Completed graduate school application (http://www.ecu.edu/cs-acad/gradschool/Admissions-Information.cfm). Application requirements include GRE scores, 2 letters of recommendation, Personal Statement and Official Transcript.
2. Minimum 3.5 GPA at the time of admission and entry to the program.
3. Completion of a minimum of 81 eligible undergraduate credit hours.
4. Currently working with or have research experience with a thesis advisor.

Pirate Academic Success Center

Located in 2300 Old Cafeteria Building, the Pirate Academic Success Center offers free tutoring to students for Math and Science courses. Engineering students in the Center provide tutoring for some engineering courses. Students are encouraged to visit the Center early and often. The website address is https://pasc.ecu.edu/

Reserve Officers' Training Corps (ROTC) Program

ECU Engineering students may participate in the Army or Air Force ROTC Programs. Military careers can be very rewarding and fulfilling to engineering students. Plus it is possible to defray some expenses of your BS degree. ROTC students should work closely with their academic advisor to plan their schedule because there are additional course requirements for ROTC students.

Websites for the ROTC programs offered at ECU are:
Army ROTC: https://hhp.ecu.edu/arotc/
Air force ROTC: https://hhp.ecu.edu/afrotc/

Services for Students with Disabilities

The ECU engineering department is happy to accommodate any student with a disability. It is important that these disabilities be properly documented through the University so that the appropriate accommodations can be made. No accommodations can be made without proper documentation from the University. If you have a disability and need accommodation on either a

temporary or long-term basis, please let your instructors know the first day of each class and contact the Department for Disability Support Services to begin the documentation process. Their website is https://dss.ecu.edu/.

Engineering Honor Societies

ECU Engineering has chapters of the following engineering honor societies:

- Tau Beta Pi – for all engineering students
- Alpha Eta Mu Beta – for biomedical engineering students
- IEEE-Eta Kappa Nu – for electrical engineering students

Membership in these honor societies is by invitation only. Selection in the junior and/or senior year is based on class standing and demonstration of exemplary character. The class standing threshold requirements are set by the national organizations.

Engineering Student Organizations

Involvement in engineering student organizations complements the knowledge and skills students develop in the classroom and provides many benefits to students. Participation in one or more student organizations is strongly encouraged.

- They provide an opportunity to learn more about the engineering profession.
- They allow opportunities to develop leadership skills.
- They give students the opportunity to meet a wide range of engineering students across all class years.
- They provide networking opportunities with industry partners.
- They build your résumé for job hunting and may lead to your first job.

American Institute of Aeronautics and Astronautics (AIAA)

The purpose of AIAA “is to ignite and celebrate aerospace ingenuity and collaboration, and its importance to our way of life.” The student chapter supports interest in aerospace and also provides a means for students to compete in AIAA-sponsored events.

Faculty Contact: Dr. Tarek Abdel-Salam

American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)

ASHRAE, founded in 1894, is an international organization. ASHRAE fulfills its mission of advancing heating, ventilation, air conditioning and refrigeration to serve humanity and promote a sustainable world through research, standards writing, publishing and continuing education. The purpose of an ASHRAE student branch is to get more students interested, concerned, and involved in pursuing a career in the field of heating, ventilating, refrigeration, and air conditioning.

Faculty Contact: Dr. Tarek Abdel-Salam

American Society of Mechanical Engineers (ASME)

ASME “promotes the art, science & practice of multidisciplinary engineering and allied sciences around the globe.” The student chapter offers the opportunity to network with other mechanical engineers and also offers access to ASME-sponsored student competitions.

Faculty Contact: Dr. Tarek Abdel-Salam

Biomedical Engineering Society (BMES)

The student chapter of BMES gives students the opportunity to explore the biomedical engineering field. This organization arranges guest speakers in a career series outlining the various career paths for biomedical engineering students. The organization also works with the biomedical engineering concentration faculty to explore research projects and the state of the art in the field.

Faculty Contact: Dr. Blair Weaver

Engineering Ambassadors

The engineering ambassadors are a special group of students who work on service projects to the department, the college, and the community. This group leads tours for prospective students, visits regional high schools, and performs similar outreach activities. Students build their leadership, involvement, and speaking skills through this program.

Faculty Contact: Prof. Jeff Foeller

Global Brigades

“Global Brigades is an international non-profit that empowers communities to meet their health and economic goals through university volunteers and local teams.” The ECU student chapter in the Department of Engineering has a primary focus in environmental engineering.

Faculty Contact: Prof. Jeff Foeller

Institute of Electrical and Electronics Engineers (IEEE)

“IEEE's core purpose is to foster technological innovation and excellence for the benefit of humanity.” The ECU student chapter offers networking opportunities as well as the opportunity to participate in student competitions.

Faculty Contact: Dr. Zhen Zhu

Institute of Industrial and Systems Engineers (IISE)

The East Carolina University Chapter of the Institute of Industrial and Systems Engineers (IISE) is an organization open to all students but is primarily focused on the Industrial and Systems Engineering concentration. The objective of the Chapter is to provide students with outside resources to develop their future professional careers. The highlight of the IISE year is the Student Regional Conference held annually.

Faculty Contact: Dr. BJ Kim

International Society for Pharmaceutical Engineering (ISPE)

ISPE is the world's largest not-for-profit society serving pharmaceutical science and manufacturing professionals. The main objectives of the ISPE ECU Student Chapter are to introduce and familiarize student members, faculty and other appropriate individuals to all aspects of the pharmaceutical and biotechnology industries and related disciplines and to promote educational exchange, career opportunities, networking, and continuing education opportunities.

Faculty Contact: Dr. Loren Limberis

National Society of Black Engineers (NSBE)

The mission of the National Society of Black Engineers is *"to increase the number of culturally responsible Black Engineers who excel academically, succeed professionally and positively impact the community."* The ECU student chapter of NSBE offers students networking opportunities, and selected students are supported to attend regional and national NSBE conferences.

Faculty Contact: Dr. Brian Sylcott

Professional Engineers of North Carolina (PENC)

Professional registration is essential to the career growth of practicing engineers and this student society focuses on building knowledge and expertise in this critical aspect of an engineering career. The group has close ties with the local and state organizations.

Faculty Contact: Dr. Randall Etheridge

Society of Automotive Engineers (SAE)

The SAE chapter provides the opportunity to learn more about and be involved in automotive and other forms of transportation engineering.

Faculty Contact: Dr. Tarek Abdel-Salam

Society of Women Engineers (SWE)

The SWE chapter at East Carolina University provides support for the women enrolled in the engineering program. The chapter takes part in engineering development activities as well as opportunities to volunteer in the community.

Faculty Contact: Dr. Colleen Janeiro