



BME Undergraduate Program Handbook

Note: The handbook is updated every year (every semester, if necessary). We recommend that students and faculty always use the latest version of the handbook.

(For use in the Fall 2012 Semester)

Highlights of Important Changes

1. Changes from the Spring 2012 Version:

- New number for EGR 53L is corrected: EGR 103L (not 101L).
- ECE 110L (27L) replaces BME 253L (153L) for matriculating classes \geq 2012.
- Approved Math courses are revised for matriculating classes \geq 2011.
- Curricula for the BME majors, matriculating class of 2012, are in Tables 1gh.
- New section on planning for study abroad has been added (pp.12-13).
- New Table 6 lists area designations of Special Topics courses.
- New section listing Student Outcomes and Program Criteria (p. 5).

2. Changes from the Fall 2011 Version:

- New course numbers are included. Old course numbers are given in parentheses. For example, BME 100L is now listed as BME 260L (100L).
- Requirements for students considering Medical School are updated (pp. 10-12).
- BME 255 (155), Safety of Medical Devices, no longer counts as a BME Area Elective (effective Fall 2012).
- Physiology requirement is now included in Tables 2a-b (BME majors, matriculating class 2010). In previous versions, this requirement was specified only on pp. 6.
- More course options are added for students with AP credits for Physics 151L (61L) and 152L (62L).
- ECE 110L (27L) is equivalent to BME 253L (153L) for all BME, BME/ME and BME/CEE majors (effective Fall 2012).
- A clarification is added for BME/Math majors: students who start BME/Math sequence of mathematics courses must complete it.

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Introduction

This handbook provides an overview of the undergraduate program in Biomedical Engineering (BME) at Duke University. It covers the program mission, educational objectives, major requirements, double major options, course requirements for students planning to apply for medical school, and research opportunities.

The undergraduate major in BME at Duke University is one of the first accredited programs in the United States, and is consistently rated as one of the best BME programs in the nation. In addition, BME is the most popular major in the Pratt School of Engineering and one of the most popular undergraduate majors in the University. The student population is diverse both geographically and culturally, and is a cross-section of the very best students in the nation and from around the world. The training in the program emphasizes research and project-based learning which prepares our students with the necessary skills for successful entry into industry and professional schools (e.g., graduate school and medical school).

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Mission

The general mission of the Department of Biomedical Engineering, as part of Duke University, is to (i) prepare our students for lives of skilled and ethical service to their communities by creating a free and open learning environment that fosters their intellectual growth, (ii) advance the frontiers of scientific inquiry, and (iii) contribute with distinction to the international community of scholarship. As biomedical engineers, our unique mission is to (a) create enabling technologies for the improvement of human health and health care and (b) create new knowledge at the interface between engineering and biomedical science.

We work closely with biologists and clinicians to identify important problems that impact human health and solve them using our technical expertise. We engage motivated and talented students in the classroom, laboratory, and clinic, imparting to them the spirit of our mission as we prepare them for future careers as effective, knowledgeable, and ethical leaders in corporate, professional, and academic communities.

Program Educational Objectives

We expect that graduates of our program will:

- (I) be leaders in biomedical engineering or related areas in industry, academia, and medicine.
- (II) undergo intellectual growth, and be effective in free and open inquiry.
- (III) engage in life-long learning and receive advanced degrees or training for professional advancement.
- (IV) utilize experience integrating mathematics, engineering, life science, and design to address complex problems.
- (V) understand the social and ethical implications of their work.

Students Outcomes and Program Criteria

Our students will have the following capabilities upon completion of their degrees:

- a. an ability to apply knowledge of mathematics, science, and engineering
- b. an ability to design and conduct experiments, as well as to analyze and interpret data
- c. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- d. an ability to function on multidisciplinary 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. the broad education necessary to understand the impact of engineering solutions in a global,
- i. economic, environmental, and societal context
- j. a recognition of the need for, and an ability to engage in life-long learning a knowledge of contemporary issues
- k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

In addition, as biomedical engineers, our students will have:

1. understanding of biology and physiology
2. capability to apply advanced mathematics, science, and engineering to solve the problems at the interface of engineering and biology
3. capability to apply statistics to solve the problems at the interface of engineering and biology
4. ability to make measurements on and interpret data from living systems
5. ability to address problems associated with the interaction between living and non-living materials and systems

Pratt School of Engineering and BME Major Requirements

As a program accredited by the Accreditation Board of Engineering and Technology (ABET), the BME curricula must satisfy minimum requirements in mathematics, sciences, and engineering. In addition, the Pratt School of Engineering has requirements for all engineering students. To meet these constraints, the Department of Biomedical Engineering has developed specific requirements for undergraduate students. Samples of curricula for

students with different BME-related major choices are provided in Tables 1-4. In summary, BME students need to take the following courses.

Two Life Science Courses and Physiology Requirement

(For matriculating classes < 2010)

Biology (25L)^D or AP credit in Biology [Biology 20 (19)] is required for all BME single or double majors. The second course can be selected from Table 7.

(For matriculating class = 2010)

Biology 201L (101L) is required for all BME single or double majors. AP credit cannot be used in lieu of Biology 201L (101L). The second course depends on how the student satisfies the requirement of physiology within BME. Students have three options to fulfill this requirement:

- 1) Take an approved BME Physiology Elective (Table 7a) as their Life Science elective.
- 2) Take BME 301L (201L) or BME 307 (207) as one of their Area Core courses.
- 3) Take BME 244L (144L) as their BME General elective.

If options 2 or 3 are chosen, the Life Science elective can be selected from Table 7.

(For matriculating class ≥ 2011)

Biology 201L (101L) and BME 244L (144L), Quantitative Physiology, are required for all BME single or double majors. The Life Science elective course can be selected from Table 7.

Two Chemistry Courses

(For matriculating classes < 2009)

Most students take Chemistry (21L)^D and (22L)^D. AP credit [Chemistry 21 (19)] is accepted in place of Chemistry (21L).^D To fulfill the second chemistry requirement, students can take either Chemistry (22L),^D (23L),^D or 201DL (151L).

(For matriculating classes ≥ 2009)

Students are required to have Chem 21 (19) (AP=5) or take Chem 101DL (31L) or Chem 110DL (43L). The second course is Chem 210DL (32L) or Chem 201DL (151L).

Chemistry options: no AP or AP ≤ 4: [Chem 101DL (31L) **or** Chem 110DL (43L)] **and**
[Chem 210DL (32L) **or** Chem 201DL (151L)]

Chem 21 (19) with AP=5: Chem 210DL (32L) **or** Chem 201DL (151L)

Two Physics Courses

The choices are as follows:

- Physics 151L (61L) + Physics 152L (62L)
- Physics 161L (41L) + Physics 162L (42L): for students transferring from the Trinity College.

AP credits are accepted in place of Physics 151L (61L) and 152L (62L): Physics 25 (61) for Physics C Exam on Mechanics and Physics 26 (62) for Physics C Exam on Electricity and

^D This superscript will indicate courses that are no longer offered.

Magnetism (score 4 or 5). If students use AP credits for both courses, they must take Physics 153L (63L), 264 (143), 361 (181), or 362 (182). *Students may not take Physics 151L (61L) at Duke and use AP credit for Physics 152L (Physics 62L).*

Physics AP options: If no AP credit or AP<4: Physics 151L (61L) **and** Physics 152L (62L)
If you have Physics 25 (61) with AP=4, 5: Physics 152 (62L)
If you have Physics 25 (61) and Physics 26 (62) with AP=4, 5:
Physics 153L (63L) **or** 264 (143) **or** 361 (181) **or** 362 (182)

For premed students who take the Physics 151L (61L) + Physics 152L (62L) sequence: It is highly recommended that you also take Physics 153L (63L) because Physics 151L (61L) and Physics 152L (62L) do not cover all the materials in the MCAT.

Five Mathematics Courses

All BME single and double majors must take Math 111L (31L), 112L (32L), 212 (103), 216 (107) and 353 (108). AP credit [Math 21 (31)] is accepted in place of Math 111L (31L) and AP credit [Math 22 (32)] is accepted in place of 112L (32L). However, it is recommended that AP credit be used only for Math 111L (31L). Common questions about mathematics placement are answered at the website: <http://www.math.duke.edu>. Transfer credits are examined on an individual basis.

Math options for the first two courses:

No AP: Math 111L (31L) **and** 112L (32L)
Math 21 (31) AP: Math 122L (41L) in the Fall **or** Math 112L (32L) in the Spring
Math 21 (31) AP **and** Math 22 (32) AP: proceed to Math 212 (103)

If students are advised by the Math department to skip any courses in the Math sequence listed above, *they must replace those courses with additional Math courses approved by the BME DUS. The total number of Math courses taken at Duke plus the number of AP or transfer credits must equal 5.* Approved classes include:

(For matriculating classes \leq 2010)

Math 333 (181), 361S (160S), 451S (132S), 453 (133), 541 (216), CEE 501 (202), CompSci 220 (150) and 334 (140). Math 230 (135) **and** Math 342 (136) combined can be used in lieu of one Math class and Stat 130 (113).

(For matriculating classes \geq 2011)

Math 230 (135), 333 (181), 342 (136), 361S (160S), 451S (132S), 453 (133), 541 (216) and Stat 130 (113).

BME/Math majors: Students wishing to do a BME/Math double major will need to take Math 111L (31L), 112L (32L), either [212 (103) + 221 (104)] **or** [221 (104) + 222 (105)], 356 (131), and 453 (133) [221 (104) + 356 (131) substituting for 216 (107), and 453 (133) substituting for 353(108)]. *Once students start the BME/Math sequence by taking Math 221 (104), they must complete it. They cannot switch to the regular BME sequence.*

One Statistics Course

(For matriculating classes \leq 2010)

All BME single and double majors must take Stat 130 (113) with the exception of students with second major or a minor in mathematics; these students may take both Math 230 (135) and Math 342 (136) in lieu of Stat 130 (113).

(For matriculating classes \geq 2011)

Stat 130 (113) is not required for BME majors and BME/ME majors. BME/ECE double majors must take Stat 130 (113) or Math 230 (135) or ECE 555(255); BME/CEE double majors must take Stat 130 (113) or equivalent.

Digital Computation and Computer Programming

All engineering students must take EGR 103L (53L) to meet this requirement. Students with BME/ECE double major must also take CompSci 201 (100).

Five Social Sciences and Humanities (SSH) Courses

The specific requirements are as follows:

- At least one course must be a social science (SS).
- Other courses must be selected from at least two of the following three areas: arts, literature, and performance (ALP), civilization (CZ), and foreign language (FL).
- At least two courses must be taken from the same *department* with one being at 200-level or higher.
- Skill courses cannot be used to fulfill the SSH requirements.
- A maximum of two AP credits are accepted in place of the SSH requirements.
- SSH courses taken in an engineering or science department (e.g., Chemistry) count only if they are cross-listed in an SSH department.

One Undergraduate Writing Course

Writing 101 (20) is required.

BME Required Courses

(For matriculating classes 2008-2010)

For students in the BME major, the following nine courses are required: EGR 201L (75L), ME 221L (83L), BME 260L (100L), BME 253L (153L), BME 271 (171) **or** ECE 280L (54L), BME 354L (154L), two BME Area Core classes, and a BME design course.

(For matriculating class 2011)

For students in the BME major, the following ten courses are required: EGR 201L (75L), ME 221L (83L), BME 244L (144L), BME 260L (100L), BME 253L (153L) **or** ECE 110L (27L), BME 271 (171) **or** ECE 280L (54L), BME 354L (154L), two BME Area Core classes, and a BME design course.

(For matriculating classes 2012 and beyond)

For students in the BME major, the following ten courses are required: EGR 201L (75L), ME 221L (83L), BME 244L (144L), BME 260L (100L), ECE 110L (27L), BME 271 (171) **or** ECE 280L (54L), BME 354L (154L), two BME Area Core classes and a BME design course.

The two Area Core Classes are chosen from the following four areas (see also Table 5):

<u>Area</u>	<u>Core Class</u>
BB (Biomechanics and Biomaterials)	BME 302L (202L) Fund. Biomaterials and Biomechanics
EL (Electrobiology)	BME 301L (201L) Bioelectricity
IM (Imaging and Measurement Systems)	BME 303 (233) Modern Diagnostic Imaging Systems
MC (Molecular, Cellular and Tissue Eng.)	BME 307 (207) Transport Phenom in Biological Systems

Important: Two BME Area Core Electives must be taken in the Spring semester of your Junior year. These courses are **not** offered in the Fall semester so you will not be able to graduate on time if you do not take these courses in this semester. Students studying abroad should plan to go abroad no later than the Fall semester of their Junior year. It will be EXTREMELY difficult to go abroad for Spring semester of your Junior year and still graduate on time.

The design course can be chosen from the following list:

- BME 432L Biomechanics and Vehicle Safety Engineering (typically offered in Fall)
- BME 436L (236L) Biophotonics Instrumentation (typically offered in Spring)
- BME 460L (260L) Devices for People with Disabilities (typically offered every term)
- BME 462L (262L) Design for The Developing World (typically offered every term)
- BME 464L (264L) Medical Instrument Design (typically offered in Fall)

BME Electives

Students take elective courses to learn advanced knowledge in specific areas of biomedical engineering. More than thirty BME electives have been developed, but the courses offered in any given semester depend on the availability of faculty. To ensure depth in at least one area of Biomedical Engineering, BME majors must take three classes within the same area: one Area Core class and two *Area* Elective classes. In addition, BME majors must take two BME *General* Electives. For double majors, the number of BME Area and General Electives required depends on the major (see Tables 1-4). Table 5 provides the current list of the Area Electives. Table 6 provides area designations of Special Topic courses, BME 290 (165) and 590 (265). BME General Elective can be any BME course for which you have the prerequisites and which is not a required course for your major. Up to two independent study courses can be counted as BME General Electives.

Unrestricted Electives

At most, two unrestricted elective course credits will be counted. The final number depends on the major choice (see Tables 1-4). Only unrestricted electives can be taken on the Satisfactory/Unsatisfactory basis.

Independent Study and Pratt Fellow Program

Independent study is an integral and immensely popular component of the undergraduate education at Duke. Up to **two** such courses (during Junior and Senior years only) can be counted as BME General Electives [BME 493 (191) and 494 (192)]. The final number depends on the major choice (see Tables 1-4).

A research experience can be achieved in one of three ways.

- Perform directed BME research with a BME faculty member.
- Take independent study courses with a non-BME faculty member (for instance, a clinician). In such cases, the project must be sponsored by a BME faculty member. The sponsor is responsible for evaluating the quality of the project and student's performance. Some students choose to perform sponsored *BME research* in the Duke Smart House Program (for details, check the website at <http://delta.pratt.duke.edu/>).
- Apply for a Pratt Research Fellow position during your Junior year (to learn more, check the website at <http://www.pratt.duke.edu/pratt-research-fellow>). Pratt Research Fellows perform research in a BME faculty's lab for three academic semesters plus a full summer term and receive two BME General elective credits [BME 493(191) and 494 (192)].

Graduation with Distinction

Graduation with Distinction Award is presented to the Pratt students who, in the opinion of the BME Department and a committee of the faculty, have demonstrated exceptional achievement in the areas of their special interest by conducting independent research and presenting the research project with a distinguished piece of writing and/or a poster presentation. BME students who have final grade point average of 3.5 or higher and have taken BME 493 (191) through either an independent study or the Pratt Research Fellow Program are eligible to apply for the Award (for details, email the BME DUS). All students who graduate in December and want to apply for Graduation with Distinction should present the research project in the symposium held in April in the year prior to graduation.

Preparation for Medical School

Students planning to attend medical and dental schools should consult with their advisor and the Office of Health Professions Advising (HPA) about course planning. HPA is located at 011 Allen Building (the website is <http://prehealth.duke.edu>). The Office provides advice to students planning careers in health professions and also information on the application process, degree requirements, research and volunteer opportunities. *While the following information is thought to be correct, students should use the Health Professions Advising at Duke as their primary source for Medical School requirements and advice.*

Medical and dental schools in the US require students to take the following courses:

Subject	Duke Courses	BME curriculum
Chemistry <i>4 semesters with lab</i>	Chem 101DL (31L) or 110DL (43L) or 21 (19-AP)	required
	Chem 201DL (151L)	required
	Chem 202L (152L)	free elective
	Chem 210DL or/and Biochem 301 (227) ¹	free elective/extra class/LS
Biology <i>2 semesters with lab</i>	Molecular: Bio 201L (101L)	required
	Genetics: Bio 202L (102L)	LS elective
	Physiology: BME 244L (144L) ²	required/GE/extra class
Physics <i>2 semesters with lab</i>	Phys 151L (61L) or 25 (61-AP)	required
	Phys 152L (62L) or 26 (62-AP)	required
	Phys 153L (63L) ³	extra class
English <i>2 semesters</i>	Writing 101 (20)	required
	English/Lit course or English AP credit	SSH elective
Behav Sci	Psy 101 (11) or Soc 110 (10) or Soc 111 (11)	SSH elective
Statistics	Stat 130 (113) ⁴	required/extra class

¹Biochemistry will be included in MCAT exams starting in 2015. It should be taken in the Fall of the Junior year or in the Summer before the Junior year (it is not offered in the Spring). For students taking MCAT exams in 2015 and beyond, Biochem 301 (227) replaces Chem 210DL (32L). For current students who take Chem 210DL (32L), Biochem 301 (227) is strongly recommended as an extra class or an LS elective.

² BME 244L (144L) is required for matriculating classes of 2011 and above. Matriculating classes <2011 can take BME 244L (144L) as a BME general elective; or Bio 221 (117), Bio 329 (151), Cellbio 503 (203) or Evanth 330L (155L) as an extra class.

³ Phys 153 (63L) is strongly recommended because Phys 151L (61L) and 152L (62L) do not cover all the material on MCAT exams.

⁴ Stat 130 (113) is required for matriculating classes <2011. Matriculating classes 2011 and above will have statistics incorporated into their BME courses; Stat 130 (113) is recommended as an extra class.

Note: BME 244L (144L) is accepted as a biology course with a lab by most medical schools. The lab portion of BME 301L (201L) is accepted as one of the biology lab requirements by most medical schools. Note however that the lecture portion of BME 301L (201L) does not count as a biology course.

As seen in the above table, many courses satisfy the requirements for both the BME major and the entrance to medical and dental schools. Examples of schedules for premed and BME are shown in Tables 1b,d,f,h. Students should complete all of their MCAT-related courses

prior to the summer between their Junior and Senior year. This allows the MCAT to be taken in that summer, which permits more preparation time.

Double Major, Second Major, Minor, and Certificate Programs

To obtain depth in specific BME areas, students can declare a double major within the Pratt School of Engineering. For these students, the required courses are listed in Tables 2-4.

Opportunities also exist for students with AP credits to combine the BME major with a second major, minor, or certificate from the Trinity College. (A certificate is similar to a minor but offered for interdisciplinary study.) To do so, the students must meet the same requirements as those for BME single major plus the specific requirements from other departments/programs outlined in the Bulletin of Undergraduate Instruction (<http://registrar.duke.edu/bulletins/undergraduate/>). The additional requirements usually consist of ≥ 10 courses for a second major, 5 courses for a minor, and ≥ 6 courses for a certificate. Some of these courses can be double-counted towards both the BME degree and the second major, minor or certificate in the Trinity College. For example, two courses required for the second major in economics may be counted as two of the five SSH courses required for the BME degree. To reduce the work load for obtaining the second major, minor, or certificate in the Trinity College during the regular academic semesters, students can either take the required Trinity courses as unrestricted electives in the BME curriculum or take them in the summer.

Sample Curricula and AP Credits

Tables 1-4 provide samples of curricula for BME majors, BME majors considering Medical School, and double majors. Most common changes to these curricula are as follows:

- Students with AP credits for Math 21 (31) should take Math 122L (41L) in the Fall and Math 212 (103) in the Spring of their Freshman year. This will eliminate a 5-course semester in the Fall of Sophomore year.
- Students with AP credits for Physics 25 (61) should take Chem 210DL (32L) or Chem 201DL (151L) in the Spring of their Freshman year. This will eliminate a 5-course semester in the Spring of Sophomore year.
- Students with AP credits for Math 21 (31) and Physics 25 (61) who are considering Medical School should move Math 122L (41L) and 212 (103) as described above, take Chem 201DL (151L) in the Spring of their Freshman year, and Chem 202L (152L) in the Fall of their Sophomore year. This will eliminate 5-course semesters in the Sophomore year.
- Students with AP credits for Chem 21 (19) who do not take Chem 101DL (31L) or 110DL (43L) should take Biology 201L (101L) in the Fall of their Freshman year and Chem 210DL (32L) or Chem 201DL (Chem 151L) in the Spring of their Freshman year.

Planning for Study Abroad

Students interested in participating in the Global Education program need to develop an academic plan with their advisors several semesters in advance. This plan includes the courses to be taken in foreign countries and the remaining courses to be taken at Duke before and after the semester abroad. Students intending to study abroad should plan to travel in the *Fall semester of their Junior year*. In the semester *prior* to study abroad, students submit requests

to the BME DUS. The process for approval of courses in the study abroad program is the same as that used for all transfer courses. For details, see <http://studyabroad.duke.edu>.

Currently, very few of the required BME courses are offered abroad. Typically, students receive credit for BME 271 (171), Social Studies and Humanities electives, Life Science elective, and/or BME General Elective. A few places also offer a course equivalent to ME 221L (83L). Therefore, the following courses should be taken before the semester abroad:

- BME 260L (100L); it is a prerequisite for BME 307, an Area Core course for Molecular, Cellular, and Tissue Engineering.
- ME 227L (83L) — unless it is offered abroad. This course is a prerequisite for BME 302L (202L), an Area Core course for Biomechanics and Biomaterials. Note that EGR 201L (75L) is a prerequisite for ME 221L (83L), so it should be taken in the Fall of your Sophomore year.
- Math 353 (108), which is also a prerequisite for BME 302L (202L).
- BME 271 (171) — if not taken abroad. It is a prerequisite for BME 303 (233), an Area Core course for Imaging and Measurement Systems.

4 + 1 BSE/MS Program (Five-Year Combined Bachelor/Master Degree Program)

The program offers a five-year combined Bachelor of Science and Master of Science degree in biomedical engineering. This is a great opportunity for students who want to broaden their undergraduate research experience or to obtain advanced training in biomedical engineering. In addition to completing both degrees in five years, students do not pay the *graduate* tuition for their graduate courses taken in the senior year (for more information, see <http://www.pratt.duke.edu/4+1-bse-ms>).

The degree requires that the students fulfill the standard degree requirements for Bachelor of Science plus an additional 30 units of upper level courses suitable for a graduate degree. (In the Graduate School, a 3-hour/week course is counted as 3 units.) Up to 15 graduate course units (5 graduate courses) out of the 30 units can be taken in the senior year, provided that these courses are not used to fulfill the Bachelor degree requirements and they are not Independent Study courses. If you complete two or more courses toward your MS degree before completing your senior year, you can easily complete the remaining graduate courses in one year beyond your BSE. More information can be found here at <http://www.pratt.duke.edu/4+1-bse-ms>.

To complete both Bachelors and Masters degrees in five years:

- Develop course plans for your senior year and for one graduate year with your academic advisor and obtain Director of Graduate Studies (DGS) approval.
- Take the GRE exam in the Fall of your Senior year.
- Apply for admission to Duke's Graduate School during the Fall of your Senior year. Apply online here (<http://gradschool.duke.edu/admissions/index.php>).

Advising

Assignment of BME advisors: Due to the high student/faculty ratio in the BME program, the BME faculty do not usually advise Freshmen. A BME advisor is assigned after the student declares a BME or BME/double major. Students can declare majors or change them at any

time after their Freshman year. To do this, the students complete an online form (<http://www.pratt.duke.edu/forms/declaration-of-major>).

The assignment of faculty advisors is based upon the major interests (e.g., BME/ECE double major) expressed by the students and the need to balance the number of advisees per faculty. Currently, each BME faculty member advises an average of twenty students.

A student's advisor may vary from semester to semester for various reasons (e.g., faculty on sabbatical and the arrival of new faculty). Thus, students need to check their academic information every semester before making an appointment. The address of BME website for making an online appointment is <http://advising.pratt.duke.edu/>

Freshman advising: In order to provide program information to Freshmen interested in BME, all students are invited to an orientation presented by the BME Director/Associate Director of Undergraduate Studies (DUS) at the end of August, prior to the start of classes. The presentation covers the degree requirements and commonly asked questions. Individual advising sessions can be arranged if requested. In October and March/April, during the pre-registration periods, the BME DUS and/or Associate DUS will also hold open consultation sessions for the first year students who have BME-related questions.

To assist undecided students choosing a major in engineering, an elective course, EGR 90L (10), Introduction to Engineering, is offered to first year students in the Fall term. This course surveys the fields of engineering offered by the Pratt School of Engineering, including two presentations from each department given by senior students, faculty, industrial leaders, and/or recent alumni.

Pre-registration advising of BME students: Students meet with their advisors during the pre-registration period in March/April for the Fall semester and in October for the Spring semester. The advisor reviews the student's academic report, discusses with the student the courses that he or she will take in the following semester. The advisor maintains a record of the student's current academic plan. The student is responsible for informing the advisor of any changes in the plan.

Career advising: Students can discuss their career plans with their advisors. In addition, advisors can help students to identify specific sequences of courses or double major options that are most appropriate for them.

Information on Internship, Co-Op, Employment, and Graduate School Opportunities

Information on internship, co-op, and employment opportunities is posted on the website of the Duke University Career Center: <http://www.studentaffairs.duke.edu/career>. In addition to maintaining the websites mentioned above, the Career Center organizes various career-related activities. These include (a) career advice sessions, (b) industrial interview events, (c) graduate school recruiting events, and (d) workshops and seminars on internship, co-op, and employment that are specific for engineering or BME students. The workshops and seminars are announced via emails and posted on the TV monitors in the engineering buildings. The Career Center is located in Smith Warehouse at 114 S. Buchanan Blvd, Bay 5.

In addition to the Career Center, Russell Holloway (russell.holloway@duke.edu), Associate Dean of Corporate and Industry Relations in the Pratt School of Engineering, helps Pratt students connect with corporations for internship opportunities. For more information, see <http://www.pratt.duke.edu/undergraduate-internship>.

Information on internships, co-ops, employment, and graduate school opportunities is sent directly to the BME faculty or the department. When this happens, the information will be distributed to BME students via emails or posted on the bulletin board outside the BME departmental office.

APPENDICES

Tables 1-4: Samples of BME Major and Its Related Double Major Curricula

Table 1a
BME Major (matriculating classes 2008, 2009)

Freshman Year	
Fall Semester	Spring Semester
Chem (21L) ^D or 101DL (31L) Core Concepts in Chemistry	Chem (22L) ^D or 210DL (32L) Applied Chem Princ or 201DL (151L) Organic Chemistry
EGR 103L (53L) Computational Methods in Engineering	Math 112L (32L) Introductory Calculus II
Math 111L (31L) Introductory Calculus I	Physics 151L (61L) Introductory Mechanics ¹
Writing 101 (20)	Social Science or Humanities Elective
Sophomore Year	
Fall Semester	Spring Semester
EGR 201L (75L) Mechanics of Solids or BME (110L) ^D	ME 221L (83L) or BME(83L) ^D Intro to Biomaterials
Bio (25L) ^D Principles of Biology	BME 260L (100L) Modeling Cellul and Molecul Systems
Math 212 (103) Multivariable Calculus ²	BME 253L (153L) Biomed Electronics and Measurem I
Physics 152L (62L) Intro Electric, Magnet , Optics ¹	Math 216 (107) Linear Algebra and Differential Eqn ²
Social Science or Humanities Elective	Social Science or Humanities Elective
Junior Year	
Fall Semester	Spring Semester
BME 271 (171) Signals and Systems or ECE 280L(54L)	BME 354L (154L) Biomed Electronics & Measurem II
Math 353 (108) Ordinary and Partial Differential Eqn ²	BME Area Core Class I ³
Life Science Elective	BME Area Core Class II ³
Social Science or Humanities Elective	Stat 130 (113) Probability and Statistics for Engineers
Senior Year	
Fall Semester	Spring Semester
BME Design ⁴	BME Area Elective ⁵
BME Area Elective ⁵	BME General Elective ⁶
BME General Elective ⁶	Social Science or Humanities Elective
Elective	Elective

1. See also the Physics requirements on pp. 6-7.
2. Students with BME/Math double-major need to take Math 221/212 or 222/356/453 (104/103 or 105/131/133) in place of Math 212/216/353 (103/107/108).
3. Selected from the four Area Core classes listed in Table 5.
4. Selected from the following list:
 - BME 432L Biomechanics and Vehicle Safety Engineering
 - BME 436L (236L) Biophotonics Instrumentation
 - BME 460L (260L) Devices for People with Disabilities
 - BME 462L (262L) Design for The Developing World
 - BME 464L (264L) Medical Instrument Design
5. Both BME Area Electives (Tables 5-6) must be from the same Area of Focus.
6. BME General Electives can be at any level.

Table 1b
BME Major (matriculating classes 2008, 2009)
Course plan for students considering medical school

Freshman Year	
Fall Semester	Spring Semester
Chemistry (21L) ^D or 101DL (31L) Core Concepts in Chemistry	Chemistry (22L) ^D or 210DL (32L) Mod Apps Chem Principles
EGR 103L (53L) Computational Methods in Engineering	Math 112L (32L) Introductory Calculus II
Math 111L (31L) Introductory Calculus I	Physics 151L (61L) Introductory Mechanics ¹
Writing 101 (20)	Social Science or Humanities Elective
Sophomore Year	
Fall Semester	Spring Semester
EGR 201L (75L) Mechanics of Solids or BME (110L) ^D	BME 253L (153L) Biomed Electronics and Measurem I
Math 212 (103) Multivariable Calculus ²	Biology (25L) ^D or 201L (101L) Molecular Biology
Physics 152L (62L) Intro Electric, Magnet, Optics ¹	Math 216 (107) Linear Algebra and Differential Eqn ²
Social Science or Humanities Elective	Social Science or Humanities Elective
Chemistry 201DL (151L) Organic Chemistry I	Chemistry 202L (152L) Organic Chemistry II
Junior Year	
Fall Semester	Spring Semester
ME 221L (83L) or BME (83L) ^D Intro to Biomaterials	BME 354L (154L) Biomed Electronics and Measurem II
BME 260L (100L) Modeling Cellul and Molecul Systems	BME Area Core Class I ³
BME 271 (171) Signals and Systems or ECE 280L(54L)	BME Area Core Class II ³
Math 353 (108) Ordinary and Partial Differential Eqn ²	Stat 130 (113) Probability and Statistics for Engineers
Senior Year	
Fall Semester	Spring Semester
BME Design ⁴	BME Area Elective ⁵
BME Area Elective ⁵	BME General Elective ⁶
Life Science Elective	BME General Elective ⁶
Social Science or Humanities Elective	Social Science or Humanities Elective

1. See also the Physics requirements on pp. 6-7.

2. Students with BME/Math double-major need to take Math 221/212 or 222/356/453 (104/103 or 105/131/133) in place of Math 212/216/353 (103/107/108).

3. Selected from the four Area Core classes listed in Table 5.

4. Selected from the following list:

- BME 432L Biomechanics and Vehicle Safety Engineering
- BME 436L (236L) Biophotonics Instrumentation
- BME 460L (260L) Devices for People with Disabilities
- BME 462L (262L) Design for the Developing World
- BME 464L (264L) Medical Instrument Design

5. Both BME Area Electives (Tables 5-6) must be from the same Area of Focus.

6. BME General Electives can be at any level.

Table 1c
BME Major (matriculating class 2010)

Freshman Year	
Fall Semester	Spring Semester
Chem 101DL (31L) Core Concepts in Chemistry	Chem 210DL (32L) Mod Apps Chem Principles or Chem 201DL (151L) Organic Chemistry
EGR 103L (53L) Computational Methods in Engineering	Math 112L (32L) Introductory Calculus II
Math 111L (31L) Introductory Calculus I	Physics 151L (61L) Introductory Mechanics ¹
Writing 101 (20)	Social Science or Humanities Elective
Sophomore Year	
Fall Semester	Spring Semester
EGR 201L (75L) Mechanics of Solids	BME 260L (100L) Modeling Cellul and Molecul Systems
Biology 201L (101L) Molecular Biology	BME 253L (153L) Biomed Electronics and Measurment I or ECE 110L (27L) Fund Electr and Comput Eng
Math 212 (Math 103) Multivariable Calculus ²	ME 221L (ME 83L) Structure and Properties of Solids
Physics 152L (62L) Intro Electric, Magnet, Optics ¹	Math 216 (107) Linear Algebra and Differential Eqn ²
Social Science or Humanities Elective	Social Science or Humanities Elective
Junior Year	
Fall Semester	Spring Semester
BME 271 (171) Signals and Systems or ECE 280L(54L)	BME 354L (154L) Biomed Electronics and Measurment II
Math 353 (108) Ordinary and Partial Differential Eqn ²	BME Area Core Class I ³
Physiology or Life Science Elective	BME Area Core Class II ³
Social Science or Humanities Elective	Stat 130 (113) Probability and Statistics for Engineers
Senior Year	
Fall Semester	Spring Semester
BME Design ⁴	BME Area Elective ⁵
BME Area Elective ⁵	BME General Elective ⁶
BME General Elective ⁶	Social Science or Humanities Elective
Elective	Elective

1. See also the Physics requirements on pp. 6-7.

2. Students with BME/Math double-major need to take Math 221/212 or 222/356/453 (104/103 or 105/131/133) in place of Math 212/216/353 (103/107/108).

3. Selected from the four Area Core classes listed in Table 5.

4. Selected from the following list:

- BME 432L Biomechanics and Vehicle Safety Engineering
- BME 426L (236L) Biophotonics Instrumentation
- BME 460L (260L) Devices for People with Disabilities
- BME 462L (262L) Design for the Developing World
- BME 464L (264L) Medical Instrument Design

5. Both BME Area Electives (Tables 5-6) must be from the same Area of Focus.

6. BME General Electives can be at any level.

Table 1d
BME Major (matriculating class 2010)
Course plan for students considering medical school

Freshman Year	
Fall Semester	Spring Semester
Chem 101DL (31L) Core Concepts in Chemistry	Chem 210DL (32L) Mod Apps Chem Principles
EGR 103L (53L) Computational Methods in Engineering	Math 112L (32L) Introductory Calculus II
Math 111L (Math 31L) Introductory Calculus I	Physics 151L (61L) Introductory Mechanics ¹
Writing 101 (20)	Social Science or Humanities Elective
Sophomore Year	
Fall Semester	Spring Semester
EGR 201L (75L) Mechanics of Solids	BME 253L (153L) Biomed Electronics and Measurem I or ECE 110L (27L) Fund Electr and Comput Eng
Math 212 (103) Multivariable Calculus ²	Biology 201L (Biology 101L) Molecular Biology
Physics 152L (62L) Intro Electric, Magnet, Optics ¹	Math 216 (107) Linear Algebra and Differential Eqn ²
Social Science or Humanities Elective	Social Science or Humanities Elective
Chem 201DL (151L) Organic Chemistry	Chem 202L (152L) Organic Chemistry
Junior Year	
Fall Semester	Spring Semester
BME 260L (100L) Modeling Cellul and Molecul Systems	BME 354L (154L) Biomed Electronics and Measurem II
BME 271 (171) Signals and Systems or ECE 280L (54L)	BME Area Core Class I ³ [BME 301L (201L)]
ME 221L (83L) Structure and Properties of Solids	BME Area Core Class II ³
Math 353 (108) Ordinary and Partial Differential Eqn ²	Stat 130 (113) Probability and Statistics for Engineers
Senior Year	
Fall Semester	Spring Semester
BME Design ⁴	BME Area Elective ⁵
BME Area Elective ⁵	BME General Elective ⁶
Physiology or Life Science Elective	BME General Elective ⁶
Social Science or Humanities Elective	Social Science or Humanities Elective

1. See also the Physics requirements on pp. 6-7.

2. Students with BME/Math double-major need to take Math 221/212 or 222/356/453 (104/103 or 105/131/133) in place of Math 212/216/353 (Math 103/107/108).

3. Selected from the four Area Core classes listed in Table 5.

4. Selected from the following list:

- BME 432L Biomechanics and Vehicle Safety Engineering
- BME 436L (236L) Biophotonics Instrumentation
- BME 460L (260L) Devices for People with Disabilities
- BME 462L (262L) Design for The Developing World
- BME 462L (264L) Medical Instrument Design

5. Both BME Area Electives (Tables 5-6) must be from the same Area of Focus.

6. BME General Electives can be at any level.

Table 1e
BME Major (matriculating class 2011)

Freshman Year	
Fall Semester	Spring Semester
Chem 101DL (31L) Core Concepts in Chemistry	Bio 201L (101L) Molecular Biology <i>[alt: Chem 210DL (32L) or Chem 201DL (151L)]</i>
EGR 103L (53L) Computational Methods in Engineering	Math 112L (Math 32L) Introductory Calculus II
Math 111L (31L) Introductory Calculus I	Physics 151L (61L) Introductory Mechanics
Writing 101 (20)	Social Science or Humanities Elective
Sophomore Year	
Fall Semester	Spring Semester
BME 244L (144L) Quantitative Physiology <i>[alt: Bio 201L (101L)]</i>	BME 253L (153L) Biomed Electronic Measurem I or ECE110L (27L) Fund Electr and Comput Eng
EGR 201L (75L) Mechanics of Solids	Chem 210DL (32L) Mod Apps Chem Principles or Chem 201DL (151L) Organic Chem <i>[(alt: BME 244L (144L)]</i>
Math 212 (103) Multivariable Calculus ²	Math 216 (107) Linear Algebra and Differential Eqn ²
Physics 152L (62L) Intro Electric, Magnet, Optics	Life Science Elective
Social Science or Humanities Elective	Social Science or Humanities Elective
Junior Year	
Fall Semester	Spring Semester
BME 260L (100L) Modeling Cellul and Molecul Systems	BME 354L (154L) Biomed Electronic Measurem II
BME 271 (171) Signals & Systems or ECE 280L (54L)	BME Area Core Class I ³
ME 221L (83L) Structure and Properties of Solids	BME Area Core Class II ³
Math 353 (108) Ordinary and Partial Diff Equations ²	Social Science or Humanities Elective
Senior Year	
Fall Semester	Spring Semester
BME Design ⁴	BME Area Elective ⁵
BME Area Elective ⁵	BME General Elective ⁶
BME General Elective ⁶	Social Science or Humanities Elective
Elective	Elective

1. See also the Physics requirements on pp 6-7.

2. Students with BME/Math double-major need to take Math 221/212 or 222/356/453 (104/103 or 105/131/133) in place of Math 212/216/353 (103/107/108).

3. Selected from the four Area Core classes listed in Table 5.

4. Selected from the following list:

- BME 432L Biomechanics and Vehicle Safety Engineering
- BME 436L (236L) Biophotonics Instrumentation
- BME 460L (260L) Devices for People with Disabilities
- BME 426L (262L) Design for the Developing World
- BME 464L (264L) Medical Instrument Design

5. Both BME Area Electives (Tables 5-6) must be from the same Area of Focus.

6. BME General Electives can be at any level.

Table 1f
BME Major (matriculating class 2011)
Course plan for students considering medical school

Freshman Year	
Fall Semester	Spring Semester
Chem 101DL (31L) Core Concepts in Chemistry	Chem 201DL (151L) Organic Chemistry
EGR 103L (53L) Computational Methods in Engineering	Biology 201L (101L) Molecular Biology <i>[alt: Social Science or Humanities Elective]</i>
Math 111L (31L) Introductory Calculus I	Math 112L (32L) Introductory Calculus II
Writing 101 (20) Academic Writing	Physics 151L (61L) Introductory Mechanics ¹
Sophomore Year	
Fall Semester	Spring Semester
BME 244L (144L) Quantitative Physiology <i>[alt: Bio 201L (101L)]</i>	BME 253L (153L) Biomed Electronic Measurem I or ECE110L (27L) Fund Electr and Comput Eng
EGR 201L (75L) Mechanics of Solids	Chem 210DL (32L) Modern Appl Chem Principles
Chem 202L (152L) Organic Chemistry	Math 216 (107) Linear Algebra and Differential Eqn ²
Math 212 (103) Multivariable Calculus ²	Life Science Elective
Physics 152L (62L) Intro Electricity, Magnetism and Optics ¹	Social Science or Humanities Elective <i>[alt: BME 244L (144L)]</i>
Junior Year	
Fall Semester	Spring Semester
BME 260L (100L) Modeling Cellul and Molecu Systems	BME 354L (154L) Biomed Electronic Measurem II
BME 271 (171) Signals & Systems or ECE 280L (54L)	BME Area Core Class I ³
ME 221L (83L) Structure and Properties of Solids	BME Area Core Class II ³
Math 353 (108) Ordinary and Partial Differential Eqn ²	Social Science or Humanities Elective
Senior Year	
Fall Semester	Spring Semester
BME Design ⁴	BME Area Elective ⁵
BME Area Elective ⁵	BME General Elective ⁶
BME General Elective ⁶	Social Science or Humanities Elective
Social Science or Humanities Elective	Social Science or Humanities Elective

1. See also the Physics requirements on pp. 6-7.

2. Students with BME/Math double-major need to take Math 221/212 or 222/356/453 (104/103 or 105/131/133) in place of Math 212/216/353 (Math 103/107/108).

3. Selected from the four Area Core classes listed in Table 5.

4. Selected from the following list:

- BME 432L Biomechanics of Vehicle Safety Engineering
- BME 436L (236L) Biophotonics Instrumentation
- BME 460L (260L) Devices for People with Disabilities
- BME 462L (262L) Design for the Developing World
- BME 464L (264L) Medical Instrument Design

5. Both BME Area Electives (Tables 5-6) must be from the same Area of Focus.

6. BME General Electives can be at any level.

Table 1g
BME Major (matriculating classes ≥ 2012)

Freshman Year	
Fall Semester	Spring Semester
Chem 101DL (31L) Core Concepts in Chemistry	Biology 201L (101L) Molecular Biology
EGR 103L (53L) Computational Methods in Engineering	Math 112L (32L) Introductory Calculus II
Math 111L (31L) Introductory Calculus I	Physics 151L (61L) Introductory Mechanics ¹
Writing 101 (20) Academic Writing	Social Science or Humanities Elective
Sophomore Year	
Fall Semester	Spring Semester
BME 244L (144L) Quantitative Physiology	EGR 201L (75L) Mechanics of Solids
ECE 110L (27L) Fund Electr and Comput Eng	Chem 210DL (32L) Mod Apps Chem Principles or Chem 201DL (151L) Organic Chem
Math 212 (103) Multivariable Calculus ²	Math 216 (107) Linear Algebra and Differential Eqn ²
Physics 152L (62L) Intro Electric, Magnetism and Optics ¹	Life Science Elective
Social Science or Humanities Elective	Social Science or Humanities Elective
Junior Year	
Fall Semester	Spring Semester
BME 260L (100L) Modeling Cellul and Molecul Systems	BME 354L (154L) Biomed Electronic Measurem II
BME 271 (171) Signals & Systems or ECE 280L (54L)	BME Area Core Class I ³
ME 221L (83L) Structure and Properties of Solids	BME Area Core Class II ³
Math 353 (108) Ordinary and Partial Diff Equations ²	Social Science or Humanities Elective
Senior Year	
Fall Semester	Spring Semester
BME Design ⁴	BME Area Elective ⁵
BME Area Elective ⁵	BME General Elective ⁶
BME General Elective ⁶	Social Science or Humanities Elective
Elective	Elective

1. See also the Physics requirements on pp. 6-7.

2. Students with BME/Math double-major need to take Math 221/212 or 222/356/453 (104/103 or 105/131/133) in place of Math 212/216/353 (Math 103/107/108).

3. Selected from the four Area Core classes listed in Table 5.

4. Selected from the following list:

- BME 432L Biomechanics of Vehicle Safety Engineering
- BME 436L (236L) Biophotonics Instrumentation
- BME 460L (260L) Devices for People with Disabilities
- BME 462L (262L) Design for the Developing World
- BME 464L (264L) Medical Instrument Design

5. Both BME Area Electives (Tables 5-6) must be from the same Area of Focus.

6. BME General Electives can be at any level.

Table 1h
BME Major (matriculating classes ≥ 2012)
Course plan for students considering medical school

Freshman Year	
Fall Semester	Spring Semester
Chem 101DL (31L) Core Concepts in Chemistry	Biology 201L (101L) Molecular Biology
EGR 103L (53L) Computational Methods in Engineering	Math 112L (32L) Introductory Calculus II
Math 111L (31L) Introductory Calculus I	Physics 151L (61L) Introductory Mechanics
Writing 101 (20) Academic Writing	Social Science or Humanities Elective
Sophomore Year	
Fall Semester	Spring Semester
BME 244L (144L) Quantitative Physiology	BME 260L (100L) Modeling Cellul and Molecul Systems
ECE 110L (27L) Fund Electr and Comput Eng	EGR 201L (75L) Mechanics of Solids
Chem 201DL (151L) Organic Chemistry ¹	Chem 202L (152L) Organic Chemistry ¹
Math 212 (103) Multivariable Calculus ²	Math 216 (107) Linear Algebra and Differential Eqn ²
Physics 152L (62L) Intro Electricity, Magnetism and Optics ¹	Life Science Elective
Junior Year	
Fall Semester	Spring Semester
BME 271 (171) Signals & Systems or ECE 280L (54L)	BME 354L (154L) Biomed Electronic Measurem II
ME 221L (83L) Structure and Properties of Solids	BME Area Core Class I ³
Math 353 (108) Ordinary and Partial Differential Eqn ²	BME Area Core Class II ³
Biochem 301 (227) ¹ Intro Biochemistry I	Social Science or Humanities Elective
Senior Year	
Fall Semester	Spring Semester
BME Design ⁴	BME Area Elective ⁵
BME Area Elective ⁵	BME General Elective ⁶
BME General Elective ⁶	Social Science or Humanities Elective
Social Science or Humanities Elective	Social Science or Humanities Elective

1. See also the Physics requirements on pp. 6-7; HPA recommends taking Chem 201DL (151L) and Chem 202L (152L) in the summer after Freshman year, and Biochem 301 (227) in the summer after Sophomore year.
2. Students with BME/Math double-major need to take Math 221/212 or 222/356/453 (104/103 or 105/131/133) in place of Math 212/216/353 (Math 103/107/108).
3. Selected from the four Area Core classes listed in Table 5.
4. Selected from the following list:
 - BME 432L Biomechanics of Vehicle Safety Engineering
 - BME 436L (236L) Biophotonics Instrumentation
 - BME 460L (260L) Devices for People with Disabilities
 - BME 462L (262L) Design for the Developing World
 - BME 464L (264L) Medical Instrument Design
5. Both BME Area Electives (Tables 5-6) must be from the same Area of Focus.
6. BME General Electives can be at any level.

Table 2a
BME/ECE Double Major (matriculating classes ≤ 2010)

Freshman Year	
Fall Semester	Spring Semester
Chem 101DL (31L) Core Concepts in Chemistry	Chem 210DL (32L) Mod Apps Chem Principles or Chem 201DL (151L) Organic Chemistry
Math 111L (31L) Introductory Calculus I	Math 112L (32L) Introductory Calculus II
EGR 103L (53L) Computational Methods in Engineering	Physics 151L (61L) Introductory Mechanics
Writing 101 (20)/ Social Sci or Humanities Elective 1	Social Sci or Humanities Elective 1/ Writing 101 (20)
Sophomore Year	
Fall Semester	Spring Semester
Biology 201L (101L) Molecular Biology	BME 260L (100L) Modeling Cellul and Molecul Systems
Math 212 (103) Multivariable Calculus	EGR 201L (75L) Mechanics of Solids
Physics 152L (62L) Electric, Magnet, Optics	Math 216 (107) Linear Algebra and Differential Eqn
ECE 110L (27L) Fundamentals of ECE	ECE 230L (51L) Microelectronic Devices & Circuits
Compsci 201 (100) Program Design and Analysis	ECE 280L(54L) Intro to Signals and Systems
Junior Year	
Fall Semester	Spring Semester
ME 221L (83L) Structure and Properties of Solids	BME 354L (154L) Biomed Electronics and Measurem II
Math 353 (108) Ordinary and Partial Diff. Equations	BME 301L (201L) Bioelectricity or BME 303 (233) Modern Diagnostic Imaging Systems ²
ECE 250L (52L) Intro to Digital Systems	ECE Concentration Elective 1 ¹
ECE 270L (53L) Electromagnetic Fields	Stat 130 (113) Probability and Statistics
Social Science or Humanities Elective 2	Social Science or Humanities Elective 3
Senior Year	
Fall Semester	Spring Semester
BME design: BME 436L (236L) or 464L (264L)	BME General Elective
BME Area Elective ²	Physiology or Life Science Elective ³
ECE Concentration Elective 2 ¹	ECE Elective
Science or Humanities Elective 4	Social Science or Humanities Elective 5

1. At least two ECE Concentration Electives must be from the same Concentration Area
2. If BME 301L (201L) is taken the Area Elective must be from the Bioelectricity Area
If BME 303 (233) is taken the Area Elective must be from the Imaging and Sensors Area
3. If BME 303 (233) is taken, choose from approved list of Physiology Electives (Table 7a)
If BME 301L (201L) is taken, choose from the approved list of Life Science Electives (Table 7)

Table 2b
BME/ECE Double Major (matriculating classes \geq 2011)

Freshman Year	
Fall Semester	Spring Semester
Chem 101DL (31L) Core Concepts in Chemistry	Biology 201L (101L) Molecular Biology <i>[alt; Chem 210DL (32L) or Chem 201DL (151L)]</i>
EGR 103L (53L) Computational Methods in Engineering	Math 112L (32L) Introductory Calculus II
Math 111L (31L) Introductory Calculus I	Physics 151L (61L) Introductory Mechanics
Writing 101 (20) /Social Sci or Humanities Elective 1	Social Sci or Humanities Elective 1 / Writing 101 (20)
Sophomore Year	
Fall Semester	Spring Semester
BME 244L (144L) Quantitative Physiology <i>[alt: Bio 201L(Bio 101L)]</i>	Chem 210DL (32L) Apps Chem Principles or Chem 201DL (151L) Organic Chemistry <i>[alt: BME 244L (BME 144L)]</i>
EGR 201L (75L) Mechanics of Solids	Math 216 (107) Linear Algebra and Differential Eqn
Math 212 (103) Multivariable Calculus	ECE 230L (51L) Microelectronic Devices & Circuits
Physics 152L (62L) Electric, Magnet, Optics	ECE 280L (54L) Intro to Signals & Systems
ECE 110L (27L) Fundamentals of ECE	Compsci 201 (100) Program Design and Analysis
Junior Year	
Fall Semester	Spring Semester
BME 260L (100L) Modeling Cellul and Molecul Systems	BME 354L (154L) Biomed Electronic Measurem II
ME 221L (83L) Structure and Properties of Solids	BME 301L (201L) Bioelectricity or BME 303 (233) Modern Diagnostic Imaging Systems ²
Math 353 (108) Ordinary and Partial Diff. Equations	ECE Concentration Elective 1 ¹
ECE 250L (52L) Intro to Digital Systems	Stat 130 (113) Probability and Statistics in Engineering
ECE 270L (53L) Electromagnetic Fields	Social Science or Humanities Elective 2
Senior Year	
Fall Semester	Spring Semester
BME design: BME 436L (236L) or BME 464L (264L)	BME General Elective
BME Area Elective ²	ECE Elective
ECE Concentration Elective 2 ¹	Social Science or Humanities Elective 4
Life Science Elective	Social Science or Humanities Elective 5
Social Science or Humanities Elective 3	

1. At least two ECE Concentration Electives must be from the same Concentration Area
2. If BME 301L (201L) is taken the Area Elective must be from the Bioelectricity Area
If BME 303 (233) is taken the Area Elective must be from the Imaging and Sensors Area

Table 3a
BME/ME Double Major (matriculating classes ≤ 2010)

Freshman Year	
Fall Semester	Spring Semester
Chem 101DL (31L) Core Concepts in Chemistry	Chem 210DL (32L) Mod Apps Chem Principles or Chem 201DL (151L)
EGR 103L (53L) Computational Methods in Engineering	Math 112L (Math 32L) Introductory Calculus II
Math 111L (31L) Introductory Calculus I	Physics 151L (61L) Introductory Mechanics ¹
Writing 101 (20) Academic Writing	EGR 121L (20L) Engineering Innovation
Sophomore Year	
Fall Semester	Spring Semester
EGR 201L (75L) Mechanics of Solids	BME 260L (100L) Modeling Cellul and Molecul Systems
Biology 201L (Biology 101L) Molecular Biology	BME 253L (153L) Biomed Electronics and Measurem I or ECE 110L (27L) Fund Electr and Comput Eng
Math 212 (103) Multivariable Calculus	ME 221L (83L) Structure and Properties of Solids
Physics 152L (62L) Intro Electric, Magnet, Optics ¹	Math 216 (107) Linear Algebra and Differential Eqn
Social Science or Humanities Elective	EGR 244L (123L) Dynamics
Junior Year	
Fall Semester	Spring Semester
BME 271 (171) Signals and Systems or ECE 280L (54L)	BME 354L (154L) Biomed Electronics & Measurem II
ME 331L (101L) Thermodynamics	BME 302L (202L) Biomechanics/Biomaterials
ME 321L (131L) ME Analysis for Design	ME 336L (126L) Fluid Mechanics
Math 353 (108) Ordinary and Partial Diff Equations	Physiology Elective ³
Stat 130 (113) Probability and Statistics	Social Science or Humanities Elective
Senior Year	
Fall Semester	Spring Semester
ME 344L (125L) Control Systems	ME 424L (160L) Mechanical Systems Design ²
ME 421L (141L) Mechanical Design	Biomech/Biomat Area Elective ⁴
ME 431L (150L) Heat and Mass Transfer	Social Science or Humanities Elective
Social Science or Humanities Elective	Social Science or Humanities Elective

Students with AP credits should pay particular attention to prerequisites when rearranging the schedule.

1. See the Physics requirements on pp. 6-7.
2. ME 424L (160L) with BME project.
3. Selected from approved list of Physiology Electives (Table 7a).
4. Selected from Table 8.

Table 3b
BME/ME Double Major (matriculating classes ≥ 2011)

Fall Semester	Spring Semester
Chem 101DL (31L) Core Concepts in Chemistry	Biology 201L (101L) Molecular Biology <i>[alt: Chem 210DL (32L) or Chem201DL (151L)]</i>
EGR 103L (53L) Computational Methods in Engineering	Math 112L (32L) Introductory Calculus II
Math 111L (31L) Introductory Calculus I	Physics 151L (61L) Introductory Mechanics ¹
Writing 101 (20) Academic Writing	EGR 121L (20L) Engineering Innovation
	Social Science or Humanities Elective
Sophomore Year	
Fall Semester	Spring Semester
BME 244L (144L) Quantitative Physiology <i>[alt: Bio 201L (101L)]</i>	BME 253L (153L) Biomed Electronics Measurem I or ECE 110L (27L) Fund Electr and Comput Eng
EGR 201L (75L) Mechanics of Solids	ME 221L (83L) Structure and Properties of Solids
Chem210DL (32L) Mod Apps Chem Principles or201DL (151L) Organic Chemistry <i>[alt: SSH Elective]</i>	Math 216 (107) Linear Algebra and Differential Equations
Math 212 (103) Multivariable Calculus	EGR 244L (123L) Dynamics
Physics 152L (62L) Intro Electric, Magnet, Optics ¹	Social Sci or Humanities Elect <i>[alt: BME 244L (144L)]</i>
Junior Year	
Fall Semester	Spring Semester
BME 260L (100L) Modeling Cellul and Molecul Systems	BME 354L (154L) Biomed Electronic Measurem II
BME 271 (171) Signals & Systems or ECE 280L (54L)	BME 302L (202L) Fund Biomechanics/Biomaterials
Math 353 (108) Ordinary and Partial Diff Equations	ME 336L (126L) Fluid Mechanics
ME 331L (101L) Thermodynamics	Life Science Elective
ME 321L (131L) ME Analysis for Design	
Senior Year	
Fall Semester	Spring Semester
ME 344L (125L) Control Systems	ME 424L (160L) Mechanical Design ³
ME 421L (141L) Mechanical Design	Biomech/Biomat Area Elective ⁴
ME 431L (150L) Heat and Mass Transfer	ME Elective 2
ME Elective 1	Social Science or Humanities Elective
Social Science or Humanities Elective	Social Science or Humanities Elective

Students with AP credits should pay particular attention to prerequisites when rearranging the schedule.

1. See the Physics requirements on pp. 6-7.
2. Selected from approved list of Life Science Electives (Table 7).
3. ME 424L (160L) with BME project.
4. Selected from Table 8.

Table 4a
BME/CEE Double Major (matriculating classes ≤ 2010)

Freshman Year	
Fall Semester	Spring Semester
Chem 101DL (31L) Core Concepts in Chemistry	Chem 210DL (32L) Mod Apps Chem Principles or Chem 201DL (151L) Organic Chemistry
EGR 103L (53L) Computational Methods in Engineering	Math 112L (32L) Introductory Calculus II
Math 111L (31L) Introductory Calculus I	Physics 151L (61L) Introductory Mechanics ¹
Writing 101 (20)	Social Science or Humanities Elective
Sophomore Year	
Fall Semester	Spring Semester
EGR 201L (75L) Mechanics of Solids	BME 253L (153L) Biomed Electronics and Measurem I or ECE 110L (27L) Fund Electr and Comput Eng
Biology 201L (101L) Molecular Biology	ME 221L (83L) Structure and Properties of Solids
Math 212 (Math 103) Multivariable Calculus	Math 216 (Math 107) Linear Algebra and Differential Eqn
Physics 152L (62L) Intro Electric, Magnet, Optics ¹	EGR 244L (123L) Dynamics
Social Science or Humanities Elective	Social Science or Humanities Elective
Junior Year	
Fall Semester	Spring Semester
BME 260L (100L) Modeling Cellul and Molecul Systems	BME 354L (154L) Biomed Electronics and Measurem II
BME 271 (171) Signals and Systems or ECE 280L (54L)	BME 302L (202L) Biomechanics/Biomaterials or BME 307 (207) Transport Phenom in Biological Systems ⁴
Math 353 (108) Ordinary and Partial Diff Equations	CEE 463L (123L) Water Resources Engineering
CEE 461L (120L) Chem Principles in Env Eng	CEE 201L (130L) Uncertainty Design and Optimization
CEE 301L (122L) Fluid Mechanics	Stat 130 (113) Probability and Statistics for Engineers
Senior Year	
Fall Semester	Spring Semester
CEE 462L (124L) Bio Principles in Environmental Engineering	BME/CEE Design ³
EGR 305 (115) Engr System Optim Econ	BME Area Elective ⁴
CEE Elective ²	Life Science or Physiology Elective ⁵
Social Science or Humanities Elective	Social Science or Humanities Elective

1. See also the Physics requirements on pp. 6-7.

2. Selected from the following list of CEE electives:

CEE 561 (242) Environmental Aquatic Chemistry	CEE 581 (245) Pollutant Transport Systems
CEE 562 (244) Bio Processes in Environ Engineering	CEE 661L (239L) Environmental Molecular Biotech
CEE 563 (240) Chemical Fate of Organic Compounds	CEE 671 (243) Water Treatment
CEE 564 (241) Physical Chemical Processes in Environ Egr	CEE 672 (248) Solid Waste Engineering
CEE 571 (249) Hazardous and Toxic Waste	CEE 685 (246) Water Supply Engineering Design
CEE 575 (247) Air Pollution Control Engineering	

3. Selected from the following list:

CEE 469 (193) Integrated Environmental Design
BME 427L (227L) Design in Biotechnology
BME 462L (262L) Design for the Developing World

4. If BME 302L (202L) is taken, the Area Elective must come from the Biomaterials/Biomechanics Area

If BME 307 (207) is taken, the Area Elective must come from the Molecular, Cellular and Tissue Engineering Area

5. If BME 302L (202L) is taken, choose from the approved list of Physiology Electives (Table 7a)

If BME 307 (207) is taken, choose from the approved list of Life Science Electives (Table 7)

Table 4b
BME/CEE Double Major (matriculating classes \geq 2011)

Freshman Year	
Fall Semester	Spring Semester
Chem 101DL (31L) Core Concepts of Chemistry	Biology 201L (101L) Molecular Biology <i>[alt: Chem 210DL (32L) or Chem 201DL (151L)]</i>
EGR 103L (53L) Computational Methods in Engineering	Math 112L (32L) Introductory Calculus II
Math 111L (31L) Introductory Calculus I	Physics 151L (61L) Introductory Mechanics
Writing 101 (20) Academic Writing	Social Science or Humanities Elective
Sophomore Year	
Fall Semester	Spring Semester
BME 244L (144L) Quantitative Physiology <i>[alt: Bio 201L (Bio 101L)]</i>	BME 253L (153L) Biomed Electronics Measurem I or ECE 110L (27L) Fund Electr and Comput Eng
EGR 201L (EGR 75L) Mechanics of Solids	ME 221L (83L) Structure and Properties of Solids
Chem 210DL (32L) Mod Apps Chem Principle or Chem 201DL (151L) Organic Chemistry <i>[alt: SSH Elective]</i>	Math 216 (107) Linear Algebra and Differential Equations
Math 212 (103) Multivariable Calculus	EGR 244L (123L) Dynamics
Physics 152L (62L) Intro Electric, Magnet, Optics	Social Science or Humanities Elective <i>[alt: BME 244L (BME 144L)]</i>
Junior Year	
Fall Semester	Spring Semester
BME 260L (100L) Modeling Cellul and Molecul Systems	BME 354L (154L) Biomed Electronic Measurem II
BME 271 (171) Signals and Systems or ECE 280L(54L)	BME 302L (202L) Fund Biomechanics/Biomaterials or BME 307 (207) Transport Phenom in Biological Systems ⁴
Math 353 (108) Ordinary and Partial Diff Equations	CEE 462L (124L) Bio Principles in Environmental Egr
CEE 461L (120L) Chem Principles in Env Egr	CEE 201L (130L) Uncertainty Design and Optimization
CEE 301L (122L) Fluid Mechanics	Stat 130 (113) Probability and Statistics in Engineering
Senior Year	
Fall Semester	Spring Semester
CEE 463L (123L) Water Resources Engineering	BME/CEE Design ³
EGR 305 (115) Egr System Optim Econ	BME Area Elective ⁴
CEE Elective ²	Social Science or Humanities Elective
Life Science Elective	Social Science or Humanities Elective
Social Science or Humanities Elective	

1. See also the Physics requirements on pp. 6-7.

2. Selected from the following list of CEE electives:

CEE 561 (242) Environmental Aquatic Chemistry
 CEE 562 (244) Biological Processes in Environ Engineering
 CEE 563 (240) Chemical Fate of Organic Compounds
 CEE 564 (241) Physical Chemical Processes in Environ Egr
 CEE 571 (249) Hazardous and Toxic Waste
 CEE 575 (247) Air Pollution Control Engineering

CEE 581 (245) Pollutant Transport Systems
 CEE 661L (239L) Environmental Molecular Biotech
 CEE 671 (243) Water Treatment
 CEE 672 (248) Solid Waste Engineering
 CEE 685 (246) Water Supply Engineering Design

3. Selected from the following list:

CEE 469 (193) Integrated Environmental Design
 BME 427L (227L) Design in Biotechnology
 BME 462L (262L) Design for the Developing World

4. If BME 302L (202L) is taken, the Area Elective must come from the Biomaterials/Biomechanics Area

If BME 307(207) is taken, the Area Elective must come from the Molecular, Cellular and Tissue Engineering Area

Table 5. BME Area Electives Currently Offered
(See also Table 6 for area designations of Special Topics courses)

(BB)	Biomechanics and Biomaterials <i>Core Class: BME 302L (202L) Fund of Biomaterials and Biomechanics</i>	(EL)	Electrobiology <i>Core Class: BME 301L (201L) Bioelectricity</i>
BME 307 (207)	Transport Phenomena in Biological Systems	BME 502 (252)	Neural Signal Acquisition
BME 427L (227L)	Design in Biotechnology	BME 503 (253)	Computational Neuroengineering
BME 432L (265)	Biomechanics and Vehicle Safety Engineering	BME 504 (254)	Fundamentals of Electrical Stimulation of the Nervous System
BME 460L (260L)	Devices for People with Disabilities	BME 506 (204)	Measurem and Control of Cardiac Electr Events
BME 522L (242L)	Intro to Bionanotechnology Engineering	BME 511L (211L)	Theoretical Electrophysiology
BME 525 (215)	Biomedical Materials and Artificial Organs	BME 512L (212L)	Theoretical Cardiology
BME 526 (206)	Elasticity	BME 513 (213)	Nonlinear Dynamics in Electrophysiology
BME 527 (217)	Cell Mechanics and Mechanotransduction	BME 515 (256)	Neural Prosthetic Systems
BME 528 (275)	Intro to Biofluid Mechanics	BME 517 (265)	Neuronal Control of Movement
BME 529 (208)	Theoretical and Applied Polymer Science	BME 545 (235)	Acoustics and Hearing
BME 530 (230)	Tissue Biomechanics	BME 560 (210)	Molecular Basis of Membrane Transport
BME 531 (231)	Intermediate Biomechanics		
BME 570L (220L)	Introduction to Biomolecular Engineering		
BME 571L (218)	Biotechnology and Bioprocess Engineering		
BME 577 (247)	Drug Transport Analysis		
(IM)	Imaging and Measurement Systems <i>Core Class: BME 303 (233), Modern Diagnostic Imaging Systems</i>	(MC)	Molecular, Cellular and Tissue Eng <i>Core Class: BME 307 (207), Transport Phenomena in Biological Systems</i>
BME 436L (236L)	Biophotonic Instrumentation	BME 427L (227L)	Design in Biotechnology
BME 460L (260L)	Devices for People with Disabilities	BME 527 (217)	Cell Mechanics and Mechanotransduction
BME 464L (264L)	Medical Instrument Design	BME 560 (210)	Molecular Basis of Membrane Transport
BME 502 (252)	Neural Signal Acquisition	BME 561L (258L)	Genome Science & Technology Lab
BME 506 (204)	Measurem and Control Cardiac Electr Events	BME 562 (265)	Biology by Design
BME 515 (256)	Neural Prosthetic Systems	BME 565L (240L)	Environmental Molecular Biotechnology
BME 542 (222)	Principles of Ultrasound Imaging	BME 566 (216)	Transport Phenomena in Cells and Organs
BME 544 (265)	Digital Image Processing	BME 567 (237)	Biosensors
BME 545 (235)	Acoustics and Hearing	BME 568 (228)	Lab in Cellular and Biosurface Eng
BME 550 (234)	Modern Microscopy	BME 569 (239)	Cell Transport Mechanisms
BME 551 (270)	Biomed Opt Spectroscopy and Tissue Optics	BME 570L (220L)	Introduction to Biomolecular Engineering
BME 552 (238)	Advanced Optics	BME 571L (218)	Biotechnology and Bioprocess Engineering
BME 567 (237)	Biosensors	BME 574 (221)	Modeling and Engineering Gene Circuits
		BME 577 (247)	Drug Transport Analysis
		BME 578 (248)	Tissue Engineering

Table 6. Area Designations of BME Special Topics Courses

Course Section	Areas*	Offered
BME 290 (165) Biomed Device Innovation	GE	S12, F12
BME 290 (165) Medical Device Innovation	GE	S11
BME 290 (165) Med Instrument Developing World	GE	F11
BME 427L (227L)‡ Design in Biotechnology	BB, MC, GE	
BME 590 (265) Advanced Biophotonics	IM, GE	S10
BME 590 (265) Advances in Photonics	IM, GE	S12
BME 590 (265) Advanced Synthetic Genomics	MC, GE	S12
BME 590 (265) Bayesian Quant Electrophysiology	EL, GE	S11-12
BME 590L (265) Bioelectrical Engineering	EL, GE	F10
BME 590 (265) Biology by Design	MC, GE	F10-12
BME 590 (265) Biomaterials Science	BB, GE	S11
BME 590 (265)† Biomechanics of Vehicle Safety	BB, GE	S11
BME 590 (265) Biomed Optical Diagnostics	IM, GE	F10
BME 590L (265L) Biomedical Optics	IM, GE	F11-12
BME 590 (265) Biomedical Polymers	BB, MC, GE	S10-12
BME 590 (265)† BME Aspects of Blasts & Ballistics	BB, GE	S11
BME 590 (265) Cardiovascular Egr Disease	BB, EL, GE	S11, F12
BME 590 (265) Image Processing	IM, GE	S10-12
BME 590 (265) Intel Sensors in Med Instum	IM, GE	S12
BME 590 (265) Modern Ultrasound Lab Methods	IM, GE	S12
BME 590 (265) Neuronal Control of Movement	EL, GE	F10-11
BME 590 (265) Programmed Assembly of Soft Matter	BB, MC, GE	F12
BME 590 (265) Quantitative Physiology	GE	S10-11
BME 590 (265) Topics in Nanomedicine	BB, MC, GE	F10-12
BME 590 (265) Transport Proc in HIV Transmission	BB, MC, GE	S11-12
BME 590 (265) Ultrasound Card Image & Function	IM, GE	F11, S12
BME 590 (265)†‡ Vehicle Safety Engineering	BB, GE	F11-12
BME 590 (265) Viscoelastic Biomechanics	BB, GE	S12

*BB: Biomechanics and Biomaterials; EL: Electrobiolgy; IM: Imaging and Measurement Systems; MC: Molecular, Cellular, and Tissue Engineering; GE: General Elective.

† Approved Biomechanics Elective.

‡ Design Course.

Table 7. Approved BME Life Science Elective Courses
(Other courses can be taken upon approval of the BME DUS)

Biochemistry

Biochem 301 (227)	Introductory Biochemistry I
Biochem 302 (228)	Introductory Biochemistry II

Biology

Biology (118) ^D	Genetics and Molecular Biology
Biology 202L (102L)	Genetics and Evolution
Biology 212L (103L)	General Microbiology
Biology 213 (120)	Cell Signaling and Diseases
Biology 214L (184L)	Experimental Cell and Molecular Biology
Biology 215 (105)	Mathematical Biology
Biology 220 (119)	Cellular and Developmental Biology
Biology 221 (117)	Cell and Organismal Physiology
Biology 224 (154)	Fundamentals Neuroscience
Biology 232S (149S)	Comparative Biomechanics
Biology 250 (122)	Population Genetics
Biology 251 (124)	Molecular Evolution
Biology 251L (124L)	Molecular Evolution
Biology 278LA (150L)	Physiology of Marine Animals
Biology 311 (147)	Intro to Systems Biology
Biology 330L (108L)	Anatomy of the Vertebrates
Biology 333L (111L)	Principles of Animal Morphology
Biology 329L (151L)	Principles of Animal Physiology*
Biology 350 (187)	Complex Traits and Evol Genetics
Biology 365 (146)	Infectious Diseases
Biology 372LA (155L)	Biochemistry of Marine Animals
Biology 377LA (176L)	Marine Invertebrate Zoology
Biology 418 (214)	Biophysics in Cellular and Developmental Biology
Biology 515 (244)	Principles of Immunology (C-L: Immunology 244)
Biology 650 (284)	Molecular Population Genetics
Biology 783 (283)	Developmental Genetics

Chemistry

Chem 302 (176)	Biophysical Chemistry
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Computer Sciences

CompSci 260 (160)	Introduction to Computational Genomics
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Evolutionary Anthropology

Evanth 231L (151L)	Anatomy of the Lower Extremities
Evanth 235L (172L)	Primate Anatomy
Evanth 330 (155)	Human Anatomy and Physiology*
Evanth 333L (133L)	The Human Body
Evanth 530 (135)	Human Functional Anatomy

Neuroscience

Neurosci 212 (112)	Introduction to Cognitive Neuroscience
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Pharmacology

Pharm 350 (150)	Pharmacology: Drug Actions and Reactions
Pharm 533 (233)	Essentials of Pharmacology and Toxicology
Pharm 554 (254)	Mammalian Toxicology

* Not open to students who have taken or are required to take BME 244L (144L).

Table 7a. Approved BME Physiology Courses

This approved list of Physiology Classes is for BME majors (matriculating class 2010), and for BME/ECE, BME/ME, and BME/CEE majors (class \leq 2010). Other courses can be taken upon approval of the BME DUS.

Biology

Biology 212L (103L)	General Microbiology
Biology 214L (184L)	Experimental Cell and Molecular Biology
Biology 221 (117)	Cell and Organismal Physiology
Biology 224 (154)	Fundamentals Neuroscience
Biology 232S (149S)	Comparative Biomechanics
Biology 278LA (150L)	Physiology of Marine Animals
Biology 329L (151L)	Principles of Animal Physiology*
Biology 330L (108L)	Anatomy of Vertebrates
Biology 418 (214)	Biophysics in Cellular and Developmental Biology

Evolutionary Anthropology

Evanth 231L (151L)	Anatomy of the Lower Extremities
Evanth 235L (172L)	Primate Anatomy
Evanth 330 (155)	Human Anatomy and Physiology*
Evanth 333L (133L)	The Human Body

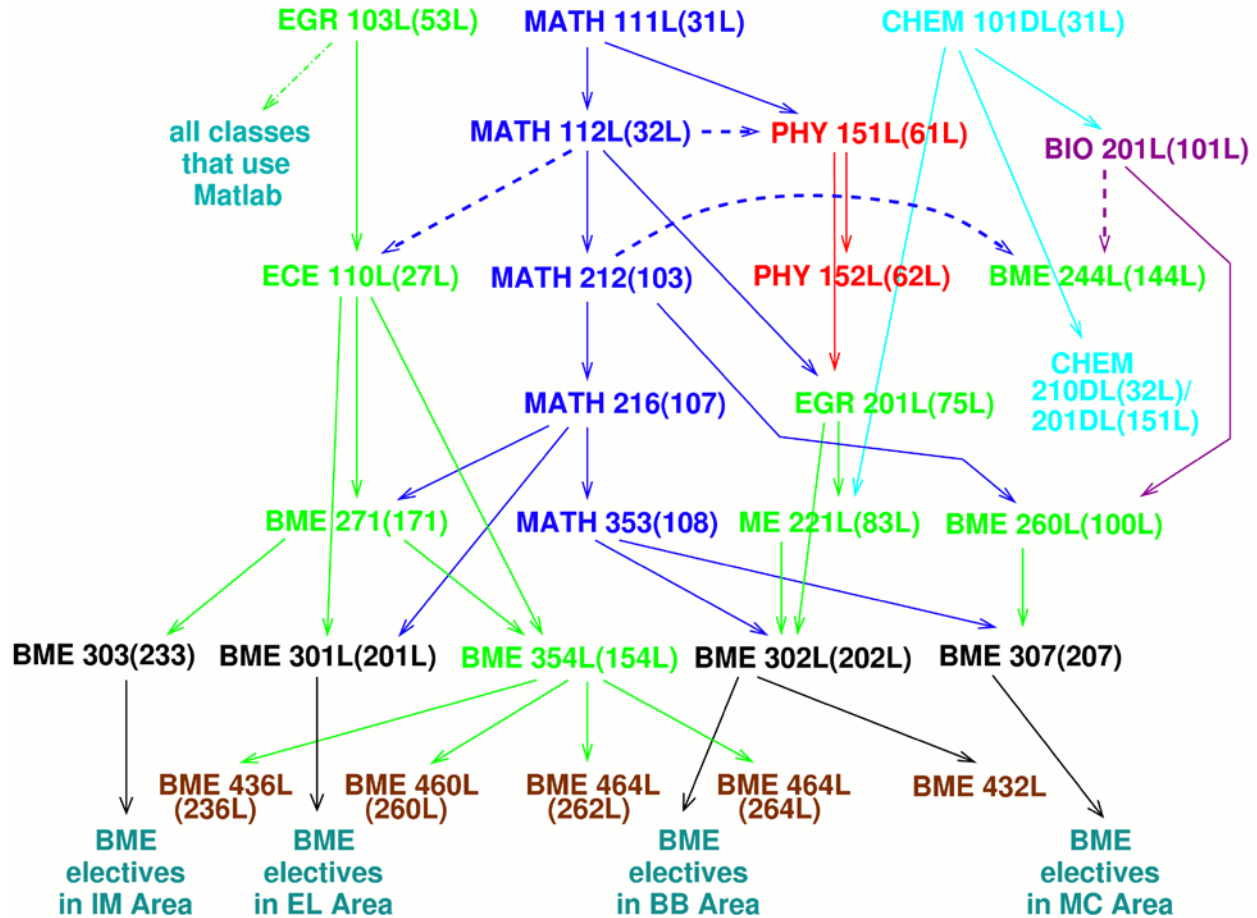
* Not open to students who have taken or are required to take BME 244L (144L).

Table 8. Approved Biomechanics Elective Courses

BME 432L (265)	Biomechanics and Vehicle Safety Engineering
BME 527 (217)	Cell Mechanics and Mechanotransduction
BME 528 (275)	Biofluid Mechanics
BME 530 (230)	Tissue Biomechanics
BME 531 (231)	Intermediate Biomechanics
BME 569 (239)	Cell Transport Mechanisms
BME 590 (265)	BME Aspects of Blasts & Ballistics (Note: the course number is temporary. It will be replaced by a permanent number.)
BME 590 (265)	Viscoelastic Mechanics of Biological Systems (Note: the course number is temporary. It will be replaced by a permanent number.)
CEE 520 (201)	Continuum Mechanics
CEE 535 (251)	Engineering Analysis and Computational Mechanics

Additional Information on Courses

- Flowchart of prerequisites (for matriculating class ≥ 2012)



blue—Math; red—Physics; cyan—Chemistry; violet—Biology; green—required Engineering courses; black—BME Area Core courses; brown—BME design courses; aqua—BME Area electives; dashed arrow—corequisite; dash-dot arrow—not a formal prerequisite

- Equivalent courses:
 - ECE 110L (27L) = BME 253L (153L)
 - ECE 280L (54L) = BME 271 (171)
(except BME/ECE double majors who *must* take ECE 280L (54L))
- The following BME courses are prerequisites for other BME courses:

EGR 103L (53L)	BME 98 (8), BME 542 (222), BME 577 (247)
ECE 110L (27L)	BME 271 (171), BME 301L (201L), BME 354L (154L), BME 506 (204)
EGR 201L (75L)	BME 302L (202L), BME 526 (206L), BME 530 (230), BME 531 (231), ME 221L (83L)
ME 221L (83L)	BME 302L (202L), BME 525 (215), BME 567 (237), 571L (218)
BME 253L (153L)	BME 271* (171), BME 301L (201L), BME 354L (154L), BME 506 (204)
BME 260L (100L)	BME 307 (207), BME 525 (215), BME 567 (237), BME 574
BME 271 (171)	BME 303 (233), BME 354L (154L), BME 545 (235)
BME 354L (154L)	BME 436L (236L), BME 460L (260L), BME 462L (262L), BME 464L (264L), BME 502 (252), BME 506 (204), BME 550 (234)
BME 301L (201L)	BME 503 (253), BME 506 (204), BME 511L (211L), BME 512L (212L), BME 513 (213), BME 515 (256)
BME 302L (202L)	BME 427L (227L), BME 432L, BME 522L (242L), BME 527 (217), BME 578 (248)
BME 303 (233)	BME 542 (222), BME 550 (234)
BME 307 (207)	BME 427L (227L), BME 528 (275), BME 566 (216), BME 568 (228), BME 569 (239), BME 577 (247), BME 578 (248)

* May be taken as a corequisite