

**THE CITY COLLEGE – SCHOOL OF ENGINEERING  
BIOMEDICAL ENGINEERING CURRICULUM  
Fall 2019 - Spring 2020**

August 26, 2019

<b>Math 20100</b> Calculus I Pre: Math 19500 (C min.) 4 cr.	<b>Chem 10301</b> General Chemistry I Pre: Math 19500 (C min.) 4 cr.	<b>Bio 10100</b> Foundations of Biology I 4 cr.	<b>Engl 11000</b> Freshman Composition 3 cr.	<b>Liberal Arts<sup>4</sup></b> 3 cr.	
<b>Math 21200</b> Calculus II Pre: Math 20100 (C min.) 4/ cr.	<b>Chem 10401</b> General Chemistry II Pre: Chem 10301 (C min.) 4 cr.	<b>Phys 20700</b> University Physics I Pre/Co: <b>Math 21200</b> 4 cr.	<b>BME 10100</b> Introduction to BME Pre/Co: Math 19500 1 cr.	<b>Engl 21007</b> Writing for Engineering Pre: Engl 11000 or FIQWS 3 cr.	
<b>Math 21300</b> Calculus III Pre: Math 21200 (C min.) 4 cr.	<b>Chem 21000 or</b> Applied Chemistry for BME Pre: Chem 10401; (engineering majors only) 3 cr. (Fall Only)	<b>Chem 32002<sup>5</sup></b> Biochemistry I Pre: Chem 26100, Chem 26300 (Pre-med Student)	<b>Phys 20800</b> University Physics II Pre: Phys 20700 Pre/Co: <b>Math 21300</b> 4 cr.	<b>BME 22000</b> Biostatistics & Research Methods Pre/Co: <b>Math 21300</b> , BME 10100 3 cr. (Fall Only)	<b>Liberal Arts<sup>4</sup></b> 3 cr.
<b>Math 39100</b> Differential Equations Pre: Math 20300 3 cr.	<b>ChE 22900</b> Chemical Engineering Thermo I Pre: Chem 10401 (C min.), Phys 20700 (C min.) Pre/Co: Math 39100 3 cr. (Spring only)	<b>ME 24600</b> Engineering Mechanics I Pre: Phys 20700 (C min.) & Math 20200 (C min.) Pre/Co: ME 14500 or BME 22000 3 cr.	<b>BME 20500</b> Bioelectrical Circuits with Lab Pre/Co: Phys 20800 (C min.), Math 39100 (C min.) 4 cr. (Spring Only)	<b>Liberal Arts<sup>4</sup></b> 3 cr.	
<b>Math 34600</b> Elements of Linear Algebra Pre: Math 20300 3 cr.	<b>ChE 34100<sup>8</sup></b> Transport Phenomena I Pre: Math 39100 (C min.) & ChE 22900 3 cr. (Fall Only)	<b>BME 40500</b> Biomedical Transducers and Instrumentation Pre: BME 20500 4 cr. (Fall Only)	<b>ME 33000</b> Mechanics of Materials Pre: Math 20300 (C min.) & ME 24600 3 cr.	<b>Bio 32100</b> Physiological Processes Pre: Bio 10100 & Math 20100 3 cr. (Fall Only)	
<b>BME 50100</b> Cell and Tissue Mechanics Pre: ME 33000 or ChE 31000, Bio 32100 3 cr. (Spring Only)	<b>BME 50300</b> Cell and Tissue Biomaterial Interactions Pre: ME 33000 or ChE 31000, Bio 32100 3 cr. (Spring Only)	<b>BME 50500</b> Image and Signal Processing in Biomedicine Pre: BME 40500 or (EE 25900 and EE 30600 & EE 33000) 3 cr. (Spring Only)	<b>BME 31000</b> Experimental Methods in BME Pre: BME 22000, ME 33000, Engl 21007 Pre/Co: Bio 22900 3 cr. (Spring Only)	<b>Bio 32200</b> Cell and Molecular Biology Pre: Bio 10100, Bio 32100 & Chem 21000 4 cr.	
<b>BME 50200</b> Cell and Tissue Transport Pre: ME 35600 or ChE 34100, Bio 32100 3 cr. (Fall Only)	<b>Technical Elective</b> (See list of Technical Electives Below) 3 cr.	<b>BME 30500</b> Dynamical Systems and Modeling Pre: BME 20500 or Engr 20400, ME 24600 Pre/Co: <b>Math 34600</b> 3 cr. (Fall Only)	<b>Engr 30000<sup>4</sup></b> Impact of Biomedical Technology Pre: Engl 21007, Bio 32100 3 cr. (Fall Only)	<b>BME 45000</b> BME Senior Design I Pre: BME 31000 , BME 50100, BME 50300 Pre/Co: BME 50200, BME 50500 3 cr. (Fall Only)	
<b>Engineering Elective</b>  BME 59003 BME Indep. Study (3cr) <b>BME 59001 BME Indep. Study (1cr)</b> BME 51000 Microflu. Dvcs. Biotech  BME 13000 Neur Engr & App Bioel <b>BME I3110 Biofluid Mechs</b> BME 14200 Org. Transp. Pharm'kin BME 15000 Biomed Imaging BME 15100 Biomed Signal Proc.  CSc 10200 Intro to Computing  ChE 33000 ChE Thermo II ChE 34200 Transport II  EE 33000 Electromagnetics  <b>Engr 10100 Engr Design (1cr)</b> Engr I4200 Continuum Mechanics Engr I1100 Engineering Analysis <b>Engr I7500 Poroelasticity</b>  ME 14500 CAD (2cr) ME 24700 Engineering Mechs II ME 32200 Cmpt Meths in Engr. ME 37100 Cmpt-Aided Design 3 cr. Total	<b>Technical Elective<sup>5</sup></b> (1 Course)  Bio 10200 Founds of Bio II Bio 20600 Intro to Genetics Bio 35000 Microbiology Bio 35400 Intro to Neurobio Bio 37500 Develop Bio Bio 41000 Cell Dev-Senes Bio 42000 Virology Bio 42500 Cancer Biology Bio 45400 Sensory Percept Bio 48300 Lab in Biotech.   3-5 cr. (Partial List of Approved Courses)	BME 50400 Cell and Tiss. Engr. BME 52000 Prac. Med. Dev. Design BME 16000 Advncd Biomats. BME 16100 Intel Prop. Reg & Qual BME 16400 Trans Chllges n Diag Dev BME 17000 Lab in Cell & Mol Engr BME 18000 Bone Biol. & Biomech. BME 19000 Skeletal Soft Tissue BME 19300 <b>Scientific Ethics</b> BME 19400 Spec. Tops n Mech. Lrn. BME 19500 Entrepreneurship  Chem 24300 Quantitative Analysis Chem 26100 Org Chemistry I Chem 26200 Org Chemistry Lab I Chem 26300 Org Chemistry II Chem 40700 Envir Org Chem Chem 45902/32002 Biochemistry I  Or any course from Engineering Electives	ChE 49808 Nanomats. ChE 51200 Pharm Appl CSc 10400 Discret Math Struct. Math 32800 Numerical Anal Math 37500 Prob. Theory Math 37600 Math. Stats. Math 37700 Appl Stats & Prob. Math 39500 Cmplx Var Sci & E  Phys 31500 Med. Phys. Phys 32100 Mod. Phys. Engrs Phys 32300 Quant Mech Phys 42200 Biomed. Phys.  Sci 28000 Bioinformat.  3 cr. (Spring Only)	<b>BME 46000</b> BME Senior Design II Pre: BME 45000  6 cr.	

- The latest version of the curriculum sheet supersedes any curriculum and pre-/co-requisite information in the Undergraduate Bulletin or online.
- "C" Passing Grade Requirement: Courses in shaded area (■) require a minimum passing grade of "C".
- Skills tests: Certain students may be required to pass CUNY Assessment Tests in one or more subjects within 1 or 2 years of admission.
- Liberal Arts electives:** BME students must take Engr 30000 Social, Economic, and Cultural Impact of Biomedical Technology (3 credits), as well as five approved courses (15 credits), of which at least one (3 credits) must be at the 20000 level or higher. A list of approved courses is posted on the School of Engineering web site at [ccny.cuny.edu/engineering/gen-ed](http://ccny.cuny.edu/engineering/gen-ed) and can be viewed at the Office of Undergraduate Affairs (ST-209) or the Office of Student Programs (ST-2M7).
  - Each course falls into one or more liberal arts clusters, specified in the list. The six courses must collectively occupy at least three clusters. The four clusters are: (f) Professional & Ethical Responsibilities, (g) Communication, (h) Global & Societal Context, and (j) Contemporary Issues.
  - Most students must also satisfy Pathways liberal arts requirements. See [ccny.cuny.edu/engineering/pathways](http://ccny.cuny.edu/engineering/pathways).
  - Students may take liberal arts courses in semesters other than shown here to better distribute course load as needed.
- Pre-med Curriculum:** Pre-med students must take the Organic Chemistry sequence (Chem 26100, 26200, 26300) as the Technical Electives, which increases the total credits by 2. Chem 32002 Biochemistry is then taken in place of Chem 21000, and Chem 26100 & 26300 replace Chem 21000 as a pre-requisite for Bio 22900.
- Other Graduation Requirements:** Apply for graduation during registration for the last semester. Minimum GPA of 2.00. Minimum QPA of zero. Residency Requirement: 30 credits of 30000-level or higher Biomedical Engineering courses taken at CCNY.
- Program Changes:** Substitution of other courses for required courses must be approved by the Chair of the Biomedical Engineering Department (ST-401), and Associate Dean of the Office of Undergraduate Affairs (ST-209).
- Transfer students who have completed Engr. 23000 (Thermodynamics) must complete ME 35600 (Fluid Mechanics) instead of ChE 34100 (Transport Phenomena I).

**Total Credits: 129 - 131.**

Grove School of Engineering – Liberal Arts electives satisfying Flexible Core (Pathways) requirements

Take one course in each Flexible Core area, CE, WCGI, IS, and US, except those areas that you satisfied at a prior college. Some students are exempt from Flexible Core requirements. **After these, choose your remaining GSoE liberal arts electives from a larger list.** See [cuny.cuny.edu/engineering/pathways](http://cuny.cuny.edu/engineering/pathways) for details.

Satisfying the Flexible Core **CREATIVE EXPRESSION (CE)** requirement:

Arch. & Env. Studies	AES 23202	Survey of World Architecture I
Arch. & Env. Studies	AES 24202	Survey of World Architecture II
Art	Art 10000	Introduction to the Visual Arts of the World (or 10001, honors)
Music	Mus 10100	Introduction to Music (or 10101, honors)
Music	Mus 10200	Introduction to World Music (or 10201, honors)
Music	Mus 14500	Introduction to Jazz (or 14501, honors)
Theatre	Thtr 13100	Introduction to Theatre Arts
CUNY Honors College	MHC 10101	The Arts in New York City, Seminar I, honors

Satisfying the Flexible Core **WORLD CULTURES AND GLOBAL ISSUES (WCGI)** requirement:

Anthropology	Anth 10100	General Anthropology
Asian Studies	Asia 10100	Asian Culture and Peoples
Asian Studies	Asia 20200	Contemporary Asia
Asian Studies	Asia 20500	Chinese Culture- Strategies & Practices
Black Studies	BlSt 10200	African Heritage and the Caribbean-Brazilian Experience
Black Studies	BlSt 31201	Africa and the Modern World (also Hist 27600)
Classical Culture	Cls 32100	Classical Mythology
French	Fren 28300	The Literature of Contemporary France
History	Hist 20400	Early Modern Europe (was 31200)
History	Hist 20600	Modern Europe
History	Hist 23700	Asia and the World
Jewish Studies	JwSt 31602	The Bible and Its Stories (was 11700)
Spanish	Span 28100	Masterworks of Spanish Literature I
Spanish	Span 28300	Masterworks of Latin American Literature
Theatre	Thtr 21100	Theatre History I
Theatre	Thtr 21200	Theatre History II
Theatre	Thtr 21300	Theatre History III
World Humanities	WHum 10100	World Humanities I: Intro. to World Literature (or 10101, honors)
World Humanities	WHum 10200	World Humanities II: Intro. to World Literature (or 10201, honors)
World Humanities	WHum 10312	World Humanities: Modern World Literature (or 10321, honors)
World Civilizations	WCiv 10100	Prehistory to 1500 A.D. (or 10101, honors)
World Civilizations	WCiv 10200	1500 to the Present (or 10201, honors)

Satisfying the Flexible Core **INDIVIDUAL AND SOCIETY (IS)** requirement:

Anthropology	Anth 20100	Cross Cultural Perspectives
Economics	Eco 10250	Principles of Microeconomics (was 10000)
Economics	10101 (19150)	Introduction to Economics, honors
Education & Culture	EdCE 25600	Language, Mind, and Society
Jewish Studies	JwSt 10411	Psychology of Religion
Jewish Studies	JwSt 10500	Introduction to Jewish Law and Ethics
Jewish Studies	JwSt 28100	The Holocaust
Philosophy	Phil 11206	Environmental Philosophy
Psychology	Psy 10200	Applications of Psych. in the Modern World (or 10101, honors)
Sociology	Soc 10500	Individual, Group and Society (or 10501, honors)
Women's Studies	WS 10000	Women's/Gender Roles in Contemporary Society
CUNY Honors College	MHC 20401	Shaping the Future of New York City, Seminar IV, honors

Satisfying the Flexible Core **US EXPERIENCE IN ITS DIVERSITY (US)** requirement:

English	Engl 15500	American Literature
History	Hist 24000	The United States: From Its Origins to 1877
History	Hist 24100	The United States since 1865
Political Science	PSc 10100	United States Politics and Government (or 10101, honors)
U.S. Society	USSo 10100	Development of the U.S. and its People (or 10101, honors)
CUNY Honors College	MHC 10201	The Peopling of New York, Seminar II, honors

sf 11/10/2017, from CCNY master list of 10/31/2017