

# Biomedical Engineering (BS) (14BMEBS)

## Freshman Year

Fall Semester	Credit	Spring Semester	Credit
CH 101 Chemistry, A Molecular Science <sup>3</sup>	3	CH 221 Organic Chem I	3
CH 102 General Chemistry Lab <sup>3</sup>	1	CH 222 Organic Chem I Lab	1
E 101 Introduction to Engr & Prob Solv <sup>4</sup>	1	MA 241 Calculus II <sup>3</sup>	4
E 115 Intro to Computing Environ	1	PY 205 Physics for Engineers & Scientists I <sup>3</sup>	3
ENG 101 Academic Writing and Research <sup>4</sup>	4	PY 206 Physics for Engineers & Scientists I Lab	1
MA 141 Calculus I <sup>3</sup>	4	EC 205 Economics (GEP Soc Sci Req*) <sup>1</sup>	3
HES_*** Health & Exercise Studies Course*	1	HES_*** Health & Exercise Studies Course*	1
	15		16

## Sophomore Year

Fall Semester	Credit	Spring Semester	Credit
BME 201 Comp Meth in BME	3	BIO 183 Intro Biol: Cellular & Molecular	4
BME 204 Biomedical Measurements	3	BME 203 Intro Mat Sci of Biomaterials	3
MAE 206 Engineering Statics <i>or</i> CE 214 Engineering Mech -Statics	3	BME 252 Engineering Design I	1
MA 242 Calculus III	4	BME 210 Analog & Digital Circuits	4
PY 208 Physics for Engineers & Scientists II	3	MAE 208 Engineering Dynamics	3
PY 209 Physics for Engineers & Scientists II Lab	1		
	17		15

## Junior Year

Fall Semester	Credit	Spring Semester	Credit
BME 301 Human Physiology for Engineers I	3	BME 302 Human Physiology for Engineers II	3
BME 311 Linear Systems in BME	3	BME Elective B <sup>2</sup>	3
MA 341 Applied Diff Equations	3	BME Elective C <sup>2</sup>	3
BME Elective A <sup>2</sup>	3	BME 352 Engineering Design II	2
ST 370 Prob and Statistics for Engrs	3	ENG 331 Comm.Engr.& Tech. <i>or</i> ENG 333 Comm. Sci. & Res.	3
		GEP Requirement*	3
	15		17

## Senior Year

Fall Semester	Credit	Spring Semester	Credit
BME 451 BME Senior Design I	3	BME 452 BME Senior Design II	3
BME Elective D <sup>2</sup>	3	BME Elective F <sup>2</sup>	3
BME Elective E <sup>2</sup>	3	GEP Requirement*	2-3
MAE 301 Thermodynamics I <i>or</i> MSE 301 Equilibrium and Rate Processes	3	GEP Requirement*	3
GEP Requirement*	3	GEP Requirement*	3
		GEP Requirement*	3
	15		17-18

## **Major/Program requirements and footnotes**

<sup>1</sup> Choose from EC 201 or 205, or ARE 201.

<sup>2</sup> Choose from an appropriate sequence of electives. These must include at least 15 hours of engineering topics.

<sup>3</sup> Grade of C (2.0) or higher required.

<sup>4</sup> Minimum grade of C- required.

**No specific emphasis:** Students will work out a plan of study with their advisor that includes at least two 300- or 400-level BME electives and any other courses listed for the emphasis areas. There must be a sequence of at least three related upper-level BME electives to demonstrate an area of depth. One course can be an appropriate non-engineering course.

**Biomechanics:** (A) MAE 314 or CE 313: Solid Mechanics; (B) MAE 308 or CE 382: Fluid Mechanics; (C) BME 342: Experimental & Analytical Methods in Biomechanical Engineering Analysis; (D) BME 441: Biomechanics; (E) and (F) Any BME elective or appropriate course approved by the student's advisor.

**Biomaterials:** (A) MAE 314 or CE 313: Solid Mechanics; (B) TE 463: Polymer Engineering; (C) PCC 471: Chemistry of Biopolymers (no engineering topics) (D) TE 466: Polymeric Biomaterials; (E) Any BME elective or appropriate course approved by the student's advisor; and (F) TE/BME 467: Mechanics of Tissues and Implants. Students following this emphasis area should take MAE 301 or MSE 301 in the fall of their junior year and the technical writing course in the spring of their junior year.

**Biomedical Instrumentation:** (A) Any BME elective or appropriate course approved by the student's advisor; (B) BME 422: Fundamentals of Biomedical Instrumentation; (C) BME 412: Biomedical Signal Processing; (D) BME 425: Bioelectricity; (E) and (F) Take two from BME 480: Biomedical Microcontroller Applications; ECE 435: Elements of Control; ECE 436: Digital Control Systems; ECE 455: Computer Control of Robots; ECE 456: Mechatronics; ECE 561: Embedded Systems; and BME 522: Medical Instrumentation. Students following this emphasis area may choose to take a GEP course in the fall semester of the junior year and BME Elective A in the spring semester of the senior year.

3 Grade of C (2.0) or higher.

4 Minimum grade of C-

### **\*General Education Program (GEP) requirements and GEP Footnotes**

To complete the requirements for graduation and the General Education Program, the following category credit hours and co-requisites must be satisfied. University approved GEP course lists for each of the following categories can be found at <https://oucc.dasa.ncsu.edu/general-education-program/>.

**A. Mathematical Sciences** (6 credit hours – one course with MA or ST prefix)

*Fulfilled as part of the Major requirements.*

**B. Natural Sciences** (7 credit hours – include one laboratory course or course with a lab)

*Fulfilled as part of the Major requirements.*

**C. Humanities** (6 credit hours selected from two different disciplines/course prefixes)

*Choose from the University approved GEP Humanities course list.*

**D. Social Sciences** (6 credit hours selected from two different disciplines/course prefixes)

*Choose 3 credits from the University approved GEP Social Sciences course list in a discipline other than*

*Economics. Economics 205 (or EC 201 or ARE 201), taken as part of the Major requirements, satisfies 3 credit hours needed to fulfill the GEP Social Science Requirement.*

**E. Health & Exercise Studies** (2 credit hours – at least one 100-level Health & Exercise Studies Course)  
*Choose from the University approved GEP Health & Exercise Studies course list.*

**F. Additional Breadth** (3 credit hours to be selected from the following checked University approved GEP course lists)

**XX** Humanities/Social Sciences/Visual and Performing Arts

**G. Interdisciplinary Perspectives** (5-6 credit hours)

*Choose from the University approved GEP Interdisciplinary Perspectives course list.*

**H. Introduction to Writing** (4 credit hours satisfied by completing ENG 101 with a C- or better)

The following **Co-Requisites** must be satisfied to complete the General Education Program requirements

**I. U.S. Diversity** (USD)

*Choose from the University approved GEP U.S. Diversity course list or choose a course identified on the approved GEP course lists as meeting the U.S. Diversity (USD) co-requisite.*

**J. Global Knowledge** (GK)

*Choose from the University approved GEP Global Knowledge course list or choose a course identified on the approved GEP course lists as meeting the Global Knowledge (GK) co-requisite.*

**K. Foreign Language proficiency** – Proficiency at the FL\_102 level is required for graduation.