Biomedical Engineering

Biomaterials

(SEMESTER-BY-SEMESTER CURRICULUM DISPLAY)

Current:X Proposed: Effective Semester: **7/2009**

DEGREE TITLE: **B. S. in Biomedical Engineering**

CONCENTRATION TITLE: **N/A**

CURRENT DEGREE KEY: **14BME097**

Freshman Year

		Fall Semester	*Credits*			*Spring Semester*	*Credits*
CH	101	Chemistry, A Molecular Science (C)	3	CH	221	Organic Chem I	3
CH	102	General Chemistry Lab (C)	1	CH	222	Organic Chem I Lab	1
E	101	Introduction to Engr & Prob Solv (C-)	1	MA	241	Calculus II (C)	4
E	115	Intro to Computing Environ (S)	1	PY	205	Physics for Engr & Sc I (C)	3
ENG	101	Academic Writing and Research (C-)	4	PY	206	Physics for Engr & Sc I Lab	1
MA	141	Calculus I (C)	4	PE	***	Physical Education / Healthy Living*	1
PE	1**	Fitness and Wellness Course*	1	EC	205	Economics (GEP Soc Sci Req*1)	3
		Semester Total	**15**			**Semester Total**	**16**

Sophomore Year

		Fall Semester	*Credits*			*Spring Semester*	*Credits*
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 ***or***	3	BME	252	Engineering Design I	1
CE	214	Engineering Mechanics - Statics		BME	210	Analog and Digital Circuits	4
MA	242	Calculus III	4	MAE	208	Engineering Dynamics	3
PY	208	Physics for Engr & Sc II	3				
PY	209	Physics for Engr & Sc II Lab	1				
		Semester Total	**17**			**Semester Total**	**15**

Junior Year

		Fall Semester	*Credits*			*Spring Semester*	*Credits*
BME	301	Human Physiology for Engineers I	3	BME	302	Human Physiology for Engineers II	3
BME	311	Linear Systems in BME	3	BME	362	Biomaterials Characterization	3
MA	341	Applied Diff Equations	3	BME	352	Engineering Design II	2
TE	463	(A) Polymer Engineering	3	MAE	214	(C) Solid Mechanics ***or***	3
MAE	201	Thermodynamics I ***or***	3	CE	313	Mechanics of Solids	
MSE	301	Equilibrium and Rate Processes		ST	370	Prob and Statistics for Engrs	3
				ENG	331	Comm.Engr.& Tech. (GEP Human.	3
				ENG	333	Comm. Sci. & Res. (GEP Human. Req*)	
		Semester Total	**15**			**Semester Total**	**17**

Senior Year

		Fall Semester	*Credits*			*Spring Semester*	*Credits*
BME	451	BME Senior Design I	3	BME	452	BME Senior Design II	3
E	304	Intro to NanoScience and Tech ***or***	3	BME	467	(F) Tissue Mechanics	3
MSE	485	Biomaterials		***	***	GEP Requirement*	2-3
***	***	BME Elective E[2]	3	***	***	GEP Requirement*	3
***	***	GEP Requirement*	3	***	***	GEP Requirement*	3
***	***	GEP Requirement*	3	***	***	GEP Requirement*	3
						Semester Total	**17-**
		Semester Total	**15**				

Minimum Total Credit Hours Required for Graduation **127-128**[I,J,]

Major/Program requirements and footnotes:

[1]Choose from EC 201 or 205, or ARE 201.

[2] Choose from an appropriate sequence of electives. These must include at least 15 hours of engineering topics.

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 214 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. Students following this area of emphasis should take MAE 201 or MSE 301 in the spring of their junior year and delay BME Elective B until the fall of the senior year.

Biomaterials: (A) TE 463: Polymer Engineering; (B) BME 362 Biomaterial Characterization (C) MAE 214 or CE 313: Solid Mechanics; (D) E 304: Introduction to Nano Science and Technology or MSE 485: 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 201 or MSE 301 in the fall of their junior year and ST370 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 308: Elements of Control Systems; 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.

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[*]**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 http://www.ncsu.edu/uap/academic-standards/gep/courselists/index.html.

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

Economics 200 (or EC 201 or ANE 201), taken as part of the Major requirements, satisfies 3 credit hours needed to fulfill
the GEP Social Sciences requirement.

E. Physical Education/Healthy Living (2 credit hours – at least one 100-level Fitness and Wellness Course)
Choose from the University approved GEP Physical Education/Healthy Living course list.

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

__X__ Humanities/Social Sciences/Visual and Performing Arts or _____ Mathematical Sciences/Natural Sciences/Engineering

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.

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