BACHELOR OF SCIENCE IN BIOMEDICAL ENGINEERING: NEURAL ENGINEERING TRACK

Neural Engineering

This area uses fundamental and applied engineering techniques to help solve basic and clinical problems in the neurosciences. At the fundamental level, it attempts to understand the behavior of individual neurons, their growth, signaling mechanisms between neurons, and how populations of neurons produce complex behavior. Such information has broad application to a better understanding of the communication that occurs between the various parts of the nervous system and the brain. For example, such an understanding can be applied to the development of replacement parts for impaired neural systems, such as the auditory, visual, and motor systems, as well as achieving a better understanding of how normal and diseased systems work.

Required Courses

Code	Title	Credit Hours
Biomedical Engineering Core Requirements		**(27)**
BME 100	Introduction to the Profession	2
BME 310	Biomaterials	3
BME 315	Instrumentation and Measurement Laboratory	2
BME 325	Bioelectronics Laboratory	1
BME 405	Physiology Laboratory	2
BME 419	Introduction to Design Concepts in Biomedical Engineering	2
BME 420	Design Concepts in Biomedical Engineering	3
BME 422	Mathematical Methods for Biomedical Engineers	3
BME 433	Biomedical Engineering Applications of Statistics	3
BME 453	Quantitative Physiology	3
ECE 308	Signals and Systems	3
Neural Engineering Requirements		**(40-41)**
CS 104	Introduction to Computer Programming for Engineers	2
ECE 211	Circuit Analysis I	3
ECE 213	Circuit Analysis II	4
ECE 218	Digital Systems	4
BME 309	Biomedical Imaging	3
BME 438	Neuroimaging	3
BME 443	Biomedical Instrumentation and Electronics	3
BME 445	Quantitative Neural Function	3
MATH 333	Matrix Algebra and Complex Variables	3-4
or CHEM 237	Organic Chemistry I	
CHEM 239	Organic Chemistry II [1]	3
Select three BME electives [2]		9
Mathematics Requirements		**(18)**
MATH 151	Calculus I	5
MATH 152	Calculus II	5
MATH 251	Multivariate and Vector Calculus	4
MATH 252	Introduction to Differential Equations	4
Physics Requirements		**(8)**
PHYS 123	General Physics I: Mechanics	4
PHYS 221	General Physics II: Electricity and Magnetism	4
Chemistry Requirements		**(8)**
CHEM 124	Principles of Chemistry I with Laboratory	4
CHEM 125	Principles of Chemistry II with Laboratory	4
Biology Requirements		**(4)**

BIOL 115	Human Biology	3
BIOL 117	Human Biology Laboratory	1
Interprofessional Projects (IPRO)		**(6)**
See Illinois Tech Core Curriculum, section E		6
Humanities and Social Science Requirements		**(21)**
See Illinois Tech Core Curriculum, sections B and C		21
Total Credit Hours		**132-133**

[1]   A technical elective may substitute for CHEM 239.

[2]   BME elective must be chosen from the approved list of 300+ level engineering courses in BME, ECE, CHE, MMAE, CAE, or CS. ENGR 497 will apply.

Bachelor of Science in Biomedical Engineering: Neural Engineering Track Curriculum

	Year 1		
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
BME 100	2	CHEM 125	4
CHEM 124	4	MATH 152	5
CS 104	2	PHYS 123	4
MATH 151	5	Social Sciences Elective	3
Humanities 200-level Course	3		
	16		**16**
	Year 2		
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
ECE 211	3	BIOL 115	3
ECE 218	4	BIOL 117	1
MATH 252	4	BME 315	2
PHYS 221	4	ECE 213	4
		MATH 251	4
		Social Sciences Elective (300+)	3
	15		**17**
	Year 3		
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
BME 309	3	BME 310	3
BME 405	2	BME 325	1
BME 422	3	BME 443	3
BME 453	3	BME 445	3
ECE 308	3	MATH 333 or CHEM 237	3-4
Humanities Elective (300+)	3	IPRO Elective I	3
	17		**16-17**
	Year 4		
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
BME 419	2	BME 420	3
BME 433	3	BME 438	3
CHEM 239[1]	3	BME Elective[2]	3
BME Elective[2]	3	IPRO Elective II	3
BME Elective[2]	3	Social Sciences Elective (300+)	3
Humanities Elective (300+)	3	Humanities or Social Science Elective	3
	17		**18**

Total Credit Hours: 132-133

[1]   A technical elective may substitute for CHEM 239.
[2]   BME elective must be chosen from the approved list of 300+ level engineering courses in BME, ECE, CHE, MMAE, CAE, or CS.
ENGR 497 will apply.

This program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).