

BACHELOR OF SCIENCE IN BIOMEDICAL ENGINEERING

Required Courses

Code	Title	Credit Hours
Biomedical Engineering Core Requirements		(31)
BME 100	Introduction to the Profession	2
CS 104	Introduction to Computer Programming for Engineers	2
ECE 211	Circuit Analysis I	3
ECE 308	Signals and Systems	3
BME 310	Biomaterials	3
BME 315	Instrumentation and Measurement Laboratory	2
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
Neural Engineering Concentration Requirement		(35-37)
ECE 213	Circuit Analysis II	4
ECE 218	Digital Systems	3-4
BME 309	Biomedical Imaging	3
BME 325	Bioelectronics Laboratory	1
BME 438	Neuroimaging	3
BME 443	Biomedical Instrumentation and Electronics	3
BME 445	Quantitative Neural Function	3
CHEM 235 & CHEM 236 or MATH 333	Organic Chemistry I and Organic Chemistry I-Lab Matrix Algebra and Complex Variables	3-4
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 122 & CHEM 123	Principles of Chemistry I and General Chemistry Laboratory	4
CHEM 126 & CHEM 140	Principles of Chemistry II Without Laboratory and Principles of Chemistry II Lab	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		(18)

See Illinois Tech Core Curriculum, sections B and C 18

Total Credit Hours 128-130

Code	Title	Credit Hours
Medical Imaging Concentration Requirement		(33-34)
CS 201	Accelerated Introduction to Computer Science	4
ECE 213	Circuit Analysis II	4
ECE 437	Digital Signal Processing I	3
ECE 481	Image Processing	3
BME 309	Biomedical Imaging	3
BME 325	Bioelectronics Laboratory	1
BME 438	Neuroimaging	3
BME 445	Quantitative Neural Function	3
CHEM 235 & CHEM 236 or MATH 333	Organic Chemistry I and Organic Chemistry I-Lab Matrix Algebra and Complex Variables	3-4
PHYS 224 or CHEM 239	General Physics III for Engineers Organic Chemistry II	3
Select one BME Elective		3

Code	Title	Credit Hours
Cell and Tissue Engineering Concentration Requirement		(34-35)
MMAE 202	Mechanics of Solids	3
CHEM 235 & CHEM 236	Organic Chemistry I and Organic Chemistry I-Lab	3-4
CHE 202	Material Energy Balances	3
BIOL 403	Biochemistry	4
BME 301	Bio-Fluid Mechanics	3
BME 335	Thermodynamics of Living Systems	3
BME 418	Reaction Kinetics for BME	3
BME 424	Quantitative Aspects of Cell and Tissue Engineering	3
BME 482	Mass Transport for Biomedical Engineers	3
Select two BME electives		6

General Biomedical Engineering without Concentration Requirement

Code	Title	Credit Hours
CHE 202 or ECE 218	Material Energy Balances ³ Digital Systems	3
MMAE 202 or ECE 213 or CS 201	Mechanics of Solids ³ Circuit Analysis II Accelerated Introduction to Computer Science	3-4
CHEM 235 & CHEM 236 or MATH 333	Organic Chemistry I and Organic Chemistry I-Lab Matrix Algebra and Complex Variables	3-4
BIOL 403 or CHEM 239 or PHYS 224	Biochemistry Organic Chemistry II General Physics III for Engineers	3-4
BME 301 or BME 309	Bio-Fluid Mechanics Biomedical Imaging	3
BME 320 or BME 325	Fluids Laboratory Bioelectronics Laboratory	1
BME 335 or BME 443	Thermodynamics of Living Systems Biomedical Instrumentation and Electronics	3

BME 418	Reaction Kinetics for BME	3
or BME 482	Mass Transport for Biomedical Engineers	
or BME 445	Quantitative Neural Function	
BME 438	Neuroimaging	3
or BME 424	Quantitative Aspects of Cell and Tissue Engineering	

¹ A technical elective may substitute for CHEM 239 for Neural Engineering Concentration.

A BME elective may be substituted for ECE 437 for Medical Imaging Concentration.

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 and will apply.

³ General Track: i) CHE 202 and MMAE 202 are recommended for the combo of BME 301 and BME 335.
ii) CS 201 and ECE 213 are recommended for the combo of BME 309 and BME 325

Bachelor of Science in Biomedical Engineering.

Neural Engineering Concentration Curriculum

		Year 1	
Semester 1	Credit Hours	Semester 2	Credit Hours
BME 100	2	CHEM 126 & CHEM 140	4
CHEM 122 & CHEM 123	4	MATH 152	5
CS 104	2	PHYS 123	4
MATH 151	5	Social Sciences Elective	3
Humanities Elective(200)	3		
16		16	

			Year 2
Semester 1	Credit Hours	Semester 2	Credit Hours
ECE 211	3	BIOL 115	3
ECE 218	3-4	BIOL 117	1
MATH 252	4	BME 315	2
PHYS 221	4	ECE 213	4
		MATH 251	4
		Social Sciences Elective (300+)	3
14-15			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	CHEM 235 & CHEM 236	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 Science Elective-300 Level	3
Humanities Elective (300+)	3		
	17		15

Total Credit Hours: 128-130

Medical Imaging Concentration Curriculum

				Year 1
Semester 1	Credit Hours	Semester 2	Credit Hours	
BME 100		2 CHEM 126 & CHEM 140		4
CHEM 122 & CHEM 123	4	MATH 152		5
CS 104	2	PHYS 123		4
MATH 151	5	Social Sciences Electives		3
Humanities 200-Level course	3			
	16			16
				Year 2
Semester 1	Credit Hours	Semester 2	Credit Hours	
CS 201	3-4	BIOL 115		3
ECE 211	3	BIOL 117		1
MATH 251	4	BME 315		2
PHYS 221	4	ECE 213		4
		MATH 251		4
		Humanities Elective -300 Level		3
	14-15			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	CHEM 235 & CHEM 236		3-4
Social Sciences Elective (300+)	3	I PRO 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
ECE 437	3	ECE 481		3
PHYS 224 or CHEM 239	3	BME Elective		3
Humanities Elective (300+)	3	Social Sciences Elective (300+)		3
I PRO II	3			
	17			15

Total Credit Hours: 128-130

Cell and Tissue Engineering Concentration

				Year 1
Semester 1	Credit Hours	Semester 2	Credit Hours	
BME 100		2 CHEM 126 & CHEM 140		4

CHEM 122 & CHEM 123	4	MATH 152	5
CS 104	2	PHYS 123	4
MATH 151	5	Social Science Elective	3
Humanities 200	3		
	16		16

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
CHEM 235 & CHEM 236	3-4	BIOL 115	3
ECE 211	3	BIOL 117	1
MATH 252	4	BME 315	2
MMAE 202	3	MATH 251	4
		PHYS 221	4
		Social Sciences Elective (300+)	3
	13-14		17

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
BME 405	2	BIOL 403	4
BME 422	3	BME 301	3
BME 453	3	BME 310	3
CHE 202	3	BME 320	1
ECE 308	3	BME 335	3
Socail Sciences Elective-300 Level	3	IPRO Elective I	3
	17		17

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
BME 418	3	BME 420	3
BME 419	2	BME 424	3
BME 433	3	BME Elective	3
BME 482	3	Social Sciences Elective (300+)	3
BME Elective	3	IPRO Elective II	3
Humanities Elective (300+)	3		
	17		15

Total Credit Hours: 128-129**General Biomedical Engineering without Concentration Curriculum****Year 1**

Semester 1	Credit Hours	Semester 2	Credit Hours
BME 100	2	CHEM 126 & CHEM 140	4
CHEM 122 & CHEM 123	4	MATH 152	5
CS 104	2	PHYS 123	4
MATH 151	5	Social Science Elective	3

Humanities or Socail Studies Elective	3		
	16		16
			Year 2
Semester 1	Credit Hours	Semester 2	Credit Hours
CHE 202 or ECE 218	3-4	BIOL 115	3
ECE 211	3	BIOL 117	1
MATH 252	4	BME 315	2
MMAE 202, CS 201, or ECE 213	3-4	MATH 251	4
Humanities Elective (300+)	3	PHYS 221	4
		Socail Sciences Elective-300 Level	3
	16-18		17
			Year 3
Semester 1	Credit Hours	Semester 2	Credit Hours
BME 405	2	BIOL 403, CHEM 239, or PHYS 224	3-4
BME 422	3	BME 301 or 309	3
BME 453	3	BME 320 or 325	1
CHEM 235 & CHEM 236	4-3	BME 310	3
ECE 308	3	BME 335 or 443	3
Social Sciences Elective (300+)	3	Social Science Elective (300+)	3
	18-17		16-17
			Year 4
Semester 1	Credit Hours	Semester 2	Credit Hours
BME 418, 482, or 445	3	BME 420	3
BME 419	2	BME 424 or 438	3
BME 433	3	BME Elective	3
BME Elective	3	I PRO Elective II	3
I PRO 1	3	Humanities Elective (300+)	3
	14		15

Total Credit Hours: 128-130

¹ A technical elective may substitute for CHEM 239 for the Neural Engineering Concentration.

BME elective may be substituted for ECE 437 for the Imaging Concentration

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.

³ MMAE is recommended for Combo BME 301 and BME 320
CS 201 or ECE 213 is recommended for combo BME 325 and BME 309.

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