

Biological Engineering: Cellular and Biomolecular Engineering

<https://ag.purdue.edu/oap/Pages/major.aspx>

Credits	Course number	Course Title	Prerequisites	Credits	Course number	Course Title	Prerequisites
Fall 1st Year				Spring 1st Year			
4	CHM 11500	General Chemistry	pre/co: calculus	4	CHM 11600	General Chemistry	CHM 11500
4	ENGL 10600	First-Year Composition		3	COM 11400	Fundamentals of Speech Communication	
2	ENGR 13100	Transforming Ideas to Innovation I		3	CS 15900	Programming Applications for Engineers	pre/co: ENGR 13100
4	MA 16500	Plane Analytic Geometry and Calculus I	ALEKS 85+	4	MA 16600	Plane Analytic Geometry and Calculus II	MA 16500
4	PHYS 17200	Modern Mechanics	MA 16500	2	ENGR 13200	Transforming Ideas to Innovation II	ENGR 13100
18				16			

Fall 2nd Year				Spring 2nd Year			
4	ABE 20100	Thermodynamics of Biological Systems I	CHM 11600	3	ABE 20200	Thermodynamics of Biological Systems II	ABE 20100, MA 26100
1	ABE 29000	Sophomore Seminar		3	CHE 32000	Statistical Modeling and Quality Enhancement	pre/co: MA 26200
3	BIOL 23000 or BIOL 23100	Biology of the Living Cell or Cell Structure and Function	CHM 11600, MA 16600	2	IT 22700 or CNIT 22700	Biotechnology Laboratory II or Bioinformatics	IT 22600
4	CHM 25700 or (CHM 25500 and CHM 25501)	Organic Chemistry or (Organic Chemistry I and Organic Chemistry Lab I)	CHM 11600	4	MA 26200	Linear Algebra and Differential Equations	MA 26100
2	IT 22600	Biotechnology Laboratory I		3	-----	Economics Selective	
4	MA 26100	Multivariate Calculus	MA 16600				
18				15			

Fall 3rd Year				Spring 3rd Year			
3	ABE 30300	Applications of Physics and Chemistry to Biological Processes	ABE 20200, CHM 25700 or (CHM 25500 and CHM 25501), pre/co: ABE 30700	3	ABE 30100	Numerical and Computational Modeling in Biological Engineering	ABE 37000, MA 30300, CS 15900
3	ABE 30700	Momentum Transfer in Food and Biological Systems	ABE 20200, co: MA 30300	3	ABE 30400	Bioprocess Engineering Laboratory	co: ABE 30800
3	ABE 37000	Biological/Microbial Kinetics and Reaction Engineering	CHM 25700 or (CHM 25500 and CHM 25501), MA 26200	3	ABE 30800	Heat and Mass Transfer in Food and Biological Systems	ABE 30700
3	MA 30300	Partial Differential Equations for Engineering and the Sciences	MA 26200	3	ABE 45700	Transport Operations in Food and Biological Engineering I	co: ABE 30800
4	-----	Biological Science Selective		3	-----	Humanities or Social Science Selective	
16				15			

Fall 4th Year				Spring 4th Year			
3	ABE 46000	Sensors and Process Controls	MA 26200	3	ABE 44000	Cell and Molecular Design Principles	BIOL 23000 or 23100, MA 26200, 30300
1	ABE 49000	Professional Practice in Agricultural and Biological Engineering	ABE 29000	3	ABE 55800	Process Design for Food and Biological Systems	ABE 55700
3	ABE 55700	Transport Operations in Food and Biological Engineering II	ABE 45700	3	ABE 58000	Process Engineering of Renewable Resources	ABE 37000
3	-----	Biological Science or Science Selective		3	-----	Humanities or Social Science Selective (30000+ level)	
3	-----	Written or Oral Communication Selective		3	-----	UCC Humanities Selective	
3	-----	Humanities or Social Science Selective					
16				15			

129 semester credits required for Bachelor of Science degree.
2.0 GPA required for Bachelor of Science degree.

The highlighted course is considered critical; timely progress toward the degree depends upon steady progress through each course in the plan of study, but this course, in particular, should be completed by the semester indicated.

Consultation with an advisor may result in an altered plan customized for an individual student.

Official and complete prerequisite lists are in the course catalog; the incomplete listing presented here regards this program and course sequencing.

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129 credits required for graduation

Credits	Course number	Course Title
Departmental/Program Major Courses (129 credits)		
Required Major Courses (45 credits)		
4	ABE 20100	Thermodynamics of Biological Systems I
3	ABE 20200	Thermodynamics of Biological Systems II
1	ABE 29000	Sophomore Seminar
3	ABE 30100	Numerical and Computational Modeling in Biological Engineering
3	ABE 30300	Applications of Physics and Chemistry to Biological Processes
3	ABE 30400	Bioprocess Engineering Laboratory
3	ABE 30700	Momentum Transfer in Food and Biological Systems
3	ABE 30800	Heat and Mass Transfer in Food and Biological Systems
3	ABE 37000	Biological/Microbial Kinetics and Reaction Engineering
3	ABE 44000	Cell and Molecular Design Principles
3	ABE 45700	Transport Operations in Food and Biological Engineering I
3	ABE 46000	Sensors and Process Controls
1	ABE 49000	Professional Practice in Agricultural and Biological Engineering
3	ABE 55700	Transport Operations in Food and Biological Engineering II
3	ABE 55800	Process Design for Food and Biological Systems
3	ABE 58000	Process Engineering of Renewable Resources
<u>Other Departmental /Program Course Requirements (84 credits) (See Advising Resources)</u>		
2	ENGR 13100	Transforming Ideas to Innovation I
2	ENGR 13200	Transforming Ideas to Innovation II
4	CHM 11500	General Chemistry (satisfies Science #1 for core)
4	CHM 11600	General Chemistry (satisfies Science #2 for core)
	CHM 25700 or (CHM 25500 and CHM 25501)	Organic Chemistry or (Organic Chemistry I and Organic Chemistry Lab I)
4	MA 16500	Plane Analytic Geometry and Calculus I (satisfies Quantitative Reasoning for core)
4	MA 16600	Plane Analytic Geometry and Calculus II
4	MA 26100	Multivariate Calculus
4	MA 26200	Linear Algebra and Differential Equations
3	MA 30300	Equations for Engineering and the Sciences
4	PHYS 17200	Modern Mechanics
3	CS 15900	Programming Applications for Engineering
3	CHE 32000	Statistical Modeling and Quality Enhancement
	BIOL 23000 or 23100	Biology of the Living Cell or Cell Structure and Function
2	IT 22600	Biotechnology Laboratory I
	IT 22700 or CNIT 22700	Biotechnology Laboratory II or Bioinformatics
4	-----	Biological Science Selective
3	-----	Biological Science or Science Selective
		First-Year Composition (satisfies Written Communication for core) (satisfies Information Literacy Selective for core)
4	ENGL 10600	Literacy Selective for core)
3	COM 11400	Fundamentals of Speech Communication (satisfies Oral Communication for core)
3	-----	Written or Oral Communications Selective
3	-----	Economics Selective (satisfies Human Culture Behavioral/Social Science for core)
3	-----	UCC Humanities Selective (satisfies Human Cultures Humanities for core)
3	-----	Humanities or Social Science Selective
3	-----	Humanities or Social Science Selective
3	-----	Humanities or Social Science Selective (30000+ level)

University Core Requirements:

Human Cultures Humanities: _____ Science, Technology, and Society: _____
 Human Cultures Behavioral/Social Science: _____ Written Communication: _____
 Information Literacy: _____ Oral Communication: _____
 Science #1: _____ Quantitative Reasoning: _____
 Science #2: _____

College of Agriculture & University Level Requirements:

2.0 GPA required for Bachelor of Science degree.
 32 Upper division credits taken from Purdue
 6 credits International Understanding: _____
 3 credits Multicultural Awareness: _____
 3 credits of Hum or Social Science Selective 30000+ level: _____
 9 credits of Hum and/or Social Sciences outside the College of Agriculture: _____

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 2.0 GPA required for Bachelor of Science degree.