Biological Systems Engineering Lower Division Curriculum*

Lower Division Courses	Units		
MAT 21A, B, C	12	Calculus	22 units Math
MAT 21D	4	Vector Analysis	
MAT 22A	3	Linear Algebra	
MAT 22B	3	Differential Equations	
PHY 9A, B, C	15	Classical Physics	15 units Physics
CHE 2A, 2B	10	General Chemistry	10 units Chemistry
BIS 2A	5	Essentials of Life	5 units Biology
ENG 6 or ECS 32A	4	Application of Computers or Intro to Programming and Problem Solving	12 units Engineering (ECS 32A req'd for ANR students)
ENG 17	4	Circuits	
ENG 35	4	Statics	
CMN1 or CMN3 or ENG 3	4	Intro to Public Speaking/Interpersonal Communication Competence/Intro to Engineering Design	4 units Communications
UWP 1	4	Expository Writing	4 units Writing
EBS 1	4	Foundations of Biological Systems Engineering	8 units EBS
EBS 75	4	Properties of Materials in Biological System Engineering	
Total Program Specific Lower Division Units	80		

* LD curriculum is the same for all EBS students.

Biological Systems Engineering Upper Division Curriculum (Areas of Specialization in Food Engineering, Biotechnical Engineering and Agriculture and Natural Resources Engineering

Upper Division Courses	Units	Food Engineering/Biotechnical Engineering	Agriculture and Natural Resources Engineering	
CHE 8A or CHE 118A	2 or 4	Organic Chemistry/Organic Chemistry for Health and Life Sciences		6 – 8 units Chemistry
CHE 8B or CHE 118B	4	Organic Chemistry/Organic Chemistry for Health and Life Sciences		
STA 100	4	Applied Statistics for Biological Sciences		4 units Statistics
ENG 100	3	Electronic Circuits and Systems		26 units core Engineering
ENG 102	4	Dynamics		
ENG 103	4	Fluid Mechanics		
ENG 104	4	Mechanics of Materials		
ENG 105	4	Thermodynamics		
ENG 106	3	Engineering Economics		
EBS 125	4	Heat Transfer in Biological Systems		16 units EBS
EBS 127	4	Mass Transfer and Kinetics in Biological Systems		
EBS 130	4	Modeling of Dynamic Processes in Biological Systems		
EBS 165	4	Bioinstrumentations and Control		
EBS 170A, B/BL, C/CL	9	Capstone Engineering Design		9 units Engineering Design
UWP Elective	4	UWP 101: Advanced Composition UWP 102 B/E/F/G: Writing in _____ UWP 104 A/E/F		4 units Writing
Bio/Life Sci. electives*	9	Any course with significant biology content (can include BIS 2B and BIS 2C)	Any course with significant biology content (can include BIS 2B and BIS 2C)	9 units Biology + Life Science
EBS Elective**	4	EBS 135 Bioenvironmental Engineering (4) EBS 161 Kinetics and Bioreactor Design (4) EBS 189A Automation for Biological Systems (4)*** EBS 189A Machine Learning for Biological Systems Engineering (4)***	EBS 128 Biomechanics and Ergonomics (4) EBS 144 Groundwater Hydrology (4)	12 units EBS/ENG electives

			EBS 145 Irrigation and Drainage Systems (4) EBS 189A Automation for Biological Systems (4)*** EBS 189A Machine Learning for Biological Systems Engineering (4)***	
ENG Elective	8	Almost any CoE courses (can include additional UD EBS courses)		
Total Program Specific Upper Division Units		82 or 84	82 or 84	
Total Program Specific Curriculum Units (LD + UD)		162 or 164	162 or 164	

* See sample schedules to see how these units can be used to explore an area in depth.

** Subject to change and may not be offered every year. Additional courses may be added in the future.

*** Course number will change as these become integrated into the catalogue.