

# 2021 CHECKLIST: Biological Systems Engineering: General

Student \_\_\_\_\_  
 Student ID \_\_\_\_\_  
 Telephone No. \_\_\_\_\_  
 Expected Graduation Month and Year \_\_\_\_\_

## University General Education Requirements

Each course taken to meet a university general education requirement can be used to meet a CALS B.S. requirement and/or a requirement of the major.

Crds	Sem/Yr Taken	Grd	Requirement	Course Taken to Meet Requirement
_____	_____	_____	Communication Part A Course (3 credits) LSC 100 or any course with a <i>Comm-A</i> designation in Course Search & Enroll. May be satisfied by placement test.	_____
_____	_____	_____	Communication Part B Course (3 credits) Any course with a <i>Comm-B</i> designation in Course Search & Enroll. InterEGR 397 or PATH-BIO 370 will also count as a tech elective.	_____
_____	_____	_____	Ethnic Studies Course (minimum of 3 credits) Any course with an <i>Ethnic Studies</i> designation in in Course Search & Enroll.	_____
_____	_____	_____	Humanities Courses (minimum of 6 credits). Courses with a <i>Humanities</i> or <i>Literature</i> breadth designation in Course Search & Enroll.	_____
_____	_____	_____	Social Science Course (minimum of 3 credits) Any course with a <i>Social Science</i> breadth designation in Course Search & Enroll.	_____

## CALS Bachelor of Science Degree Requirements

Each course taken to meet a CALS B.S. requirement can be used to meet a university general education requirement and/or a requirement of the major.

Crds	Sem/Yr Taken	Grd	Requirement	Course Taken to Meet Requirement
_____	_____	_____	International Studies Course (minimum of 3 credits). For a list of eligible courses see the Guide or CALS website.	_____
_____	_____	_____	First-Year Seminar Course (1 credit minimum).BSE 170 (2,S) preferred. For a list of eligible courses see the Guide or CALS website. Waived for students who transfer into CALS after freshman year.	_____

## BSE Major Requirements Common to All Option Areas (General)

Crds	Sem/Yr Taken	Grd	Requirement	Course Taken to Meet Requirement
			MATH 221 (5) Calculus and Analytic Geometry	
			MATH 222 (5) Calculus and Analytic Geometry	
			MATH 234 (3) Calculus - Functions of Several Variables	
			MATH 320 (3) [recommended] Linear Algebra and Differential Equations ( <i>pre-req</i> : MATH 222) or MATH 319 (3) Techniques in Ordinary Differential Equations ( <i>pre-req</i> : MATH 222)	
			STAT 324 (3) Introductory Applied Statistics for Engineers ( <i>pre-reqs</i> : MATH 221)	
			CHEM 109 (5) Advanced General Chemistry or CHEM 103 (4) General Chemistry and CHEM 104 (5) General Chemistry	
			BSE 380 Introductory Data Science for the Agricultural and Life Sciences (3, F) (preferred) or COMP SCI 310 (3, S) Problem Solving Using Computers ( <i>pre-req</i> : MATH 222)	
			Biological Science Course: ZOOLOGY 151 (5), ZOOLOGY 153 (3), BOTANY 130 (5), ZOOLOGY 101 (3), MICROBIO 101 (3), MICROBIO 303 (3), or any other Biological breadth course. Credits taken above 3 may be counted as Category D Technical Electives.	
			EMA 201 (3) Statics ( <i>pre-req</i> : MATH 222)	
			PHYSICS 202 (5) General Physics ( <i>pre-req</i> : MATH 211 or 221)	
			BSE 270 (3,F+Su) Intro to Computer Aided Design	
			Engineering Econ Course: BSE 310 Project Economics & Decision Analysis (3, S) (preferred) or ISYE 313 (3) Engineering Economic Analysis	
			BSE 249 (3,F) Engr. Principles for Biological Systems ( <i>pre-req</i> : MATH 221), or CBE 250 (3) Process Synthesis ( <i>pre-reqs</i> : Chem 329 or con reg). Note that CBE 250 is a prerequisite for CBE 310 and CBE 320 and must be taken by students who plan on enrolling in CBE 310 and CBE 320.	
			BSE 349 (3,S) Biological Concepts for Engineers ( <i>pre-reqs</i> : MATH 222, CHEM 104 or 109, introductory biology course)	
			BSE 365 (3,S) Measurements and Instrumentation for Biological Systems ( <i>pre-reqs</i> : full admission status)	
			BSE 308 (1,S) Career Management for Engineers	
			BSE 508 (2,S) Biological Systems Engineering Design Practicum I ( <i>pre-req</i> : full admission status)	
			BSE 509 (3,F) Biological Systems Engineering Design Practicum II ( <i>pre-reqs</i> : BSE 508, full admission status)	

## BSE Major Requirements for the General Program Option

Take BSE 249 and the M E 361, M E 363 and M E 364 sequence, or take CBE 250 and the CBE 310, CBE 320 and CBE 326 sequence.

Crds	Sem/Yr Taken	Grd	Requirement	Course Taken to Meet Requirement
			ME 361 (3) Thermodynamics ( <i>pre-reqs</i> : EMA 202, MATH 234), or CBE 310 (3) Chemical Process Thermodynamics ( <i>pre-reqs</i> : Math 234, Physics 201 or equiv; CBE 255 or equiv, CBE 250)	
			CIV ENGR 310 (3) Fluid Mechanics ( <i>pre-reqs</i> : EMA 202, MATH 234), or ME 363 (3) Fluid Dynamics ( <i>pre-reqs</i> : ME 361), or CBE 320 (4) Introductory Transport Phenomena ( <i>pre-reqs</i> : Physics 201, Math 319 or 320, CBE 250)	
			EMA 303 (3) or ME 306 (3) Mechanics of Materials ( <i>pre-reqs</i> : EMA 201, MATH 222)	
			BSE 464 (3,S) Heat and Mass Transfer in Biological Systems ( <i>pre-reqs</i> : ME 361, CBE 310 or an equivalent Thermodynamics course; ME 363, CBE 320, CEE 310 or an equivalent Fluid Mechanics course)	
			Minimum of three courses from: BSE 301 (3,F), 364 (3,S), 367 (3,S+Su+F), 372 (2,F), 460 (3,S), 461 (3,F), 472 (3,S), 473 (3,F), 475 (3,F), 476 (3,S), 571 (3,S), and 642 (2,S)	
			Minimum of nine credits of 300 level or above non-BSE engineering courses.	
			<b>Category A Technical Electives. Introduction to Engineering Course:</b> BSE 170 (2,S), INTEREGR 170 (2)	
			<b>Category B Technical Electives. Independent Study/Instruction Courses:</b> CALS or CoE courses with a 001, 299, 399, or 699 course number. No more than 3 credits of coursework allowed in this category.	
			<b>Category C Technical Electives. Upper-Level Engineering and Science Courses:</b> Upper-level engineering courses includes engineering courses with a 300 or greater course number, any BSE courses not taken to meet other curricular requirements, and EMA 202 (or ME 240) when not taken to meet another curricular requirement. Upper-level science courses includes all <b>advanced</b> level courses with a biological, natural and/or physical science breadth designation plus CHEM 341, 342, 343, 344, 345, 421 and AGRONOMY/ASM OCN/SOIL SCI 532. Independent study/instruction courses (BSE or otherwise) cannot be included in this category.	
			<b>Category D Technical Electives. Lower-Level Science and Engineering Courses, Breadth Courses:</b> Elementary and intermediate biological, natural and physical science courses except elementary and intermediate math courses; CoE courses with a 100 or 200 level designation; CALS courses, Institute of Environmental Studies courses, and/or School of Business courses. Independent study/instruction courses cannot be counted in this category. No more than 12 credits of coursework allowed in this category.	
			TOTAL credits in general option area must be no less than <b>43</b>	



## Four Year Road Map General Program Option

Yr	Sem.	Course	X	Crds	Sem. Total
1	Fall	MATH 221 <i>Calculus and Analytic Geometry</i>		5	16
		Ethnic Studies/International Studies/ Humanities/Social Science		3	
		CHEM 109 <i>Advanced General Chemistry*</i>		5	
		Biological Science Course		3	
1	Spring	MATH 222 <i>Calculus and Analytic Geometry</i>		4	15
		BSE 170 <i>Product Design Practicum</i>		2	
		BSE 380 <i>Introductory Data Science for the Agricultural &amp; Life Sciences</i>		3	
		LSC 100 <i>Science and Storytelling</i> or other Comm A course		3	
		BSE 310 <i>Project Economics and Decision Analysis</i>		3	
2	Fall	MATH 234 <i>Calculus - Functions of Several Variables</i>		4	16
		EMA 201 <i>Statics</i>		3	
		BSE 249 <i>Engineering Principles for Biological Systems</i>		3	
		BSE 270 <i>Introduction to Computer Aided Design</i>		3	
		Ethnic Studies/International Studies/ Humanities/Social Science		3	
2	Spring	BSE 349 <i>Biological Concepts for Engineers</i>		3	15
		MATH 320 <i>Linear Algebra and Differential Equations</i>		3	
		PHYSICS 202 <i>General Physics</i>		5	
		BSE 308 <i>Career Management for Engineers</i>		1	
		ME 306 <i>Mechanics of Materials</i>		3	
3	Fall	STAT 324 <i>Introductory Applied Statistics for Engineers</i>		3	17
		BSE Course		2	
		ME 361 <i>Thermodynamics</i>		3	
		Ethnic Studies/International Studies/ Humanities/Social Science		3	
		300 level or higher non-BSE engineering course		3	
		Technical Elective		2	
3	Spring	InterEGR 397 <i>Engineering Comm.</i> or other Comm B course		3	17
		BSE 508 <i>Biological Systems Engineering Design Practicum I</i>		2	
		ME 363 <i>Fluid Dynamics</i>		3	
		BSE 365 <i>Measurements and Instrumentation for Bio Systems</i>		3	
		BSE Course		3	
		Humanities/Social Science/Ethnic Studies/International Studies		3	
4	Fall	BSE 509 <i>Biological Systems Engineering Design Practicum II</i>		3	16
		BSE Course		3	
		300 level or higher non-BSE engineering course		3	
		Technical Elective		4	
		Humanities/Social Science/Ethnic Studies/International Studies		3	
4	Spring	BSE 464 <i>Heat and Mass Transfer in Biological Systems</i>		3	14
		Humanities/Social Science/Ethnic Studies/International Studies		3	
		300 level or higher non-BSE engineering course		3	
		Technical Elective		3	
		Free Elective		1	
Total					125

**Notes:** Need 125 credits to complete degree. If Chemistry 103 & 104 is taken in place of Chemistry 109, it is suggested to take Chemistry 103 in Fall semester and Chemistry 104 in Spring semester of year 1.