

# 2019 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) Any course with a <i>Comm-A</i> designation in the on-line Guide.	_____
_____	_____	_____	Communication Part B Course (2-3 credits) Any course with a <i>Comm-B</i> designation in the on-line Guide. EPD 397 will also count as a tech elective.	_____
_____	_____	_____	Ethnic Studies Course (minimum of 3 credits) Any course with an <i>Ethnic Studies</i> designation in the on-line Guide.	_____
_____	_____	_____	Humanities Courses (minimum of 6 credits). Courses with a <i>Humanities</i> or <i>Literature</i> breadth designation in the on-line Guide.	_____
_____	_____	_____	Social Science Course (minimum of 3 credits) Any course with a <i>Social Science</i> breadth designation in the on-line Guide.	_____

## 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.	_____
_____	_____	_____	First-Year Seminar Course (1 credit minimum). BSE 170 preferred. For a list of eligible courses see the Guide. 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	
			COMP SCI 310 (3,S) (preferred) Problem Solving Using Computers ( <i>pre-req</i> : MATH 222) or CBE 255 (3) or CIV ENGR 291 (3) ( <i>pre-req</i> : MATH 221)	
			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.	
			E M A 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: I SY E 313 (3) (preferred) or M E 314 (3) or ACCT I S 300 (3) or FINANCE 300 (3) or GEN BUS 310 (3)	
			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> : STAT 324, PHYSICS 202, 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
			M E 361 (3) Thermodynamics ( <i>pre-reqs</i> : E M A 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 M E 363 (3) Fluid Dynamics ( <i>pre-reqs</i> : M E 361), or CBE 320 (4) Introductory Transport Phenomena ( <i>pre-reqs</i> : Physics 201, Math 319 or 320, CBE 250)	
			E M A 303 (3) or M E 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> : M E 361, CBE 310 or an equivalent Thermodynamics course; M E 363, CBE 320, CEE 310 or an equivalent Fluid Mechanics course)	
			Minimum of three courses from: BSE 201 (1,F), 364 (3,S), 367 (3,S+Su+F), 372 (2,F), 460 (3,F), 461 (3,S), 472 (3,S), 473 (2,F), 475 (3,F), 476 (3,S), 571 (3,F), 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), 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 E M A 202 (or M E 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>	

## Free Electives

Crds	Sem/Yr Taken	Grade	Course
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

\_\_\_\_\_ TOTAL for Degree – Minimum 125 Credits Required (no course can be counted twice)

To be admitted to the degree-granting designation of ABE (biological systems engineering), a student must have:

1. A minimum of 24 degree credits.
2. A minimum of 17 credits of calculus, statistics, chemistry, biology, computer science, statics and physics courses required for a BSE degree.
3. A BSE *Math and Science Grade Point Average* (MSGPA) of at least 2.80 with a minimum grade of C in every course used to calculate the MSGPA. The MSGPA is based on the following (and only the following) courses: all math courses 217 and above (except Math 228); statistics courses 224 and above; all chemistry courses (i.e., all CHEM courses); up to three biology courses (i.e., any courses with a UW-Madison "Biological" breadth designation); computer science courses 302 and above (except CS 402); EMA 201; and Physics courses 201 and above. For any course that a student repeats, only the most recent grade will be used in the calculation. Any transfer course from another university that is included in the previous list must be included in the GPA calculation. There is no limit on the number of courses a student can retake or on the number of times a student can retake a specific course.
4. Successful completion of introductory chemistry (Chem 103/104 or 109 or equivalent) and math through Math 222.

## 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	
		COMP SCI 310 <i>Problem Solving Using Computers</i>		3	
		LSC 100 <i>Science and Storytelling</i> or other Comm A course		3	
		ISyE 313 <i>Engineering Economic Analysis</i>		3	
2	Fall	MATH 234 <i>Calculus - Functions of Several Variables</i>		4	16
		E M A 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	
		M E 306 <i>Mechanics of Materials</i>		3	
3	Fall	STAT 324 <i>Introductory Applied Statistics for Engineers</i>		3	17
		BSE Course		2	
		M E 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	E P D 397 <i>Technical Comm.</i> or other Comm B course		3	17
		BSE 508 <i>Biological Systems Engineering Design Practicum I</i>		2	
		M E 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, and move ISyE 313 to the fall semester of year 2.