

# BIOLOGICAL SYSTEMS ENGINEERING ~ LOWER DIVISION REQUIREMENTS

## 2 0 1 5 - 2 0 1 6

Units	Course	Qtr	Usually Taken	Title	Prerequisites	(COI=Consent of Instructor) (MTC=May take concurrently)
<b>MATHEMATICS</b>						
4	MAT 21A	F, W, S	1	Calculus	Appropriate score on PreCalc Qual. Exam	
4	MAT 21B	F, W, S	2	Calculus	MAT 21A or 21AH	
4	MAT 21C	F, W, S	3	Calculus	MAT 16C, 17C, 21B or 21BH	
4	MAT 21D	F, W, S	4	Vector Analysis	MAT 21C or 21CH	
3	MAT 22A	F, W, S	5	Linear Algebra	9 units of college math; ENG 6 or 22AL (MTC)	
3	MAT 22B	F, W, S	6	Differential Equations	MAT 21C and 22A or 67	
<b>PHYSICS</b>						
5	PHY 9A	F, S	3	Classical Physics	MAT 21B	
5	PHY 9B	F, W	4	Classical Physics	PHY 9A, MAT 21C and 21D (MTC)	
5	PHY 9C	W, S	5	Classical Physics	PHY 9B; MAT 21D and 22A (MTC)	
<b>GENERAL CHEMISTRY</b>						
5	CHE 2A	F, W	2	General Chemistry	Appropriate scores on CDE & PDE	
5	CHE 2B	W, S	3	General Chemistry	CHE 2A or 2AH	
<b>BIOLOGICAL SCIENCES</b>						
5	BIS 2A	F, W, S	4	Essentials of Life		
5	BIS 2B	F, W, S	5	Prin. of Ecology & Evolution	BIS 2A	
5	BIS 2C	F, W, S	6	Biodiversity & the Tree of Life	BIS 2B	
<b>ENGINEERING SCIENCE</b>						
4	EBS 1	F	1	Foundations of Bio. Sys. Engr.	Restricted to BSE Majors	
4	ENG 6	F, W, S	2	Application of Computers	MAT 16A or 21A w/C- or better MAT 16B or 21B (MTC)	
4	ENG 35	F, W, S	4	Statics	MAT 21D (MTC), PHY 9A, ECI 19 or ENG 6 recomm.	
4	ENG 17	F, S	6	Circuits	MAT 22A w/C- or better, MAT 22B (MTC) and PHY 9C w/C- or better	
4	EBS 75	W	5	Prop. of Matls. in Bio. Sys.	BIS 2A and PHY 9C (MTC)	
<b>ENGLISH COMPOSITION</b>						
4	UWP 1/Y/V	F, W, S	1	Expository Writing	ELWR Satisfied	
<b>ORAL COMMUNICATION</b> Select 1 course to satisfy Oral Communication.						
_____	4	CMN 1	F, W, S	6	Intro. to Public Speaking	ELWR Satisfied (RECEIVE GE WRITING)
_____	4	CMN 3	F, W, S		Interpersonal Comm. Competence	ELWR Satisfied

**MINIMUM UPPER DIVISION UNITS REQUIRED: 72**

**MINIMUM UNITS REQUIRED FOR MAJOR: 185**

*Freshman = 00.00 - 44.99 units*  
*Sophomore = 45.00 - 89.99 units*  
*Junior = 90.00 - 134.99 units*  
*Senior = 135.0 + units*

**Staff Academic Adviser**  
 Lauren Lirio Mendoza  
 2038 Bainer Hall  
 (530) 752-1451  
 llmendoza@ucdavis.edu

**Faculty Academic Adviser**  
 Professor Tina Jeoh  
 2044 Bainer Hall  
 (530) 752-1020  
 tjeoh@ucdavis.edu

## BIOLOGICAL SYSTEMS ENGINEERING ~ UPPER DIVISION REQUIREMENTS

Units/	Course	Qtr Taken	Qtr	Title	Prerequisites	(COI=Consent of instructor) (MTC=May take concurrently)
<b>MATH/STATISTICS AND BASIC SCIENCES</b>						
	2/4 CHE 8A/118A	7	F, S/F,W	Organic Chem/O Chem for Life Sci.	CHE 2B w/C- or better	
	4 CHE 8B/118B	8	F, W/F,S	Organic Chem/O Chem for Life Sci.	CHE 8A / CHE 118A	
	4 STA 100	7	F, W, S	Applied Statistics for Biological Scientists	MAT 16B or equivalent	
<b>ENGINEERING TOPICS</b>						
	3 ENG 100	8	W, S	Electronic Circuits & Systems	ENG 17 w/C- or better	
	4 ENG 102	7	F, W, S	Dynamics	ENG 35 and MAT 22B; Restricted to COE students	
	4 ENG 104	9	F, W, S	Mechanics of Materials	ENG 35 and MAT 22B; Restricted to COE students	
	4 ENG 105	7	F, W, S	Thermodynamics	MAT 22B and PHY 9B; Restricted to COE students	
	3 ENG 106	11	W	Engineering Economics	Upper division standing in Engineering	
	4 EBS 103	8	W	Fluid Mechanics Fundamentals	PHY 9B	
	4 EBS 125	9	S	Heat & Mass Transfer in Biological Sys.	EBS 103, ENG 105, BIS 2A/2B/2C	
	4 EBS 127	10	F	Mass Transfer & Kinetics	EBS 125	
	4 EBS 130	8	W	Dyn Model of Proc in Bio Sys	MAT 22B, ENG 6, EBS 75	
	4 EBS 165	10	F	Bioinstrumentation and Control	ENG 100 and ENG 6 or ECS 30	
	3 EBS 170A	10	F	Engr Design & Prof. Respon.	EBS 1, ENG 102 and 104	
	2,1 EBS 170B, BL	11	W	Engr Projects: Design	EBS 170A; concurrent enrollment in EBS 170BL	
	1,2 EBS 170C, CL	12	S	Engr Projects: Design Eval.	EBS 170B, BL; concurrent enrollment in EBS 170CL	

### BIOLOGICAL SYSTEMS ENGINEERING ELECTIVE (EBS):

**MINIMUM OF 4 UNITS**

There are many possible areas of concentration in Biological Systems Engineering; our faculty have active research activities in all of these areas:

**Agricultural Engineering**  
Biomechanics  
Bioprocessing

**Biotechnology**  
Forest Engineering  
Aquacultural Engineering

**Ecological Systems Engineering**  
Food Engineering  
Bioenergy

Select four units from any upper division EBS courses not otherwise required for the major, with the exception of EBS 189-199.

### ENGINEERING ELECTIVES:

**MINIMUM OF 3 UNITS**

All upper division courses offered by the College of Engineering may be taken as engineering electives **except the following:** ECI 123; ECS 188; ENG 103, ENG 160; and all courses numbered 190-197 and 199 (except ENG 190, which may be taken for 2 units of engineering elective credit).

### BIOLOGICAL SCIENCE ELECTIVES:

**MINIMUM OF 3 UNITS**

All upper division courses in the College of Biological Sciences (*with the exception of BIS 132; EVE 175; EXB 102, 112, 115, 118 through 149L; MIC 100 and all courses numbered 190-199*) may be used as biological sciences electives. The following courses may also be taken as biological sciences electives: ABT 161; ANS 118, 143, 144, 146; ATM 133; AVS 100; CHA 101, 101L; ENT 100; ENH 102; ESPM 120, 182, 185 (*offered at UC Berkeley*); ESP 100, 110, 155; ETX 101,131; FST 102A, 104L, 119, 120, 128, 159; IDI 141; PLS 110A; SSC 100; WFC 121.

*Students may choose other upper division courses with substantial biological content offered by the College of Agricultural and Environmental Sciences; consultation with a BSE faculty adviser and approval by petition is required.*

### UPPER DIVISION ENGLISH COMPOSITION Select one course from the following: (must pass course with C- or higher)

_____	4	UWP 101	8-10	F, W, S	Advanced Composition	UWP 1 or ENL 3; Upper Division Standing
_____	4	UWP 102B	8-10	F, W, S	Writing in Biological Sciences	UWP 1 or ENL 3; Upper Division Standing
_____	4	UWP 102E	8-10	F, W, S	Writing in Engineering	UWP 1 or ENL 3; Upper Division Standing; UD students in COE
_____	4	UWP 102F	8-10	S	Writing in Food Science and Technology	UWP 1 or ENL 3; Upper Division Standing
_____	4	UWP 102G	8-10	S	Writing: Bioregion	UWP 1 or ENL 3; Upper Division Standing
_____	4	UWP 104A	8-10	F, W, S	Business Reports & Technical Communications	UWP 1 or ENL 3; Upper Division Standing
_____	4	UWP 104E	8-10	F, W, S	Writing in the Professions: Science	UWP 1 or ENL 3; Upper Division Standing
_____	4	UWP 104F	8-10	F, W, S	Writing in the Health Profession	UWP 1 or ENL 3; Upper Division Standing