

## Department of Biology Graduation Checklist

<http://biology.sfsu.edu/content/biology-undergraduate-graduation-checklists>

LD= \_\_\_\_\_ Student: \_\_\_\_\_ E-mail \_\_\_\_\_  
 UD= \_\_\_\_\_ Last First \_\_\_\_\_  
 Advisor: \_\_\_\_\_ Phone \_\_\_\_\_

### BACHELOR OF ARTS IN GENERAL BIOLOGY

*Course is 3 units unless otherwise noted.*

<b>Lower Division Requirements (32-33 units)</b>		<i>Units</i>	√	<i>Equiv. Form if any (√)</i>
BIOL 230	Introductory Biology I	5		
BIOL 240	Introductory Biology II	5		
CHEM 115	General Chemistry I: Essential Concepts of Chemistry	5		
CHEM 130	General Organic Chem. (CHEM 233 also acceptable)	3		
CHEM 215	General Chemistry II (CHEM 216 is recommended)	3		
PHYS 111/112	General Physics I/Laboratory (3/1)	4		
PHYS 121/122	General Physics II/Laboratory (3/1)	4		

*One course from the following (3-4 units):*

MATH 124	Elementary Statistics			
MATH 226	Calculus I (4)			

**Total lower division requirements (units):..... 32-33**

### Upper Division Requirements (24-25 units)

BIOL 355	Genetics	3		
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*One physiology course from the following (3 units):*

BIOL 442	Microbial Physiology			
BIOL 525	Plant Physiology			
BIOL 612	Human Physiology			
BIOL 630	Animal Physiology			

*One cell biology course from the following (3-4 units):*

BIOL 350	Cell Biology			
BIOL 358	Forensic Genetics: Math Matters (4)			
BIOL 401	General Microbiology			
BIOL 435	Immunology			
BIOL 453	General Parasitology			
CHEM 349	General Biochemistry			

*One physiology or cell biology laboratory course from the following (1-4 units):*

BIOL 351 GW	Experiments in Cell and Molecular Biology - GVAR (4)			
BIOL 402 GW	General Microbiology Laboratory - GVAR			
BIOL 436	Immunology Laboratory (2)			
BIOL 454	Parasitology Laboratory (1)			
BIOL 526	Plant Molecular Physiology Laboratory (2)			
BIOL 613 GW	Human Physiology Laboratory - GVAR			
BIOL 631 GW	Animal Physiology Laboratory - GVAR (4)			
CHEM 343	Biochemistry I Laboratory			

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**One ecology course from the following (3-4 units):**

BIOL 482	Ecology (4)			
BIOL 490	Ecology of Infectious Disease (4)			
BIOL 529 GW	Plant Ecology - GWAR (4)			
BIOL 532	Restoration Ecology			
BIOL 534	Wetland Ecology (4)			
BIOL 580	Limnology			
BIOL 582	Biological Oceanography (4)			
BIOL 585/586	Marine Ecology/Laboratory (3/2-both must be taken)			

**One evolution or organismal biology course from the following (3-5 units):**

BIOL 328	Human Anatomy (4)			
BIOL 337	Evolution			
BIOL 380	Evolutionary Developmental Biology			
BIOL 382	Developmental Biology			
BIOL 425	Emerging Diseases			
BIOL 453/ 454	General Parasitology/Laboratory (3/1)*			
BIOL 460	General Entomology (4)			
BIOL 475 GW	Herpetology - GWAR			
BIOL 478 GW	Ornithology - GWAR (4)			
BIOL 500	Evolution and Diversity of Plants (4)			
BIOL 502	Biology of the Algae			
BIOL 504	Biology of the Fungi (4)			
BIOL 505	Comparative Anatomy of Vascular Plants (4)			
BIOL 514	Plant Taxonomy (5)			
BIOL 555	Marine Invertebrate Zoology (4)			
BIOL 570 GW	Biology of Fishes - GWAR (4)			
BIOL 600	Animal Behavior			
BIOL 638	Bioinformatics & Genome Annotations (4)			

*\*Note: cannot double count Biol 453 to meet both Cell Biology & Evolution/Organismal Biology requirements*

*There are multiple options for meeting the GWAR requirement (course name must have GW) - consult with advisor  
 GWAR course must be completed with a C- or better to meet graduation requirements*

**Upper division electives selected in consultation with an advisor:..... 4 - 8 additional units**

**•Courses can be those listed above, not already used to satisfy requirements in those categories.**

**•Only one of the following courses can be included among those selected:**

**BIOL 317, BIOL 327, BIOL 330, and BIOL 349.**

**•Up to three units of BIOL 699 can also be used towards the total of four to eight units.**

**•All Biology courses that have BIOL 230 and/or BIOL 240 as prerequisites can also be used as electives.**

**Additional elective courses include:**

BIOL 332	Health Disparities in Cancer			
BIOL 344GW	Research Skills - GWAR			
BIOL 358	Forensic Genetics: Math Matters (4)			
BIOL 461	Insect Taxonomy (4)			
BIOL 464	Medical Entomology			
BIOL 470	Natural History of Vertebrates (4)			
BIOL 492	Comparative Anatomy of Vertebrates (4)			
BIOL 530	Conservation Biology			
BIOL 550	Plant and Animal Interactions (4)			

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BIOL 555	Marine Invertebrate Zoology (4)			
BIOL 556	Natural History of Marine Invertebrates (4)			
BIOL 577	Ecological and Environmental Modeling (4)			
BIOL 607	Conservation and Management of Marine Mammals			
BIOL 609	Physics in Medicine			
BIOL 614	Vertebrate Histology (4)			
BIOL 616	Cardiorespiratory Physiology			
BIOL 620	Endocrinology			
BIOL 621	Reproductive Physiology			
BIOL 622	Hormones and Behavior			
BIOL 623	Pharmacology			
BIOL 640	Biophysics			
BIOL 652	Science Education Partners in Biology (4)			

<i>Course Num.</i>	<i>Course Title</i>	<i>Units</i>

*What course has student taken to meet GVAR?* \_\_\_\_\_

	<i>Required</i>	<i>Completed</i>
<b>Total upper division unit requirements</b>	<b>24-25</b>	_____
<b>Total units for major</b>	<b>57</b>	_____

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**BACHELOR OF SCIENCE IN BIOLOGY: CONCENTRATION IN BOTANY**

*Course is 3 units unless otherwise noted.*

**Lower Division Requirements (34-35 units)**

		<i>Units</i>	√	<i>Equiv. Form if any (√)</i>
BIOL 230	Introductory Biology I	5		
BIOL 240	Introductory Biology II	5		
CHEM 115	General Chemistry I: Essential Concepts of Chemistry	5		
CHEM 130	General Organic Chemistry	3		
or CHEM 233	Organic Chemistry I			

***Units selected from the following (16-17 units):***

CHEM 215/216	General Chemistry II: Quantitative Appl. of Chem.Conc../ Lab (3/2)			
MATH 226	Calculus I (4)			
MATH 227	Calculus II (4)			
PHYS 111/112	General Physics I and Laboratory (3/1)			
PHYS 121/122	General Physics II and Laboratory (3/1)			

***Total lower division requirements (units):.....*** **34-35**

**Upper Division Requirements (32-33 units)**

BIOL 337	Evolution	3		
BIOL 355	Genetics	3		
BIOL 458	Biometry	4		
BIOL 525/526	Plant Physiology and Plant Molecular Physiology Laboratory (3/2)	5		

***Units selected from the following (4 units)***

BIOL 529 GW	Plant Ecology - GVAR (4)			
BIOL 534	Wetland Ecology (4)			

***Units selected from the following (4 units)***

BIOL 500	Evolution and Diversity of Plants (4)			
BIOL 505	Comparative Anatomy of Vascular Plants (4)			

***Units selected from the following (3 - 5 units)***

BIOL 502	Biology of the Algae			
BIOL 504	Biology of the Fungi (4)			
BIOL 514	Plant Taxonomy (5)			

*There are multiple options for meeting the GVAR requirement (course name must have GW) - consult with advisor*

*GVAR course must be completed with a C- or better to meet graduation requirements*

***Upon advisement, upper division electives from the alternates not used in fulfilling the requirements listed above or any other upper division undergraduate***

***biology courses not specifically excluded for majors credit, or any***

***graduate course in biology..... 4-7 additional units***

<i>Course Num.</i>	<i>Course Title</i>	<i>Units</i>

***What course has student taken to meet GVAR?***

	<b><i>Required</i></b>	<b><i>Completed</i></b>
<b><i>Total upper division unit requirements:</i></b>	<b>32-33</b>	_____
<b><i>Total units for major</i></b>	<b>67</b>	_____

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**BACHELOR OF SCIENCE IN BIOLOGY: CONCENTRATION IN CELL & MOLECULAR**

*Course is 3 units unless otherwise noted.*

<b>Lower Division Requirements (38-39 units)</b>		<i>Units</i>	<i>√</i>	<i>Equiv. Form if any (√)</i>
BIOL 230	Introductory Biology I	5		
BIOL 240	Introductory Biology II	5		
CHEM 115	General Chemistry I: Essential Concepts of Chemistry	5		
CHEM 215/216	General Chemistry II: Quant. Appl. of Chem. Conc./Lab (3/2)	5		
CHEM 233	Organic Chemistry I [must take Chem 335 BEFORE taking Biochemistry (Chem 340 or Chem 349)]	3		
MATH 226	Calculus I	4		
PHYS 111/112	General Physics I/Laboratory (3/1)	4		
PHYS 121/122	General Physics II/Laboratory (3/1)	4		

*One course selected from the following (3-4 units):*

MATH 227	Calculus II (4)			
CSC 210	Introduction to Computer Programming			
BIOL 358	Forensic Genetics: Math Matters (4)			
BIOL 458	Biometry (4)			

*Total lower division requirements (units):.....* **38-39**

**Upper Division Requirements (30 units)**

BIOL 350	Cell Biology	3		
BIOL 351 GW	Experiments in Cell and Molecular Biology - GVAR	4		
BIOL 355	Genetics	3		
BIOL 357	Molecular Genetics	3		
CHEM 335	Organic Chemistry II	3		
CHEM 349*	General Biochemistry	3		
* Students may take CHEM 340 (3) and CHEM 341(3) in lieu of CHEM 349 upon advisement				
CHEM 340 (3) substitutes for Chem 349 and CHEM 341(3) used as upper division elective units				

*Upper division electives upon advisement. At least one elective course must have an upper division laboratory component.*

*Graduate level courses may be used upon advisement..... 11 additional units*

BIOL 332	Health Disparities in Cancer			
BIOL 337	Evolution			
BIOL 344GW	Research Skills - GVAR			
BIOL 349	Bioethics			
BIOL 356	Honors Genetics (2)			
BIOL 358	Forensic Genetics: Math Matters (4) (if not used to meet Math requirement)			
BIOL 380	Evolutionary Developmental Biology			
BIOL 382	Developmental Biology			
BIOL 401	General Microbiology			
BIOL 402GW <sup>‡</sup>	General Microbiology Laboratory - GVAR			
BIOL 411	Environmental Microbiology			
BIOL 420	General Virology			

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BIOL 425	Emerging Diseases			
BIOL 435	Immunology			
BIOL 436 <sup>‡</sup>	Immunology Laboratory (2)			
BIOL 442	Microbial Physiology			
BIOL 443 <sup>‡</sup>	Microbial Physiology Laboratory (2)			
BIOL 446	Microbial Genomics (4)			
BIOL 453	General Parasitology			
BIOL 454 <sup>‡</sup>	Parasitology Laboratory (1)			
BIOL 458	Biometry (4) (if not used to meet Math requirement)			
BIOL 490	Ecology of Infectious Diseases (4)			
BIOL 525	Plant Physiology			
BIOL 526 <sup>‡</sup>	Plant Molecular Physiology Laboratory (2)			
BIOL 615	Molecular Pathophysiology			
BIOL 618	Biology of Aging			
BIOL 623	Pharmacology			
BIOL 630	Animal Physiology			
BIOL 631GW <sup>‡</sup>	Animal Physiology Laboratory - GVAR (4)			
BIOL 638 <sup>‡</sup>	Bioinformatics & Genome Annotation (4)			
BIOL 640	Cellular Neurosciences			
BIOL 652	Science Education Partners in Biology (4)			
BIOL 699 <sup>‡</sup>	Special Study in Biology (1-3 units) <i>requires faculty mentor's approval</i>			
CHEM 343 <sup>‡</sup>	Biochemistry I Laboratory			

<sup>‡</sup>meets upper division laboratory elective requirement

<i>Course Num.</i>	<i>Course Title</i>	<i>Units</i>

*GWAR course must be completed with a C- or better to meet graduation requirements*

**What course has student taken to meet GWAR? (typically Biol 351 GW)**

	<i>Required</i>	<i>Completed</i>
<b>Total upper division unit requirements:</b>	<b>30</b>	_____
<b>Total units for major</b>	<b>68-69</b>	_____

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**BACHELOR OF SCIENCE IN BIOLOGY: CONCENTRATION IN ECOLOGY**

*Course is 3 units unless otherwise noted.*

<b>Lower Division Requirements (34-35 units)</b>		<i>Units</i>	√	<i>Equiv. Form if any (√)</i>
BIOL 230	Introductory Biology I	5		
BIOL 240	Introductory Biology II	5		
CHEM 115	General Chemistry I: Essential Concepts of Chemistry	5		
CHEM 130	General Organic Chemistry	3		

*Units selected from the following (16-17 units):*

CHEM 215/ 216	General Chemistry II: Quantitative Appl.of Chem. Concepts/Lab. (3/2)			
MATH 226	Calculus I (4)			
MATH 227	Calculus II (4)			
PHYS 111/ 112	General Physics I/Laboratory (3/1)			
PHYS 121/122	General Physics II and Laboratory (3/1)			

*Total lower division requirements (units):*..... **34-35**

**Upper Division Requirements (32-33 units)**

BIOL 337	Evolution	3		
BIOL 355	Genetics	3		
BIOL 458	Biometry	4		

*One of the following physiology courses upon advisement (3 units):*

BIOL 525	Plant Physiology			
BIOL 630	Animal Physiology			

*Units selected from the following ecology courses upon advisement (6-8 units)*

BIOL 482	Ecology (4)			
BIOL 490	Ecology of Infectious Disease (4)			
BIOL 529 GW	Plant Ecology - GVAR (4)			
BIOL 530	Conservation Biology			
BIOL 532	Restoration Ecology			
BIOL 534	Wetland Ecology (4)			
BIOL 577	Ecological and Environmental Modeling (4)			
BIOL 580	Limnology			
BIOL 582	Biological Oceanography (4)			
BIOL 585	Marine Ecology			
BIOL 586	Marine Ecology Laboratory (2)			

*There are multiple options for meeting the GVAR requirement (course name must have GW) - consult with advisor  
 GVAR course must be completed with a C- or better to meet graduation requirements*

*Upon advisement, upper division electives from the alternates not used in fulfilling the requirements listed above or any other upper division undergraduate biology courses not specifically excluded*

*for majors credit, or any graduate course in biology: ..... 11-14 additional units*

<i>Course Num.</i>	<i>Course Title</i>	<i>Units</i>

*What course has student taken to meet GVAR?*

	<i>Required</i>	<i>Completed</i>
<b>Total upper division unit requirements:</b>	<b>32-33</b>	_____
<b>Total units for major:</b>	<b>67</b>	_____

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**BACHELOR OF SCIENCE IN BIOLOGY: CONCENTRATION IN MARINE BIOLOGY & LIMNOLOGY**

*Course is 3 units unless otherwise noted.*

<b>Lower Division Requirements (34-35 units)</b>		<i>Units</i>	<i>√</i>	<i>Equiv. Form if any (√)</i>
BIOL 230	Introductory Biology I	5		
BIOL 240	Introductory Biology II	5		
CHEM 115	General Chemistry I: Essential Concepts of Chem.	5		
CHEM 130	General Organic Chemistry	3		

***Units selected from the following (16-17 units):***

CHEM 215/216	General Chemistry II: Quantitative Appl. of Chem. Concepts / Lab (3/2)			
MATH 226	Calculus I (4)			
MATH 227	Calculus II (4)			
PHYS 111/112	General Physics I and Laboratory (3/1)			
PHYS 121/122	General Physics II and Laboratory (3/1)			

***Total lower division requirements (units):.....*** **34-35**

**Upper Division Requirements (32-33 units)**

BIOL 337	Evolution	3		
BIOL 355	Genetics	3		
BIOL 458	Biometry	4		

***Units selected from the following (3 units):***

BIOL 525	Plant Physiology ( <i>select on advisement</i> )			
BIOL 630	Animal Physiology			

***Units selected from the following (3-5 units):***

BIOL 534	Wetland Ecology (4)			
BIOL 580	Limnology			
BIOL 582	Biological Oceanography (4)			
BIOL 585/586*	Marine Ecology (3/2)			



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**Upper Division Electives (14 - 17 additional units)**

*NOTE: Upper division electives should be selected from alternatives not used in fulfilling the requirements listed above, or from the list below.*

*Upon advisement, students may use other upper division biology courses or appropriate graduate courses as electives.....*

**14-17 additional units**

BIOL 502	Biology of the Algae			
BIOL 526	Plant Molecular Physiology Laboratory (2)			
BIOL 532	Restoration Ecology			
BIOL 555	Marine Invertebrate Zoology (4)			
BIOL 556	Natural History of Marine Invertebrates (4)			
BIOL 570 GW	Biology of Fishes - GVAR (4)			
BIOL 575	Fisheries Biology			
BIOL 584	Marine Microbial Ecology Laboratory (1)			
BIOL 585*	Marine Ecology			
BIOL 586*	Marine Ecology Laboratory (2)			
BIOL 631 GW	Animal Physiology Laboratory - GVAR (4) ( <i>not Biol 613GW</i> )			
CHEM 680	Chemical Oceanography			
ERTH 642	Watershed Assessment (4)			
MSCI 312-344	Any course without duplicating courses taken at SF State			
ERTH 434	Coastal Processes			

*\*Note: cannot double count Biol 585/586 to meet both Ecology and UD elective requirements*

*There are multiple options for meeting the GVAR requirement (course name must have GW) - consult with advisor*

*GVAR course must be completed with a C- or better to meet graduation requirements*

<b>Course Num.</b>	<b>Course Title</b>	<b>Units</b>

**What course has student taken to meet GVAR?**

	<b>Required</b>	<b>Completed</b>
<b>Total upper division unit requirements:</b>	<b>32-33</b>	_____
<b>Total units for major</b>	<b>67</b>	_____

**(despite what is stated erroneously in the 2018-2019 SF State Bulletin, 67-unit minimum is required)**

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### BACHELOR OF SCIENCE IN BIOLOGY: CONCENTRATION IN MICROBIOLOGY

*Course is 3 units unless otherwise noted.*

<b>Lower Division Requirements (38-39 units)</b>		<i>Units</i>	√	<i>Equiv. Form if any (√)</i>
BIOL 230	Introductory Biology I	5		
BIOL 240	Introductory Biology II	5		
CHEM 115	General Chemistry I: Essential Concepts of Chemistry	5		
CHEM 215/216	General Chemistry II: Quantitative Appl. of Chem. Concepts / Lab (3/2)	5		
CHEM 233	Organic Chemistry I [must take Chem 335 BEFORE taking Biochemistry (Chem 340 or Chem 349)]	3		
MATH 226	Calculus I	4		
PHYS 111/112	General Physics I and Laboratory (3/1)	4		
PHYS 121/122	General Physics II and Laboratory (3/1)	4		

*Units selected from the following (3-4 units):*

MATH 124	Elementary Statistics			
MATH 227	Calculus II (4)			
MATH 228	Calculus III (4)			
CSC 210	Intro to Computer Programming			
BIOL 358	Forensic Genetics: Math Matters (4)			
BIOL 458	Biometry (4)			

*Total lower division requirements (units):*..... **38-39**

### Upper Division Requirements (30 units)

BIOL 355	Genetics	3		
BIOL 401/402GW	General Microbiology and Laboratory (Biol 402 - GVAR) (3/3)	6		
BIOL 442	Microbial Physiology	3		
CHEM 335	Organic Chemistry II	3		

*Units selected from the following (3 units):*

CHEM 340	Biochemistry I			
CHEM 349	General Biochemistry			

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<i>Upper division electives in Microbiology: Select 12 units from the following courses, including at least 3 laboratory courses with approval of an advisor.....</i>		<i>12 additional units</i>		
BIOL 351 GW*	Experiments in Cell & Molecular Biology - GVAR (4)			
BIOL 420	General Virology			
BIOL 425	Emerging Diseases			
BIOL 430	Medical Microbiology			
BIOL 431*	Medical Microbiology Laboratory (2)			
BIOL 435	Immunology			
BIOL 436*	Immunology Laboratory (2)			
BIOL 443*	Microbial Physiology Laboratory (2)			
BIOL 446*	Microbial Genomics (4)			
BIOL 453	General Parasitology			
BIOL 454*	General Parasitology Laboratory (1)			
BIOL 490*	Ecology of Infectious Diseases (4)			
BIOL 625*	Hematology			
BIOL 638*	Bioinformatics & Genome Annotation (4)			
BIOL 699*	Independent Study in Biology (1 - 3 units)			
BIOL/CHEM/ ERTH 741*	Electron Microscopy (4)			
CHEM 336* <b>OR</b> CHEM 343*	Organic Chemistry II Laboratory (2) Biochemistry I Laboratory			

*\*meets upper division lab elective requirement*

<i>Course Num.</i>	<i>Course Title</i>	<i>Units</i>

*GWAR course must be completed with a C- or better to meet graduation requirements*

***What course has student taken to meet GWAR? (Typically Biol 402 GW)***

	<i>Required</i>	<i>Completed</i>
<b><i>Total upper division unit requirements:</i></b>	<b>30</b>	_____
<b>Total units for major</b>	<b>68-69</b>	_____

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**BACHELOR OF SCIENCE IN BIOLOGY: CONCENTRATION IN MICROBIOLOGY**

**Clinical Science Track**

*Equiv. Form*

*Course is 3 units unless otherwise noted.*

<b>Lower Division Requirements (34-35 units)</b>		<i>Units</i>	<input type="checkbox"/>	<i>if any (✓)</i>
BIOL 230	Introductory Biology I	5		
BIOL 240	Introductory Biology II	5		
CHEM 115	General Chemistry I: Essential Concepts of Chemistry	5		
CHEM 130	General Organic Chemistry ( <i>in lieu of Chem 233, for CS track</i> )	3		
CHEM 215/216	General Chemistry II: Quantitative Appl. of Chem. Concepts (3/2)	5		
PHYS 111/112†	General Physics I and Laboratory (3/1)	4		
PHYS 121/122†	General Physics II and Laboratory (3/1)	4		

*Units selected from the following (3-4 units) (required for CLS program) :*

MATH 124	Elementary Statistics			
MATH 226	Calculus I (4)			
BIOL 358	Forensic Genetics: Math Matters (4)			
BIOL 458	Biometry (4)			

*Total lower division requirements (units):.....* **34-35**

**Upper Division Requirements (34 units)**

BIOL 355‡	Genetics	3		
BIOL 401/402GW	General Microbiology and Laboratory (Biol 402GW meets GWAR) (3/3)	6		
BIOL 430†	Medical Microbiology	3		
BIOL 435†	Immunology	3		
BIOL 612‡	Human Physiology	3		
BIOL 625†	Hematology (includes lab)	3		
CHEM 321/322†	Quantitative Chemical Analysis (3/2) ( <i>if Chem 320 (4), then need 6 elective units instead of 5 elective units</i> )	5		
CHEM 349†	General Biochemistry	3		

† Required by CA Health Dept. for CLS trainees ‡ Highly recommended by CDHS & CLS

### Clinical Science Track

<i>Upper division electives in Microbiology, including at least 1 laboratory course with approval of an advisor.....</i>		<b>5 additional units</b>		
BIOL 351 GW*	Experiments in Cell & Molecular Biology - GVAR (4)			
BIOL 420‡	General Virology			
BIOL 425	Emerging Diseases			
BIOL 431‡*	Medical Microbiology Laboratory (2)			
BIOL 436‡*	Immunology Laboratory (2)			
BIOL 442	Microbial Physiology			
BIOL 443*	Microbial Physiology Laboratory (2)			
BIOL 446*	Microbial Genomics (4)			
BIOL 453‡	General Parasitology			
BIOL 454‡*	General Parasitology Laboratory (1)			
BIOL 490*	Ecology of Infectious Diseases (4)			
BIOL 613GW*	Human Physiology Laboratory			
BIOL 638*	Bioinformatics & Genome Annotation (4)			
BIOL 699*	Independent Study in Biology (1 - 3 units)			
BIOL/CHEM/ ERTH 741*	Electron Microscopy (4)			
CHEM 336* <b>OR</b>	Organic Chemistry II Laboratory (2)			
CHEM 343‡*	Biochemistry I Laboratory			

† Required by CA Health Dept. for CLS trainees    ‡ Highly recommended by CDHS & CLS  
 \*meets lab elective requirement

<i>Course Num.</i>	<i>Course Title</i>	<i>Units</i>

*GWAR course must be completed with a C- or better to meet graduation requirements*

**What course has student taken to meet GWAR? (Typically Biol 402 GW)**

	<i>Required</i>	<i>Completed</i>
<b>Total upper division unit requirements:</b>	<b>34</b>	_____
<b>Total units for major</b>	<b>68-69</b>	_____

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 UD= \_\_\_\_\_ Last First \_\_\_\_\_  
 Advisor: \_\_\_\_\_ Phone \_\_\_\_\_

**BACHELOR OF SCIENCE IN BIOLOGY: CONCENTRATION IN PHYSIOLOGY**

*Course is 3 units unless otherwise noted.*

<b>Lower Division Requirements (38-39 units)</b>		<i>Units</i>	$\checkmark$	<i>Equiv. Form if any (<math>\checkmark</math>)</i>
BIOL 230	Introductory Biology I	5		
BIOL 240	Introductory Biology II	5		
CHEM 115	General Chemistry I: Essential Concepts of Chemistry	5		
CHEM 130	General Organic Chemistry ( <i>if taking Chem 233, must also take Chem 335 BEFORE taking Biochemistry (Chem 340 or Chem 349)</i> )	3		
CHEM 215/216	General Chemistry II: Quantitative Appl. of Chem. Concepts / Lab (3/2)	5		
MATH 226	Calculus I	4		

**One course from the following (3-4 units):**

BIOL 358	Forensic Genetics: Math Matters (4)			
BIOL 458	Biometry (4)			
MATH 124	Elementary Statistics			
MATH 227	Calculus II (4)			

**One set of four courses from the following (8 units):**

PHYS 111/112	General Physics I and Laboratory (3/1) <i>and</i>			
PHYS 121/122	General Physics II and Laboratory (3/1)			
	<i>OR</i>			
PHYS 220/222	General Physics with Calculus I and Laboratory (3/1) <i>and</i>			
PHYS 230/232	General Physics with Calculus II and Laboratory (3/1)			

**Total lower division requirements (units):..... 38-39**

**Upper Division Requirements (29-33 units)**

BIOL 350	Cell Biology	3		
BIOL 355	Genetics	3		

**Units selected from the following (3 units):**

CHEM 340	Biochemistry I			
CHEM 349	General Biochemistry			

**Physiology core courses from the following (one lecture must be BIOL 612 or BIOL 630) (9 units):**

BIOL 525	Plant Physiology			
BIOL 612	Human Physiology			
BIOL 616	Cardiorespiratory Physiology			
BIOL 617	Environmental Physiology			
BIOL 618	Biology of Aging			
BIOL 620	Endocrinology			
BIOL 621	Reproductive Physiology			
BIOL 622	Hormones and Behavior			
BIOL 630	Animal Physiology			
BIOL 640	Cellular Neurosciences			
BIOL 642	Neural Systems Physiology			

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**One physiology lab selected from the following (2-4 units):**

BIOL 526	Plant Molecular Physiology Laboratory (2)			
BIOL 613 GW	Human Physiology Laboratory - GVAR			
BIOL 631 GW	Animal Physiology Laboratory - GVAR (4)			

**Upper division electives selected in consultation with an advisor from the following (10-11 additional units):**

**(Criteria for selecting electives: 1 elective must contain a lab component; 1 elective must be chosen from each of the two emphases below; additional electives may be selected from the list of physiology core courses and/or either of the emphases below.)..... 10 - 11 additional units**  
 (2018-2019 SF State Bulletin incorrectly lists 9 - 11 units; it should be 10 - 11 units)

**Cell and Molecular Emphasis**

BIOL 351 GW	Experiments in Cell and Molecular Biology - GVAR (4)			
BIOL 357	Molecular Genetics			
BIOL 382	Developmental Biology			
BIOL 435	Immunology			
BIOL 615	Molecular Pathophysiology			
BIOL 623	Pharmacology			
BIOL 652	Science Education Partners in Biology (4)			
BIOL 699	Special Study in Biology (1-3)*			
BIOL 865	Advances in Physiology and Behavioral Biology (2)*			
CHEM 343	Biochemistry I Laboratory			

**Ecological, Anatomical, and Evolutionary Emphasis**

BIOL 328	Human Anatomy (4)			
BIOL 337	Evolution			
BIOL 482	Ecology (4)			
BIOL 504	Biology of the Fungi (4)			
BIOL 505	Comparative Anatomy of Vascular Plants (4)			
BIOL 525	Plant Physiology			
BIOL 526	Plant Molecular Physiology Laboratory (2)			
BIOL 529 GW	Plant Ecology - GVAR (4)			
BIOL 555	Marine Invertebrate Zoology (4)			
BIOL 570 GW	Biology of Fishes - GVAR (4)			
BIOL 585/586	Marine Ecology/Laboratory (3/2)			
BIOL 600	Animal Behavior			
BIOL 614	Vertebrate Histology (4)			
BIOL 652	Science Education Partners in Biology (4)			
BIOL 699	Independent Study in Biology (1-3)*			
BIOL 865	Advances in Physiology and Behavioral Biology (2)*			

\* Courses may be used only once within the major. No more than one Biol 699 or Biol 865 may be used as an elective  
 There are multiple options for meeting the GVAR requirement (course name must have GW) - consult with advisor  
 GVAR course must be completed with a C- or better to meet graduation requirements

<b>Course Num.</b>	<b>Course Title</b>	<b>Units</b>

**What course has student taken to meet GVAR?**

	<b>Required</b>	<b>Completed</b>
<b>Total upper division unit requirements:</b>	<b>29-33</b>	_____
<b>Total units for major</b>	<b>67-72</b>	_____

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**BACHELOR OF SCIENCE IN BIOLOGY: CONCENTRATION IN ZOOLOGY**

*Course is 3 units unless otherwise noted.*

<b>Lower Division Requirements (34-35 units)</b>		<i>Units</i>	<input type="checkbox"/>	<i>Equiv. Form if any (√)</i>
BIOL 230	Introductory Biology I	5		
BIOL 240	Introductory Biology II	5		
CHEM 115	General Chemistry I: Essential Concepts of Chemistry	5		
CHEM 130	General Organic Chemistry	3		

*Units selected from the following (16-17 units):*

CHEM 215/216	General Chemistry II: Quantitative Appl. of Chem. Concepts / Lab (3/2)			
MATH 226	Calculus I (4)			
MATH 227	Calculus II (4)			
PHYS 111/112	General Physics I and Laboratory (3/1)			
PHYS 121/122	General Physics II and Laboratory (3/1)			

*Total lower division requirements (units):*..... **34-35**

**Upper Division Requirements (32-33 units)**

BIOL 337	Evolution	3		
BIOL 355	Genetics	3		
BIOL 458	Biometry	4		

*Units selected from the following on advisement (3 units):*

BIOL 350	Cell Biology			
BIOL 357	Molecular Genetics			
BIOL 380	Comparative Embryology			
BIOL 382	Developmental Biology			
BIOL 453	General Parasitology			
BIOL 600	Animal Behavior			
BIOL 612	Human Physiology			
BIOL 620	Endocrinology			
BIOL 621	Reproductive Physiology			
BIOL 630	Animal Physiology			

*Units selected from the following ecology courses (3-4 units):*

BIOL 482	Ecology (4)			
BIOL 529 GW	Plant Ecology - GEAR (4)			
BIOL 530	Conservation Biology			
BIOL 532	Restoration Ecology			
BIOL 534	Wetland Ecology (4)			
BIOL 577	Ecological and Environmental Modeling (4)			
BIOL 580	Limnology			
BIOL 582	Biological Oceanography (4)			
BIOL 585	Marine Ecology			
BIOL 586	Marine Ecology Laboratory (2)			



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*Upon advisement, at least one course focused on the taxonomy or whole organism biology of an invertebrate or vertebrate..... 3-4 units*

BIOL 460	General Entomology (4)			
BIOL 461	Insect Taxonomy (4)			
BIOL 464	Medical Entomology			
BIOL 475 GW	Herpetology - GVAR			
BIOL 478 GW	Ornithology - GVAR (4)			
BIOL 555	Marine Invertebrate Zoology (4)			
BIOL 570 GW	Biology of Fishes - GVAR (4)			

*There are multiple options for meeting the GVAR requirement (course name must have GW) - consult with advisor  
 GVAR course must be completed with a C- or better to meet graduation requirements*

*Upon advisement, upper division electives from the alternates not used in fulfilling the requirements listed above or any other upper division undergraduate biology courses not specifically excluded for majors credit, or any graduate course in biology:.....*

***\*11 - 14 additional units***

<i>Course Num.</i>	<i>Course Title</i>	<i>Units</i>

*What course has student taken to meet GVAR?*

***\*2018-2019 SF State Bulletin incorrectly states "7 - 11 elective units". but must complete minimum 67 units.***

	<i>Required</i>	<i>Completed</i>
<b>Total upper division unit requirements:</b>	<b>32-33</b>	_____
<b>Total units for major</b>	<b>67</b>	_____