BIOLOGY, BACHELOR OF SCIENCE

Requirements

Total Course Requirements for the Bachelor's Degree

See the "Requirements for the Bachelor's Degree (https:// catalog.csudh.edu/general-information/baccalaureate-degreesundergraduate-studies/)" in the University Catalog for complete details on general degree requirements. A minimum of 40 units, including those required for the major, must be upper division.

Elective Requirements

Completion of elective courses (beyond the requirements listed below) to reach a total of a minimum of 120 units.

General Education Requirements (43 units)

See the "General Education (https://catalog.csudh.edu/generaleducation/)" requirements in the University Catalog or the Class Schedule for the most current information on General Education requirements and course offerings.

Graduation Writing Assessment Requirement (3 Units)

See the "Graduation Writing Assessment Requirement (https:// catalog.csudh.edu/general-information/baccalaureate-degreesundergraduate-studies/gwar-certifying-courses/)" section in the University Catalog.

Statutory Requirements: United States History, Constitution and American Ideals (6 Units)

See the "University Graduation Requirements (https://catalog.csudh.edu/ general-information/baccalaureate-degrees-undergraduate-studies/ university-graduation-requirements/)" section in the University Catalog.

Minor Requirements

Single field major, no minor required. However, for students who wish to complete the Biochemistry minor, Organic Chemistry is considered a prerequisite class for both programs and therefore can be double counted for both major and minor requirements.

Major Requirements (76-84 units)

Students must select one of the options listed.

All courses applied to the B.S. in Biology must be passed with a grade of "C" or better.

Cellular and Molecular Biology Option (76-81 units)

Coue	The	Houis	
Lower Division Requirements			
BIO 120	Principles of Biology I	3	
BIO 121	Principles of Biology Lab I	1	
BIO 122	Principles of Biology II	3	
BIO 123	Principles of Biology II Lab	1	
BIO 124	Principles of Biology III	3	
BIO 125	Principles of Biology Lab III	1	
BIO 220	Molecular Biology	3	
BIO 221	Molecular Biology Laboratory	1	
CHE 110	General Chemistry I	5	
CHE 112	General Chemistry II	5	

MAT 131	Elementary Statistics and Probability	3
MAT 171	Survey of Calculus for Management and Life Sciences	4-5
or MAT 191	Calculus I	
Select one of the	following:	8-10
PHY 120 & PHY 122	Elements Of Physics I and Elements Of Physics II	
PHY 130 & PHY 132	General Physics I and General Physics II	
Upper Division Re	equirements	
BIO 320	Cell Biology	3
BIO 340	Genetics	3
BIO 342	Cell And Genetics Lab	1
BIO 421	Advanced Molecular Biology	3
or BIO 440	Molecular Genetics	
BIO 490	Senior Project	3
Select one of the	following:	4-5
CHE 310 & CHE 311	Organic Chemistry I and Organic Chemistry Lab I	
CHE 300 & CHE 301	Organic Chemistry I and Organic Chemistry Lab I	
Select one of the	following:	4-5
CHE 312 & CHE 313	Organic Chemistry II and Organic Chemistry Laboratory II	
CHE 302 & CHE 303	Organic Chemistry II and Organic Chemistry Lab II	
Select one of the	following:	4
BIO 310 & BIO 311	Plant Physiology and Plant Physiology Laboratory	
BIO 312 & BIO 313	Animal Physiology and Animal Physiology Laboratory	
BIO 314 & BIO 315	Developmental Biology and Developmental Biology Lab	
BIO 326 & BIO 327	General Microbiology and General Microbiology Laboratory	
Select a minimun Chemistry Course	n of 10 additional units of upper division Biology es	or 10
Total Hours		76-81
Ecology and Env Code	rironmental Biology Option (76-81 units) Title	Hours
Lower Division D	aquiromonto	

Lower Division Requirements		
BIO 120	Principles of Biology I	3
BIO 121	Principles of Biology Lab I	1
BIO 122	Principles of Biology II	3
BIO 123	Principles of Biology II Lab	1
BIO 124	Principles of Biology III	3
BIO 125	Principles of Biology Lab III	1
BIO 220	Molecular Biology	3
BIO 221	Molecular Biology Laboratory	1
CHE 110	General Chemistry I	5
CHE 112	General Chemistry II	5
MAT 131	Elementary Statistics and Probability	3
MAT 171	Survey of Calculus for Management and Life Sciences	4-5

or MAT 191	Calculus I	
Select one of the	following:	8-10
PHY 120 & PHY 122	Elements Of Physics I and Elements Of Physics II	
PHY 130	General Physics I	
& PHY 132	and General Physics II	
Upper Division Re	equirements	
BIO 312	Animal Physiology	3
BIO 313	Animal Physiology Laboratory	1
BIO 330	Botany	3
BIO 331	Botany Laboratory	1
BIO 332	Ecology	3
BIO 333	Ecology Laboratory	1
BIO 340	Genetics	3
BIO 490	Senior Project	3
Select one of the	folowing:	4-10
CHE 310	Organic Chemistry I	
& CHE 311	and Organic Chemistry Lab I	
& CHE 301	and Organic Chemistry Lab I	
CHE 312 & CHE 313	Organic Chemistry II and Organic Chemistry Laboratory II	
CHE 302	Organic Chemistry II	
& CHE 303	and Organic Chemistry Lab II	
CHE 316 & CHE 317	Survey of Organic Chemistry and Survey of Organic Chemistry Laboratory	
Soloot a minimum	of 0.15 additional units of upper division Pieles	15
Select a minimum		1. 9-15
Chemistry, Anthro Biology advisor	pology or Earth Science courses approved by a	/, 9-15
Chemistry, Anthro Biology advisor Total Hours	pology or Earth Science courses approved by a	72-87
Chemistry, Anthro Biology advisor Total Hours Microbiology Op	tion (79-84 units)	72-87
Chemistry, Anthro Biology advisor Total Hours Microbiology Op Code	tion (79-84 units)	72-87 Hours
Chemistry, Anthro Biology advisor Total Hours Microbiology Op Code Lower Division Re	tion (79-84 units) Title equirements	72-87 Hours
Chemistry, Anthro Biology advisor Total Hours Microbiology Op Code Lower Division Re BIO 120	tion (79-84 units) Title Principles of Biology I	72-87 Hours
Chemistry, Anthro Biology advisor Total Hours Microbiology Op Code Lower Division Re BIO 120 BIO 121	tion (79-84 units) Title equirements Principles of Biology I Principles of Biology Lab I	72-87 Hours 3
Chemistry, Anthro Biology advisor Total Hours Microbiology Op Code Lower Division Re BIO 120 BIO 121 BIO 122	tion (79-84 units) Title equirements Principles of Biology I Principles of Biology I Principles of Biology II	72-87 Hours 3 1 3
Chemistry, Anthro Biology advisor Total Hours Microbiology Op Code Lower Division Re BIO 120 BIO 121 BIO 122 BIO 123	tion (79-84 units) Title equirements Principles of Biology I Principles of Biology Lab I Principles of Biology II Principles of Biology II Principles of Biology II	72-87 Hours 3 1 3 1
Chemistry, Anthro Biology advisor Total Hours Microbiology Op Code Lower Division Re BIO 120 BIO 121 BIO 122 BIO 123 BIO 124	tion (79-84 units) Title equirements Principles of Biology I Principles of Biology II Principles of Biology II Principles of Biology II Principles of Biology II Principles of Biology II	72-87 Hours 3 1 3 1 3 3
Chemistry, Anthro Biology advisor Total Hours Microbiology Op Code Lower Division Re BIO 120 BIO 121 BIO 122 BIO 123 BIO 124 BIO 125	tion (79-84 units) Title equirements Principles of Biology I Principles of Biology II Principles of Biology III Principles of Biology III Principles of Biology III	72-87 Hours 3 1 3 1 3 1 3 1
Chemistry, Anthro Biology advisor Total Hours Microbiology Op Code Lower Division Re BIO 120 BIO 121 BIO 122 BIO 123 BIO 123 BIO 124 BIO 125 BIO 220	tion (79-84 units) Title equirements Principles of Biology I Principles of Biology I Principles of Biology II Principles of Biology III Principles of Biology III Principles of Biology III Principles of Biology III Principles of Biology III	72-87 Hours 3 1 3 1 3 1 3 3 1 3 3 3
Chemistry, Anthro Biology advisor Total Hours Microbiology Op Code Lower Division Re BIO 120 BIO 121 BIO 122 BIO 123 BIO 123 BIO 124 BIO 125 BIO 220 BIO 221	tion (79-84 units) Title equirements Principles of Biology I Principles of Biology I Principles of Biology II Principles of Biology III Principles of Biology III Principles of Biology Lab	72-87 Hours 3 1 3 1 3 1 3 1 3 1 3 1 3 1
Chemistry, Anthro Biology advisor Total Hours Microbiology Op Code Lower Division Re BIO 120 BIO 121 BIO 122 BIO 123 BIO 123 BIO 124 BIO 125 BIO 220 BIO 221 CHE 110	tion (79-84 units) Title equirements Principles of Biology I Principles of Biology I Principles of Biology II Principles of Biology II Orinciples of Biology II Principles of Biology II Principles of Biology II Principles of Biology Lab	72-87 Hours 3 1 3 1 3 1 3 1 3 1 5
Chemistry, Anthro Biology advisor Total Hours Microbiology Op Code Lower Division Re BIO 120 BIO 121 BIO 122 BIO 123 BIO 123 BIO 124 BIO 125 BIO 220 BIO 221 CHE 110 CHE 112	tion (79-84 units) Title equirements Principles of Biology I Principles of Biology I Principles of Biology II Principles of Biology III Principles of Biology Lab Principles of Biology Lab	72-87 Hours 3 1 3 1 3 1 3 1 3 1 5 5 5
Chemistry, Anthro Biology advisor Total Hours Microbiology Op Code Lower Division Re BIO 120 BIO 121 BIO 122 BIO 123 BIO 124 BIO 125 BIO 220 BIO 221 CHE 110 CHE 112 MAT 131	tion (79-84 units) Title equirements Principles of Biology I Principles of Biology Lab I Principles of Biology II Principles of Biology Lab III Molecular Biology Molecular Biology Laboratory General Chemistry I Elementary Statistics and Probability	72-87 Hours 3 1 3 1 3 1 3 1 3 1 5 5 5 3
Chemistry, Anthro Biology advisor Total Hours Microbiology Op Code Lower Division Re BIO 120 BIO 121 BIO 122 BIO 123 BIO 124 BIO 125 BIO 220 BIO 221 CHE 110 CHE 112 MAT 131 MAT 171	tion (79-84 units) Title equirements Principles of Biology I Principles of Biology Lab I Principles of Biology II Principles of Biology II Principles of Biology II Principles of Biology III Principles of Biology Lab III Molecular Biology Molecular Biology Laboratory General Chemistry I Elementary Statistics and Probability Survey of Calculus for Management and Life Sciences	72-87 Hours 3 1 3 1 3 1 3 1 3 1 3 1 5 5 5 3 4-5
Chemistry, Anthro Biology advisor Total Hours Microbiology Op Code Lower Division Re BIO 120 BIO 121 BIO 122 BIO 123 BIO 123 BIO 124 BIO 125 BIO 220 BIO 221 CHE 110 CHE 112 MAT 131 MAT 171 or MAT 191	tion (79-84 units) Title equirements Principles of Biology I Principles of Biology Lab I Principles of Biology II Principles of Biology II Principles of Biology II Principles of Biology II Principles of Biology Lab Principles o	72-87 Hours 3 1 3 1 3 1 3 1 3 1 3 1 5 5 3 4-5
Chemistry, Anthro Biology advisor Total Hours Microbiology Op Code Lower Division Re BIO 120 BIO 121 BIO 122 BIO 123 BIO 123 BIO 124 BIO 125 BIO 220 BIO 221 CHE 110 CHE 112 MAT 131 MAT 131 MAT 171 Select one of the	tion (79-84 units) Title equirements Principles of Biology I Principles of Biology I Principles of Biology II Principles of Biology II Principles of Biology II Principles of Biology II Principles of Biology III Principles of Biology Lab Principles of Biology Lab Molecular Biology Laboratory General Chemistry I General Chemistry II Elementary Statistics and Probability Survey of Calculus for Management and Life Sciences Calculus I following:	72-87 Hours 3 1 3 1 3 1 3 1 3 1 3 1 5 5 3 4-5 8-10
Chemistry, Anthro Biology advisor Total Hours Microbiology Op Code Lower Division Re BIO 120 BIO 121 BIO 122 BIO 123 BIO 123 BIO 123 BIO 124 BIO 125 BIO 220 BIO 221 CHE 110 CHE 112 MAT 131 MAT 171 or MAT 191 Select one of the PHY 120 & PHY 122	tion (79-84 units) Title equirements Principles of Biology I Principles of Biology Lab I Principles of Biology II Principles of Biology II Principles of Biology III Principles of Biology Lab Principles of Biology Lab Principles of Biology Lab Principles of Biology Lab Molecular Biology Laboratory General Chemistry I General Chemistry II Elementary Statistics and Probability Survey of Calculus for Management and Life Sciences Calculus I following: Elements Of Physics I and Elements Of Physics II	72-87 Hours 3 1 3 1 3 1 3 1 3 1 3 1 3 1 5 5 3 4-5 8-10
Chemistry, Anthro Biology advisor Total Hours Microbiology Op Code Lower Division Re BIO 120 BIO 121 BIO 122 BIO 123 BIO 123 BIO 124 BIO 125 BIO 220 BIO 221 CHE 110 CHE 112 MAT 131 MAT 171 or MAT 191 Select one of the PHY 120 & PHY 122 PHY 130	tion (79-84 units) Title equirements Principles of Biology I Principles of Biology Lab I Principles of Biology II Principles of Biology II Principles of Biology II Principles of Biology II Principles of Biology Lab Principles of Chemistry I Elementary Statistics and Probability Survey of Calculus for Management and Life Sciences Calculus I following: Elements Of Physics I Ad Elements Of Physics I General Physics I	72-87 Hours 3 1 3 1 3 1 3 1 3 1 3 1 3 1 5 5 3 4-5 8-10

Т	otal Hours		79-84
	CHE 450 & CHE 456	Biochemistry I and Clinical Chemistry	
	CHE 450 & CHE 451	Biochemistry I and Biochemistry I Lab	
	BIO 491	Seminar in Biological and Biomedical Research	
	BIO 458 & BIO 459	Human Parasitology and Human Parasitology Laboratory	
	BIO 428	Virology	
	BIO 422 & BIO 424	Histology and Histology Laboratory	
	BIO 421	Advanced Molecular Biology	
	BIO 420 & BIO 419	Histotechnique and Histotechnique Laboratory	
S	elect a minimum	n of 9 units from the following:	9
E	ectives		
	CHE 302 & CHE 303	Organic Chemistry II and Organic Chemistry Lab II	
	CHE 312 & CHE 313	Organic Chemistry II and Organic Chemistry Laboratory II	
S	elect one of the	following:	4-5
	CHE 300 & CHE 301	Organic Chemistry I and Organic Chemistry Lab I	
	CHE 310 & CHE 311	Organic Chemistry I and Organic Chemistry Lab I	
S	elect one of the	following:	4-5
В	IO 490	Senior Project ¹	3
В	10 436	Immunology Laboratory	1
В	10 426	Immunology	3
В	10 435	Medical Bateriology Laboratory	2
В	10 425	Medical Bacteriology	2
В	10 340	Genetics	3
B	10 325	Microbiology with Clinical Applications Laborator	v 1
B	10 320	Microbiology with Clinical Applications	3
В	10 320	Cell Biology	3

¹ BIO 490 Senior Project: Major students may substitute this course for General Education Area E. Please contact the University Advisement Center to request the course substitution.

Program Learning Outcomes

Upon successful completion of the B.A. and B.S. Programs in Biology, a degree recipient will be able to:

- Describe the detail the major unifying themes of biology, such as evolution, energy flow and transformation, homeostasis, genetic information storage and utilization, structure-function relationships, and hierarchies of organization.
- Apply scientific reasoning to generate and test hypotheses by designing and executing experiments using appropriate methods in the laboratory or in the field.
- · Analyze and interpret quantitative biological data.
- Communicate scientific information in a variety of written and oral formats.

- Discuss the relevance of scientific research to society from a historic and a modern perspective, including the ethical implications of scientific research and of new technology.
- Find, read, understand, critically evaluate, summarize, and use scientific information.

Cellular and Molecular Biology Option 4-Year Degree Roadmap

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Course	Title	Hours
First Year		
Fall		
GE Area 1A English Compo	osition	3
GE Area 1C Oral Communio	cation	3
GE Area 3A Arts		3
GE Area 6 Ethnic Studies		3
MAT 131	Elementary Statistics and Probability (satisfies GE	3
	Area 2 Mathematica Concepts and Quantitative	
	Heuro	15
Spring	nouis	15
GF Area 1B Critical Thinkin	a	3
GE Area 3B Humanities	3	3
GE Area 4A Perspectives o	n Individuals Groups and Society	3
CHE 108	Introduction to College Chemistry	5
	Hours	14
Second Year		
Fall		
HIS 101	History Of United States	3
GE Area 4B Global and His	torical Perspectives	3
BIO 120	Principles of Biology I (may meet GE Area 5B for BIO	3
	majors)	
BIO 121	Principles of Biology Laboratory I (may meet GE Area 5C for BIO majors)	1
CHE 110	General Chemistry I (May meet GE Area 5A for BIO majors)	5
	Hours	15
Spring		
POL 101	American Institutions	3
BIO 122	Principles of Biology II	3
BIO 123	Principles of Biology Laboratory II	1
CHE 112	General Chemistry II	5
GE Area 4UD Integrative St	udies in the Social Sciences	3
	Hours	15
Third Year		
Fall		
BIO 124	Principles of Biology III	3
BIO 125	Principles of Biology Lab III	1
CHE 310	Organic Chemistry I	4
CHE 311	Organic Chemistry Lab I	1
BIO 220	Molecular Biology	3
BIO 221	Molecular Biology Laboratory	1
GE Area 3UD Integrative St	udies in the Humanities	3
Spring	Hours	16
BIO 320	Cell Biology	3
BIO 340	Genetics (satisfies GE Area B5)	3
BIO 342	Cell And Genetics Lab	1
CHE 312	Organic Chemistry II	3
CHE 313	Organic Chemistry Laboratory II	2
Major Elective		4

Hours

Fourth	Year
E-II	

	Total Hours	120
	Hours	14
Major Elective		3
PHY 122	Elements Of Physics II	4
Free Elective		1
BIO 490	Senior Project (satisfies GWAR requirement)	3
BIO 440	Molecular Genetics (or major elective)	3
Spring		
	Hours	15
MAT 171	Survey of Calculus for Management and Life Sciences	4
PHY 120	Elements Of Physics I	4
BIO 421	Advanced Molecular Biology (or major elective)	3
BIO UD requirement lab		1
BIO UD requirement lectu	re	3
Fall		

2-Year Roadmap (transfer students)

Course	Title	Hours
First Year		
Fall		
GE Area C3UD Integrative S	Studies in the Humanities	3
BIO 124	Principles of Biology III	3
BIO 125	Principles of Biology Lab III	1
BIO 220	Molecular Biology	3
BIO 221	Molecular Biology Laboratory	1
CHE 310	Organic Chemistry I	4
CHE 311	Organic Chemistry Lab I	1
	Hours	16
Spring		
GE Area 4UD Integrative St	udies in the Social Sciences	3
BIO 320	Cell Biology	3
BIO 340	Genetics (satisfies GE Area 5UD)	3
BIO 342	Cell And Genetics Lab	1
CHE 312	Organic Chemistry II	3
CHE 313	Organic Chemistry Laboratory II	2
	Hours	15
Second Year		
Fall		
BIO 421	Advanced Molecular Biology (or major elective)	3
PHY 120	Elements Of Physics I	4
BIO UD requirement lecture	2	3
BIO UD requirement lab		1
Major Elective		4
	Hours	15
Spring		
BIO 440	Molecular Genetics (or major elective)	3
BIO 490	Senior Project (satisfies GWAR requirement)	3
PHY 122	Elements Of Physics II	4
Major Elective		4
	Hours	14
	Total Hours	60

ECOLOGY AND ENVIRONMENTAL BIOLOGY OPTION

4- Year Degree Roadmap

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Course	Title	Hours
First Year		
Fall		
GE Area 1A English Com	position	3

GE Area 1C Oral Communio	cation	3
GE Area 3A Arts		3
GE Area 6 Ethnic Studies		3
MAT 131	Elementary Statistics and Probability (satisfies GE Area 2)	3
	Hours	15
Spring		
GE Area 1B Critical Thinkin	g	3
GE Area 3B Humanities		3
GE Area 4A Perspectives o	n Individuals, Groups, and Societies	3
CHE 108	Introduction to College Chemistry	5
	Hours	14
Second Year		
Fall		
HIS 101	History Of United States	3
GE Area 4B Global and His	torical Perspectives	3
	Principles of Biology I (may meet GE Area 5B for BIO	3
610 120	majors)	J
BIO 121	Principles of Biology Laboratory I (May meet GE Area 5C for BIO majors)	1
CHE 110	General Chemistry I (May meet GE Area 5A for BIO majors)	5
	Hours	15
Spring		
GE Area 4UD Integrative St	udies in the Social Sciences	3
POL 101	American Institutions	3
BIO 122	Principles of Biology II	3
BIO 123	Principles of Biology Laboratory II	1
CHE 112	General Chemistry II	5
	Hours	15
Third Year		
Fall		
BIO 124	Principles of Biology III	3
BIO 125	Principles of Biology Lab III	1
CHE 316	Survey of Organic Chemistry	
CHE 317	Survey of Organic Chemistry Laboratory	1
BIO 220	Molecular Biology	3
BIO 221	Molecular Biology	1
CE Area 2LID Integrative St		2
GE Alea SOD Integrative St		
o .	Hours	10
Spring		
BIO 332	Ecology	3
BIO 333	Ecology Laboratory	1
BIO 340	Genetics (satisfies GE Area B5)	3
Major Elective (may substi	tute with CHE 313	3
PHY 120	Elements Of Physics I	4
GE Area 4UD Integrative St	udies in the Social Sciences	3
Fourth Year	Hours	17
Fall		
BIO 312	Animal Physiology	3
BIO 313	Animal Physiology Laboratory	1
BIO 330	Botany	3
BIO 331	Botany Laboratory	1
Major Elective (may substi	tute with CHE 312)	4
MAT 171	Survey of Calculus for Management and Life Sciences	4
	Hours	16
Spring		
BIO 490	Senior Project (satisfies GWAR requirement)	3
PHY 122	Elements Of Physics II	1
Major Elective		4
		4

Major Elective		4
	Hours	15
	Total Hours	122
2-Year Roa	dmap (transfer students)	
Course	Title	Hours
First Year		
	etive Studies in the Humanities	2
GE Area 30D Integr	ative Studies in the Humanities	3
BIO 124	Principles of Biology In	3
BIO 125	Malacular Dialamu	1
BIO 220	Molecular Biology	3
	Molecular Biology Laboratory	1
CHE 316	CHE 310)	3
CHE 317	Survey of Organic Chemistry Laboratory (may substitute with CHE 311)	1
	Hours	15
Spring		
GE Area 4UD Integr	rative Studies in the Social Sciences	3
BIO 340	Genetics (satisfies GE Area 5UD)	3
BIO 332	Ecology	3
BIO 333	Ecology Laboratory	1
Major Elective (mag	y substitute with CHE 312	4
	Hours	14
Second Year		
Fall		
BIO 312	Animal Physiology	3
BIO 313	Animal Physiology Laboratory	1
BIO 330	Botany	3
BIO 331	Botany Laboratory	1
PHY 120	Elements Of Physics I	4
Major Elective (mag	y substitute with CHE 313)	4
	Hours	16
Spring		
BIO 490	Senior Project (GWAR satisfying course)	3
PHY 122	Elements Of Physics II	4
Major Elective		4
Major Elective		4
	Hours	15
	Total Hours	60

Microbiology Option 4-Year Degree Roadmap

Course	Title	Hours
First Year		
Fall		
GE Area 1A English Comp	3	
GE Area 1C Oral Communication		
GE Area 3A Arts		3
GE Area 6 Ethnic Studies		3
MAT 131	Elementary Statistics and Probability (satisfies GE	3
	Area 2)	
	Hours	15
Spring		
GE Area 1B Critical Thinking		3
GE Area 3B Humanities		3
GE Area 4A Perspectives on Individuals, Groups, and Society		3
CHE 108	Introduction to College Chemistry	5
	Hours	14

Second Year Fall HIS 101 History Of United States 3 GE Area 4B Gobal and Historical Perspectives 3 BIO 120 Principles of Biology I (may meet GE Area 5B for BIO 3 majors) Principles of Biology Laboratory I (may meet GE Area BIO 121 1 5C for BIO majors) CHE 110 General Chemistry I (may meet GE Area 5A for BIO 5 majors) Hours 15 Spring POL 101 American Institutions 3 GE Area 4UD Integrative Studies in the Social Sciences 3 BIO 122 Principles of Biology II 3 BIO 123 Principles of Biology Laboratory II 1 5 CHE 112 General Chemistry II Hours 15 Third Year Fall BIO 124 Principles of Biology III 3 BIO 125 Principles of Biology Lab III 1 CHE 310 Organic Chemistry I 4 CHE 311 Organic Chemistry Lab I 1 BIO 220 Molecular Biology 3 Molecular Biology Laboratory BIO 221 1 GE Area 3UD Integrative Studies in the Humanities 3 Hours 16 Spring Cell Biology BIO 320 3 Genetics (satisfies GE Area 5UD) BIO 340 3 CHE 312 Organic Chemistry II 3 CHE 313 Organic Chemistry Laboratory II 2 PHY 120 Elements Of Physics I 4 Hours 15 Fourth Year Fall BIO 324 Microbiology with Clinical Applications 3 BIO 325 Microbiology with Clinical Applications Laboratory 1 BIO 426 Immunology 3 BIO 436 Immunology Laboratory 1 MAT 171 Survey of Calculus for Management and Life Sciences 4 Major Elective 3 Hours 15 Spring Medical Bacteriology 2 BIO 425 BIO 435 Medical Bateriology Laboratory 2 BIO 490 Senior Project (satisfies GWAR requirement) 3 Major Eective 3 Major Elective 3 PHY 122 Elements Of Physics II 4 17 Hours **Total Hours** 122

2- Year Roadmap (transfer students)

Course	Title	Hours
First Year		
Fall		
BIO 124	Principles of Biology III	3
BIO 125	Principles of Biology Lab III	1
CHE 310	Organic Chemistry I	4

	Total Hours	62
	Hours	17
Major Elective		3
Major Elective		3
PHY 122	Elements Of Physics II	4
BIO 490	Senior Project (satisfies GWAR requirement)	3
BIO 435	Medical Bateriology Laboratory	2
BIO 425	Medical Bacteriology	2
Spring	Hours	14
Major Elective		3
BIO 436	Immunology Laboratory	1
BIO 426	Immunology	3
BIO 325	Microbiology with Clinical Applications Laboratory	1
BIO 324	Microbiology with Clinical Applications	3
GE Area 4UD Integrative S	Studies in the Social Sciences	3
Fall		
Second Year		
	Hours	15
PHY 120	Elements Of Physics I	4
CHE 313	Organic Chemistry Laboratory II	2
CHE 312	Organic Chemistry II	3
BIO 340	Genetics	3
Spring BIO 320	Cell Biology	3
	Hours	16
GE Area 3UD Integrative S	Studies in the Humanities	3
BIO 221	Molecular Biology Laboratory	1
BIO 220	Molecular Biology	3
CHE 311	Organic Chemistry Lab I	1