College of Natural Sciences and Mathematics

DEPARTMENT OF BIOLOGICAL SCIENCE

BIOLOGY BACHELOR OF SCIENCE

CLASS OF 2022

CONCENTRATION IN CELL AND DEVELOPMENTAL BIOLOGY

Biology B.S.

TERM 1	TERM 2	TERM 3	TERM 4	TERM 5	TERM 6	TERM 7	TERM 8
BIOL 151 (GE B2 and B3) 4 units	BIOL 152 4 units	BIOL 251 3 units	BIOL 252 3 units	BIOL 303 3 units	BIOL 302 5 units	Upper Division Biology Elective 3-4 units	Biology Capstone 2-3 units
CNSM 101# 3 units		BIOL 253L 1 unit	BIOL 254L 1 unit	BIOL 325 3 units		Upper Division Biology Elective 3-4 units	Upper Division Biology Elective(s) to complete required units
MATH 130 or MATH 150B* (GE B4) 4 units	CHEM 120A (GE B1) 5 units	CHEM 120B 5 units	CHEM 301A 3 units	CHEM 301B 3 units	MATH 338 (GE B5) 4 units	PHYS 212 3 units	
GE A1 or A2 3 units	GE A1 or A2 3 units	GE A3 3 units	GE C3 3 units	CHEM 302 2 units	PHYS 211 3 units	PHYS 212L 1 unit	
GE C1 or C2 3 units	GE C1 or C2 3 units	GE D1/Z 3 units	GE D2 3 units	Upper Division writing ENGL 301 or 363 3 units	PHYS 211L 1 unit	Upper Division GE C4/Z 3 units	Upper Division GE D4/Z 3 units
			GE D3 3 units		GE E 3 units		Electives to complete 120 units
17 units	15 units	15 units	16 units	14 units	16 units	13-15 units	12-14 units

** only if you have AP credit for MATH 150A*

 # For freshmen entering Fall 2018, CNSM 101 fulfills 3 units of the 40 required Biology units

30	GE lower division
6	GE upper division
40	Biology Required Courses#
34	Biology Supporting Courses
3	Upper Division Writing
7	Electives
120	**TOTAL UNITS**

INSTRUCTIONS FOR COMPLETING THE BIOLOGY BACHELOR OF SCIENCE

1. Attend Biology major advising each semester to plan and review your academic progress.
2. Visit your College of Natural Sciences and Mathematics Student Success Team in MH 488 to review GE and graduation requirements.
3. **All** Biology and Supporting Courses (CHEM, MATH, PHYS) must be completed with a grade of C or higher.
4. Complete GE courses in areas A1, A2, and A3 with a C- or better. Complete Area B4 with a C or higher since it is part of the major. Complete a total of 12 units in GE Area B. One course from GE Area Z can also fulfill a requirement in categories D1, C4, or D4. Check your Titan Degree Audit for courses that appear in both categories.
5. Declare your concentration during the semester you are taking your last lower-division Biol Core course.
6. Apply for Graduation through your Student Center at the start of Term 7.

Revised June 04, 2018

BIOLOGY BACHELOR OF SCIENCE
Cell and Developmental Biology Concentration

The Biology Major is for students who are preparing to (1) enter biology graduate and health professional schools, (2) seek biology-related careers in industry or government agencies, or (3) teach in secondary school.

BIOLOGY CORE AND SUPPORTING COURSES

- **Complete the courses listed below:**

Course	Course Title
BIOL 151	Cellular & Molecular Biology (GE B2 and B3)
BIOL 152	Evolution & Organismal Biology
BIOL 251	Genetics
BIOL 252	Principles of Ecology
BIOL 253L	Cell & Molecular Biology Skills Laboratory
BIOL 254L	Research Skills for Ecology and Organismal Biology
BIOL 325	Principles of Evolution
CHEM 120A	General Chemistry (GE B1)
CHEM 120B	General Chemistry
CHEM 301A	Organic Chemistry
CHEM 301B	Organic Chemistry
CHEM 302	Organic Chemistry Laboratory
MATH 130 or 150A+150B*	A Short Course in Calculus/ Calculus (GE B4)
MATH 338	Statistics Applied to Natural Sciences (GE B5)
PHYS 211	Elementary Physics
PHYS 211L	Elementary Physics: Laboratory
PHYS 212	Elementary Physics
PHYS 212L	Elementary Physics: Laboratory

***only if you have AP credit for MATH 150A, then you would take MATH 150B**

- **Cell and Developmental Concentration Requirements (15 units total) Units are shown as total units / lab-field units, e.g. (4/2)**

Cell and Developmental Biology Required Courses (8 units)

BIOL 303	Intermediate Cell Biology (3)
BIOL 302	General Microbiology (5/2)

Cell and Developmental Biology Elective Courses (5 units)

Course	Course Title	Course	Course Title
BIOL 329	Essential Tech. Cell Biol. (3/2)	BIOL 428	Biology of Cancer (3)
BIOL 362	Mammalian Physiology (4/1)	BIOL 429	Tech. Stem Cell Biol. (3/2)
BIOL 405	Developmental Biology (3)	BIOL 438	Pub. Health Microbiology (4/2)
BIOL 417	Adv. Cell Biology (3)	BIOL 445	Plant Cell Physiology (3)
BIOL 418L	Adv. Cell Biology Lab (2/2)	BIOL 465	Int. Biol. of Spider Silk (3)
BIOL 424	Immunology (5/2)	BIOL 470	Cellular Neurobiology (3)
BIOL 427	Stem Cell Biology (3)		

Cell and Developmental Biology Capstone Courses (2 units)

Course	Course Title	Course	Course Title
BIOL 400	Sem. in Biology Education (2)	BIOL 465	Int. Biol. of Spider Silk (3)
BIOL 424	Immunology (5/2)	BIOL 470	Cellular Neurobiology (3)
BIOL 427	Stem Cell Biology (3)	BIOL 482	Capstone Studies in Biology (2)
BIOL 428	Biology of Cancer (3)	BIOL 495	Internship (3/2)
BIOL 429	Tech. Stem Cell Biol. (3/2)	BIOL 498	Thesis (1-2)
BIOL 438	Pub. Health Microbiology (4/2)	BIOL 499L	Independent Lab Study (1-3)

Courses can count as Electives or as Capstone, not both

Physiology: One course in physiology is required. This can be taken as part of the concentration electives (if allowed) or separately. (3 units)

Course	Course Title	Course	Course Title
BIOL 362	Mammalian Physiology (4/1)	BIOL 445	Plant Cell Physiology (3)
BIOL 444	Plant Physiological Ecology (4/2)	BIOL 468	Comp. Animal Physiology (4/1)

CNSM 101 (for freshmen entering Fall 2018) and any upper division biology majors course(s) can be used to complete the remaining units needed to reach 40 total biology units.

As part of their Biology Requirements students must complete:

- **6 units of 400-level biology courses**
- **6 units of laboratory/field courses, 3 units of which must be taken within the concentration**

UNIVERSITY & GE REQUIREMENTS

• Upper Division Writing Requirement

To meet the upper-division baccalaureate writing requirement, students must pass with a "C" (2.0) or better ENGL 301 or ENGL 363 or six units from the following: BIOL 411, BIOL 414, BIOL 417, BIOL 422, BIOL 426, BIOL 427, BIOL 446, BIOL 447, BIOL 449, BIOL 465, BIOL 466, BIOL 468, BIOL 470, BIOL 495, BIOL 498.

GENERAL EDUCATION REQUIREMENTS

• **Area A Core Competencies**. Complete one course in each subarea for a total of 9 units. Area A1 and A2 must be completed during your first year; one should be taken in the fall and one should be taken in the spring. You should not take both A1 and A2 your first semester.

Subarea	Title
A1	Oral Communication
A2	Written Communication
A3	Critical Thinking

• **Area B Scientific and Quantitative Reasoning.** Fulfilled by MAJOR/SUPPORTING COURSES

Subarea	Title
B1	Physical Science (CHEM 120A)
B2	Life Science (BIOL 151)
B3	Laboratory Experience (BIOL 151)
B4	Mathematics/Quantitative Reasoning (MATH 130 or MATH 150A from AP credit)
B5	Implications & Explorations NSM (MATH 338)

• **Area C Arts and Humanities**. Complete one course in each subarea for a total of 9 lower division and 3 upper division units.

Subarea	Title
C1	Introduction to the Arts
C2	Introduction to the Humanities
C3	Origins of World Civilizations
C4	Explorations in the Arts and Humanities (upper div)

• **Area D Social Sciences**. Complete one course in each subarea for a total of 9 lower division and 3 upper division units.

Area	Title
D1	Introduction to the Social Sciences
D2	American History, Institutions, and Values
D3	American Government
D4	Explorations in the Social Sciences (upper div)

• **Area E Lifelong Learning and Self Development**. Complete one course in this area

• **Area Z Cultural Diversity**. Area Z should be completed with a course that will fulfill both Area C4 and Area Z OR both Area D1 and Area Z OR both Area D4 and Area Z.

College of Natural Sciences and Mathematics

DEPARTMENT OF BIOLOGICAL SCIENCE

BIOLOGY BACHELOR OF SCIENCE

CLASS OF 2022

CONCENTRATION IN ECOLOGY AND EVOLUTIONARY BIOLOGY

Biology B.S.

TERM 1	TERM 2	TERM 3	TERM 4	TERM 5	TERM 6	TERM 7	TERM 8
BIOL 151 (GE B2 and B3) 4 units	BIOL 152 4 units	BIOL 251 3 units	BIOL 252 3 units	BIOL 325 3 units	Upper Division Biology Elective 3-4 units	Upper Division Biology Elective 3-4 units	Biology Capstone 2-3 units
CNSM 101# 3 units		BIOL 253L 1 unit	BIOL 254L 1 unit	Upper Division Biology Elective 3-4 units		Upper Division Biology Elective 3-4 units	Upper Division Biology Elective(s) to complete required units
MATH 130 or MATH 150B* (GE B4) 4 units	CHEM 120A (GE B1) 5 units	CHEM 120B 5 units	CHEM 301A 3 units	CHEM 301B 3 units	MATH 338 (GE B5) 4 units	PHYS 212 3 units	
GE A1 or A2 3 units	GE A1 or A2 3 units	GE A3 3 units	GE C3 3 units	CHEM 302 2 units	PHYS 211 3 units	PHYS 212L 1 unit	
GE C1 or C2 3 units	GE C1 or C2 3 units	GE D1/Z 3 units	GE D2 3 units	Upper Division writing ENGL 301 or 363 3 units	PHYS 211L 1 unit	Upper Division GE C4/Z 3 units	Upper Division GE D4/Z 3 units
			GE D3 3 units		GE E 3 Units		Electives to complete 120 units
17 units	15 units	15 units	16 units	14-15 units	14-15 units	13-15 units	12-14 units

** only if you have AP credit for MATH 150A*

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3	Upper Division Writing
7	Electives
120	**TOTAL UNITS**

INSTRUCTIONS FOR COMPLETING THE BIOLOGY BACHELOR OF SCIENCE

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2. Visit your College of Natural Sciences and Mathematics Student Success Team in MH 488 to review GE and graduation requirements.
3. **All** Biology and Supporting Courses (CHEM, MATH, PHYS) must be completed with a grade of C or higher.
4. Complete GE courses in areas A1, A2, and A3 with a C- or better. Complete Area B4 with a C or higher since it is part of the major. Complete a total of 12 units in GE Area B. One course from GE Area Z can also fulfill a requirement in categories D1, C4, or D4. Check your Titan Degree Audit for courses that appear in both categories.
5. Declare your concentration during the semester you are taking your last lower-division Biol Core course.
6. Apply for Graduation through your Student Center at the start of Term 7.

Revised June 04, 2018

BIOLOGY BACHELOR OF SCIENCE

Ecology and Evolutionary Biology Concentration

The Biology Major is for students who are preparing to (1) enter biology graduate and health professional schools, (2) seek biology-related careers in industry or government agencies, or (3) teach in secondary school.

BIOLOGY CORE AND SUPPORTING COURSES

• Complete the courses listed below:

Course	Course Title
BIOL 151	Cellular & Molecular Biology (GE B2 and B3)
BIOL 152	Evolution & Organismal Biology
BIOL 251	Genetics
BIOL 252	Principles of Ecology
BIOL 253L	Cell & Molecular Biology Skills Laboratory
BIOL 254L	Research Skills for Ecology and Organismal Biology
BIOL 325	Principles of Evolution
CHEM 120A	General Chemistry (GE B1)
CHEM 120B	General Chemistry
CHEM 301A	Organic Chemistry
CHEM 301B	Organic Chemistry
CHEM 302	Organic Chemistry Laboratory
MATH 130 or 150A+150B*	A Short Course in Calculus/ Calculus (GE B4)
MATH 338	Statistics Applied to Natural Sciences (GE B5)
PHYS 211	Elementary Physics
PHYS 211L	Elementary Physics: Laboratory
PHYS 212	Elementary Physics
PHYS 212L	Elementary Physics: Laboratory

***only if you have AP credit for MATH 150A, then you would take MATH 150B**

• EEB Concentration Requirements (14 units total)

Units are shown as total units / lab-field units, e.g. (4/2)

EEB Organismal Biology Elective Courses (3-4 units)

Course	Course Title	Course	Course Title
BIOL 317	Field Marine Biology[1] (4/2)	BIOL 467	Entomology (4/2)
BIOL 340	Field Botany (3/2)	BIOL 474	Natural History Vertebrates (4/2)
BIOL 344	Survey of the Land Plants (4/2)	BIOL 475	Ichthyology[1] (4/2)
BIOL 345	Plant Biology (3/1)	BIOL 476	Herpetology (4/2)
BIOL 441	Plant Taxonomy (4/2)	BIOL 478	Mammalogy (4/2)
BIOL 446	Marine Phycology[1] (4/2)	BIOL 479	Ornithology (4/2)
BIOL 461	Marine Invert. Biology[1] (4/2)		

EEB Ecology Elective Courses (3-4 units)

Course	Course Title	Course	Course Title
BIOL 301	Prob. Env. Biol. (3/2)	BIOL 442	Pollination Biology (3/1)
BIOL 314	Pop. and Comm. Ecology (3)	BIOL 443	Plant Ecology (4/2)
BIOL 419 and 419L	Marine Ecology[1] (3) and Marine Ecology Lab[1] (1)	BIOL 449	Desert Ecology (4/2)
BIOL 422	Coastal Ecology[1] (4/2)	BIOL 466	Behavioral Ecology (3)

EEB Free Elective Courses (4-6 units) Any course listed below, or any course listed as an organismal biology elective, an ecology elective, or an EEB capstone course can be used to fulfill the 14 required units

Course	Course Title	Course	Course Title
BIOL 361	Human Anatomy (4/2)	BIOL 410	Evolutionary Genetics (4/1)
BIOL 402	Computer Lab Molec. Systematics (3/1)	BIOL 444	Plant Physiological Ecology (4/2)
BIOL 407	Genes and Genomes (3)	BIOL 468	Comp. Animal Physiology (4/1)

[1] ***only one of these courses may be counted towards the EEB concentration units***

EEB Capstone Courses (2 units)

Course	Course Title	Course	Course Title
BIOL 400	Sem. in Biology Education (2)	BIOL 481	Adv. Evolution and Ecology (3)
BIOL 401	Biogeography (3)	BIOL 482	Capstone Studies in Biology (2)
BIOL 447	Ethnobotany (3/1)	BIOL 495	Internship (3/2)
BIOL 450	Conservation Biology (3)	BIOL 498	Thesis (1-2)
BIOL 465	Int. Biology of Spider Silk (3)	BIOL 499L	Independent Lab Study (1-3)

Courses can count as Electives or as Capstone, not both

Physiology: One course in physiology is required. This can be taken as part of the concentration electives (if allowed) or separately. (3 units)

Course	Course Title	Course	Course Title
BIOL 362	Mammalian Physiology (4/1)	BIOL 445	Plant Cell Physiology (3)
BIOL 444	Plant Physiological Ecology (4/2)	BIOL 468	Comp. Animal Physiology (4/1)

CNSM 101 (for freshmen entering Fall 2018) and any upper division biology majors course(s) can be used to complete the remaining units needed to reach 40 total biology units.

As part of their Biology Requirements students must complete:

- **6 units of 400-level biology courses**
- **6 units of laboratory/field courses, 3 units of which must be taken within the concentration**

UNIVERSITY & GE REQUIREMENTS

• Upper Division Writing Requirement

To meet the upper-division baccalaureate writing requirement, students must pass with a "C" (2.0) or better ENGL 301 or ENGL 363 or six units from the following: BIOL 411, BIOL 414, BIOL 417, BIOL 422, BIOL 426, BIOL 427, BIOL 446, BIOL 447, BIOL 449, BIOL 465, BIOL 466, BIOL 468, BIOL 470, BIOL 495, BIOL 498.

GENERAL EDUCATION REQUIREMENTS

• Area A Core Competencies. Complete one course in each subarea for a total of 9 units. Area A1 and A2 must be completed during your first year; one should be taken in the fall and one should be taken in the spring. You should not take both A1 and A2 your first semester.

Subarea	Title
A1	Oral Communication
A2	Written Communication
A3	Critical Thinking

• Area B Scientific and Quantitative Reasoning. Fulfilled by MAJOR/SUPPORTING COURSES

Subarea	Title
B1	Physical Science (CHEM 120A)
B2	Life Science (BIOL 151)
B3	Laboratory Experience (BIOL 151)
B4	Mathematics/Quantitative Reasoning (MATH 130 or MATH 150A from AP credit)
B5	Implications & Explorations NSM (MATH 338)

• Area C Arts and Humanities. Complete one course in each subarea for a total of 9 lower division and 3 upper division units.

Subarea	Title
C1	Introduction to the Arts
C2	Introduction to the Humanities
C3	Origins of World Civilizations
C4	Explorations in the Arts and Humanities (upper div)

• Area D Social Sciences. Complete one course in each subarea for a total of 9 lower division and 3 upper division units.

Area	Title
D1	Introduction to the Social Sciences
D2	American History, Institutions, and Values
D3	American Government
D4	Explorations in the Social Sciences (upper div)

• Area E Lifelong Learning and Self Development. Complete one course in this area

• Area Z Cultural Diversity. Area Z should be completed with a course that will fulfill both Area C4 and Area Z OR both Area D1 and Area Z OR both Area D4 and Area Z.

College of Natural Sciences and Mathematics

DEPARTMENT OF BIOLOGICAL SCIENCE

BIOLOGY BACHELOR OF SCIENCE

CLASS OF 2022

CONCENTRATION IN MARINE BIOLOGY

Biology B.S.

TERM 1	TERM 2	TERM 3	TERM 4	TERM 5	TERM 6	TERM 7	TERM 8
BIOL 151 (GE B2 and B3) 4 units	BIOL 152 4 units	BIOL 251 3 units	BIOL 252 3 units	BIOL 325 3 units	BIOL 317 4 units	Upper Division Biology Elective 3-4 units	Biology Capstone 2-3 units
CNSM 101# 3 units		BIOL 253L 1 unit	BIOL 254L 1 unit	Upper Division Biology Elective 3-4 units		Upper Division Biology Elective 3-4 units	Upper Division Biology Elective(s) to complete required units
MATH 130 or MATH 150B* (GE B4) 4 units	CHEM 120A (GE B1) 5 units	CHEM 120B 5 units	CHEM 301A 3 units	CHEM 301B 3 units	MATH 338 (GE B5) 4 units	PHYS 212 3 units	
GE A1 or A2 3 units	GE A1 or A2 3 units	GE A3 3 units	GE C3 3 units	CHEM 302 2 units	PHYS 211 3 units	PHYS 212L 1 unit	
GE C1 or C2 3 units	GE C1 or C2 3 units	GE D1/Z 3 units	GE D2 3 units	Upper Division writing ENGL 301 or 363 3 units	PHYS 211L 1 unit	Upper Division GE C4/Z 3 units	Upper Division GE D4/Z 3 units
			GE D3 3 units		GE E 3 Units		Electives to complete 120 units
17 units	15 units	15 units	16 units	14-15 units	15 units	13-15 units	12-15 units

** only if you have AP credit for MATH 150A*

 # For freshmen entering Fall 2018, CNSM 101 fulfills 3 units of the 40 required Biology units

30	GE lower division
6	GE upper division
40	Biology Required Courses#
34	Biology Supporting Courses
3	Upper Division Writing
7	Electives
120	**TOTAL UNITS**

INSTRUCTIONS FOR COMPLETING THE BIOLOGY BACHELOR OF SCIENCE

1. Attend Biology major advising each semester to plan and review your academic progress.
2. Visit your College of Natural Sciences and Mathematics Student Success Team in MH 488 to review GE and graduation requirements.
3. **All** Biology and Supporting Courses (CHEM, MATH, PHYS) must be completed with a grade of C or higher.
4. Complete GE courses in areas A1, A2, and A3 with a C- or better. Complete Area B4 with a C or higher since it is part of the major. Complete a total of 12 units in GE Area B. One course from GE Area Z can also fulfill a requirement in categories D1, C4, or D4. Check your Titan Degree Audit for courses that appear in both categories.
5. Declare your concentration during the semester you are taking your last lower-division Biol Core course.
6. Apply for Graduation through your Student Center at the start of Term 7.

Revised June 04, 2018

BIOLOGY BACHELOR OF SCIENCE
Marine Biology Concentration

The Biology Major is for students who are preparing to (1) enter biology graduate and health professional schools, (2) seek biology-related careers in industry or government agencies, or (3) teach in secondary school.

BIOLOGY CORE AND SUPPORTING COURSES

- **Complete the courses listed below:**

Course	Course Title
BIOL 151	Cellular & Molecular Biology (GE B2 and B3)
BIOL 152	Evolution & Organismal Biology
BIOL 251	Genetics
BIOL 252	Principles of Ecology
BIOL 253L	Cell & Molecular Biology Skills Laboratory
BIOL 254L	Research Skills for Ecology and Organismal Biology
BIOL 325	Principles of Evolution
CHEM 120A	General Chemistry (GE B1)
CHEM 120B	General Chemistry
CHEM 301A	Organic Chemistry
CHEM 301B	Organic Chemistry
CHEM 302	Organic Chemistry Laboratory
MATH 130 or 150A+150B*	A Short Course in Calculus/ Calculus (GE B4)
MATH 338	Statistics Applied to Natural Sciences (GE B5)
PHYS 211	Elementary Physics
PHYS 211L	Elementary Physics: Laboratory
PHYS 212	Elementary Physics
PHYS 212L	Elementary Physics: Laboratory

***only if you have AP credit for MATH 150A, then you would take MATH 150B**

• Marine Biology Concentration Requirements (14 units total)
Units are shown as total units / lab-field units, e.g. (4/2)

Marine Biology Required Course (4 units)

BIOL 317	Field Marine Biology (4/2)

Marine Biology Organismal Biology Courses (4 units)

Course	Course Title	Course	Course Title
BIOL 446	Marine Phycology (4/2)	BIOL 475	Ichthyology (4/2)
BIOL 461	Marine Invertebrate Biology (4/2)		

Marine Biology Ecology Courses (4 units)

Course	Course Title
BIOL 419 & BIOL 419L	Marine Ecology (3) & Marine Ecology Lab (1)
BIOL 422	Coastal Ecology (4/2)

Marine Biology Capstone Courses (2 units)

Course	Course Title	Course	Course Title
BIOL 400	Sem. in Biology Education (2)	BIOL 482	Capstone Studies in Biology (2)
BIOL 401	Biogeography (3)	BIOL 495	Internship (3/2)
BIOL 422	Coastal Ecology (4/2)	BIOL 498	Thesis (1-2)
BIOL 450	Conservation Biology (3)	BIOL 499L	Independent Lab Study (1-3)
BIOL 481	Adv. in Evolution and Ecology (3)		

Courses can count as Electives or as Capstone, not both

Physiology: One course in physiology is required. This can be taken as part of the concentration electives (if allowed) or separately. (3 units)

Course	Course Title	Course	Course Title
BIOL 362	Mammalian Physiology (4/1)	BIOL 445	Plant Cell Physiology (3)
BIOL 444	Plant Physiological Ecology (4/2)	BIOL 468	Comp. Animal Physiology (4/1)

CNSM 101 (for freshmen entering Fall 2018) and any upper division biology majors course(s) can be used to complete the remaining units needed to reach 40 total biology units.

As part of their Biology Requirements students must complete:

- **6 units of 400-level biology courses**
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UNIVERSITY & GE REQUIREMENTS

• Upper Division Writing Requirement

To meet the upper-division baccalaureate writing requirement, students must pass with a "C" (2.0) or better ENGL 301 or ENGL 363 or six units from the following: BIOL 411, BIOL 414, BIOL 417, BIOL 422, BIOL 426, BIOL 427, BIOL 446, BIOL 447, BIOL 449, BIOL 465, BIOL 466, BIOL 468, BIOL 470, BIOL 495, BIOL 498.

GENERAL EDUCATION REQUIREMENTS

• **Area A Core Competencies**. Complete one course in each subarea for a total of 9 units. Area A1 and A2 must be completed during your first year; one should be taken in the fall and one should be taken in the spring. You should not take both A1 and A2 your first semester.

Subarea	Title
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• **Area B Scientific and Quantitative Reasoning.** Fulfilled by MAJOR/SUPPORTING COURSES

Subarea	Title
B1	Physical Science (CHEM 120A)
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B3	Laboratory Activity (BIOL 151)
B4	Mathematics/Quantitative Reasoning (MATH 130 or MATH 150A from AP credit)
B5	Implications & Explorations NSM (MATH 338)

• **Area C Arts and Humanities**. Complete one course in each subarea for a total of 9 lower division and 3 upper division units.

Subarea	Title
C1	Introduction to the Arts
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C3	Origins of World Civilizations
C4	Explorations in the Arts and Humanities (upper div)

• **Area D Social Sciences**. Complete one course in each subarea for a total of 9 lower division and 3 upper division units.

Area	Title
D1	Introduction to the Social Sciences
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• **Area E Lifelong Learning and Self Development**. Complete one course in this area

• **Area Z Cultural Diversity**. **Area Z Cultural Diversity**. Area Z should be completed with a course that will fulfill both Area C4 and Area Z OR both Area D1 and Area Z OR both Area D4 and Area Z.

College of Natural Sciences and Mathematics

DEPARTMENT OF BIOLOGICAL SCIENCE

BIOLOGY BACHELOR OF SCIENCE

CLASS OF 2022

CONCENTRATION IN MOLECULAR BIOLOGY & BIOTECHNOLOGY

Biology B.S.

TERM 1	TERM 2	TERM 3	TERM 4	TERM 5	TERM 6	TERM 7	TERM 8
BIOL 151 (GE B2 and B3) 4 units	BIOL 152 4 units	BIOL 251 3 units	BIOL 252 3 units	BIOL 309 3 units	BIOL 302 or CHEM 421 3-5 units	Upper Division Biology Elective 3-4 units	Biology Capstone 2-3 units
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GE C1 or C2 3 units	GE C1 or C2 3 units	GE D1/Z 3 units	GE D2 3 units	Upper Division writing ENGL 301 or 363 3 units	PHYS 211L 1 unit	Upper Division GE C4/Z 3 units	Upper Division GE D4/Z 3 units
			GE D3 3 units		GE E 3 Units		Electives to complete 120 units
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** only if you have AP credit for MATH 150A*

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6. Apply for Graduation through your Student Center at the start of Term 7.

Revised June 04, 2018

BIOLOGY BACHELOR OF SCIENCE
Molecular Biology and Biotechnology

The Biology Major is for students who are preparing to (1) enter biology graduate and health professional schools, (2) seek biology-related careers in industry or government agencies, or (3) teach in secondary school.

BIOLOGY CORE AND SUPPORTING COURSES

• Complete the courses listed below:

Course	Course Title
BIOL 151	Cellular & Molecular Biology (GE B2 and B3)
BIOL 152	Evolution & Organismal Biology
BIOL 251	Genetics
BIOL 252	Principles of Ecology
BIOL 253L	Cell & Molecular Biology Skills Laboratory
BIOL 254L	Research Skills for Ecology and Organismal Biology
BIOL 325	Principles of Evolution
CHEM 120A	General Chemistry (GE B1)
CHEM 120B	General Chemistry
CHEM 301A	Organic Chemistry
CHEM 301B	Organic Chemistry
CHEM 302	Organic Chemistry Laboratory
MATH 130 or 150A+150B*	A Short Course in Calculus/ Calculus (GE B4)
MATH 338	Statistics Applied to Natural Sciences (GE B5)
PHYS 211	Elementary Physics
PHYS 211L	Elementary Physics: Laboratory
PHYS 212	Elementary Physics
PHYS 212L	Elementary Physics: Laboratory

***only if you have AP credit for MATH 150A, then you would take MATH 150B**

• Molecular Biology and Biotechnology Concentration Requirements
Units are shown as total units / lab-field units, e.g. (4/2)
Molecular Biology and Biotechnology Required Courses (6 -8 units)

BIOL 309	Intermediate Molecular Biology (3)
BIOL 302 **OR** CHEM 421	General Microbiology (5/2) OR Biological Chemistry (3)

Molecular Biology and Biotechnology Elective Courses (5-6 units)

Course	Course Title	Course	Course Title
BIOL 402	Comp. Lab in Molecular Systematics (3/1)	BIOL 430	Advances in Microbiology (3)
BIOL 405	Developmental Biology (3)	BIOL 438	Public Health Microbiol (4/2)
BIOL 407	Genes & Genomes (3)	BIOL 445	Plant Cell Physiology (3)
BIOL 410	Evolutionary Genetics (4/1)	BIOL 448	Plant Molecular Biology (4/1)
BIOL 411	Medical Genetics & Syst. Biology (3)	BIOL 472A	Adv. Biotech. Lab (3/2)
BIOL 412	Principles Gene Manipulation (3)	BIOL 472B	Adv. Biotech. Lab (3/2)
BIOL 413	Adv. Molecular Genetics (3)	BIOL 473	Bioinformatics (3/1)
BIOL 414	Microbial Genetics (3)	CHEM 421	Biological Chemistry (3)
BIOL 426	Molecular Virology (3)		

Molecular Biology and Biotechnology Capstone Courses (2 units)

Course	Course Title	Course	Course Title
BIOL 400	Sem. In Biology Education (2)	BIOL 472B	Adv. Biotech. Lab (3/2)
BIOL 412	Principles Gene Manipulation (3)	BIOL 482	Capstone Studies in Biology (2)
BIOL 426	Molecular Virology (3)	BIOL 495	Internship (3/2)
BIOL 430	Adv. Microbiol (3)	BIOL 498	Thesis (1-2)
BIOL 472A	Adv. Biotech. Lab (3/2)	BIOL 499L	Independent Lab Study (1-3)

Courses can count as Electives or as Capstone, not both

Physiology: One course in physiology is required. This can be taken as part of the concentration electives (if allowed) or separately. (3 units)

Course	Course Title	Course	Course Title
BIOL 362	Mammalian Physiology (4/1)	BIOL 445	Plant Cell Physiology (3)
BIOL 444	Plant Physiological Ecology (4/2)	BIOL 468	Comp. Animal Physiology (4/1)

CNSM 101 (for freshmen entering Fall 2018) and any upper division biology majors course(s) can be used to complete the remaining units needed to reach 40 total biology units.

As part of their Biology Requirements students must complete:

- **6 units of 400-level biology courses**
- **6 units of laboratory/field courses, 3 of which must be taken within the concentration**

UNIVERSITY & GE REQUIREMENTS

• Upper Division Writing Requirement

To meet the upper-division baccalaureate writing requirement, students must pass with a "C" (2.0) or better ENGL 301 or ENGL 363 or six units from the following: BIOL 411, BIOL 414, BIOL 417, BIOL 422, BIOL 426, BIOL 427, BIOL 446, BIOL 447, BIOL 449, BIOL 465, BIOL 466, BIOL 468, BIOL 470, BIOL 495, BIOL 498.

GENERAL EDUCATION REQUIREMENTS

• **Area A Core Competencies**. Complete one course in each subarea for a total of 9 units. Area A1 and A2 must be completed during your first year; one should be taken in the fall and one should be taken in the spring. You should not take both A1 and A2 your first semester.

Subarea	Title
A1	Oral Communication
A2	Written Communication
A3	Critical Thinking

• **Area B Scientific and Quantitative Reasoning.** Fulfilled by MAJOR/SUPPORTING COURSES

Subarea	Title
B1	Physical Science (CHEM 120A)
B2	Life Science (BIOL 151)
B3	Laboratory Experience (BIOL 151)
B4	Mathematics/Quantitative Reasoning (MATH 130 or MATH 150A from AP credit)
B5	Implications & Explorations NSM (MATH 338)

• **Area C Arts and Humanities**. Complete one course in each subarea for a total of 9 lower division and 3 upper division units.

Subarea	Title
C1	Introduction to the Arts
C2	Introduction to the Humanities
C3	Origins of World Civilizations
C4	Explorations in the Arts and Humanities (upper div)

• **Area D Social Sciences**. Complete one course in each subarea for a total of 9 lower division and 3 upper division units.

Area	Title
D1	Introduction to the Social Sciences
D2	American History, Institutions, and Values
D3	American Government
D4	Explorations in the Social Sciences (upper div)

• **Area E Lifelong Learning and Self Development**. Complete one course in this area

• **Area Z Cultural Diversity**. Area Z should be completed with a course that will fulfill both Area C4 and Area Z OR both Area D1 and Area Z OR both Area D4 and Area Z.

College of Natural Sciences and Mathematics

DEPARTMENT OF BIOLOGICAL SCIENCE

BIOLOGY BACHELOR OF SCIENCE

CLASS OF 2022

CONCENTRATION IN PLANT BIOLOGY

Biology B.S.

TERM 1	TERM 2	TERM 3	TERM 4	TERM 5	TERM 6	TERM 7	TERM 8
BIOL 151 (GE B2 and B3) 4 units	BIOL 152 4 units	BIOL 251 3 units	BIOL 252 3 units	BIOL 345 3 units	Upper Division Biology Elective 3-4 units	Upper Division Biology Elective 3-4 units	Biology Capstone 2-3 units
CNSM 101# 3 units		BIOL 253L 1 unit	BIOL 254L 1 unit	BIOL 325 3 units		Upper Division Biology Elective 3-4 units	Upper Division Biology Elective(s) to complete required units
MATH 130 or MATH 150B* (GE B4) 4 units	CHEM 120A (GE B1) 5 units	CHEM 120B 5 units	CHEM 301A 3 units	CHEM 301B 3 units	MATH 338 (GE B5) 4 units	PHYS 212 3 units	
GE A1 or A2 3 units	GE A1 or A2 3 units	GE A3 3 units	GE C3 3 units	CHEM 302 2 units	PHYS 211 3 units	PHYS 212L 1 unit	
GE C1 or C2 3 units	GE C1 or C2 3 units	GE D1/Z 3 units	GE D2 3 units	Upper Division writing ENGL 301 or 363 3 units	PHYS 211L 1 unit	Upper Division GE C4/Z 3 units	Upper Division GE D4/Z 3 units
			GE D3 3 units		GE E 3 Units		Electives to complete 120 units
17 units	15 units	15 units	16 units	14 units	14-15 units	13-15 units	13-16 units

** only if you have AP credit for MATH 150A*

 # For freshmen entering Fall 2018, CNSM 101 fulfills 3 units of the 40 required Biology units

30	GE lower division
6	GE upper division
40	Biology Required Courses#
34	Biology Supporting Courses
3	Upper Division Writing
7	Electives
120	**TOTAL UNITS**

INSTRUCTIONS FOR COMPLETING THE BIOLOGY BACHELOR OF SCIENCE

1. Attend Biology major advising each semester to plan and review your academic progress.
2. Visit your College of Natural Sciences and Mathematics Student Success Team in MH 488 to review GE and graduation requirements.
3. **All** Biology and Supporting Courses (CHEM, MATH, PHYS) must be completed with a grade of C or higher.
4. Complete GE courses in areas A1, A2, and A3 with a C- or better. Complete Area B4 with a C or higher since it is part of the major. Complete a total of 12 units in GE Area B. One course from GE Area Z can also fulfill a requirement in categories D1, C4, or D4. Check your Titan Degree Audit for courses that appear in both categories.
5. Declare your concentration during the semester you are taking your last lower-division Biol Core course.
6. Apply for Graduation through your Student Center at the start of Term 7.

Revised June 04, 2018

BIOLOGY BACHELOR OF SCIENCE

Plant Biology Concentration

The Biology Major is for students who are preparing to (1) enter biology graduate and health professional schools, (2) seek biology-related careers in industry or government agencies, or (3) teach in secondary school.

BIOLOGY CORE AND SUPPORTING COURSES

- **Complete the courses listed below:**

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- **Plant Biology Concentration Requirements (12 units total)**

Units are shown as total units / lab-field units, e.g. (4/2)

Plant Biology Required Course (3 units)

BIOL 345	Plant Biology (3/1)

Plant Biology Elective Courses (7 units)

Course	Course Title	Course	Course Title
BIOL 340	Field Botany (3/2)	BIOL 445	Plant Cell Physiology (3)
BIOL 344	Survey of the Land Plants (4/2)	BIOL 446	Marine Phycology (4/2)
BIOL 441	Plant Taxonomy (4/2)	BIOL 447	Ethnobotany (3/1)
BIOL 442	Pollination Biology (3/1)	BIOL 448	Plant Molecular Biology (4/1)
BIOL 443	Plant Ecology (4/2)	BIOL 449	Desert Ecology (4/2)
BIOL 444	Plant Physiological Ecology (4/2)	GEOG 313	Natural Vegetation (3)

Plant Biology Capstone Courses (at least 2 units)

Course	Course Title
BIOL 450	Conservation Biology (3)
BIOL 482	Capstone Studies in Biology (2)
BIOL 495	Internship (3/2)
BIOL 498	Thesis (1-2)
BIOL 499L	Independent Lab Study (1-3)

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