CALIFORNIA STATE UNIVERSITY CHANNEL ISLANDS

PROGRAM MODIFICATION

PROGRAM AREA BIOLOGY

Please use the following format to modify any existing program. Any deletions from an existing program need to be underlined (left hand column), and any additions/changes to the program need to be in CAPS (right hand column).

EXISTING PROGRAM

Name of Degree Program

- Bachelor of Science in Biology
- Bachelor of Science in Biology with an Emphasis in Cell and Molecular Biology
- Bachelor of Science in Biology with an Emphasis in Medical Imaging
- Minor in Biology
- Certificate in Biotechnology

Catalog Description of the Program

Biology is the study of life, its origins, diversity and intricacies. It emphasizes the relationship between structure and function in living systems and the processes by which organisms grow, reproduce interact with each other and and their environment. The discipline is dynamic and rapidly particularly advancing in the areas of biotechnology and information technology. The Biology Program provides its students with a strong theoretical foundation in biology, combined with extensive hands-on laboratory experiences using state-of-the-art technology. Students take a series of core courses augmented by upperdivision electives selected from areas of special interest.

CAREERS: The Bachelor of Science in Biology and the Bachelor of Science in Biology with an Emphasis in Cell and Molecular Biology are designed for students who wish to enter medical, dental or other health professional or graduate schools, the teacher credential program, or to seek careers in science education, business, industry or government. The Bachelor of Science in Biology with an Emphasis in Cell and Molecular Biology

PROPOSED PROGRAM

Name of Degree Program

- Bachelor of Science in Biology
- Bachelor of Science in Biology with an Emphasis in Cell and Molecular Biology
- Bachelor of Science in Biology with an Emphasis in Medical Imaging
- Minor in Biology
- Certificate in Biotechnology

Catalog Description of the Program

Biology is the study of life, its origins, diversity and intricacies. It emphasizes the relationship between structure and function in living systems and the processes by which organisms grow, reproduce and interact with each other and their environment. The discipline is dynamic and rapidly advancing particularly in the areas of biotechnology and information technology. The Biology Program provides its students with a strong theoretical foundation in biology, combined with extensive hands-on laboratory experiences using state-of-the-art technology. Students take a series of core courses augmented by upperdivision electives selected from areas of special interest.

CAREERS: The Bachelor of Science in Biology and the Bachelor of Science in Biology with an Emphasis in Cell and Molecular Biology are designed for students who wish to enter medical, dental or other health professional or graduate schools, the teacher credential program, or to seek careers in science education, business, industry or government.

also offers students an opportunity to study the	THE BACHELOR OF SCIENCE DEGREE IN
exciting developments in genetics, molecular	BIOLOGY PROVIDES STUDENTS WITH A
biology, cloning, biotechnology and	BROAD BACKGROUND IN THE
bioinformatics. Such programs lead to careers in	BIOLOGICAL SCIENCES. THE DEGREE
biotechnology, pharmaceuticals, research and	PROGRAM REQUIRES COURSEWORK IN
development, intellectual property and patent law.	FUNDAMENTAL AREAS OF BIOLOGY
	AND THEN ALLOWS STUDENTS TO
The Bachelor of Science in Biology with an	TAILOR THE DEGREE THROUGH
Emphasis in Medical Imaging prepares students	ELECTIVES TO SUIT THEIR INTERESTS.
for graduate or professional study in the medical	STUDENTS INTERESTED IN EARNING A
sciences (medical imaging medical physics health	SINGLE SUBJECT TEACHING
physics dosimetry nuclear medicine radiotherapy	CREDENTIAL CAN SUPPLEMENT THE BS
oncology biomedical engineering) or for entry	DEGREE PROGRAM WITH 14
into professional positions in the clinical	ADDITIONAL UNITS (SEE ADDITIONAL
anticoprofessional positions in the children	COUDSES RELOWA TO SATISEY THE
environment and in medical imaging research and	DECUDEMENTS EOD SUDIECT MATTER
development.	REQUIREMENTS FOR SUBJECT MATTER
	PREPARATION IN BIOLOGY.
The Certificate in Biotechnology will provide	
students with advanced knowledge and skills in	The Bachelor of Science in Biology with an
modern biotechnology that will lead to careers in	Emphasis in Cell and Molecular Biology offers
biotech as well as pharmaceutical industries.	students an opportunity to study the exciting
	developments in genetics, molecular biology,
	cloning, biotechnology and bioinformatics. Such
	programs lead to careers in biotechnology,
	pharmaceuticals, research and development,
	intellectual property and patent law.
	The Bachelor of Science in Biology with an
	Emphasis in Medical Imaging prepares students
	for graduate or professional study in the medical
	sciences (medical imaging medical physics health
	physics dosimetry nuclear medicine radiotherapy
	oncology biomedical engineering) or for entry
	into professional positions in the clinical
	into professional positions in the clinical
	environment and in medical imaging research and
	development.
	The Certificate in Biotechnology will provide
	students with advanced knowledge and skills in
	modern biotechnology that will lead to careers in
	biotech as well as pharmaceutical industries.
CONTACT INFORMATION	CONTACT INFORMATION
Biology@csuci.edu	Biology@csuci.edu
FACULTY	FACULTY
Ching-Hua Wang, MD, PhD, Professor of Biology	Ching-Hua Wang, MD, PhD, Professor and Chair
Academic Coordinator	of Biology

Academic Advisor	Academic Advisor
Phone: (805) 437-8870	Phone: (805) 437-8870
Email: ching-hua.wang@csuci.edu	Email: <u>ching-hua.wang@csuci.edu</u>
Simone Aloisio, PhD, Assistant Professor of Chemistry Phone: (805) 437-8999 Email: simone.aloisio@csuci.edu	AMY DENTON, PH.D., ASSISTANT PROFESSOR OF BIOLOGY PHONE (805) 437-8458 EMAIL: AMY.DENTON@CSUCI.EDU
Nikolaos Diamantis, PhD, Assistant Professor of <u>Mathematics</u> Phone: (805) 437-8991 Email: nikolaos.diamantis@csuci.edu Geoffrey Dougherty, PhD, Professor of Physics Phone: (805) 437-8990 Email: geoffrey.dougherty@csuci.edu	Geoffrey Dougherty, PhD, Professor of Physics Phone: (805) 437-8990 Email: geoffrey.dougherty@csuci.edu Louise Lutze-Mann, PhD, Associate Professor of Biology Phone: (805) 437-8873 Email: louise.lutze-mann@csuci.edu
Ivona Grzegorczyk, PhD, Professor of Mathematics Phone: (805) 437-8868 Email: ivona.grze@csuci.edu	Nancy Mozingo, PhD, Assistant Professor of Biology Phone: (805) 437-8989 Email: Nancy.mozingo@csuci.edu
Philip Hampton, PhD, Professor of Chemistry Phone: (805) 437-8869 Email: philip.hampton@csuci.edu	
Louise Lutze-Mann, PhD, Associate Professor of Biology Phone: (805) 437-8873 Email: louise.lutze-mann@csuci.edu	
Nancy Mozingo, PhD, Assistant Professor of Biology Phone: (805) 437-8989 Email: Nancy.mozingo@csuci.edu	
Requirements for the Degree Program	Requirements for the Degree Program
REQUIREMENTS FOR THE BACHELOR OF SCIENCE DEGREE IN BIOLOGY- for pre-professional and general biology students (120 units): LOWER DIVISION REQUIREMENTS (31 units): 1. Biology BIOL 200 Principles of Organismal and Population Biology (4) BIOL 201 Principles of Cell and Molecular	REQUIREMENTS FOR THE BACHELOR OF SCIENCE DEGREE IN BIOLOGY (120 units) Lower Division Requirements (31 units) 1. Biology BIOL 200 Principles of organismal and population biology (4) BIOL 201 Principles of cell and molecular biology (4) BIOL 202 Biostatistics (3)

Biology (4)	2. Mathematics
BIOL202 Biostatistics (3)	MATH 105 PRE-CALCULUS or MATH 150
	Calculus I (4)
2. Mathematics	
MATH 150 Calculus I (4)	3. Physical Sciences
	CHEM 121 General chemistry I (4)
3. Chemistry	CHEM 122 General chemistry II (4)
CHEM 121 General Chemistry I (4)	PHYS 100 Introduction to physics I (4)
CHEM 122 General Chemistry II (4)	PHYS 101 Introduction to physics II (4)
	NOTE: PHYS 200/201 MAY BE
4. Physics	SUBSTITUTED FOR THE ABOVE PHYSICS
Select either	SEQUENCE.
PHYS 100 Introduction to Physics I (4)	
PHYS 101 Introduction to Physics II (4)	Upper Division Requirements (21 UNITS)
<u> </u>	BIOL 300 CELL BIOLOGY (4)
PHYS 200 General Physics I (4)	BIOL 302 GENETICS (4)
PHYS 201 General Physics II (4)	BIOL 303 EVOLUTIONARY BIOLOGY (3)
	BIOL 304 COMPARATIVE ANIMAL
(12 units of the above courses will be counted	PHYSIOLOGY (3)
toward lower-division GE credits, 4 units in each	BIOL 433 Ecology and the Environment (4)
of three different disciplines)	BIOL 494 Independent research or BIOL 497
	Directed study (2)
UPPER DIVISION REQUIREMENTS (33	BIOL 499 Senior capstone colloquium (1)
<u>units):</u>	Elections in high an (10.12)
<u>1. Biology</u>	Select at least three courses from the following list
BIOL 300 Cell Physiology (4)	one of which must be a lab course
BIOL 302 Genetics and Evolution (4)	BIOL 301
BIOL 400 Molecular Biology and Molecular	BIOL 310
Genetics (4)	BIOL 311
BIOL 433* Ecology and the Environment (4)	BIOL 312
	BIOL 313
2. Organic Chemistry	BIOL 316
<u>CHEM 311 & 312 Organic Chemistry I (4)</u>	BIOL 317
<u>CHEM 314 & 315 Organic Chemistry II (4)</u>	BIOL 329
<u>(A year-long organic chemistry sequence with</u>	BIOL 400
<u>laboratory taken at a community college may be</u>	BIOL 401
<u>accepted for the Biology major in lieu of</u>	BIOL 402
<u>CHEM 311, 312, 314, 315.)</u>	BIOL 420
2 E41	BIOL 421
<u>5. Etnics</u>	BIOL 422
	BIOL 423
(2) DIOL 340" Scientific and Professional Ethics	BIOL 424
DIVS/ENCL 220* Science and Conscience (2)	BIOL 425
	BIOL 427
4 Computing in Biology	BIOL 428
<u>4. Computing in Diology</u> Select one of the following courses:	BIOL 431
BIOI 410 Computer Applications	BIOL 432
Biomodical Evolds (2)	BIOL 450
Diomedical Fields (3)	

BIOL 430* Research Design and Data	Required Supporting and other GE Courses
Analysis (3)	American institutions requirement (6)
BIOL431* Bioinformatics (4)	Other GE courses (39)
	University electives (12-14)
5. Service Learning	
A minimum of 2 units taken from the following:	Additional Courses for SUBJECT MATTER
BIOL 494 Independent Research (1-3)	PREPARATION IN BIOLOGY (14) Subject matter propagation in biology can be mat by
BIOL 497 Directed Study (1-3)	fulfilling the requirements for the BS in Biology and
	successfully completing the following 14 units:
6 Capstone	PHYS 105 Introduction to the Solar System (4)
BIOL 499 Senior Capstone Colloquium (1)	GEOL 121 Physical Geology (4)
bioli ()) benior capstone conoquiant ()	BIOL 335 THE BIOSPHERE (3)
(Courses with * are double counted toward upper	EDUC 330 Introduction to secondary schooling
division CE credits	(3)
division OE creatis.	TOTAL: 14
ELECTIVES IN PLOLOCY (14 metro)	
A minimum of 14 mits change from 200 to 400	
A minimum of 14 units chosen from 500 to 400	
level upper division biology courses, with at least	
one lab-based course and no more than two	
courses that could be taken at 300 level (no	
courses from BIOL 331 to 343 would be counted	
toward the major). CHEM 318 or CHEM 400	
could also be taken to satisfy the electives.	
ELECTIVES IN ANY DISCIPLINE (6 units)	
REQUIRED AUDONTING AND OTHER OF	
REQUIRED SUPPORTING AND OTHER GE	
COURSES (36 units):	
ENGL 330 Writing in the Disciplines (3)	
American Institutions Requirement (6)	
Other GE Courses in Categories A-E (27)	
	DECUIDEMENTS FOD THE BACHELOD
REQUIREMENTS FOR THE BACHELOR	OF SCIENCE DECREE IN BIOLOCY
OF SCIENCE DEGREE IN BIOLOGY	WITH AN EMPHASIS IN CELL AND
WITH AN EMPHASIS IN CELL AND	MOLECIII AR BIOLOCY (120 unita):
MOLECULAR BIOLOGY (120 units):	MOLLEOLAR DIOLOGI (120 dints).
LOWED DIVISION DEALUDEMENT'S (21	LOWER DIVISION REQUIREMENT'S (31
LOWER DIVISION REQUIREMENTS (31	unite).
units).	1 Biology
$\begin{array}{c} 1. \text{ DIOLOGY} \\ \text{DIOL} 200 \text{ Drived} 1 \text{for } 1 1 \\ \end{array}$	BIOL 200 Principles of Organismal and
DIOL 200 Principles of Organismal and	Population Biology (4)
Population Biology (4)	BIOL 201 Principles of Coll and Molecular
BIOL 201 Principles of Cell and Molecular	Biology (4)
Biology (4)	BIOL 202 Biostatistics (2)
BIOL 202 Biostatistics (3)	DIOL 202 DIOSTAUSUUS (3)
2 Mathematics	2. Mathematics
2. Matternaucs MATH 150 Colombus L (4)	MATH 150 Calculus I (4)
$\frac{1}{1}$	
	3. PHYSICAL SCIENCE

3. Chemistry	CHEM 121 General Chemistry I (4)
CHEM 121 General Chemistry I (4)	CHEM 122 General Chemistry II (4)
CHEM 122 General Chemistry II (4)	AND select either
<u>Oriential Ociteral Orientistry II (1)</u>	PHYS 100 Introduction to Physics I (4)
1 Develop	PHVS 101 Introduction to Physics II (4)
<u>4. 1 Hysics</u>	11113 for infoduction to rifysics if (4)
DLIVS 100 Latraduction to Dhusian L (4)	DLIVE 200 Constal District I (4)
PHYS 100 Introduction to Physics I (4)	PH 15 200 General Physics 1 (4)
PHYS 101 Introduction to Physics II (4)	PHYS 201 General Physics II (4)
PHYS 200 General Physics I (4)	(12 units of the above courses will be counted
PHYS 201 General Physics II (4)	toward lower-division GE credits, 4 units in each
	of three different disciplines)
(12 units of the above courses will be counted	
toward lower-division GE credits, 4 units in each	
of three different disciplines)	
	UPPER DIVISION REQUIREMENTS (44
UPPER DIVISION REQUIREMENTS (41-42	units):
units):	1. Biology
1. Biology	BIOL 300 CELL BIOLOGY (4)
BIOL 300 Cell Physiology (4)	BIOL 301 Microbiology (4)
BIOL 301 Microbiology (4)	BIOL 302 Genetics (4)
BIOL 302 Genetics and Evolution (4)	BIOL 303 EVOLUTIONARY BIOLOGY (3)
BIOL 400 Molecular Biology and Molecular	BIOL 400 Molecular Biology and Molecular
Genetics (1)	Genetics (A)
BIOI 401 Biotechnology and Recombinant	BIOI 401 Biotechnology and Recombinant
DIOL 401 Diotectinology and Recombinant	DIOL 401 Diotectinology and Recombinant
PIOL 422* Englagy and the Environment (4)	DINA TECHNIques (5) DIOL 421 DIOLNEODMATICS
BIOL 455* Ecology and the Environment (4)	DIOL 451 DIOINFORMATICS
	BIOL 494 Independent research or BIOL 497
2. Organic Chemistry and Biochemistry	Directed study (1-3)
Select either Group A or Group B courses:	BIOL 499 Senior capstone colloquium (1)
Group A-	
CHEM 311 Organic Chemistry I (3)	2. Organic Chemistry and Biochemistry
CHEM 312 Organic Chemistry I Laboratory	Select either Group A or Group B courses:
(1)	Group A-
CHEM 318 Biological Chemistry (3)	CHEM 311 Organic Chemistry I (3)
	CHEM 312 Organic Chemistry I Laboratory (1)
Group B-	AND EITHER:
(Note: Students completing the following courses	CHEM 318 BIOLOGICAL CHEMISTRY (3)
to satisfy this category will obtain a Minor in	OR
Chemistry	CHEM 314 ORGANIC CHEMISTRY II (3)
in addition to a Major in Biology:	AND
CHEM 311 Organic Chemistry I (3)	CHEM 315 ORGANIC CHEMISTRY II
CHEM 312 Organic Chemistry I Laboratory (1)	LABORATORY (1)
CHEM 314 Organic Chemistry II (3)	
CHEM 315 Organic Chemistry II Laboratory (1)	Group B
CHEM 400 Biochemistry (4)	Note: Students completing the following courses
(A year long organic chemistry secures with	to satisfy this category will obtain a Minor in
laboratory taken at a community sequence with	Chomister
aboratory taken at a community college may be	Chemistry
accepted for the biology major in lieu of CHEM	in addition to a Major in Biology:

311, 312, 314, 315.)	CHEM 311 Organic Chemistry I (3)
	CHEM 312 Organic Chemistry I Laboratory (1)
3. Ethics	CHEM 314 Organic Chemistry II (3)
Select one of the following:	CHEM 315 Organic Chemistry II Laboratory (1)
BIOL 346* Scientific and Professional Ethics	CHEM 400 Biochemistry (4)
(3)	(A year-long organic chemistry sequence with
PHYS/ENGL 338* Science and Conscience (3)	laboratory taken at a community college may be
	accepted for the Biology major in lieu of CHEM
4. Computing in Biology	311, 312, 314, 315.)
Select one of the following:	,,,
BIOL 430* Research Design and Data Analysis	3. Required General Education Courses
(3)	ENGL 330 WRITING IN THE DISCIPLINES
$\frac{49}{100}$ BIOL 431* Bioinformatics (4)	AND Select one of the following:
Diole ist Diomiornates (i)	BIOI 346* Scientific and Professional Ethics
5 Service Learning	
A minimum of 2 units taken from the following:	PHVS/ENGL 338* Science and Conscience (3)
BIOL 492 Internship (2.3)	11113/EIVOE 550 Science and Conscience (5)
BIOL 494 Independent Research (1, 3)	(Courses with * are double coupted toward upper
BIOL 407 Directed Study (1.3)	division CE gradits)
DIOL 497 Directed Study (1-3)	division GE credits.)
6 Capatana	ELECTIVES IN BIOLOCY (0 units)
BIOL 400 Serier Carstone Celle guium (1)	Select at least 0 write of coveres from the following
BIOL 499 Senior Capstone Conoquium (1)	Select at least 9 units of courses from the following
	list: DIOL 402
(Courses with * are double-counted toward upper-	DIOL 402 DIOL 417
division GE credits.)	DIOL 410 DIOL 420
	DIOL 420 DIOL 421
ELECTIVES IN BIOLOGY (8-9 units):	BIOL 421 DIOL 422
A minimum of 8-9 units chosen from 400 level	BIOL 422 DIOL 422
courses, excluding BIOL 410.	BIOL 425
	BIOL 424
ELECTIVES IN ANY DISCIPLINE (6 units)	BIOL 425
DECLUDED (UDDOD'TDIC AND OTHER CE	BIOL 42/
REQUIRED SUPPORTING AND OTHER GE	BIOL 428
COURSES (<u>33 units):</u>	BIOL 432
ENGL 330 Writing in the Disciplines (3)	BIOL 433
American Institutions Requirement (6)	
Other GE Courses in Categories A-E (24)	ELECTIVES IN ANY DISCIPLINE (6 units)
	REQUIRED SUPPORTING AND OTHER GE
	COURSES (36 UNITS).
	American Institutions Requirement (6)
	OTHER OF COURSES IN CATECODIES A F
	(30)

REQUIREMENTS FOR THE BACHELOR	REQUIREMENTS FOR THE BACHELOR OF SCIENCE DEGREE IN BIOLOGY
OF SCIENCE DEGREE IN BIOLOGY	WITH AN EMPHASIS IN MEDICAL
WITH AN EMPHASIS IN MEDICAL	IMAGING (120 units):
IMAGING (120 units):	LOWER DIVISION REQUIREMENTS (36
LOWER DIVISION REQUIREMENTS (36	units):
units):	1. Biology
1. Biology	BIOL 200 Principles of Organismal and $\mathbf{p} = 1 \cdot \mathbf{r}^{T} \mathbf{p} \cdot 1 = \mathbf{r}^{T}$
BIOL 200 Principles of Organismal and Depulation Riology (4)	Population Biology (4) BIOL 201 Dringiples of Coll and Molecular
BIOL 201 Principles of Cell and Molecular	Biology (4)
Biology (4)	BIOL 210 Human Anatomy and
BIOL 210 Human Anatomy and	Physiology I (4)
Physiology I (4)	BIOL 211 Human Anatomy and
BIOL 211 Human Anatomy and	Physiology II (4)
Physiology II (4)	
	2. Mathematics
2. Mathematics	MATH 150 Calculus I (4)
MATH 150 Calculus I (4)	2 DUVELCAL SCIENCE
3 Chemistry	CHEM 121 General Chemistry I (4)
CHEM 121 General Chemistry I (4)	CHEM 122 General Chemistry II (4)
CHEM 122 General Chemistry II (4)	AND select either
	PHYS 100 Introduction to Physics I (4)
<u>4. Physics</u>	PHYS 101 Introduction to Physics II (4)
<u>Select either</u>	Or
<u>PHYS 100 Introduction to Physics I (4)</u>	PHYS 200 General Physics I (4)
<u>PHYS 101 Introduction to Physics II (4)</u>	PHYS 201 General Physics II (4)
<u>PHYS 200 General Physics I (4)</u>	(12 units of the above courses will be counted
PHYS 201 General Physics II (4)	toward lower-division GE credits, 4 units in each
	of three different science disciplines)
(12 units of the above courses will be counted	
toward lower-division GE credits, 4 units in each	UPPER DIVISION REQUIREMENTS (38
of three different science disciplines)	units):
LIDDED DIVISION DECLIDEMEN'T'S (41	I. Biology and Physics
unite):	BIOL 300 CELL BIOLOGI (4) BIOL 301 Microbiology (4)
1. Biology	BIOL 400 Molecular Biology and Molecular
BIOL 300 Cell Physiology (4)	Genetics (4)
BIOL 301 Microbiology (4)	PHYS 492 Physics Internship (3) OR
BIOL 400 Molecular Biology and Molecular	BIOL 494/PHYS 494 Independent
Genetics (4)	Research (1-3) OR BIOL/PHYS 497 Directed
	Study (1-3)
2. Organic Chemistry and Biochemistry	BIOL/PHYS 499 Senior Capstone

CHEM 311 Organic Chemistry I (3)	Colloquium (1)
CHEM 212 Organic Chemistry I (3)	
CHEM 512 Organic Chemistry I Laboratory (1)	
CHEM 318 Biological Chemistry (3)	2. Organic Chemistry and Biochemistry
(An organic chemistry I-equivalent course with	CHEM 311 Organic Chemistry I (3)
laboratory taken at a community college may be	CHEM 312 Organic Chemistry I Laboratory (1)
accepted for the Biology major in lieu of CHEM	CHEM 318 Biological Chemistry (3)
311 and 312.)	(An organic chemistry I-equivalent course with
	laboratory taken at a community college may be
3 Ethics	accepted for the Biology major in lieu of CHEM
Select one of the following:	311 and 312)
BIOL 246* Scientific and Drofossional Ethics	511 and 512.)
BIOL 540 ⁺⁺ Scientific and Professional Etnics	
(3)	3. Required General Education Courses
PHYS/ENGL 338* Science and Conscience (3)	ENGL 330 WRITING IN THE DISCIPLINES
	AND Select one of the following:
4. Medical Imaging	BIOL 346* Scientific and Professional Ethics
BIOL/PHYS 416 Radiobiology and	(3)
Radionuclides (3)	PHYS/ENGL 338* Science and Conscience (3)
BIOI /PHVS 434* Introduction to Biomedical	
Imaging (3)	4 Medical Imaging
DIOL /DUVS ACA Discussed in all networks and the	PLOI /DUVC 41(Dediabilitation and
BIOL/PHYS 404 biomedical Instrumentation	BIOL/PHYS 410 Kadiobiology and
(4)	Radionuclides (3)
	BIOL/PHYS 434* Introduction to Biomedical
5. Computing in Medical Imaging	Imaging (3)
BIOL 410 Computer Applications in	BIOL/PHYS 464 Biomedical Instrumentation
Biomedical Fields (3)	(4)
BIOL 430* Research Design and Data Analysis	
(3)	(Courses with * are double-counted toward upper-
(0)	division GE credits
6 Service Learning	
A minimum of 2 units taken from the following	ELECTIVES IN BIOLOCY AND DUVSICS
Λ minimum of 2 units taken from the following.	The second secon
PHYS 492 Physics Internship (3)	
BIOL 494 Independent Research (1-3)	Select at least 10 units of courses from the
	following list:
PHYS 494 Independent Research (3)	BIOL 302
BIOL 497 Directed Study (1-3)	BIOL/PHYS 315
PHYS 497 Directed Study (3)	BIOL 401
	BIOL 402
7. Capstone	BIOL 420
BIOL /PHVS 499 Senior Capstone	BIOL 421
Colleguium (1)	BIOL 422
	DIOL 422 DIOL 422
	DIOL 425
(Courses with * are double-counted toward upper-	BIOL 424
division GE credits.)	BIOL 425
	BIOL 427
ELECTIVES IN BIOLOGY AND PHYSICS	BIOL 428
(10):	BIOL 431
10 units chosen from upper-division courses in	BIOL 432
Biology and/ or Physics.	BIOL 433
	PHYS 445

<u>REQUIRED SUPPORTING AND OTHER GE</u> COURSES (33 units):	REQUIRED SUPPORTING AND OTHER GE COURSES (36 units):
ENGL 330 Writing in the Disciplines (3)	American Institutions Requirement (6)
American Institutions Requirement (6)	OTHER GE COURSES IN CATEGORIES A-
Other GE Courses in Categories A-E (24)	E (30)
<u> </u>	



1. Bachelor of Science in Biology

SUMMARY OF CHANGES

- The number of units required for the BS in Biology was reduced from 78 units to 62-64 units.
- The lower division core is unchanged except for allowing MATH 105 instead of MATH 150.
- The upper division requirements were modified to include coursework covering a broader range of topics including the addition of an evolutionary biology course and a physiology course.

JUSTIFICATION

There were two motivations for proposing these changes to the Bachelor of Science in Biology degree:

A) A reduction in the number of units in the major was deemed desirable to allow students expanded opportunities to engage in cross-disciplinary opportunities such as the pursuit of minors and double majors.

B) A degree program was needed that would provide students with subject matter preparation in biology. The proposed changes in the degree were designed to meet the CCTC standards. The CCTC standards for subject matter preparation in biology are more general than the existing general biology degree. Students interested in subject matter preparation in Biology can meet the standards by completing the BS in Biology along with 14 additional units.

2. Bachelor of Science in Biology with an emphasis in Cell and Molecular Biology SUMMARY OF CHANGES

- BIOL 433 was replaced by BIOL 303 as a requirement.
- BIOL 431 was made a requirement
- Required and supporting and other GE courses category changed from 33 to 39 units

JUSTIFICATION

Three minor modifications were made to this emphasis. Since evolution is a central, unifying theme throughout all biological fields, a course in evolution (BIOL 303) was made a requirement rather than ecology (BIOL 433). Previously, students could choose either BIOL 430 or BIOL 431, however, since knowledge of bioinformatics is essential for students choosing this emphasis, BIOL 431 was made a requirement rather than an option. The number of units for GE courses was changed due to a miscalculation.

3. Bachelor of Science in Biology with an emphasis in Medical Imaging. SUMMARY OF CHANGES

- Required and supporting and other GE courses category changed from 33 to 39 units
- Computing in biology courses were dropped as a requirement

JUSTIFICATION

The number of units for GE courses was changed due to a miscalculation. The Medical Imaging emphasis is computer-intensive, thus is was redundant to have an additional computing in biology requirement for this emphasis, thus it was removed.

OTHER CHANGES: Program faculty was updated.

____Nancy Mozingo and Ching-Hua Wang____5 Dec03_____ Proposer of Program Modification Date