Department of Biology

Undergraduate Advising Handbook

2018-2019

Biology website: http://bio.wcupa.edu/biology/
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BIOLOGY FACULTY

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PROGRAM INFORMATION

BACHELOR OF SCIENCE: INTEGRATIVE CONCENTRATION

The B.S. Biology: Integrative Concentration is for students who wish to earn a general degree in Biology. Students may select from a variety of courses that provide skills needed to achieve a number of different career goals. This program prepares students for admission into graduate or professional schools. Students preparing for professional school who need to take the MCAT should take at least one semester of psychology and one semester of sociology.

For more information contact **Dr. Fish**.

ACCELERATED PROGRAM - BACHELOR OF SCIENCE: INTEGRATIVE CONCENTRATION + MASTER OF SCIENCE IN BIOLOGY

The Accelerated Program allows students to start making progress on the Master's degree before completing their Bachelor's degree. Twelve credits of graduate coursework are used to satisfy the Bachelor's degree, allowing a student to earn both a B.S. and M.S. degree in as few as 138 credits. Students are considered undergraduates until conferral of the B.S. degree. Students can apply to the Accelerated Program in their junior year. *Students are responsible for finding a biology faculty member that is willing to serve as their thesis advisor as well as a thesis committee that will supervise the project.*

To be considered for the Accelerated Program and enroll in BIO 608 (Thesis Research I), students must have attained (completed) 75 credits with a minimum of 18 biology credits. Students must have a minimum cumulative GPA of 3.00 including a minimum GPA of 3.00 for biology courses. BIO 608 requires departmental permission to enroll; students must arrange a committee meeting prior to enrolling in BIO 608 (e.g., during their third year). The accelerated program in biology is only open to thesis students. Any student wishing to switch out of the thesis option will be required to complete all requirements of the B.S. degree. Once admitted to the graduate program, graduate policies apply, including minimum GPA (3.00).

For more information contact **Dr. Casotti** or **Dr. Auld**.

BACHELOR OF SCIENCE: CELL AND MOLECULAR CONCENTRATION

The B.S. Biology: Cell and Molecular Biology Concentration is designed to prepare students for graduate study or employment in modern Cell and Molecular Biology. The curriculum entails a "core" of concentration requirements (designed to provide an appropriate academic foundation) followed by a selection of upper-level "concentration electives" to be chosen in consultation with the student's academic advisor. Several Biology Department faculty members are actively engaged in research, and opportunities exist for qualified undergraduates to obtain hands-on research experience working in one of these laboratories. This program is appropriate for

students anticipating a career in Medicine or other Health Professions. Students preparing for professional school who need to take the MCAT should take at least one semester of psychology and one semester of sociology.

For more information contact **Dr. Sullivan-Brown**.

BACHELOR OF SCIENCE: MICROBIOLOGY CONCENTRATION

The B.S. Biology: Microbiology Concentration is designed to provide students with the special preparation required for careers in clinical laboratories, industrial, academic research and government service in the areas of microbiology, immunology, virology, and mycology. The training students receive should make them especially attractive to biotechnology industries, several of which are developing or expanding in Pennsylvania and surrounding areas. Generation of highly trained individuals requires that the courses incorporated into the program provide extensive "hands-on" experience with the techniques that are most useful and important to modern biomedical sciences. Students will be exposed to fundamental knowledge of the characteristics, genetics, cultivation, metabolic properties, and host interaction of microorganisms including bacteria, fungi, intracellular and extracellular parasites, and viruses. Also included is the identification and characterization of such microorganisms. Emphasis will also be placed on acquisition of skills needed to evaluate and technically interpret results obtained.

Satisfactory completion of this program gives the student the option of taking the National Registry Examinations that provide recognition by the National Registry of Microbiologists at specific levels of training and/or experience mastered. Circulation of the student name in the registry brings the student to the attention of prospective employers.

This program also provides the basic preparation needed for entry into graduate school in several specialized areas of biology or into professional schools.

Students whose primary interests relate to the role of microorganisms in nature ***(Microbial Ecology)*** *should consider taking the following courses as directed electives:* Chemistry of the Environment (CHE 403), Wastewater Systems (ENV 463), and Water Quality and Health (ENV 462).

For more information contact **Dr. Fan**.

BACHELOR OF SCIENCE: ECOLOGY AND CONSERVATION CONCENTRATION

The B.S. Biology: Ecology and Conservation Concentration provides an opportunity for interested students to obtain a strong background in field biology. The required core curriculum and choice of electives provide opportunities for later careers as biologists in State and Federal Environmental agencies, industry, environmental consulting firms and similar organizations.

Internships are strongly recommended as part of the program. Coursework emphasizes skills obtained in Biology, Chemistry and Mathematics. Additional coursework from other departments may be recommended to fulfill particular career objectives. Whereas many students obtain jobs in some area of Ecology directly after obtaining the B.S. degree, many jobs in Ecology today require a M.S. degree.

Although the basic purpose of the program is to develop strong analytical skills suitable for a broad range of careers in ecology, conservation, and environmental biology, the opportunity exists for some specialization at the undergraduate level through 1) recommended courses, 2) internships with local organizations, and 3) summer courses offered at appropriate biological field stations.

1) Recommended Courses: Students interested in aquatic ecology, water quality, fisheries and related fields should consider taking Freshwater Ecology (BIO 476), Wetlands (BIO 471), Water Quality and Health (ENV 462), and Chemistry of the Environment (CHE 403). Students interested in plant ecology, horticulture, and related fields should take Plant Physiology (BIO 466), Wetlands (BIO 471), Plant Communities (BIO 475), Systematic Botany (BIO 485), and selected courses such as Entomology (BIO 377) and Fundamentals of Soil (ESS 490). Students wishing to specialize in wetland ecology should plan to take Wetlands (BIO 471), Freshwater Ecology (BIO 476), Hydrogeology (ESS 339) and Soils (ESS 490). Students interested in microbial ecology should consider taking General Microbiology (BIO 214), Microbial Ecology (BIO 474), Microbial Physiology (BIO 464), Chemistry of the Environment (CHE 403), and Water Quality and Health (ENV 462). Students with an interest in animal ecology should plan to take Vertebrate Ecology (BIO 277), Entomology (BIO 377), Invertebrate Zoology (BIO 387) and Animal Behavior (PSY 335, 336).

2) Internships: A large number of local organizations are interested in providing student internships, and can supply valuable experience and contacts. Students should expect to seek internships during their senior year, or during the summer between their junior and senior years. Internships receive course credit as BIO 409. A maximum of 8 credit hours may be used to satisfy Biology elective credit.

3) Biological Field Stations: Course taken during the summer at Biological Field Stations are highly recommended. Field stations provide an intensive exposure to field biology and can offer courses complementary to those available at West Chester. Courses taken under advisement can be applied to the degree.

For more information contact **Dr. Schedlbauer**.

ACCELERATED PROGRAM - BACHELOR OF SCIENCE: ECOLOGY AND CONSERVATION CONCENTRATION + MASTER OF SCIENCE IN BIOLOGY

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credits. Students are considered undergraduates until conferral of the B.S. degree. Students can apply to the Accelerated Program in their junior year. *Students are responsible for finding a biology faculty member that is willing to serve as their thesis advisor as well as a thesis committee that will supervise the project.*

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For more information contact **Dr. Casotti** or **Dr. Auld**.

BACHELOR OF SCIENCE: MARINE SCIENCE CONCENTRATION

The B.S. Biology: Marine Science Concentration provides the opportunity for interested students to obtain a strong educational background in marine biology and other topics in a field that stretches from marine organisms to biotechnology and even oceanography interests from the coastal waters to deep oceans. The required core curriculum and electives will allow students the opportunity to draw on educational resources at West Chester University and Marine Field stations, such as the Wallops Island Marine Science Consortium, VA. Course work emphasizes techniques in biological sciences, oceanography, chemistry, physics and mathematics. Field and laboratory courses form a strong foundation of this program and students are encouraged to engage in directed research projects or internships.

For more information contact **Dr. Boettger**.

BACHELOR OF SCIENCE: MEDICAL LABORATORY SCIENCE CONCENTRATION

The B.S. Biology: Medical Laboratory Science Concentration offers students the opportunity to enter the field of laboratory medicine with emphasis on the techniques and instrumentation used to evaluate disease processes. This concentration allows students to complete the necessary general education and departmental requirements in three years. The fourth year is spent in a hospital internship training program at one of the several affiliated hospitals and students receive 26 semester hour credits for the internship year (Bio 407 & 408, Internship in Medical Laboratory Science). To qualify for the internship, students must have a minimum 2.75 GPA and be accepted by an accredited hospital Medical Laboratory Science program. Applications should be submitted by the summer of the junior year (60 credits completed). Internships are very competitive and acceptance depends on the cumulative GPA, excellent letters of recommendation and successful completion of an on site interview. Please note that some

programs require computer science or Anatomy and Physiology courses. Students completing the internship will receive a B.S. in Biology: Medical Laboratory Science concentration and the training necessary to take the national certification exam.

Affiliated hospitals include Pennsylvania Hospital, Pennsylvania College of Health Sciences (formerly Lancaster General Hospital) and St. Christopher's Hospital.

For more information contact **Dr. Pisciotta**.

BACHELOR OF SCIENCE IN EDUCATION: BIOLOGY

This program is designed to prepare the student for a career in teaching in Secondary Schools. Professional certification in biology is awarded to the student who completes the program satisfactorily. Each student is strongly advised to seek certification in a related area to enhance employment potential. Related areas include the following: General Science, Health Education, Athletic Training, and Environmental Education. Students in this program have two Academic Advisors, one for Biology and one for Secondary Education.

*THE BSED PROGRAM REQUIRES 124 CREDITS FOR GRADUATION.

For more information contact **Dr. Turner**.

MINOR IN BIOLOGY

The Department of Biology offers a minor in biology. The Minor in Biology requirements include the following:

1. Required prerequisite: BIO 110 (must be passed with a C- or better), or BIO 100 (must be passed with a grade of A or A-). These courses are prerequisites and must be completed before admission to the minor. The grades in these courses are not used in calculating the GPA in the minor and do not count toward the 18 semester hours required.
2. Students must complete 18 credits at the 200 level or higher for the minor. At least three credits must be in addition to the biology courses required by the student's major. A grade of C- or better is required in all courses.
3. To graduate with a minor in Biology, students must maintain a GPA of 2.00 in the minor courses.

For more information contact **Dr. Auld**.

OTHER OPTIONS

Pre-Professional Studies

West Chester University has a Pre-Professional program design to help students gain entry into professional school once they graduate with an undergraduate degree from the University. The program aids student admission into programs such as medicine, veterinary sciences, physical assistants, physical therapists and dentistry. The program advises students on the courses appropriate for entry into the above programs and conducts mock interviews with applicants in their junior year to prepare them for successful admission. If recommended by the program, each applicant receives a committee letter of recommendation forwarded directly to their schools of choice. Although any biology major can qualify for these programs the department strongly encourages majors to be in either the *Integrative or Cell and Molecular Biology concentrations,* as these offer almost all of the pre-requisite courses needed for entry into future programs.

Appropriate Biology courses students should take to gain admission to the schools include Organic Chemistry II lab (CRL 232) (not a biology requirement), Comparative Vertebrate Anatomy (BIO 357), Animal Histology (BIO 428), Animal Development (BIO 448) and Comparative Vertebrate Physiology (BIO 468), these BIO courses fulfill Biology Elective credit. Other useful courses include Molecular Biology Techniques (BIO 333), Cellular and Molecular Biology (BIO 421), Molecular Genetics (BIO 431), Human Genetics (BIO 440), Virology (BIO 456), Immunology BIO 465), Light Microscopy and the Living Cell (BIO 480), Epidemiology (BIO 484), and Special Problems in Biology (BIO 491).

Other courses that are highly recommended include Biomedical Ethics (PHI 371), Business & Organizations Writing (ENG 368), Technical Writing (ENG 371), and Biochemistry I (CHE 476, required for Cell & Molecular students).

Interested students may apply in their second semester. Please note that five letters of reference are required for an interview or eligibility for a letter of recommendation from the Pre-Med committee. MCAT and GRE prep assistance is available through the Pre-Professional Office as well.

Pre-Physical Therapy Option

There are several academic paths a student may follow to prepare for a professional physical therapy program. The Department of Kinesiology has a Pre-Physical Therapy Concentration in Exercise Science, for students who wish to emphasize Exercise Science; we strongly recommend a minor in Biology for those students. Students may also meet the requirements for Physical Therapy programs by following the general concentration in the BS in Biology. In addition, within the College of Arts and Sciences, the Department of Biology and the Liberal Studies Program have cooperated on a degree plan that will allow students the flexibility necessary to meet the requirements of virtually all physical therapy schools in the Northeast. Students who are interested in a career in physical therapy are strongly advised to write to the admissions office of the schools they are interested in to determine specific prerequisites for those programs. Required biology courses are particularly variable.

Students interested in pre-physical therapy in the College of Arts and Sciences should enter West Chester University as biology majors in the BS: General program, and identify themselves as pre-physical therapy during their summer orientation and advising session. They will be given a pre-physical therapy guidance sheet, and all assigned to the same advisor. The basic skills, science, and math courses taken during the first year are virtually the same as the BS: General program, but specific courses are recommended for the general education electives. These include Psychology 100 and Philosophy 180.

After completing 32 credits with a minimum GPA of 2.00, the student may elect to transfer to the B.S. in Liberal Studies, Science and Mathematics Track, and declare a biology minor. Biology courses that will fulfill the requirements of the minor will be selected after advisement and consideration of the particular physical therapy school the student plans to enter.

Pre-MBA Option

Students interested in pursuing a Master's in Business Administration following a Bachelor of Science degree in Biology can be admitted to the M.B.A. program with a GMAT score of 460 (or its equivalent GRE score). The GMAT requirement will be waived if your overall GPA is 3.3 (or higher), and you earn a B or better in each of the following courses: Management, Accounting, Marketing, Economics (ECO 111 or ECO 112), Finance, and Statistics (MAT 121).

INFORMATION & POLICIES

Research Opportunities in Biology

All of the Biology professors hold doctoral degrees and most are actively engaged in research in such areas as molecular genetics, immunology, cell physiology, ecology, and functional morphology. These individuals are nationally and internationally recognized with over 50 articles and papers appearing over the last five years in prestigious journals. Almost half have recently received grant support from either the National Institutes of Health or the National Science Foundation. Research facilities, as well as classrooms, are equipped with such state-of-the-art equipment as liquid scintillation and gamma counters, spectrophotometers with recorders, a digitized HPLC system, and scanning and transmitting electron microscopes. The Biology Department also manages the 20,000 specimen William Darlington Herbarium and a 126-acre Robert B. Gordon Natural Area for Environmental Studies.

Undergraduates interested in receiving academic credit for participating in departmental research activities should take BIO 491, Special Problems in Biology. Senior biology majors interested in gaining research experience in an off-campus medical, commercial, industrial or government agency should take BIO 409, Internship in Biological Sciences. Students interested in these research opportunities should consult their advisor or any faculty member in their field of

interest. An overall GPA of 2.5 and a GPA 2.5 or better in BIO courses is required before taking BIO 409 or BIO 491.

Advising & Graduation Requirements

The following pages (advising sheets) list the requirements for each of the programs within the Biology Department. You should use the appropriate section to plan and record your academic progress. Students are assigned to an Academic Advisor during summer orientation; consult with your Academic Advisor regularly. As academic advisors, Biology faculty members are expected to provide accurate, helpful information to students; students are expected to be knowledgeable about the academic policies and procedures governing the completion of their degrees. The ultimate responsibility for satisfying all graduation requirements is the student's. The ultimate responsibility for constructing each semester's schedule is also the student's. For university policy information and degree requirements, refer to the WCU Undergraduate Catalog for the year you entered the university. This is your contract with the university for your General Education Requirements, provided you maintain full-time student status, for the duration of your academic career and terminates upon earning your degree. You may at any time review your major requirements with your academic advisor. Students are expected to utilize campus email.

Every semester, a Scheduling Hold is placed on your account. This hold prevents you from scheduling until you meet with your Academic Advisor. Your advisor then removes the hold. This system is designed to assist you selecting the best coursework each semester to meet graduation guidelines in a timely fashion.

Please note that several courses WILL NOT count as a Biology major elective: BIO 102, 204, 259, 269, 307, and 469, and SCB courses. *See the WCU Undergraduate Catalog for prerequisites for individual courses.*

Be aware as well, that Interdisciplinary ("I") courses can **ONLY** be used to fulfill an interdisciplinary requirement, not a distributive requirement.

You must apply for graduation one full year before you anticipate graduating. This allows you the time to take required courses that may be offered only once per year in case you need them to graduate. The application process begins online in your myWCU account. The Registrar's Office will review your general education requirements with you prior to graduation. You should review your major requirements with your Academic Advisor. Students must have a GPA of 2.0 overall and in their BIO classes to receive a degree in Biology. Transfer students must complete at least half of their Biology credits at WCU to receive a degree in Biology.

Internal and External Transfer Students

For an internal transfer into any biology degree program, a student must:

1. be in good academic standing (2.00 GPA or better);
2. have already passed BIO 100 with an A- or better, or BIO 110 with a C- or better; and
3. complete the application for change of major.

For newly admitted transfer students, a student must:

1. meet University standards for admission to West Chester University;
2. have a grade of C- (70%) or better if they have taken a BIO 110 equivalent; and
3. interview with a department representative.

NOTE: In order to receive a degree in biology from West Chester University, a transfer student must successfully complete 30 credits at WCU and a minimum of 50 percent of the required biology credits (excluding cognates such as Chemistry, Physics, & Calculus) in the WCU Department of Biology.

Advanced Placement Policy

A score of three or better on the Biology Advanced Placement Exam will transfer as credit for BIO 110, General Biology.

Darlington Biological Society

The Darlington Biological Society (DBS) is the Biology Club at WCU. This dedicated group of students meets regularly to discuss a variety of topics and events with the assistance of a biology faculty advisor. Past service opportunities include Gordon Natural Area Clean-Up Days, West Chester's Adopt-a-Block program, Alex's Lemonade Stand, Earth Week, Aid to South Africa, and Native Plant Garden (planted outside Merion's window wall). They also hold an annual Paintball Tournament and All Science Semi-Formal along with the Chemistry Club. Trips to the Philadelphia Zoo, NYC, the Mutter Museum and the Franklin Institute were also taken last year. Camping and hiking events take place throughout the year. DBS hosts a successful monthly Seminar Series highlighting faculty and guests' research. Additionally, the DBS runs a tutoring program for biology courses. The first meeting of the year is announced via campus email to Biology students using OrgSync. Meetings are held in the Biology Student Lounge in Schmucker Science Link, Room 159.

Students should contact the Darlington Biological Society at BioClub@wcupa.edu.

Approved General Education Distributive Requirements

Beginning Fall 2014, only certain courses will be approved for general education credit for incoming first-year students. For a complete list of approved General Education Distributive classes consult the online Undergraduate Catalog. This can be found by going to www.wcupa.edu and typing in the words "approved general education course" using the search engine. or entering the following URL:

http://catalog.wcupa.edu/undergraduate/general-education-requirements/approved-gen-ed-course-list/

For transfer students, WCU will continue to accept transfer credit for courses other than those identified as “approved” general education courses, if the course equivalent has the same prefix as those in the sciences, behavioral and social sciences, humanities, or arts categories within the distributed requirements, including those assigned the 199 course number.

ADVISING SHEETS:
B. S. IN BIOLOGY: INTEGRATIVE BIOLOGY CONCENTRATION

Fall 2018 – Spring 2019

REQUIREMENT	COURSE	CREDITS	TERM	YEAR	GRADE
I. ACADEMIC FOUNDATIONS (18 credits)					
Effective Writing I	WRT 120	3	_____	_____	____
Writing II	WRT ___*	3	_____	_____	____
Statistics	MAT 121	3	_____	_____	____
Communication	SPK ___*	3	_____	_____	____
Diverse Communities ("J")	____	3	_____	_____	____
Interdisciplinary ("I")	____	3	_____	_____	____

II. LIBERAL ARTS DISTRIBUTIVE REQUIREMENTS (*Approved courses only*)

No course that carries the Interdisciplinary attribute ("I" course) may be used to fulfill any of these requirements, even if it carries a LIT, GEO, MHL, etc. prefix.

A. Approved courses in the **Humanities** (6 credits)
Select courses from at least 2 of the following areas.

Literature (LIT/CLS)	History (HIS)	Philosophy (PHI)			
_____	3		_____	_____	____
_____	3		_____	_____	____

B. Approved courses in the **Behavioral and Social Sciences** (6 credits)
Select courses from at least 2 of the following areas.

Anthropology (ANT)	Psychology (PSY)	Sociology (SOC)			
Economics (ECO)	Geography (GEO)	Government (PSC)			
_____	3		_____	_____	____
_____	3		_____	_____	____

Students taking the MCAT should take at least one semester of psychology and one semester of sociology.

C. Approved courses in the **Arts** (3 credits)
Select a course in Art, Cinematography, Dance, Music, Photography, or Theatre.

_____	3		_____	_____	____

Note: Biology majors will fulfill their distributive requirements in the Sciences with CHE 103 and PHY 130/170. These courses are listed under Supporting Courses.

III. DIRECTED ELECTIVES – 16-17 credits (as many as needed to reach 120 credits at graduation)

_____	___	_____	_____	____
_____	___	_____	_____	____
_____	___	_____	_____	____
_____	___	_____	_____	____
_____	___	_____	_____	____
_____	___	_____	_____	____

IV. SUPPORTING COURSES (28-29 credits)

Calculus ***	MAT __	3/4	_____	_____	____
General Chemistry I	CHE 103	3	_____	_____	____
Exp. General Chemistry I	CRL 103	1	_____	_____	____
General Chemistry II	CHE 104	3	_____	_____	____
Exp. General Chemistry II	CRL 104	1	_____	_____	____
Organic Chemistry I	CHE 231	4	_____	_____	____
Exp. Organic Chemistry I	CRL 231	2	_____	_____	____
Organic Chemistry II	CHE 232	3	_____	_____	____
General Physics I ****	PHY 130	4	_____	_____	____
or Physics I	PHY 170	4			
General Physics II	PHY 140	4	_____	_____	____
or Physics II	PHY 180	4			

V. Biology Courses (42 credits) Must have 2.0 to graduate.

A. Required courses (21 credits)

General Biology **	BIO 110	3	_____	_____	____
Botany **	BIO 215	3	_____	_____	____
Zoology **	BIO 217	3	_____	_____	____
Cell Physiology **	BIO 220	3	_____	_____	____
Genetics **	BIO 230	3	_____	_____	____
Ecology **	BIO 270	3	_____	_____	____
Seminar or Internship or	BIO 490/409/491				
Independent Study**△		3	_____	_____	____

B. Biology Electives. Select 21 semester hours under advisement. Courses may be selected from BIO 214, BIO 275, BIO 277 or BIO courses at or above the 300 level, except BIO 307 and BIO 469.

_____	___	_____	_____	____
_____	___	_____	_____	____
_____	___	_____	_____	____
_____	___	_____	_____	____
_____	___	_____	_____	____
_____	___	_____	_____	____
_____	___	_____	_____	____

VI. Writing Emphasis *See college catalog for details*.

	BIO 220	___	_____	_____	____
	_____	___	_____	_____	____
**One at 300/400-level:*	_____	___	_____	_____	____

Total degree program: 120 credits.

Requirements

* Courses in Communications, second WRT course, and Calculus must be selected with the approval of the advisor. Approved Communication courses are SPK 199 (for transfer students only), 208, or 230. Approved WRT courses are 200, 204, 205, 206, 208, or 220.

** Course must be passed with a "C-" or better.

*** The Biology department recommends MAT 145 (Calculus for the Life Sciences; 3 credits) or MAT 161 (Calculus I; 4 credits). MAT 143 (Brief Calculus; 3 credits) is also acceptable. You must meet the necessary pre-requisites or obtain a minimum score on the Math Placement Exam to enroll in a calculus class. Visit the Math Department website to take the exam. If you receive a score of 3 or lower on the placement exam, you must take MAT 115 (Algebra, Functions, and Trigonometry) or MAT 131 (Precalculus) as preparation for Calculus (MAT 143 or MAT 145). If you receive a score of 4 or above, you can enroll directly into MAT 143 or MAT 145. You must score a 5 to enroll into MAT 161 or take the pre-requisite of MAT 131.

**** The recommended Physics sequence is PHY 130 & PHY 140. Students may substitute the PHY 170 & PHY 180 sequence, but PHY 130 may not be used as a prerequisite for PHY 180 and PHY 170 may not be used as a prerequisite for PHY 140.

△ Students using BIO 409 to fill this requirement must be aware that using three credits in a required Biology course (section VI A) will not also count as three credits towards a Biology elective (section VI B). Check with your academic advisor if you are unsure of credit usage.

All students entering WCU Fall of 1980 or later must take at least three approved Writing Emphasis courses, totaling at least 9 credits; students who enter with 40-70 transfer credits need only 2, and a minimum of 6 credits; students who enter with more than 70cr. only need one course (at least 3 credits). **At least 1 Writing Emphasis course must be taken at the 300 or 400 level for all students.**

A maximum of 8 combined credits from BIO 409 & 491 may be applied to total Biology credits.

Suggested Sequence for B.S. Biology Majors

Integrative Biology Concentration

Fall 2018 – Spring 2019

	Semester #1 (16 credits)		**Semester #2 (16 credits)**
____	WRT 120 (3)	____	WRT 2__ __ (3)
____	BIO 110 (3)	____	BIO 215 or 217 (3)
____	CHE 103/CRL 103 (3)/(1)	____	CHE 104/CRL 104 (3)/(1)
____	MAT 121 (3) or MAT 143, 145, 161	____	MAT 121 (3) or MAT 143, 145, 161
____	Gen Ed Distributive (3)	____	Gen Ed Distributive (3)
	Semester #3 (15 credits)		**Semester #4 (15 credits)**
____	BIO 215 or 217 (3)	____	BIO 220 (3)
____	CHE 231/CRL 231 (4)/(2)	____	BIO 230 (3)
____	Math (if still needed) (3)	____	CHE 232 (3)
____	Gen Ed Distributive (3)	____	SPK 208 or 230 (3)
		____	Gen Ed Distributive (3)
	Semester #5 (16 credits)		**Semester #6 (13 credits)**
____	BIO 270 (3)	____	BIO Elective (3)
____	BIO Elective (3)	____	BIO Elective (3)
____	PHY 130/170 (4)	____	PHY 140/180 (4)
____	Diversity (J) Course (3)	____	Interdisciplinary (I) Course (3)
____	Directed Elective (3)		
	Semester #7 (15 credits)		**Semester #8 (15 credits)**
____	BIO Elective (3)	____	BIO Elective (3)
____	BIO Elective (3)	____	BIO Elective (3)
____	Directed Elective (3)	____	Directed Elective (3)
____	Directed Elective (3)	____	Directed Elective (3)
____	Gen Ed Distributive (3)	____	BIO 490/409/491 (3)

All required 200 level Biology courses should be completed by the end of Semester #5.

Students should take MAT 121 (Statistics) in the first year.

ACCELERATED PROGRAM - B. S. IN BIOLOGY: INTEGRATIVE BIOLOGY + M. S. IN BIOLOGY

Fall 2018 – Spring 2019

Requirement	Course	Credits	Term	Year	Grade
I. Academic Foundations (18 credits)					
Effective Writing I	WRT 120	3	_____	_____	____
Writing II	WRT ___ *	3	_____	_____	____
Statistics	MAT 121	3	_____	_____	____
Communication	SPK ___ *	3	_____	_____	____
Diverse Communities ("J")	_____	3	_____	_____	____
Interdisciplinary ("I")	_____	3	_____	_____	____
II. Liberal Arts (Distributive) Requirements ** (15 credits)					
Courses must be selected from the approved list. No Interdisciplinary ("I") course may be used to fulfill any of these requirements, even if it carries a LIT, GEO, MHL, etc. prefix.					
A. Humanities (6 credits)					
Select courses from at least 2 of the following areas:					
Literature (LIT/CLS)	History (HIS)		Philosophy (PHI)		
	_____	3	_____	_____	____
	_____	3	_____	_____	____
B. Behavioral and Social Sciences (6 credits)					
Select courses from at least 2 of the following areas:					
Anthropology (ANT)	Psychology (PSY)		Sociology (SOC)		
Economics (ECO)	Geography (GEO)		Government (PSC)		
	_____	3	_____	_____	____
	_____	3	_____	_____	____
C. THE ARTS (3 credits)					
Select any course in Art, Cinematography, Dance, Music, Photography, or Theatre.					
	_____	3	_____	_____	____
III. Directed Electives – 17 credits (to reach 120 credits for the B.S. degree)					
	_____	___	_____	_____	____
	_____	___	_____	_____	____
	_____	___	_____	_____	____
	_____	___	_____	_____	____
	_____	___	_____	_____	____
	_____	___	_____	_____	____
IV. Writing Emphasis Ψ					
	BIO 220	___	_____	_____	____
	_____	___	_____	_____	____
**One at 300/400-level:*	_____	___	_____	_____	____

V. SUPPORTING COURSES (28 credits)

Calculus [α]	MAT 145	3	_____	_____	____
General Chemistry I	CHE 103	3	_____	_____	____
Exp. General Chemistry I	CRL 103	1	_____	_____	____
General Chemistry II	CHE 104	3	_____	_____	____
Exp. General Chemistry II	CRL 104	1	_____	_____	____
Organic Chemistry I	CHE 231	4	_____	_____	____
Exp. Organic Chemistry I	CRL 231	2	_____	_____	____
Organic Chemistry II	CHE 232	3	_____	_____	____
General Physics I [λ]	PHY 130	4	_____	_____	____
or Physics I	PHY 170	4			
General Physics II	PHY 140	4	_____	_____	____
or Physics II	PHY 180	4			

VI. Biology Courses (42 credits; 30 credits taken at the undergraduate level, 12 credits taken at graduate level are applied to the B.S.) Must have 3.00 GPA for graduate admission.

A. Required courses (18 credits)

General Biology [β]	BIO 110	3	_____	_____	____
Botany [β]	BIO 215	3	_____	_____	____
Zoology [β]	BIO 217	3	_____	_____	____
Cell Physiology [β]	BIO 220	3	_____	_____	____
Genetics [β]	BIO 230	3	_____	_____	____
Ecology [β]	BIO 270	3	_____	_____	____

B. Biology Electives [Ω] (12 credits; 12 additional credits completed at graduate level)

_____	___	_____	_____	____
_____	___	_____	_____	____
_____	___	_____	_____	____
_____	___	_____	_____	____

VII. Graduate Classes in Biology [Δ]

A. Biology Electives [ξ] (21 credits; 12 are used to finish B.S. degree)

1. Two Research Methods courses (selected from BIO 511, 513, 514, or 515)

_____	___	_____	_____	____
_____	___	_____	_____	____

2. Two Concentration courses (selected from BIO 535, 536, 537, or 590)

_____	___	_____	_____	____
_____	___	_____	_____	____

3. Three other electives selected under advisement

_____	___	_____	_____	____
_____	___	_____	_____	____
_____	___	_____	_____	____

B. Required courses [Σ] (9 credits)

Directed Research I	BIO 608	3	_____	_____	____
Thesis Research	BIO 609	3	_____	_____	____
Thesis	BIO 610	3	_____	_____	____

Notes and Requirements

The Accelerated B.S. + M.S. program is only open to thesis students (not non-thesis students). Students should begin discussing research topics with prospective faculty advisors during the 2nd year in preparation for application to the accelerated program during their 3rd year.

Credit requirements: B.S.: 120 credits; M.S.: 30 credits. Twelve credits taken at the graduate level are also applied to the B.S. degree. Therefore the total for both degrees is 138 credits.

* - The Communications course and the second WRT course must be selected with the approval of the advisor. Approved Communication courses are SPK 208, 230, or 199 (for transfer students only). Approved WRT courses are 200, 204, 205, 206, 208, or 220.

** - Biology majors will fulfill their distributive requirements in the Sciences with CHE 103 and PHY 130/170. These courses are listed under Supporting Courses.

Ψ - Students are required to take at least 9 credits of approved Writing Emphasis (W) coursework; students transferring in 40-70 credits need only 6 W credits, students transferring in >70 credits only need 3 W credits. **At least 1 W course must be taken at the 300 level or above.** *See the Undergraduate Catalog for further details*.

α - The Biology Department recommends MAT 145 (Calculus for Life Sciences; 3 credits) or MAT 161 (Calculus I; 4 credits). MAT 143 (Brief Calculus; 3 credits) is also acceptable. You must take the *Math Placement Exam* to enroll in a calculus class. Visit the Math Department website to take the exam. If you receive a score of 3 or lower on the placement exam, you must take MAT 115 (Algebra, Functions, and Trig) as preparation for Calculus (MAT 143 or 145). If you receive a score of 4 or above, you can enroll directly into MAT 143 or 145. You must score a 5 to enroll into MAT 161 or take the pre-requisite of MAT 131.

β - Course must be passed with a "C-" or better.

λ - The recommended Physics sequence is PHY 130 & PHY 140. Students may substitute the PHY 170 & PHY 180 sequence, but PHY 130 may not be used as a prerequisite for PHY 180 and PHY 170 may not be used as a prerequisite for PHY 140.

Ω - Biology electives are selected from BIO 214, 275, 277, or BIO courses at or above the 300 level, except BIO 307 and BIO 469.

Δ - To be considered for the accelerated program and enroll in BIO 608 (Thesis Research I), students must have attained (completed) 75 credits with a minimum of 18 biology credits. Students must have a minimum cumulative GPA of 3.00 including a minimum GPA of 3.00 for biology courses. BIO 608 requires departmental permission to enroll; students must arrange a committee meeting prior to enrolling in BIO 608 (e.g., during their third year). The accelerated program in biology is only open to thesis students. Any student wishing to switch out of the thesis option will be required to complete all requirements of the B.S. degree. Once admitted to the graduate program, graduate policies apply, including minimum GPA (3.00). *See the Graduate Catalog for further details.*

ξ - If a course is offered at both the 400 and 500 levels, the student must take the 500-level course. No more than 6 credits of 400-level courses may be counted toward the M.S. degree. With prior departmental approval, up to 6 credits of graduate course work from another department or university may be applied toward the M.S. degree. BIO 535, 536, and 537 may be repeated for credit provided the topic is different.

Σ - A letter grade must be obtained for BIO 608 before the student can enroll in BIO 609. Likewise, a letter grade must be obtained for BIO 609 before the student can enroll in BIO 610.

Suggested Sequence for Accelerated B.S. + M.S. Biology Majors

Integrative Biology Concentration

Fall 2018 – Spring 2019

	Semester #1 (16 credits)		Semester #2 (16 credits)
____	WRT 120 (3)	____	WRT 2___ (3)
____	BIO 110 (3)	____	BIO 215 or 217 (3)
____	CHE 103 / CRL 103 (3) / (1)	____	CHE 104 / CRL 104 (3) / (1)
____	MAT 121 (3)	____	MAT 145 (3)
____	Gen Ed distributive (3)	____	Gen Ed distributive (3)
	Semester #3 (15 credits)		**Semester #4 (15 credits)**
____	BIO 215 or 217 (3)	____	BIO 220 (3)
____	CHE 231 (4)	____	BIO 230 (3)
____	CRL 231 (2)	____	CHE 232 (3)
____	Gen Ed distributive (3)	____	SPK 2___ (3)
____	Diversity (J) elective (3)	____	Gen Ed distributive (3)
	Semester #5 (16 credits)		**Semester #6 (16 credits)**
____	BIO 270 (3)	____	BIO elective (3)
____	BIO elective (3)	____	BIO elective (3)
____	PHY 130/170 (4)	____	PHY 140/180 (4)
____	Gen Ed distributive (3)	____	Interdisciplinary (I) elective (3)
____	Directed elective (3)	____	Directed elective (3)
	Semester #7 $^{\Delta}$ (14 credits)		**Semester #8 (12 credits)**
____	BIO elective (3)	____	BIO elective (3) [Graduate]
____	BIO elective (3) [Graduate]	____	BIO elective (3) (500 level)
____	Directed elective (3)	____	Directed elective (3)
____	Directed elective (2)	____	Directed elective (3)
____	BIO 608 $^{\Delta}$ (3)		
	Semester #9 (9 credits)		**Semester #10 (9 credits)**
____	BIO elective (3) (500 level)	____	BIO elective (3) (500 level)
____	BIO elective (3) (500 level)	____	BIO elective (3) (500 level)
____	BIO 609 (3)	____	BIO 610 (3)

- All required 200 level Biology courses must be completed by the end of Semester #5.
- Students should take MAT 121 (Statistics) in their first year.

B. S. IN BIOLOGY: CELL AND MOLECULAR CONCENTRATION

Fall 2018 – Spring 2019

REQUIREMENT	COURSE	CREDITS	TERM	YEAR	GRADE
I. ACADEMIC FOUNDATIONS (18 credits)					
Effective Writing I	WRT 120	3	_____	_____	____
Writing II	WRT ___*	3	_____	_____	____
Statistics	MAT 121	3	_____	_____	____
Communication	SPK ___*	3	_____	_____	____
Diverse Communities ("J")	____	3	_____	_____	____
Interdisciplinary ("I")	____	3	_____	_____	____

II. LIBERAL ARTS DISTRIBUTIVE REQUIREMENTS (*Approved courses only*)

No course that carries the Interdisciplinary attribute ("I" course) may be used to fulfill any of these requirements, even if it carries a LIT, GEO, MHL, etc. prefix.

A. Approved courses in the **Humanities** (6 credits)
Select courses from at least 2 of the following areas.

Literature (LIT/CLS) History (HIS) Philosophy (PHI)

_____	3	_____	_____	____
_____	3	_____	_____	____

B. Approved courses in the **Behavioral and Social Sciences** (6 credits)
Select courses from at least 2 of the following areas.

Anthropology (ANT) Psychology (PSY) Sociology (SOC)
Economics (ECO) Geography (GEO) Government (PSC)

_____	3	_____	_____	____
_____	3	_____	_____	____

Students taking the MCAT should take at least one semester of psychology and one semester of sociology.

C. Approved courses in the **Arts** (3 credits)
Select a course in Art, Cinematography, Dance, Music, Photography, or Theatre.

_____	3	_____	_____	____

Note: Biology majors will fulfill their distributive requirements in the Sciences with CHE 103 and PHY 130/170. These courses are listed under Supporting Courses.

III. DIRECTED ELECTIVES – 13-14 credits (as many as needed to reach 120 credits at graduation)

_____	___	_____	_____	____	
_____	___	_____	_____	____	
_____	___	_____	_____	____	
_____	___	_____	_____	____	
_____	___	_____	_____	____	

IV. SUPPORTING COURSES (31-32 credits)

Calculus ***	MAT __	3/4	_____	_____	____
General Chemistry I	CHE 103	3	_____	_____	____
Exp. General Chemistry I	CRL 103	1	_____	_____	____
General Chemistry II	CHE 104	3	_____	_____	____
Exp. General Chemistry II	CRL 104	1	_____	_____	____
Organic Chemistry I	CHE 231	4	_____	_____	____
Exp. Organic Chemistry I	CRL 231	2	_____	_____	____
Organic Chemistry II	CHE 232	3	_____	_____	____
Biochemistry 1	CHE 476	3	_____	_____	____
General Physics I ****	PHY 130	4	_____	_____	____
or Physics I	PHY 170	4			
General Physics II	PHY 140	4	_____	_____	____
or Physics II	PHY 180	4			

V. Biology Courses (40 credits) Must have 2.0 to graduate.

A. Required courses (28 credits)

General Biology **	BIO 110	3	_____	_____	____
General Microbiology**	BIO 214	4	_____	_____	____
Botany ** or Zoology	BIO 215/217	3	_____	_____	____
Cell Physiology **	BIO 220	3	_____	_____	____
Genetics **	BIO 230	3	_____	_____	____
Molec. Biol. Techniques	BIO 333	2	_____	_____	____
Cellular and Molecular **	BIO 421	4	_____	_____	____
Molecular Genetics	BIO 431	3	_____	_____	____
Seminar or Internship or	BIO 490/409/491				
Independent Study or CHE 491**△		3	_____	_____	____

Students who take CHE 491 instead of Bio 490/491/ 409 must take 14 credits of upper level CHE or BIO courses.

B. Biology or Chemistry electives (14 credits)
Select 14 semester hours from courses in BIO or CHE at or above the 300 level (except BIO 307 and 469). Courses should be chosen in consultation with the student's advisor.

_____	___	_____	_____	____
_____	___	_____	_____	____
_____	___	_____	_____	____
_____	___	_____	_____	____
_____	___	_____	_____	____

VI. Writing Emphasis *See college catalog for details*.

	BIO 220	___	_____	_____	____
	_____	___	_____	_____	____
**One at 300/400-level:*	_____	___	_____	_____	____

Total degree program: 120 credits.

Requirements

* Courses in Communications, second WRT course, and Calculus must be selected with the approval of the advisor. Approved Communication courses are SPK 199 (for transfer students only), 208, or 230. Approved WRT courses are 200, 204, 205, 206, 208, or 220.

** Course must be passed with a "C-" or better.

*** The Biology department recommends MAT 145 (Calculus for the Life Sciences; 3 credits) or MAT 161 (Calculus I; 4 credits). MAT 143 (Brief Calculus; 3 credits) is also acceptable. You must meet the necessary pre-requisites or obtain a minimum score on the Math Placement Exam to enroll in a calculus class. Visit the Math Department website to take the exam. If you receive a score of 3 or lower on the placement exam, you must take MAT 115 (Algebra, Functions, and Trigonometry) or MAT 131 (Precalculus) as preparation for Calculus (MAT 143 or MAT 145). If you receive a score of 4 or above, you can enroll directly into MAT 143 or MAT 145. You must score a 5 to enroll into MAT 161 or take the pre-requisite of MAT 131.

**** The recommended Physics sequence is PHY 130 & PHY 140. Students may substitute the PHY 170 & PHY 180 sequence, but PHY 130 may not be used as a prerequisite for PHY 180 and PHY 170 may not be used as a prerequisite for PHY 140.

△ Students using BIO 409 to fill this requirement must be aware that using three credits in a required Biology course (section VI A) will not also count as three credits towards a Biology elective (section VI B). Check with your academic advisor if you are unsure of credit usage.

All students entering WCU Fall of 1980 or later must take at least three approved Writing Emphasis courses, totaling at least 9 credits; students who enter with 40-70 transfer credits need only 2, and a minimum of 6 credits; students who enter with more than 70cr. only need one course (at least 3 credits). **At least 1 Writing Emphasis course must be taken at the 300 or 400 level for all students.**

A maximum of 8 combined credits from BIO 409 & 491 may be applied to total Biology credits.

Suggested Sequence for B.S. Biology Majors

Cell & Molecular Concentration

Fall 2018 – Spring 2019

	Semester #1 (16 credits)		**Semester #2 (16 credits)**
____	WRT 120 (3)	____	WRT 2 __ __ (3)
____	BIO 110 (3)	____	BIO 215 or 217 (3)
____	CHE 103/CRL 103 (3)/(1)	____	CHE 104/CRL 104 (3)/(1)
____	MAT 121 (3) or MAT 143, 145, 161	____	MAT 121 (3) or MAT 143, 145, 161
____	Gen Ed Distributive (3)	____	Gen Ed Distributive (3)
	Semester #3 (16 credits)		**Semester #4 (12 credits)**
____	CHE 231/CRL 231 (4)/(2)	____	BIO 230 (3)
____	BIO 214 (4)	____	BIO 220 (3)
____	Gen Ed Distributive (3)	____	CHE 232 (3)
____	SPK 208 or 230 (3)	____	Gen Ed Distributive (3)
	Semester #5 (15 credits)		**Semester #6 (16 credits)**
____	BIO 333 (2)	____	CHE 476 (3)
____	PHY 130/170 (4)	____	PHY 140/180 (4)
____	Diversity (J) Course (3)	____	Interdisciplinary (I) Course (3)
____	Directed Elective (3)	____	Directed Elective (3)
____	Directed Elective (3)		BIO/CHE Elective (3)
	Semester #7 (15 credits)		**Semester #8 (16 credits)**
____	BIO 431 (3)	____	BIO 421 (4)
____	BIO/CHE Elective (3)	____	BIO/CHE Elective (3)
____	BIO/CHE Elective (3)	____	BIO/CHE Elective (3)
____	Directed Elective (3)	____	Directed Elective (3)
____	Gen Ed Distributive (3)	____	BIO 490/409/491 (3)

All required 200 level Biology courses should be completed by the end of Semester #5.

Students should take MAT 121 (Statistics) in the first year.

CRL 232 is strongly recommended for any student considering Professional or Graduate training following completion of their degree.

B. S. IN BIOLOGY: MICROBIOLOGY CONCENTRATION

Fall 2018 – Spring 2019

REQUIREMENT	COURSE	CREDITS	TERM	YEAR	GRADE
I. ACADEMIC FOUNDATIONS (18 credits)					
Effective Writing I	WRT 120	3	_____	_____	____
Writing II	WRT ___*	3	_____	_____	____
Statistics	MAT 121	3	_____	_____	____
Communication	SPK ___*	3	_____	_____	____
Diverse Communities ("J")	____	3	_____	_____	____
Interdisciplinary ("I")	____	3	_____	_____	____

II. LIBERAL ARTS DISTRIBUTIVE REQUIREMENTS (*Approved courses only*)

No course that carries the Interdisciplinary attribute ("I" course) may be used to fulfill any of these requirements, even if it carries a LIT, GEO, MHL, etc. prefix.

A. Approved courses in the **Humanities** (6 credits)
Select courses from at least 2 of the following areas.

Literature (LIT/CLS) History (HIS) Philosophy (PHI)

_____	3	_____	_____	____
_____	3	_____	_____	____

B. Approved courses in the **Behavioral and Social Sciences** (6 credits)
Select courses from at least 2 of the following areas.

Anthropology (ANT) Psychology (PSY) Sociology (SOC)
Economics (ECO) Geography (GEO) Government (PSC)

_____	3	_____	_____	____
_____	3	_____	_____	____

Students taking the MCAT should take at least one semester of psychology and one semester of sociology.

C. Approved courses in the **Arts** (3 credits)
Select a course in Art, Cinematography, Dance, Music, Photography, or Theatre.

_____	3	_____	_____	____

Note: Biology majors will fulfill their distributive requirements in the Sciences with CHE 103 and PHY 130/170. These courses are listed under Supporting Courses.

III. DIRECTED ELECTIVES – 18 credits (as many as needed to reach 120 credits at graduation)

_____	___	_____	_____	____
_____	___	_____	_____	____
_____	___	_____	_____	____
_____	___	_____	_____	____
_____	___	_____	_____	____
_____	___	_____	_____	____

IV. SUPPORTING COURSES (28 credits)

Calculus ***	MAT __	3/4	_____	_____	____
General Chemistry I	CHE 103	3	_____	_____	____
Exp. General Chemistry I	CRL 103	1	_____	_____	____
General Chemistry II	CHE 104	3	_____	_____	____
Exp. General Chemistry II	CRL 104	1	_____	_____	____
Organic Chemistry I	CHE 231	4	_____	_____	____
Exp. Organic Chemistry I	CRL 231	2	_____	_____	____
Organic Chemistry II	CHE 232	3	_____	_____	____
General Physics I ****	PHY 130	4	_____	_____	____
or Physics I	PHY 170	4			
General Physics II	PHY 140	4	_____	_____	____
or Physics II	PHY 180	4			

V. Biology Courses (41 credits) Must have 2.0 to graduate.

A. Required courses (30 credits)

General Biology **	BIO 110	3	_____	_____	____
General Microbiology**	BIO 214	4	_____	_____	____
Botany ** or Zoology**	BIO 215/217	3	_____	_____	____
Cell Physiology **	BIO 220	3	_____	_____	____
Genetics **	BIO 230	3	_____	_____	____
Ecology **	BIO 270	3	_____	_____	____
Microbial Physiology**	BIO 464	4	_____	_____	____
Immunology**	BIO 465	4	_____	_____	____
Seminar or Internship or	BIO 490/409/491				
Independent Study**△		3	_____	_____	____

B. Microbiology elective (11 credits) to be chosen from the following:

Pathogenic Microbiology	BIO 314	4	_____	_____	____
Molec. Biol. Techniques	BIO 333	2	_____	_____	____
Microbial Genetics	BIO 334	4	_____	_____	____
Applied & Industrial Micro.	BIO 414	3	_____	_____	____
Molecular Genetics	BIO 431	3	_____	_____	____
Parasitology	BIO 452	3	_____	_____	____
Mycology	BIO 454	3	_____	_____	____
Virology	BIO 456	3	_____	_____	____
Microbial Ecology	BIO 474	4	_____	_____	____
Epidemiology	BIO 484	3	_____	_____	____
Light Microscopy	BIO 480	3	_____	_____	____

VI. Writing Emphasis *See college catalog for details*.

	BIO 220	___	_____	_____	____
	_____	___	_____	_____	____
**One at 300/400-level:*	_____	___	_____	_____	____

Total degree program: 120 credits.

Requirements

* Courses in Communications, second WRT course, and Calculus must be selected with the approval of the advisor. Approved Communication courses are SPK 199 (for transfer students only), 208, or 230. Approved WRT courses are 200, 204, 205, 206, 208, or 220.

** Course must be passed with a "C-" or better.

*** The Biology department recommends MAT 145 (Calculus for the Life Sciences; 3 credits) or MAT 161 (Calculus I; 4 credits). MAT 143 (Brief Calculus; 3 credits) is also acceptable. You must meet the necessary pre-requisites or obtain a minimum score on the Math Placement Exam to enroll in a calculus class. Visit the Math Department website to take the exam. If you receive a score of 3 or lower on the placement exam, you must take MAT 115 (Algebra, Functions, and Trigonometry) or MAT 131 (Precalculus) as preparation for Calculus (MAT 143 or MAT 145). If you receive a score of 4 or above, you can enroll directly into MAT 143 or MAT 145. You must score a 5 to enroll into MAT 161 or take the pre-requisite of MAT 131.

**** The recommended Physics sequence is PHY 130 & PHY 140. Students may substitute the PHY 170 & PHY 180 sequence, but PHY 130 may not be used as a prerequisite for PHY 180 and PHY 170 may not be used as a prerequisite for PHY 140.

△ Students using BIO 409 to fill this requirement must be aware that using three credits in a required Biology course (section VI A) will not also count as three credits towards a Biology elective (section VI B). Check with your academic advisor if you are unsure of credit usage.

All students entering WCU Fall of 1980 or later must take at least three approved Writing Emphasis courses, totaling at least 9 credits; students who enter with 40-70 transfer credits need only 2, and a minimum of 6 credits; students who enter with more than 70cr. only need one course (at least 3 credits). **At least 1 Writing Emphasis course must be taken at the 300 or 400 level for all students.**

A maximum of 8 combined credits from BIO 409 & 491 may be applied to total Biology credits.

Suggested Sequence for B.S. Biology Majors

Microbiology Concentration

Fall 2018 – Spring 2019

	Semester #1 (16 credits)		**Semester #2 (16 credits)**
____	WRT 120 (3)	____	WRT 2 __ __ (3)
____	BIO 110 (3)	____	BIO 215 or 217 (3)
____	CHE 103/CRL 103 (3)/(1)	____	CHE 104/CRL 104 (3)/(1)
____	MAT 121 (3) or MAT 143, 145, 161	____	MAT 121 (3) or MAT 143, 145, 161
____	Gen Ed Distributive (3)	____	Gen Ed Distributive (3)
	Semester #3 (16 credits)		**Semester #4 (15 credits)**
____	BIO 214 (4)	____	BIO 220 (3)
____	CHE 231/CRL 231 (4)/(2)	____	BIO 230 (3)
____	Math (if still needed) (3)	____	CHE 232 (3)
____	Gen Ed Distributive (3)	____	SPK 208 or 230 (3)
		____	Gen Ed Distributive (3)
	Semester #5 (16 credits)		**Semester #6 (13 credits)**
____	BIO 270 (3)	____	BIO Elective (3)
____	PHY 130/170 (4)	____	PHY 140/180 (4)
____	Diversity (J) Course (3)	____	Interdisciplinary (I) Course (3)
____	Directed Elective (3)	____	Directed Elective (3)
____	Directed Elective (3)		
	Semester #7 (16 credits)		**Semester #8 (16 credits)**
____	BIO 465 (4)	____	BIO 464 (4)
____	BIO Elective (3)	____	BIO Elective (3)
____	BIO Elective (3)	____	BIO Elective (3)
____	Directed Elective (3)	____	Directed Elective (3)
____	Gen Ed Distributive (3)	____	BIO 490/409/491 (3)

All required 200 level Biology courses should be completed by the end of Semester #5.

Students should take MAT 121 (Statistics) in the first year.

B. S. IN BIOLOGY: ECOLOGY AND CONSERVATION CONCENTRATION

Fall 2018 – Spring 2019

REQUIREMENT	COURSE	CREDITS	TERM	YEAR	GRADE
I. ACADEMIC FOUNDATIONS (18 credits)					
Effective Writing I	WRT 120	3	_____	_____	____
Writing II	WRT ___*	3	_____	_____	____
Statistics	MAT 121	3	_____	_____	____
Communication	SPK ___*	3	_____	_____	____
Diverse Communities ("J")	____	3	_____	_____	____
Interdisciplinary ("I")	____	3	_____	_____	____

II. LIBERAL ARTS DISTRIBUTIVE REQUIREMENTS (*Approved courses only*)

No course that carries the Interdisciplinary attribute ("I" course) may be used to fulfill any of these requirements, even if it carries a LIT, GEO, MHL, etc. prefix.

A. Approved courses in the **Humanities** (6 credits)
Select courses from at least 2 of the following areas.

Literature (LIT/CLS)	History (HIS)	Philosophy (PHI)			
_____	3		_____	_____	____
_____	3		_____	_____	____

B. Approved courses in the **Behavioral and Social Sciences** (6 credits)
Select courses from at least 2 of the following areas.

Anthropology (ANT)	Psychology (PSY)	Sociology (SOC)			
Economics (ECO)	Geography (GEO)	Government (PSC)			
_____	3		_____	_____	____
_____	3		_____	_____	____

Students taking the MCAT should take at least one semester of psychology and one semester of sociology.

C. Approved courses in the **Arts** (3 credits)
Select a course in Art, Cinematography, Dance, Music, Photography, or Theatre.

_____	3		_____	_____	____

Note: Biology majors will fulfill their distributive requirements in the Sciences with CHE 103 and PHY 130/170. These courses are listed under Supporting Courses.

III. DIRECTED ELECTIVES – 14-15 credits (as needed to reach 120 credits at graduation)

_____	___	_____	_____	_____
_____	___	_____	_____	_____
_____	___	_____	_____	_____
_____	___	_____	_____	_____
_____	___	_____	_____	_____

IV. SUPPORTING COURSES (28-29 credits)

Calculus ***	MAT __	3/4	_____	_____	_____
General Chemistry I	CHE 103	3	_____	_____	_____
Exp. General Chemistry I	CRL 103	1	_____	_____	_____
General Chemistry II	CHE 104	3	_____	_____	_____
Exp. General Chemistry II	CRL 104	1	_____	_____	_____
Organic Chemistry I	CHE 231	4	_____	_____	_____
Exp. Organic Chemistry I	CRL 231	2	_____	_____	_____
Organic Chemistry II	CHE 232	3	_____	_____	_____
General Physics I ****	PHY 130	4	_____	_____	_____
or Physics I	PHY 170	4			
General Physics II	PHY 140	4	_____	_____	_____
or Physics II	PHY 180	4			

V. Biology Ecology Core (39 credits) Must have 2.0 to graduate.

A. Required courses (24 credits)

General Biology **	BIO 110	3	_____	_____	_____
Botany **	BIO 215	3	_____	_____	_____
Zoology **	BIO 217	3	_____	_____	_____
Cell Physiology **	BIO 220	3	_____	_____	_____
Genetics **	BIO 230	3	_____	_____	_____
Ecology **	BIO 270	3	_____	_____	_____
Biostatistical Applications	BIO 310	3	_____	_____	_____
Seminar or Internship or Independent Study**△	BIO 490/409/491	3	_____	_____	_____

B. Biology Electives (15 credits)

_____	___	_____	_____	_____
_____	___	_____	_____	_____
_____	___	_____	_____	_____
_____	___	_____	_____	_____
_____	___	_____	_____	_____

Biology Electives to be selected from:

BIO214	General Microbiology	BIO453	Marine Mammals
BIO275	Field Botany	BIO454	Mycology
BIO277	Vertebrate Ecology	BIO466	Plant Physiology
BIO312	Marine Botany	BIO470	Population Biology
BIO313	Marine Biology	BIO471	Wetlands
BIO315	Terrestrial Ecosystem Ecology	BIO473	Conservation Biology
BIO377	Entomology	BIO474	Microbial Ecology
BIO387	Invertebrate Zoology	BIO475	Plant Communities
BIO409	Internship in Biological Sciences	BIO476	Freshwater Ecology
BIO412	Organic Evolution	BIO478	Plant Evolution
BIO415	Tropical Ecology and Conservation	BIO485	Systematic Botany
BIO435	Global Climate Change	BIO491	Special Problems in Biology

VI. OTHER ECOLOGY RELATED ELECTIVES (6-7 credits)

To be chosen under advisement from Biology Department approved list below.

_____ ___ _____ _____ ____

_____ ___ _____ _____ ____

Ecology and Conservation Concentration majors must also take 2 courses (6-7 semester hours) under advisement in disciplines germane to ecology. Student originated requests to use a course not on the list to fulfill this requirement must be signed by their Advisor, then by the Department Chair. Select two from the following list:

Department of Biology		**Department of Geology & Astronomy**	
Any Biology Ecology Electives (above)		ESS 330	Introduction to Oceanography
BIO 457	Functional Animal Morphology	ESS 332	Advanced Oceanography
BIO 464	Microbial Physiology	ESS 336	Environmental Geology
BIO 468	Comparative Vertebrate Physiology	ESS 343	Geomorphology
		ESS 435	Remote Sensing
Department of Chemistry		ESS 439	Hydrogeology
CHE 321	Analytical Chemistry I	ESS 490	Fundamental of Soil
CHE 403	Chemistry of the Environment		
CHE 424	Advanced Analytical Chemistry	**Department of Geography & Planning**	
CRL 321	Experimental Analytical Chemistry I	GEO 214	Introduction to Planning
CRL 424	Advanced Analytical Chemistry Lab	GEO 225	Introduction to Maps & Remote Sensing
		GEO 230	Environmental Conservation & Sustainability
Department of Health		GEO 320	Land Use Planning
ENV 451	Environmental Toxicology	GEO 324	Introduction to GIS
ENV 462	Water Quality and Health	GEO 332	Environmental Crises
		GEO 336	Environmental Planning
Department of Psychology		GEO 338	Environmental Applications of GIS
PSY 335	Animal Behavior	GEO 341	Landscape Analysis
PSY 336	Animal Behavior Lab	GEO 401	Internet Mapping
PSY 490	Course Topics: Primate Behavior & Culture	GEO 402	Field Methods in Environmental Geography
ANT/PSY 230	Introduction to Primatology	GEO 424	GIS Applications

VI. Writing Emphasis *See college catalog for details*.

BIO 220 ___ _____ _____ ____

_____ ___ _____ _____ ____

**One at 300/400-level:* _____ ___ _____ _____ ____

Total degree program: 120 credits.

Requirements

* Courses in Communications, second WRT course, and Calculus must be selected with the approval of the advisor. Approved Communication courses are SPK 199 (for transfer students only), 208, or 230. Approved WRT courses are 200, 204, 205, 206, 208, or 220.

** Course must be passed with a "C-" or better.

*** The Biology department recommends MAT 145 (Calculus for the Life Sciences; 3 credits) or MAT 161 (Calculus I; 4 credits). MAT 143 (Brief Calculus; 3 credits) is also acceptable. You must meet the necessary pre-requisites or obtain a minimum score on the Math Placement Exam to enroll in a calculus class. Visit the Math Department website to take the exam. If you receive a score of 3 or lower on the placement exam, you must take MAT 115 (Algebra, Functions, and Trigonometry) or MAT 131 (Precalculus) as preparation for Calculus (MAT 143

or MAT 145). If you receive a score of 4 or above, you can enroll directly into MAT 143 or MAT 145. You must score a 5 to enroll into MAT 161 or take the pre-requisite of MAT 131.

**** The recommended Physics sequence is PHY 130 & PHY 140. Students may substitute the PHY 170 & PHY 180 sequence, but PHY 130 may not be used as a prerequisite for PHY 180 and PHY 170 may not be used as a prerequisite for PHY 140.

△ Students using BIO 409 to fill this requirement must be aware that using three credits in a required Biology course (section VI A) will not also count as three credits towards a Biology elective (section VI B). Check with your academic advisor if you are unsure of credit usage.

All students entering WCU Fall of 1980 or later must take at least three approved Writing Emphasis courses, totaling at least 9 credits; students who enter with 40-70 transfer credits need only 2, and a minimum of 6 credits; students who enter with more than 70cr. only need one course (at least 3 credits). **At least 1 Writing Emphasis course must be taken at the 300 or 400 level for all students.**

A maximum of 8 combined credits from BIO 409 & 491 may be applied to total Biology credits.

Suggested Sequence for B.S. Biology Majors

Ecology and Conservation Concentration

Fall 2018 – Spring 2019

	Semester #1 (16 credits)		**Semester #2 (16 credits)**
____	WRT 120 (3)	____	WRT 2 __ __ (3)
____	BIO 110 (3)	____	BIO 215 or 217 (3)
____	CHE 103/CRL 103 (3)/(1)	____	CHE 104/CRL 104 (3)/(1)
____	MAT 121 (3) or MAT 143, 145, 161	____	MAT 121 (3) or MAT 143, 145, 161
____	Gen Ed Distributive (3)	____	Gen Ed Distributive (3)
	Semester #3 (15 credits)		**Semester #4 (15 credits)**
____	BIO 215 or 217 (3)	____	BIO 220 or 230 (3)
____	CHE 231/CRL 231 (4)/(2)	____	BIO 270 (3)
____	Math (if still needed) (3)	____	CHE 232 (3)
____	Gen Ed Distributive (3)	____	SPK 208 or 230 (3)
		____	Gen Ed Distributive (3)
	Semester #5 (16 credits)		**Semester #6 (16 credits)**
____	BIO 220 or 230 (3)	____	BIO 310 (3)
____	PHY 130/170 (4)	____	BIO ECOLOGY Elective (3)
____	Diversity (J) Course (3)	____	PHY 140/180 (4)
____	BIO ECOLOGY Elective (3)	____	Interdisciplinary (I) Course (3)
____	Directed Elective (3)	____	Directed Elective (3)
	Semester #7 (15 credits)		**Semester #8 (15 credits)**
____	BIO ECOLOGY Elective (3)	____	BIO ECOLOGY Elective (3)
____	BIO ECOLOGY Elective (3)	____	BIO ECOLOGY Elective (3)
____	Ecology Relevant Elective (3)	____	Ecology Relevant Elective (3)
____	Directed Elective (3)	____	Directed Elective (3)
____	Gen Ed Distributive (3)	____	BIO 490/409/491 (3)

All required 200 level Biology courses should be completed by the end of Semester #5.
Students should take MAT 121 (Statistics) in the first year.

ACCELERATED PROGRAM - B. S. IN BIOLOGY: ECOLOGY AND CONSERVATION CONCENTRATION + M. S. IN BIOLOGY

Fall 2018 – Spring 2019

Requirement	Course	Credits	Term	Year	Grade
I. Academic Foundations (18 credits)					
Effective Writing I	WRT 120	3	_____	_____	____
Writing II	WRT ___ *	3	_____	_____	____
Statistics	MAT 121	3	_____	_____	____
Communication	SPK ___ *	3	_____	_____	____
Diverse Communities ("J")	_____	3	_____	_____	____
Interdisciplinary ("I")	_____	3	_____	_____	____
II. Liberal Arts (Distributive) Requirements ** (15 credits)					
Courses must be selected from the approved list. No Interdisciplinary ("I") course may be used to fulfill any of these requirements, even if it carries a LIT, GEO, MHL, etc. prefix.					
A. Humanities (6 credits)					
Select courses from at least 2 of the following areas:					
Literature (LIT/CLS)	History (HIS)		Philosophy (PHI)		
	_____	3	_____	_____	____
	_____	3	_____	_____	____
B. Behavioral and Social Sciences (6 credits)					
Select courses from at least 2 of the following areas:					
Anthropology (ANT)	Psychology (PSY)		Sociology (SOC)		
Economics (ECO)	Geography (GEO)		Government (PSC)		
	_____	3	_____	_____	____
	_____	3	_____	_____	____
C. THE ARTS (3 credits)					
Select any course in Art, Cinematography, Dance, Music, Photography, or Theatre.					
	_____	3	_____	_____	____
III. Directed Electives – 17 credits (to reach 120 credits for the B.S. degree)					
	_____	___	_____	_____	____
	_____	___	_____	_____	____
	_____	___	_____	_____	____
	_____	___	_____	_____	____
	_____	___	_____	_____	____
	_____	___	_____	_____	____
IV. Writing Emphasis Ψ					
	BIO 220	___	_____	_____	____
	_____	___	_____	_____	____
**One at 300/400-level:*	_____	___	_____	_____	____

V. SUPPORTING COURSES (28 credits)

Calculus [α]	MAT 145	3	_____	_____	____
General Chemistry I	CHE 103	3	_____	_____	____
Exp. General Chemistry I	CRL 103	1	_____	_____	____
General Chemistry II	CHE 104	3	_____	_____	____
Exp. General Chemistry II	CRL 104	1	_____	_____	____
Organic Chemistry I	CHE 231	4	_____	_____	____
Exp. Organic Chemistry I	CRL 231	2	_____	_____	____
Organic Chemistry II	CHE 232	3	_____	_____	____
General Physics I ****	PHY 130	4	_____	_____	____
or Physics I	PHY 170	4			
General Physics II	PHY 140	4	_____	_____	____
or Physics II	PHY 180	4			

VI. Biology Courses (42 credits; 30 credits taken at the undergraduate level, 12 credits taken at graduate level are applied to the B.S.) Must have 3.00 GPA for graduate admission.

A. Required courses (21 credits)

General Biology [β]	BIO 110	3	_____	_____	____
Botany [β]	BIO 215	3	_____	_____	____
Zoology [β]	BIO 217	3	_____	_____	____
Cell Physiology [β]	BIO 220	3	_____	_____	____
Genetics [β]	BIO 230	3	_____	_____	____
Ecology [β]	BIO 270	3	_____	_____	____
Biostatistical Applications	BIO 310	3	_____	_____	____

B. Biology Ecology Electives (3 credits; must be selected from list below)

_____ ___ _____ _____ ____

BIO214	General Microbiology	BIO453	Marine Mammals
BIO275	Field Botany	BIO454	Mycology
BIO277	Vertebrate Ecology	BIO466	Plant Physiology
BIO312	Marine Botany	BIO470	Population Biology
BIO313	Marine Biology	BIO471	Wetlands
BIO315	Terrestrial Ecosystem Ecology	BIO473	Conservation Biology
BIO377	Entomology	BIO474	Microbial Ecology
BIO387	Invertebrate Zoology	BIO475	Plant Communities
BIO409	Internship in Biological Sciences	BIO476	Freshwater Ecology
BIO412	Organic Evolution	BIO478	Plant Evolution
BIO415	Tropical Ecology and Conservation	BIO485	Systematic Botany
BIO435	Global Climate Change	BIO491	Special Problems in Biology

C. Ecology Related Electives (6 credits; must be selected under advisement from list below)

_____ ___ _____ _____ ____
_____ ___ _____ _____ ____

Department of Biology		Department of Geology & Astronomy	
Any Biology Ecology Electives (above)		ESS 330	Introduction to Oceanography
BIO 457	Functional Animal Morphology	ESS 332	Advanced Oceanography
BIO 464	Microbial Physiology	ESS 336	Environmental Geology
BIO 468	Comparative Vertebrate Physiology	ESS 343	Geomorphology
		ESS 435	Remote Sensing
Department of Chemistry		ESS 439	Hydrogeology
CHE 321	Analytical Chemistry I	ESS 490	Fundamental of Soil
CHE 403	Chemistry of the Environment		
CHE 424	Advanced Analytical Chemistry	**Department of Geography & Planning**	
CRL 321	Experimental Analytical Chemistry I	GEO 214	Introduction to Planning
CRL 424	Advanced Analytical Chemistry Lab	GEO 225	Introduction to Maps & Remote Sensing
		GEO 230	Environmental Conservation & Sustainability
Department of Health		GEO 320	Land Use Planning
ENV 451	Environmental Toxicology	GEO 324	Introduction to GIS
ENV 462	Water Quality and Health	GEO 332	Environmental Crises
		GEO 336	Environmental Planning
Department of Psychology		GEO 338	Environmental Applications of GIS
PSY 335	Animal Behavior	GEO 341	Landscape Analysis
PSY 336	Animal Behavior Lab	GEO 401	Internet Mapping
PSY 490	Course Topics: Primate Behavior & Culture	GEO 402	Field Methods in Environmental Geography
ANT/PSY 230	Introduction to Primatology	GEO 424	GIS Applications

VII. Graduate Classes in Biology [Δ]

A. Biology Electives [ξ] (21 credits; 12 are used to finish B.S. degree)

1. Two Research Methods courses (selected from BIO 511, 513, 514, or 515)

_____ ___ _____ _____ _____

_____ ___ _____ _____ _____

2. Two Concentration courses (selected from BIO 535, 536, 537, or 590)

_____ ___ _____ _____ _____

_____ ___ _____ _____ _____

3. Three other electives [ξ] (selected under advisement from: BIO 412, 415, 435, 453, 454, 473, 474, 478, 485, 566, 570, 571, 575, 576)

_____ ___ _____ _____ _____

_____ ___ _____ _____ _____

_____ ___ _____ _____ _____

B. Required courses [Σ] (9 credits)

Directed Research I	BIO 608	3	_____	_____	_____
Thesis Research	BIO 609	3	_____	_____	_____
Thesis	BIO 610	3	_____	_____	_____

Notes and Requirements

The Accelerated B.S. + M.S. program is only open to thesis students (not non-thesis students). Students should begin discussing research topics with prospective faculty advisors during the 2nd year in preparation for application to the accelerated program during their 3rd year.

Credit requirements: B.S.: 120 credits; M.S.: 30 credits. Twelve credits taken at the graduate level are also applied to the B.S. degree. Therefore the total for both degrees is 138 credits.

* - The Communications course and the second WRT course must be selected with the approval of the advisor. Approved Communication courses are SPK 208, 230, or 199 (for transfer students only). Approved WRT courses are 200, 204, 205, 206, 208, or 220.

** - Biology majors will fulfill their distributive requirements in the Sciences with CHE 103 and PHY 130/170. These courses are listed under Supporting Courses.

*** The recommended Physics sequence is PHY 130 & PHY 140. Students may substitute the PHY 170 & PHY 180 sequence, but PHY 130 may not be used as a prerequisite for PHY 180 and PHY 170 may not be used as a prerequisite for PHY 140.

**** The recommended Physics sequence is PHY 130 & PHY 140. Students may substitute the PHY 170 & PHY 180 sequence, but PHY 130 may not be used as a prerequisite for PHY 180 and PHY 170 may not be used as a prerequisite for PHY 140.

Ψ - Students are required to take at least 9 credits of approved Writing Emphasis (W) coursework; students transferring in 40-70 credits need only 6 W credits, students transferring in >70 credits only need 3 W credits. **At least 1 W course must be taken at the 300 level or above.** *See the Undergraduate Catalog for further details*.

α - The Biology Department recommends MAT 145 (Calculus for Life Sciences; 3 credits) or MAT 161 (Calculus I; 4 credits). MAT 143 (Brief Calculus; 3 credits) is also acceptable. You must take the *Math Placement Exam* to enroll in a calculus class. Visit the Math Department website to take the exam. If you receive a score of 3 or lower on the placement exam, you must take MAT 115 (Algebra, Functions, and Trig) as preparation for Calculus (MAT 143 or 145). If you receive a score of 4 or above, you can enroll directly into MAT 143 or 145. You must score a 5 to enroll into MAT 161 or take the pre-requisite of MAT 131.

β - Course must be passed with a "C-" or better.

Δ - To be considered for the accelerated program and enroll in BIO 608 (Thesis Research I), students must have attained (completed) 75 credits with a minimum of 18 biology credits. Students must have a minimum cumulative GPA of 3.00 including a minimum GPA of 3.00 for biology courses. BIO 608 requires departmental permission to enroll; students must arrange a committee meeting prior to enrolling in BIO 608 (e.g., during their third year). The accelerated program in biology is only open to thesis students. Any student wishing to switch out of the thesis option will be required to complete all requirements of the B.S. degree. Once matriculated into the graduate program, graduate policies apply, including minimum GPA (3.00). *See the Graduate Catalog for further details.*

ξ – *Students may not, under any circumstances, take any additional graduate courses beyond the 12 graduate credits until conferral of their undergraduate degree*. If a course is offered at both the 400 and 500 levels, the student must take the 500-level course. No more than 6 credits of 400-level courses may be counted toward the M.S. degree. With prior departmental approval, up to 6 credits of graduate course work from another department or university may be applied toward the M.S. degree. BIO 535, 536, and 537 may be repeated for credit provided the topic is different.

Σ - A letter grade must be obtained for BIO 608 before the student can enroll in BIO 609. Likewise, a letter grade must be obtained for BIO 609 before the student can enroll in BIO 610.

Suggested Sequence for Accelerated B.S. + M.S. Biology Majors

Ecology & Conservation Concentration

Fall 2018 – Spring 2019

	Semester #1 (16 credits)		**Semester #2 (16 credits)**
____	WRT 120 (3)	____	WRT 2___ (3)
____	BIO 110 (3)	____	BIO 215 or 217 (3)
____	CHE 103 / CRL 103 (3) / (1)	____	CHE 104 / CRL 104 (3) / (1)
____	MAT 121 (3)	____	MAT 145 (3)
____	Gen Ed distributive (3)	____	Gen Ed distributive (3)
	Semester #3 (15 credits)		**Semester #4 (15 credits)**
____	BIO 215 or 217 (3)	____	BIO 220 or 230 (3)
____	CHE 231 (4)	____	BIO 270 (3)
____	CRL 231 (2)	____	CHE 232 (3)
____	Gen Ed distributive (3)	____	SPK 2___ (3)
____	Diversity (J) elective (3)	____	Gen Ed distributive (3)
	Semester #5 (16 credits)		**Semester #6 (16 credits)**
____	BIO 220 or 230 (3)	____	BIO 310 (3)
____	BIO Ecology elective (3)	____	BIO Ecology related elective (3)
____	PHY 130/170 (4)	____	PHY 140/180 (4)
____	Gen Ed distributive (3)	____	Interdisciplinary (I) elective (3)
____	Directed elective (3)	____	Directed elective (3)
	Semester #7 $^{\Delta}$ (14 credits)		**Semester #8 (12 credits)**
____	BIO Ecology related elective (3)	____	BIO elective (3) [Graduate]
____	BIO elective (3) [Graduate]	____	BIO elective (3) (500 level)
____	Directed elective (3)	____	Directed elective (3)
____	Directed elective (2)	____	Directed elective (3)
____	BIO 608 $^{\Delta}$ (3)		
	Semester #9 (9 credits)		**Semester #10 (9 credits)**
____	BIO elective (3) (500 level)	____	BIO elective (3) (500 level)
____	BIO elective (3) (500 level)	____	BIO elective (3) (500 level)
____	BIO 609 (3)	____	BIO 610 (3)

- All required 200 level Biology courses must be completed by the end of Semester #5.
- Students should take MAT 121 (Statistics) in their first year.

B. S. IN BIOLOGY: MARINE SCIENCE CONCENTRATION

Fall 2018 – Spring 2019

REQUIREMENT	COURSE	CREDITS	TERM	YEAR	GRADE
I. ACADEMIC FOUNDATIONS (18 credits)					
Effective Writing I	WRT 120	3	_____	_____	____
Writing II	WRT ___*	3	_____	_____	____
Statistics	MAT 121	3	_____	_____	____
Communication	SPK ___*	3	_____	_____	____
Diverse Communities ("J")	____	3	_____	_____	____
Interdisciplinary ("I")	____	3	_____	_____	____

II. LIBERAL ARTS DISTRIBUTIVE REQUIREMENTS (*Approved courses only*)

No course that carries the Interdisciplinary attribute ("I" course) may be used to fulfill any of these requirements, even if it carries a LIT, GEO, MHL, etc. prefix.

A. Approved courses in the **Humanities** (6 credits)
Select courses from at least 2 of the following areas.

Literature (LIT/CLS)	History (HIS)	Philosophy (PHI)			
_____	3		_____	_____	____
_____	3		_____	_____	____

B. Approved courses in the **Behavioral and Social Sciences** (6 credits)
Select courses from at least 2 of the following areas.

Anthropology (ANT)	Psychology (PSY)	Sociology (SOC)			
Economics (ECO)	Geography (GEO)	Government (PSC)			
_____	3		_____	_____	____
_____	3		_____	_____	____

Students taking the MCAT should take at least one semester of psychology and one semester of sociology.

C. Approved courses in the **Arts** (3 credits)
Select a course in Art, Cinematography, Dance, Music, Photography, or Theatre.

_____	3		_____	_____	____

Note: Biology majors will fulfill their distributive requirements in the Sciences with CHE 103 and PHY 130/170. These courses are listed under Supporting Courses.

III. DIRECTED ELECTIVES – 16-17 credits (as many as needed to reach 120 credits at graduation)

_____	___	_____	_____	_____	
_____	___	_____	_____	_____	
_____	___	_____	_____	_____	
_____	___	_____	_____	_____	
_____	___	_____	_____	_____	

IV. SUPPORTING COURSES (31-32 credits)

Calculus ***	MAT __	3/4	_____	_____	_____
General Chemistry I	CHE 103	3	_____	_____	_____
Exp. General Chemistry I	CRL 103	1	_____	_____	_____
General Chemistry II	CHE 104	3	_____	_____	_____
Exp. General Chemistry II	CRL 104	1	_____	_____	_____
Organic Chemistry I	CHE 231	4	_____	_____	_____
Exp. Organic Chemistry I	CRL 231	2	_____	_____	_____
Organic Chemistry II	CHE 232	3	_____	_____	_____
General Physics I ****	PHY 130	4	_____	_____	_____
or Physics I	PHY 170	4			
General Physics II	PHY 140	4	_____	_____	_____
or Physics II	PHY 180	4			
Intro to Oceanography** **ΦΩ**	ESS 330	3	_____	_____	_____

V. Biology Courses (39 credits) Must have 2.0 to graduate.

A. Required courses (30 credits)

General Biology **	BIO 110	3	_____	_____	_____
Botany **	BIO 215	3	_____	_____	_____
Zoology **	BIO 217	3	_____	_____	_____
Cell Physiology **	BIO 220	3	_____	_____	_____
Genetics **	BIO 230	3	_____	_____	_____
Ecology **	BIO 270	3	_____	_____	_____
Biostatistical Applications	BIO 310	3	_____	_____	_____
Marine Biology** **Φ**	BIO 313	3	_____	_____	_____
Marine Botany** **Φ**	BIO 312	3	_____	_____	_____
Seminar or Internship orBIO 490/409/491					
Independent Study**△	3		_____	_____	_____

B. Marine Science Electives (9 credits) – 6 credits are to be chosen at the 300 or 400 level from the Biology Department approved list.

_____	___	_____	_____	_____
_____	___	_____	_____	_____
_____	___	_____	_____	_____
_____	___	_____	_____	_____

<u>West Chester Courses</u>:
BIO 387 Invertebrate Zoology
ESS 332 Advanced Oceanography
BIO 453 Marine Mammals
GEO 324 Introduction to GIS

<u>Cheyney Courses</u>:
Marine Invertebrates SLF330
Ichthyology SLF332

Wallops Island/Marine Field Station Courses: (all 3 credit courses)
Courses are to be chosen from two or more topics including but not limited to marine or wetlands ecology, ichthyology, invertebrate zoology, marine mammals, ornithology, marine molecular biology and biotechnology.
Courses to be completed at the Wallops Island Marine Science Consortium and other marine field stations (summer and winter semesters) will be approved on an individual basis and will require advisor and departmental approval.

VI. Writing Emphasis *See college catalog for details*.

	BIO 220	___	_____	_____	____
	_____	___	_____	_____	____
**One at 300/400-level:*	_____	___	_____	_____	____

Total degree program: 120 credits.

Requirements

* Courses in Communications, second WRT course, and Calculus must be selected with the approval of the advisor. Approved Communication courses are SPK 199 (for transfer students only), 208, or 230. Approved WRT courses are 200, 204, 205, 206, 208, or 220.

** Course must be passed with a "C-" or better.

*** The Biology department recommends MAT 145 (Calculus for the Life Sciences; 3 credits) or MAT 161 (Calculus I; 4 credits). MAT 143 (Brief Calculus; 3 credits) is also acceptable. You must meet the necessary pre-requisites or obtain a minimum score on the Math Placement Exam to enroll in a calculus class. Visit the Math Department website to take the exam. If you receive a score of 3 or lower on the placement exam, you must take MAT 115 (Algebra, Functions, and Trigonometry) or MAT 131 (Precalculus) as preparation for Calculus (MAT 143 or MAT 145). If you receive a score of 4 or above, you can enroll directly into MAT 143 or MAT 145. You must score a 5 to enroll into MAT 161 or take the pre-requisite of MAT 131.

**** The recommended Physics sequence is PHY 130 & PHY 140. Students may substitute the PHY 170 & PHY 180 sequence, but PHY 130 may not be used as a prerequisite for PHY 180 and PHY 170 may not be used as a prerequisite for PHY 140.

△ Students using BIO 409 to fill this requirement must be aware that using three credits in a required Biology course (section VI A) will not also count as three credits towards a Biology elective (section VI B). Check with your academic advisor if you are unsure of credit usage.

Φ Core Courses of the Marine Science Program Concentration.

Ω Marine Science majors are exempt from the pre-requisite of ESS 101 for ESS 330 (Introduction to Oceanography).

All students entering WCU Fall of 1980 or later must take at least three approved. Writing Emphasis courses, totaling at least 9 credits; students who enter with 40-70 transfer credits need only 2, and a minimum of 6 credits; students who enter with more than 70cr. only need one course (at least 3 credits). **At least 1 Writing Emphasis course must be taken at the 300 or 400 level for all students.**

A maximum of 8 combined credits from BIO 409 & 491 may be applied to total Biology credits.

Suggested Sequence for B.S. Biology Majors

Marine Science Concentration

Fall 2018 – Spring 2019

	Semester #1 (16 credits)		**Semester #2 (16 credits)**
____	WRT 120 (3)	____	WRT 2 __ __ (3)
____	BIO 110 (3)	____	BIO 215 or 217 (3)
____	CHE 103/CRL 103 (3)/(1)	____	CHE 104/CRL 104 (3)/(1)
____	MAT 121 (3) or MAT 143, 145, 161	____	MAT 121 (3) or MAT 143, 145, 161
____	Gen Ed Distributive (3)	____	Gen Ed Distributive (3)
	Semester #3 (15 credits)		**Semester #4 (15 credits)**
____	BIO 215 or 217 (3)	____	BIO 220 or 230 (3)
____	CHE 231/CRL 231 (4)/(2)	____	BIO 270 (3)
____	SPK 208 or 230 (3)	____	CHE 232 (3)
____	Gen Ed Distributive (3)	____	BIO313 (3)
		____	Gen Ed Distributive (3)
	Semester #5 (16 credits)		**Semester #6 (16 credits)**
____	BIO 220 or 230 (3)	____	BIO 310 (3)
____	PHY 130/170 (4)	____	Marine Botany (3)
____	Diversity (J) Course (3)	____	PHY 140/180 (4)
____	ESS 330 (3)	____	Interdisciplinary (I) Course (3)
____	Directed Elective (3)	____	Directed Elective (3)
	Semester #7 (13 credits)		**Semester #8 (13 credits)**
____	MarSci Relevant Elective (3)	____	MarSci Relevant Elective (3)
____	MarSci Relevant Elective (3)	____	Directed Elective (3)
____	Directed Elective (4)	____	BIO 490/409/491 (3)
____	Gen Ed Distributive (3)	____	Directed Elective (4)

All required 200 level Biology courses should be completed by the end of Semester #5.

Students should take MAT 121 (Statistics) in the first year.

Marine Science relevant electives (noted in semesters 7&8) may need to be taken during the summer or winter terms, when taken off campus, i.e. at a Marine Science Field Station.

B. S. IN BIOLOGY: MEDICAL LABORATORY SCIENCE CONCENTRATION

Fall 2018 – Spring 2019

REQUIREMENT	COURSE	CREDITS	TERM	YEAR	GRADE
I. ACADEMIC FOUNDATIONS (18 credits)					
Effective Writing I	WRT 120	3	_____	_____	____
Writing II	WRT ___*	3	_____	_____	____
Statistics	MAT 121	3	_____	_____	____
Communication	SPK ___*	3	_____	_____	____
Diverse Communities (“J”)	____	3	_____	_____	____
Interdisciplinary (“I”)	____	3	_____	_____	____

II. LIBERAL ARTS DISTRIBUTIVE REQUIREMENTS (*Approved courses only*)

No course that carries the Interdisciplinary attribute (“I” course) may be used to fulfill any of these requirements, even if it carries a LIT, GEO, MHL, etc. prefix.

A. Approved courses in the **Humanities** (6 credits)
Select courses from at least 2 of the following areas.

Literature (LIT/CLS)	History (HIS)	Philosophy (PHI)			
_____	3		_____	_____	____
_____	3		_____	_____	____

B. Approved courses in the **Behavioral and Social Sciences** (6 credits)
Select courses from at least 2 of the following areas.

Anthropology (ANT)	Psychology (PSY)	Sociology (SOC)			
Economics (ECO)	Geography (GEO)	Government (PSC)			
_____	3		_____	_____	____
_____	3		_____	_____	____

Students taking the MCAT should take at least one semester of psychology and one semester of sociology.

C. Approved courses in the **Arts** (3 credits)
Select a course in Art, Cinematography, Dance, Music, Photography, or Theatre.

_____	3		_____	_____	____

Note: Biology majors will fulfill their distributive requirements in the Sciences with CHE 103 and PHY 130/170. These courses are listed under Supporting Courses.

III. DIRECTED ELECTIVES – 9-10 credits (as many as needed to reach 120 credits at graduation)

_____	___	_____	_____	____
_____	___	_____	_____	____
_____	___	_____	_____	____
_____	___	_____	_____	____

IV. SUPPORTING COURSES (28-29 credits)

Calculus ***	MAT __	3/4	_____	_____	____
General Chemistry I	CHE 103	3	_____	_____	____
Exp. General Chemistry I	CRL 103	1	_____	_____	____
General Chemistry II	CHE 104	3	_____	_____	____
Exp. General Chemistry II	CRL 104	1	_____	_____	____
Organic Chemistry I	CHE 231	4	_____	_____	____
Exp. Organic Chemistry I	CRL 231	2	_____	_____	____
Organic Chemistry II	CHE 232	3	_____	_____	____
General Physics I ****	PHY 130	4	_____	_____	____
or Physics I	PHY 170	4			
General Physics II	PHY 140	4	_____	_____	____
or Physics II	PHY 180	4			

V. Biology Courses (49 credits) Must have 2.0 to graduate.

A. Required courses (27 credits)

General Biology **	BIO 110	3	_____	_____	____
General Microbiology**	BIO 214	4	_____	_____	____
Botany *** or Zoology**	BIO 215/217	3	_____	_____	____
Cell Physiology **	BIO 220	3	_____	_____	____
Genetics **	BIO 230	3	_____	_____	____
Immunology**	BIO 465	4	_____	_____	____
Seminar**	BIO 490	3	_____	_____	____

❖Internship in Medical Laboratory Science**

BIO 407-408	26	_____	_____	____

VI. Writing Emphasis *See college catalog for details*.

BIO 220	___	_____	_____	____
_____	___	_____	_____	____
*One at 300/400-level:	_____	___	_____	_____	____

Total degree program: 120 credits.

Requirements

* Courses in Communications, second WRT course, and Calculus must be selected with the approval of the advisor. Approved Communication courses are SPK 199 (for transfer students only), 208, or 230. Approved WRT courses are 200, 204, 205, 206, 208, or 220.

** Course must be passed with a "C-" or better.

*** The Biology department recommends MAT 145 (Calculus for the Life Sciences; 3 credits) or MAT 161 (Calculus I; 4 credits). MAT 143 (Brief Calculus; 3 credits) is also acceptable. You must meet the necessary pre-requisites or obtain a minimum score on the Math Placement Exam to enroll in a calculus class. Visit the Math Department website to take the exam. If you receive a score of 3 or lower on the placement exam, you must take MAT 115 (Algebra, Functions, and Trigonometry) or MAT 131 (Precalculus) as preparation for Calculus (MAT 143 or MAT 145). If you receive a score of 4 or above, you can enroll directly into MAT 143 or MAT 145. You must score a 5 to enroll into MAT 161 or take the pre-requisite of MAT 131.

**** The recommended Physics sequence is PHY 130 & PHY 140. Students may substitute the PHY 170 & PHY 180 sequence, but PHY 130 may not be used as a prerequisite for PHY 180 and PHY 170 may not be used as a prerequisite for PHY 140.

❖ To qualify for the internship, students must have a minimum 2.75 GPA and be accepted by an accredited hospital Medical Laboratory Science program. Applications should be submitted by the summer of the junior year (60 credits completed). Internships are very competitive and acceptance depends on the cumulative GPA, excellent letters of recommendation and successful completion of an on site interview. Please note that some programs require computer science or Anatomy and Physiology courses. Please see **Dr. Pisciotta** for any questions about applying for this internship.

All students entering WCU Fall of 1980 or later must take at least three approved Writing Emphasis courses, totaling at least 9 credits; students who enter with 40-70 transfer credits need only 2, and a minimum of 6 credits; students who enter with more than 70cr. only need one course (at least 3 credits). **At least 1 Writing Emphasis course must be taken at the 300 or 400 level for all students.**

A maximum of 8 combined credits from BIO 409 & 491 may be applied to total Biology credits.

Some Medical Laboratory Science programs require a course in computer science. Consult with **Dr. Pisciotta.**

Suggested Sequence for B.S. Biology Majors

Medical Laboratory Science Concentration

Fall 2018 – Spring 2019

	Semester #1 (16 credits)		**Semester #2 (16 credits)**
____	WRT 120 (3)	____	WRT 2 __ __ (3)
____	BIO 110 (3)	____	BIO 215 or 217 (3)
____	CHE 103/CRL 103 (3)/(1)	____	CHE 104/CRL 104 (3)/(1)
____	MAT 121 (3) or MAT 143, 145, 161	____	MAT 121 (3) or MAT 143, 145, 161
____	Social Science #1 (3)	____	Elective (3)
	Semester #3 (16 credits)		**Semester #4 (15 credits)**
____	BIO 214 (4)	____	BIO 220 (3)
____	CHE 231/CRL 231 (4)/(2)	____	BIO 230 (3)
____	SPK 208 or 230 (3)	____	CHE 232 (3)
____	Humanities #1 (3)	____	Humanities #2 (3)
		____	Social Science #2 (3)
	Semester #5 (17 credits)		**Semester #6 (16 credits)**
____	PHY 130/170 (4)	____	PHY 140/180 (4)
____	BIO 465 (4)	____	BIO 490 (3)
____	Art (3)	____	Free Elective (3)
____	Diversity (J) Course (3)	____	Free Elective (3)
____	Interdisciplinary (I) Course (3)	____	Free Elective (3)
	Semester #7 (13 credits)		**Semester #8 (13 credits)**
____	BIO 407	____	BIO 408

An average of 16 credits per semester must be completed to enter the Medical Laboratory Science training in the 4th year. If a student follows the proposed outline of courses, a total of 94 credits will be earned at WCU. The additional 26 credits necessary for graduation will be earned at the affiliated hospital.

BACHELOR OF SCIENCE IN EDUCATION: BIOLOGY

Fall 2018 – Spring 2019

REQUIREMENT	COURSE	CREDITS	TERM	YEAR	GRADE
I. ACADEMIC FOUNDATIONS (18 credits)					
Effective Writing I	WRT 120	3	_____	_____	____
Writing II	WRT ___*	3	_____	_____	____
Statistics	MAT 121	3	_____	_____	____
Communication	SPK ___*	3	_____	_____	____
Diverse Communities ("J") # ____		3	_____	_____	____
Interdisciplinary ("I") # ____		3	_____	_____	____

II. LIBERAL ARTS DISTRIBUTIVE REQUIREMENTS (*Approved courses only*)

No course that carries the Interdisciplinary attribute ("I" course) may be used to fulfill any of these requirements, even if it carries a LIT, GEO, MHL, etc. prefix.

A. Approved courses in the **Humanities** (6 credits)
Select courses from at least 2 of the following areas.

Literature (LIT/CLS) ##	History (HIS)	Philosophy (PHI)		
_____	3	_____	_____	____
_____	3	_____	_____	____

B. Approved courses in the **Behavioral and Social Sciences** (6 credits)
Select courses from at least 2 of the following areas.

Anthropology (ANT)	Psychology (PSY)	Sociology (SOC)
Economics (ECO)	Geography (GEO)	Government (PSC)

_____	3	_____	_____	____
_____	3	_____	_____	____

C. Approved courses in the **Arts** (3 credits)
Select a course in Art, Cinematography, Dance, Music, Photography, or Theatre.

_____	3	_____	_____	____

Note: Biology majors will fulfill their distributive requirements in the Sciences with CHE 103 and PHY 130/170. These courses are listed under Supporting Courses.

III. DIRECTED ELECTIVES (9 credits)**

_____	_____	3	_____	_____	____
_____	_____	3	_____	_____	____
_____	_____	3	_____	_____	____

IV. SUPPORTING COURSES (24-25 credits)

Calculus ***	MAT __	3/4	_____	_____	____
General Chemistry I	CHE 103	3	_____	_____	____
Exp. General Chemistry I	CRL 103	1	_____	_____	____
General Chemistry II	CHE 104	3	_____	_____	____
Exp. General Chemistry II	CRL 104	1	_____	_____	____
Organic Chemistry I	CHE 231	4	_____	_____	____
Exp. Organic Chemistry I	CRL 231	2	_____	_____	____
General Physics I	PHY 130/170	4	_____	_____	____
Earth & Space Science	ESS 101	3	_____	_____	____

V. BIOLOGY COURSES (27-28 credits) Must be passed with a "C-" or greater and a 2.0 to graduate.

A. Required

General Biology	BIO 110	3	_____	_____	____
General Microbiology	BIO 214	4	_____	_____	____
General Botany	BIO 215	3	_____	_____	____
General Zoology	BIO 217	3	_____	_____	____
Cell Physiology	BIO 220	3	_____	_____	____
Genetics	BIO 230	3	_____	_____	____
General Ecology	BIO 270	3	_____	_____	____
B. Electives (300 level or above	_____	3	_____	_____	____
except BIO 307 and 469)	_____	3	_____	_____	____

VI. EDUCATION COURSES (36 credits)

Democracy & Education (I)	EDF 300/HIS 444	3	____	_____	____
or History of American Education					
Educational Psychology+	EDP 250^	3	____	_____	____
Foundations of Special Education	EDA 103	3	____	_____	____
Special Education Processes/Procedures for Secondary Educators	EDA 304^	3	____	_____	____
Literacy Development and Secondary Students with Disabilities in Inclusive Classrooms	EDR 347	3	____	_____	____
Teaching English Language Learners PK-12 (J)	LAN/ENG 382	3	____	_____	____
Teaching Principles and Field Experience in Secondary Schools ("W")^^+	EDS 306^	3	____	_____	____
Science Education in the Secondary School^+	SCB 350^	3	____	_____	____
Student Teaching^^+	EDS 411/412	12	____	_____	____

VII. WRITING EMPHASIS COURSES – 3 approved "W" courses must be taken by BSEd students unless they enter with 40-70 transfer credits, in which case they need only 2 "W" courses. Students entering with > than 70 credits need take only 1 "W" course. **At least 1 "W" course must be taken at the 300 or > level.** EDS 306 meets the later requirement, as does BIO 440 that can also act as a Biology elective. Other recommended "W" courses include general education or directed elective courses.

LIT 165	_____	_____	____
EDS 306	_____	_____	____
BIO 440	_____	_____	____

The minimum number of credits in the BSEd Biology Program: 124.

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*Communications courses and a second writing course must be selected with advisor approval and include SPK 208 or 230 and WRT 200, 204, 205, 206, 208 or 220. The department recommends WRT 208 or 220 for BSEd majors.

**Recommended Directed Elective courses include CHE 232, EDM 300, ESS 170, or GEO 101.

*** The Biology department recommends MAT 145 (Calculus for the Life Sciences; 3 credits) or MAT 161 (Calculus I; 4 credits). MAT 143 (Brief Calculus; 3 credits) is also acceptable. You must meet the necessary pre-requisites or obtain a minimum score on the Math Placement Exam to enroll in a calculus class. Visit the Math Department website to take the exam. If you receive a score of 3 or lower on the placement exam, you must take MAT 115 (Algebra, Functions, and Trigonometry) or MAT 131 (Precalculus) as preparation for Calculus (MAT 143 or MAT 145). If you receive a score of 4 or above, you can enroll directly into MAT 143 or MAT 145. You must score a 5 to enroll into MAT 161 or take the pre-requisite of MAT 131.

#Students may use either EDF 300 or SCB 210 to fulfill their General Education (a) Interdisciplinary ("I") and LAN 382 their (b) Diverse Communities ("J") course requirements, since counting any other course(s) may result in a student graduating with more than 127 credits.

##A literature course is required for Formal Admission to Teacher Education.

+Clearances are required at time of enrollment.

^Requires field experiences: EDP 250, EDA 304, EDS 306, and SCB 350.

^^Requires Formal Admission to Teacher Education **(**FATE). Refer to the College of Education and Social Work website (http://www.wcupa.edu/education-socialWork/) for up to date information on requirements.

Students must take Basic Skills and Subject Area Tests (i.e., Praxis II, Biology: Content Knowledge) for certification. Refer to the College of Education and Social Work website for up to date general information, subject area details and requirements, and registration information. Note that the Biology Praxis II must be taken before student teaching.

A cumulative GPA of 3.0 is required for graduation and for certification from PDE.

A maximum of three combined credits from BIO 409 and 491 may be applied to Biology credits, but they cannot count in multiple areas.

Suggested Course Sequence for BSED Biology Majors

Fall 2018 – Spring 2019

	Semester 1 (16 credits) WRT 120 (3) BIO 110 (3) CHE 103 (3) / CRL 103 (1) MAT 121 (3) GEN ED 1 (3)		**Semester 2 (16 credits)** WRT ___ (3) BIO 215 or 217 (3) CHE 104 (3) / CRL 104 (1) SPK 208 or 230 (3) LIT/CLS {GEN ED 2} (3)
	Semester 3 (18 credits) CHE 231 (4) / CRL 231 (2) BIO 215 or 217 (3) EDF 300 "I" (3) EDP 250 (3) *– Requires 20 FE hours* GEN ED 3 (3)		**Semester 4 (16 credits)** BIO 214 (4) MAT 145 or 161 (3/4) EDA 103 (3) BIO 230 or 270 (3) DIRECTED Elective 1 (3) *Apply for FATE by semester end.*
	Semester 5 (16 credits) PHY 130/170 (4) BIO 220 (3) BIO 230 or 270 (3) EDA 304 (3) *– Requires 20 FE hours* EDR 347 (3)		**Semester 6 (15 credits)** DIRECTED Elective 2 (3) BIO Elective 1 (3) EDS 306 (3) *– Requires 24 FE hours* LAN/ENG 382 "J" (3) GEN ED 4 (3)
	Semester 7 (15 credits) DIRECTED Elective 3 (3) BIO Elective 2 (3) GEN ED 5 (3) SCB 350 (3) *– Requires 24 FE hours* ESS 101 (3)		**Semester 8 (12 credits)** EDS 411 & 412 (12)

MINOR IN BIOLOGY

Student _____ WCU ID: _____

Major: _____ Major Advisor: _____

REQUIRED PREREQUISITE (must be completed before admission into minor; does not count toward 18 required credits and is not calculated into minor GPA)

BIO 110 (3) _____ (requires C- or better)

or

BIO 100 (3) _____ (requires A- or better)

18 additional credits of Biology courses are required for the minor in Biology. You may choose any courses with a BIO prefix at the 200 level or higher. They must be completed with C- or better AND at least 3 credits must be in addition to BIO courses required for student's major AND at least 9 of these credits MUST be taken at WCU.

Course	Credits	Semester earned	Letter grade	Numerical value of grade	Numerical value X credits
BIO					
BIO					
BIO					
BIO					
BIO					
BIO					
Total # of credits earned					
				Minor GPA	

For the minor to be earned, the minor GPA must be 2.00 or better.

To calculate your minor GPA, use the chart above to fill in the *Numerical value of grades* column. Each letter grade corresponds to a number. Multiply this number by the number of credits earned for that grade and enter it in the last column. Add the column on the right together then divide that total by the total number of credits you have earned toward the major. This number will be your minor GPA.

	A 4	A- 3.67
B+ 3.33	B 3	B- 2.67
C+ 2.33	C 2	C- 1.67
D+ 1.33	D 1	D- 0.67
	F 0	

Pre-Physical Therapy Guidance sheet

Suggested Sequence for B.S. Biology Majors, Integrative Concentration

	Semester #1 (16 credits)		**Semester #2 (16 credits)**
____	WRT 120 (3)	____	WRT 2 __ __ (3)
____	BIO 110 (3)	____	BIO 217 (3)
____	CHE 103/CRL 103 (3)/(1)	____	CHE 104/CRL 104 (3)/(1)
____	MAT 121 (3) or MAT 143, 145, 161	____	MAT 121 (3) or MAT 143, 145, 161
____	Gen Ed Distributive Requirement (3)	____	Gen Ed Distributive Requirement (3)
	Semester #3 (16 credits)		**Semester #4 (16 credits)**
____	BIO 230 (3)	____	BIO 220 (3)
____	BIO 259[1] (4)	____	BIO 269[1] (4)
____	CHE 231/CRL 231 (4)/(2)	____	CHE 232 (3)
____	HEA 110 (J)(3)	____	SPK 208 or 230 (3)
		____	PSY 100(3)
	Semester #5 (15 credits)		**Semester #6 (14 credits)**
____	BIO 357 (4)	____	BIO 468 (4)
____	BIO core course (4)	____	BIO core course (4) (3)
____	BIO Elective (3)	____	BIO Elective (3)
____	PHY 130 (4)	____	PHY 140 (4)
	Semester #7 (15 credits)		**Semester #8 (15 credits)**
____	BIO Elective (3)	____	BIO Elective (3)
____	BIO Elective (3)	____	BIO Elective (3)
____	BIO PPT Elective * (3)	____	BIO PPT Elective * (3)
____	Directed Elective (3)	____	PHI 374 (I)(3)
____	PSY (as directed by school you are going to attend) (3)	____	BIO 490/409/491 (3)

**BIO electives (13 credits total):*

BIO 214 General Microbiology (4)
BIO 428 Animal Histology
BIO 457 Functional Morphology
BIO 367 Physiology of Drug Interactions
BIO 448 Animal Development (4)
BIO 467 Endocrinology

[1] Bio 259 & 269 count as Directed Electives and *not* Bio Electives

All required 200-level Biology courses should be completed by the end of Semester #5.

Students should take MAT 121 (Statistics) in the first year.

Pre-MBA Guidance sheet

Suggested Sequence for B.S. Biology Majors, Integrative Concentration

	Semester #1 (16 credits)		Semester #2 (16 credits)
____	WRT 120 (3)	____	WRT 2____[5] (3)
____	BIO 110[1] (3)	____	BIO 215[1] or 217[1] (3)
____	CHE 103/CRL 103 (3)/(1)	____	CHE 104/CRL 104 (3)/(1)
____	MAT 121[2] (3) or Calculus[3] (3-4)	____	MAT 121[2] (3) or Calculus[3] (3-4)
____	Gen Ed Distributive[4] (3)	____	Gen Ed Distributive[4] (3)
	Semester #3 (12-15 credits)		**Semester #4 (15 credits)**
____	BIO 215[1] or 217[1] (3)	____	BIO 220[1] (3)
____	CHE 231/CRL 231 (4)/(2)	____	BIO 230[1] (3)
____	Math (if still needed) (3)	____	CHE 232 (3)
____	ECO 111 or 112[2] (3)	____	SPK 208 or 230 (3)
		____	Gen Ed Distributive[4] (3)
	Semester #5 (16 credits)		**Semester #6 (16 credits)**
____	BIO 270[1] (3)	____	BIO elective[6] (3)
____	BIO elective[6] (3)	____	BIO elective[6] (3)
____	PHY 130 (4)	____	PHY 140 (4)
____	ACC elective[2] (3)	____	MGT elective[2] (3)
____	FIN elective[2] (3)	____	MKT elective[2] (3)
	Semester #7 (15 credits)		**Semester #8 (12-15 credits)**
____	BIO elective[6] (3)	____	BIO elective[6] (3)
____	BIO elective[6] (3)	____	BIO elective[6] (3)
____	Interdisciplinary (I) Course (3)	____	Diversity (J) Course (3)
____	Directed elective (3)	____	Directed elective (if still needed) (3)
____	Gen Ed Distributive[4] (3)	____	BIO 490/409/491[1,7] (3)

- A GMAT score of 460 (or its equivalent GRE score) is required for admission to the M.B.A. program. The GMAT requirement will be waived if your overall GPA is 3.3 (or higher), and you earn a B or better in each of the following courses[2]: Management, Accounting, Marketing, Economics, Finance, and Statistics.
- Students must take at least 9 credits of approved Writing Emphasis courses. Students with 40-70 transfer credits need a minimum of 6 credits; students with >70 transfer credits need a minimum of 3 credits. **At least 1 Writing Emphasis course must be taken at the 300 or 400 level for all students.**

1. Course must be passed with a "**C-**" or better. All required 200 level Biology courses should be completed by the end of Semester #5.
2. Course must be passed with a "**B**" or better. Students should take MAT 121 in the first year.
3. The Biology Department recommends MAT 145 (Calculus for the Life Sciences; 3 credits) or MAT 161 (Calculus I; 4 credits). MAT 143 (Brief Calculus; 3 credits) is also acceptable. You must meet the necessary pre-requisites or obtain a minimum score on the Math Placement Exam to enroll in a calculus class. Visit the Math Department website to take the exam. If you receive a score of 3 or lower on the placement exam, you must take MAT 115 (Algebra, Functions, and Trigonometry) or MAT 131 (Precalculus) as preparation for Calculus (MAT 143 or MAT 145). If you receive a score of 4 or above, you can enroll directly into MAT 143 or MAT 145. You must score a 5 to enroll into MAT 161 or take the pre-requisite of MAT 131.
4. Choose courses from the approved list: 2 from the Humanities, 1 from the Behavioral and Social Sciences, and 1 from the Arts.
5. Approved WRT courses are 200, 204, 205, 206, 208, or 220.
6. Selected from BIO 214, 275, 277, or BIO courses at or above the 300 level except BIO 307 and BIO 469.
7. A maximum of 8 combined credits from BIO 409 & BIO 491 may be applied to total BIO credits.