

## B. S. IN BIOLOGY: MARINE SCIENCE CONCENTRATION

Fall 2019 – Spring 2020

### I. ACADEMIC FOUNDATIONS & DEGREE REQUIREMENTS

<i>Requirement</i>	<i>Course</i>	<i>Credits</i>	<i>Term</i>	<i>Year</i>	<i>Grade</i>
First Year Experience	FYE 100	4	_____	_____	_____
Effective Writing I	WRT 120	3	_____	_____	_____
Effective Writing II	WRT 2__ <sup>▲</sup>	3	_____	_____	_____
Mathematics: Statistics	MAT 121 or 125	3	_____	_____	_____
Interdisciplinary (“I”)	_____	3	_____	_____	_____
Diverse Communities (“J”)	_____♥	3	_____	_____	_____
Ethics (“ET”)	_____♥	3	_____	_____	_____

**Writing Emphasis** *Nine credits<sup>▲</sup>, integrated across General Education & Major courses.*

BIO 220

*One at 300/400-level:*

_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

**Speaking Emphasis** *Nine credits<sup>▲</sup>, integrated across General Education & Major courses.*

*One at 300/400-level:*

_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

### II. GENERAL EDUCATION DISTRIBUTIVE REQUIREMENTS

- *Courses must be selected from the approved General Education list (see the [catalog](#)).*
- *Interdisciplinary (“I”) courses cannot also be a General Education distributive course.*
- *Biology majors fulfill their science requirements with CHE 103 and PHY 130/170.*
- *Distributive requirements can be simultaneously satisfied with other degree requirements, see some examples<sup>▲</sup>.*

**A. Humanities** (6 credits): E.g., Literature (LIT/CLS), History (HIS), Philosophy (PHI)

*Courses must be selected from two different subject areas.*

_____	3	_____	_____	_____
_____	3	_____	_____	_____

**B. Behavioral and Social Sciences** (6 credits): E.g., Psychology (PSY), Sociology (SOC), Anthropology (ANT), Political Science (PSC), Geography (GEO), Economics (ECO)

*Courses must be selected from two different subject areas.*

*Note: Students taking the MCAT should take PSY 100 and SOC 200.*

_____	3	_____	_____	_____
_____	3	_____	_____	_____

**C. Arts** (3 credits): E.g., Art (ART), Art History (ARH), Dance (DAN), Film (FLM), Music (MHL, MTC), Theater (THA)

_____	3	_____	_____	_____
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### III. DIRECTED ELECTIVES – 16-17 credits (as many as needed to reach 120 total credits)

_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

### IV. SUPPORTING COURSES (31-32 credits)

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

### V. BIOLOGY COURSES (39 credits) -- GPA must be 2.0 or higher to graduate.

#### A. Required courses (30 credits)

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

_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

#### West Chester Courses:

BIO 387 Invertebrate Zoology  
 ESS 332 Advanced Oceanography  
 BIO 453 Marine Mammals  
 GEO 324 Introduction to GIS

#### Cheyney Courses:

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.

### **Notes and Requirements**

Total degree program: 120 credits.

♠ The second (200-level) WRT course is chosen from WRT 200, 204, 205, 206, 208, or 220.

♥ The Diverse Communities (“J”) course and the Ethics (“ET”) courses can be satisfied through another requirement (e.g., Interdisciplinary or Distributive) as long as the course carries the appropriate attribute(s). *Note:* Credits are not duplicated such that if a course satisfies two requirements, those credits must be made up via directed electives (the minimum total credits for a B.S. degree is 120).

♣ All students must take at least 9 credits of Writing Emphasis courses and 9 credits of Speaking Emphasis courses. Students who enter WCU with 40-70 transfer credits only need 6 credits of each; students who enter with >70 transfer credits only need 3 credits of each. **All students must take at least 3 credits of Writing Emphasis and 3 credits of Speaking Emphasis at the 300-400 level.**

♦ Students should think about how requirements can be simultaneously satisfied. As examples: LNC 110 is a Humanities distributive that satisfies the Ethics requirement; PHI 180 is a Humanities distributive that satisfies the Diverse Communities & Ethics requirements; LIT 165 is a Humanities distributive that is also Writing Emphasis; PSC 101 is a Behavioral & Social Science distributive that satisfies the Diverse Communities requirement.

\* 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.

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

△ Students using BIO 409 to fill this requirement must be aware that using three credits in a required Biology course (section V - A) will not also count as three credits towards a Biology elective (section V - B). Check with your academic advisor if you are unsure of credit usage. A maximum of 8 combined credits from BIO 409 & 491 may be applied to the total BIO elective credits.

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).

# Suggested Sequence for B.S. Biology Majors

## Marine Science Concentration

Fall 2019 – Spring 2020

_____	<b>Semester #1 (17 credits)</b> FYE 100 (4) WRT 120 (3) BIO 110 (3) CHE 103/CRL 103 (3)/(1) MAT 121 or MAT 125 (3)	_____	<b>Semester #2 (16 credits)</b> WRT 2____ (3) BIO 215 or 217 (3) CHE 104/CRL 104 (3)/(1) MAT 145 (3) or MAT 143/161 Gen Ed Distributive: Behavioral & Social Science (3)
_____	<b>Semester #3 (15 credits)</b> BIO 215 or 217 (3) CHE 231/CRL 231 (4)/(2) Gen Ed Distributive: Arts (3) Gen Ed Distributive: Humanities & Ethics (ET) course (3)	_____	<b>Semester #4 (15 credits)</b> BIO 220 (3) (W) BIO 270 (3) CHE 232 (3) BIO 313 (3) Gen Ed Distributive: Behavioral & Social Science (3)
_____	<b>Semester #5 (16 credits)</b> BIO 230 (3) PHY 130/170 (4) Diversity (J) Course (3) ESS 330 (3) Directed Elective (3)	_____	<b>Semester #6 (16 credits)</b> BIO 310 (3) BIO 312 (3) PHY 140/180 (4) Interdisciplinary (I) Course (3) Directed Elective (3)
_____	<b>Semester #7 (13 credits)</b> Marine Science Elective (3) Marine Science Elective (3) Directed Elective (4) Gen Ed Distributive: Humanities (3)	_____	<b>Semester #8 (13 credits)</b> Marine Science Elective (3) Directed Elective (3) BIO 490/409/491 (3) Directed Elective (4)

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

Students should take Statistics (MAT 121 or 125) 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.

All students must take at least 9 credits of Writing Emphasis courses and 9 credits of Speaking Emphasis courses. Students who enter WCU with 40-70 transfer credits only need 6 credits of each; students who enter with >70 transfer credits only need 3 credits of each. **All students must take at least 3 credits of Writing Emphasis and 3 credits of Speaking Emphasis at the 300-400 level.**