

## Biological Sciences

**DeEtta K. Mills**, Associate Professor and Chairperson and Director, IFRI  
**Ligia Collado-Vides**, Teaching Professor and Associate Chairperson  
**Matthew Anderson**, Assistant Teaching Professor  
**Christopher Baraloto**, Professor and Director of the ICTB and the Division of Land and Biodiversity and Associate Director of the Institute of Environment  
**M. Alejandro Barbieri**, Professor  
**Ana Paula Benaduce**, Assistant Teaching Professor  
**Bradley C. Bennett**, Professor  
**Kevin Boswell**, Associate Professor  
**Heather D. Bracken-Grissom**, Associate Professor and Assistant Director of the Coastlines and Oceans Division of the Institute of Environment  
**Lisa Brinn**, Teaching Professor  
**Richard P. Brinn**, Teaching Professor  
**Mark J. Butler IV**, Walter and Rosalie Goldberg Professor of Tropical Ecology and Conservation  
**Justin E. Campbell**, Assistant Professor  
**Alessandro Catenazzi**, Assistant Professor  
**Laurel S. Collins**, Professor  
**Timothy M. Collins**, Professor and Graduate Program Director  
**Christian Cox**, Assistant Professor  
**John Cozza**, Associate Teaching Professor  
**Todd Crawl**, Professor and Director, Institute of Environment  
**Matthew DeGennaro**, Associate Professor  
**Bryan M. Dewsbury**, Associate Professor  
**Maureen A. Donnelly**, Professor and Counselor to the Deans, College of Arts, Sciences and Education  
**Nathan J. Dorn**, Associate Professor  
**Alain Duran**, Assistant Teaching Professor  
**Sarah Eddy**, Assistant Professor  
**Jose Maria Eirin-Lopez**, Associate Professor  
**Sian Evans**, Associate Teaching Professor  
**James W. Fourqurean**, Distinguished University Professor and Director of the Division of Coastlines and Oceans and Associate Director of the Institute of Environment  
**Javier Francisco-Ortega**, Professor  
**Evelyn E. Gaiser**, Professor and George M. Barley Jr. Endowed Chair of Everglades Research  
**Daniel Gann**, Assistant Professor  
**Sat Gavassa**, Associate Teaching Professor  
**John Geiger**, Associate Teaching Professor  
**Camila Granados-Cifuentes**, Assistant Teaching Professor  
**Alastair Harborne**, Assistant Professor  
**Michael Heithaus**, Professor and Dean, College of Arts, Sciences and Education  
**Lou Kim**, Associate Professor  
**Jeremy Kiszka**, Assistant Professor  
**John S. Kominoski**, Associate Professor  
**Lidia Kos**, Professor and Associate Dean, University Graduate School and Associate Vice President, Research and Economic Development  
**Marcy Kravec**, Associate Teaching Professor and Associate Director for Faculty Leadership and Success, Office of the Provost  
**Alexis Lainoff**, Assistant Teaching Professor

**Jun Li**, Associate Professor  
**Jessica Liberles**, Assistant Professor  
**Sparkle Malone**, Assistant Professor  
**Jaime Mayoral**, Assistant Teaching Professor and Laboratory Coordinator  
**Melissa McCartney**, Assistant Professor  
**Fernando G. Noriega**, Professor  
**Steven F. Oberbauer**, Professor  
**Yannis Papastamatiou**, Assistant Professor  
**Thomas R. Pitzer**, Teaching Professor and Laboratory Coordinator  
**Adam Roddy**, Assistant Professor  
**Mauricio Rodriguez-Lanetty**, Associate Professor  
**Maria Jose Rodriguez Mora**, Associate Teaching Professor and Director of Undergraduate Studies  
**Karla Rivera-Caceres**, Assistant Teaching Professor  
**Diego Salazar**, Assistant Professor  
**Rolando Santos Corujo**, Assistant Professor  
**Helena Schmidtmayerova**, Associate Teaching Professor  
**Laura Serbus**, Associate Professor  
**Paul R. Sharp**, Associate Teaching Professor  
**Anna Simonsen**, Assistant Professor  
**Philip K. Stoddard**, Professor  
**Jamie Theobald**, Associate Professor  
**Oscar Valverde-Barrantes**, Assistant Professor  
**Maureen Walter**, Teaching Professor  
**Jeffrey D. Wells**, Associate Professor  
**Elizabeth Whitman**, Assistant Teaching Professor  
**Yuying Zhang**, Associate Professor

## Bachelor of Arts in Biological Sciences

**Degree Program Hours: 120**

**Courses Required for the Degree  
Lower Division Program**

**Common Prerequisite Courses and  
Equivalencies**

<u>FIU Course(s)</u>	<u>Equivalent Course(s)</u>
BSC 2010, BSC 2010L	BSCX010/X010L or BSCX010C or BSCX040C/
BSC 2011, BSC 2011L	BSCX011/X011L or BSCX011C or BSCX041C
CHM 1045, CHM 1045L	CHMX045/X045L or CHMX045C or CHMX040 and CHMX04L
CHM 1046, CHM 1046L	CHMX046/X046L or CHMX046C
PHY 2053	PHYX053
MAC 1147 or	MACX147 or
MAC 1140, MAC 1114	MACX114, MACX140

Courses which form part of the statewide articulation between the State University System and the Florida College System will fulfill the Lower Division Common Prerequisites.

Please visit <https://cpm.flvc.org> for a current list of state-approved common prerequisites.

**Lower Division Common Prerequisites**

BSC 2010	General Biology I &	3
BSC 2010L	General Biology I Lab	1
BSC 2011	General Biology II &	3
BSC 2011L	General Biology II Lab	1
CHM 1045	General Chemistry I &	3
CHM 1045L	General Chemistry I Lab	1
CHM 1046	General Chemistry II &	3
CHM 1046L	General Chemistry II Lab	1
PHY 2053	Physics without Calculus I	4
MAC 1147	Pre-calculus Algebra & Trigonometry	4
	<b>or</b>	
MAC 1140	Pre-Calculus Algebra	3
	<b>and</b>	
MAC 1114	Trigonometry	3

**OTHER DEGREE REQUIREMENTS: 60 credits**

STA 2122	Statistics for Behavioral & Social Sciences	3
BSC 2077	Career planning: how to make the most of your biology degree	1

**Upper Division Core Requirements – 14 credits**

BSC 3848	Scientific literacy: integrating biological content and skills	1
BCH 3034	Cellular chemistry	3
PCB 3043	Ecology	3
PCB 3063	Genetics	3
PCB 4674	Evolution	3
BSC 4931	Senior Seminar	1

**Upper Division Biology Electives – 12 credits**

Students must complete 4 lecture courses from the acceptable Upper Division Biology Electives maintained by the Biology Department.

The 4 lecture courses may be chosen at the student's discretion from courses in any of the distribution areas. The following courses are not allowed as Biology Electives: Student Research Labs (BSC 3915, 4914, and 6916); Workshop Biology Labs (BSC 5928, PCB 5238, BSC 6926, etc.); Cooperative Education credits (BSC 3949); Biology of Women (BSC 3027); Research Methods in Biological Sciences (BSC 3910); and courses for non-science majors (BOT 1010, PCB 2061, PCB 2099, MCB 2000, BSC 2023, EVR 3013, OCB 2000, and OCE 3014).

**Biology Laboratory Requirements – 2 credits**

2 Upper Division Labs

**Track Specific Courses – 18 credits**

Six courses in the specified track must be completed. Alternatively, students can complete a minor offered by a different department. If additional credits are needed to complete a minor, students can use General Electives credits.

**Allied Health Profession Track**

ANT 3462	Medical Anthropology	3
ANT4480	Anthropological Approaches to Global Health	3
APK 3110	Exercise Physiology	3
CLP 4146	Abnormal Psychology	3
DEP 2000	Human Growth and Development: Introductory Developmental Psychology	3
ECO 4504	Intro to Public Finance	3
HIS 4492	History of U.S. Health Policy	3

PAD 3034	Policy Development and Implementation	3
PCB 3703	Human Physiology I	3
PCB 3703L	Human Physiology I Lab	1
POS 3424	The Legislative Process	3
HSC 3537	Medical Terminology	3
HSC 3549	Clinical Physiology for Health Professionals	3
HSC 4553	Fundamentals of Pathology	3
HUN 2202	Principles of Nutrition	3
PET 3310	Kinesiology	3
PSY 2012	Introductory Psychology	3
ZOO 3731	Human Anatomy	3
ZOO 3731L	Human Anatomy Demonstration	1

**Health Policy, Environmental Policy and Pre-Law Track**

AMH 3630	Environmental History of the United States	3
CJL 3512	The Courts	3
CJL 4064	Criminal Justice and the Constitution	3
COM 4462	Conflict Management	3
ECP 3302	Introduction to Environmental Economics	3
ENC 3311	Advanced Writing and Research	3
ENC 3354	Writing as Social Action	3
ENC 3371	Rhetorical Theory and Practice	3
ENC 4331	Writing, Rhetoric, and Community	3
ENC 4930	Special Topics in Composition	3
GEO 4354	Geography of the Global Food System	3
INR 4350	International Environmental Politics (IP)	3
PAD 3034	Policy Development and Implementation - GL	3
PHI 2100	Introduction to Logic	3
PHI 2103	Critical Thinking	3
PHI 4130	Symbolic Logic	3
POS 3283	The Judicial Process	3
POS 3603	Constitutional Law: Powers	3
POS 3604	Constitutional Law: Limitations	3
POS 4784	Analytic Writing in Political Science	3
REL 3492	Earth Ethics	3
SPC 3230	Rhetorical Communication: A Theory of Civil Discourse	3
SPC 3540	Persuasion	3

**Science Communication Track**

COM 3110	Business and Professional Communication	3
ENC 3213	Professional and Technical Writing	3
ENC 3311	Advanced Writing and Research	3
ENC 3363	Writing About the Environment	3
ENC 3416	Writing and New Media	3
ENC 4241	Scientific Writing	3
ENC 4260	Advanced Professional Writing	3
ENC 4357	How To Go Public	3
IDS 3309	How We Know What We Know – GL	3
MMC 3121	Writing Fundamentals for Communicators	3
MMC 3650	Media and Sustainability	3
MMC 4936	Special Topics	3
JOU 3314	Environmental Journalism: Communicating Environmental Issues in South Florida	3

**Bioentrepreneur Track**

ACG 3024	Introduction to Accounting for Managers and Investors (AC)	3
FIN 3005	Introduction to Business Finance	3
ISM 3012	Introduction to Decision and Information Systems (IS)	3
MAN 3022	Introduction to Management	3
MAR 3024	Marketing Fundamentals (ME)	3

**Choose one of the following:**

COM 3110	Business and Professional Communication	3
HAS 3111	Introduction to Health Services Systems	3

**General Electives – 10 credits**

Ten additional credits must be completed.

(Students transferring with 60 or more credits, including those who have completed an Associate of Arts degree, will take BSC 2XXX.)

A minimum of 45 credits must be earned in Upper Division courses (3000- or 4000- level courses).

**Bachelor of Science in Biological Sciences**

**Degree Program Hours: 120**

**Courses Required for the Degree****Lower Division Program****Common Prerequisite Courses and Equivalencies**

<b>FIU Course(s)</b>	<b>Equivalent Course(s)</b>
BSC 2010, BSC 2010L	BSCX010/X010L or BSCX010C or BSCX040/X040L or BSCX011/X011L or
BSC 2011, BSC 2011L	BSCX011C or BSCX041C or CHMX045/X045L or
CHM 1045, CHM 1045L	CHMX045C or CHMX040 and CHMX041 or CHMX046/X046L or
CHM 1046, CHM 1046L	CHMX046C or CHMX210/X210L or
CHM 2210, CHM 2210L	CHMX210C or CHMX211/X211L or
CHM 2211, CHM 2211L	CHMX211C or PHYX048/X048L or
PHY 2048, PHY 2048L	PHY053/X053L or PHYX049/X049L or
PHY 2049, PHY 2049L	PHY054/X054L or MACX311 or MACX233* or
MAC 2311	MACX253 or MACX281 or MACX241 or MACX312 or MACX282 or
MAC 2312 or	MACX234 or STAX023 or
STA 2122	STAX024 or STAX321**

Courses which form part of the statewide articulation between the State University System and the Florida College System will fulfill the Lower Division Common Prerequisites.

Please visit <https://cpm.flvc.org> for a current list of state-approved common prerequisites.

\*FIU does not accept MAC 2233 (Calculus for Business) as a substitute for MAC 2311 (Calculus I).

\*\*Calculus I and Statistics I alone are not sufficient to meet the requirements for the degree. STA 3111 and STA 3112 may be substituted for STA 2122 and STA 3123.

**Lower Division Common Prerequisites**

A grade of "C" or better required

<b>BSC 2010</b>	<b>General Biology I</b>	<b>3</b>
<b>BSC 2010L</b>	<b>General Biology I Lab</b>	<b>1</b>
<b>BSC 2011</b>	<b>General Biology II</b>	<b>3</b>
<b>BSC 2011L</b>	<b>General Biology II Lab</b>	<b>1</b>
<b>CHM 1045</b>	<b>General Chemistry I</b>	<b>3</b>
<b>CHM 1045L</b>	<b>General Chemistry I Lab</b>	<b>1</b>
<b>CHM 1046</b>	<b>General Chemistry II</b>	<b>3</b>
<b>CHM 1046L</b>	<b>General Chemistry II Lab</b>	<b>1</b>
<b>CHM 2210</b>	<b>Organic Chemistry I<sup>1</sup></b>	<b>4</b>
<b>CHM 2210L</b>	<b>Organic Chemistry I Lab<sup>1</sup></b>	<b>1</b>
<b>CHM 2211</b>	<b>Organic Chemistry II<sup>1</sup></b>	<b>3</b>
<b>CHM 2211L</b>	<b>Organic Chemistry II Lab<sup>1</sup></b>	<b>1</b>
<b>PHY 2048</b>	<b>Physics with Calculus I<sup>1,2</sup></b>	<b>4</b>
Or		
<b>PHY 2053</b>	<b>Physics without Calculus I<sup>1,2</sup></b>	<b>4</b>
<b>PHY 2049</b>	<b>Physics with Calculus II<sup>1,2</sup></b>	<b>4</b>
Or		
<b>PHY 2054</b>	<b>Physics without Calculus II<sup>1,2</sup></b>	<b>4</b>
<b>PHY 2048L</b>	<b>General Physics Lab I<sup>1,2</sup></b>	<b>4</b>
<b>PHY 2049L</b>	<b>General Physics Lab II<sup>1,2</sup></b>	<b>4</b>
<b>MAC 2311</b>	<b>Calculus I<sup>3</sup></b>	
<b>MAC 2312</b>	<b>Calculus II<sup>3</sup></b>	<b>4</b>
Or		
<b>STA 2122</b>	<b>Stats for Behav Scien I<sup>3</sup></b>	<b>3</b>

<sup>1</sup>For common prerequisites, students must complete either the organic chemistry sequence or the physics sequence. However, students must complete both Organic Chemistry and Physics sequences to fulfill degree requirements.

<sup>2</sup>Physics without Calculus I and II and corresponding labs can be substituted (PHY 2053 and PHY 2054).

<sup>3</sup>Statistics II is required for students who do not take Calculus II.

Students admitted to the university are admitted directly to their chosen major. Students are expected to make good progress based on critical indicators, such as GPA in specific courses or credits earned. In cases where students are not making good progress, a change of major may be required. Advisors work to redirect students to more appropriate majors when critical indicators are not met.

**OTHER DEGREE REQUIREMENTS: 60 credits**

CHM 2210	Organic Chemistry I	4
CHM 2210L	Organic Chemistry I Lab	1
CHM 2211	Organic Chemistry II	3
CHM 2211L	Organic Chemistry II Lab	1
PHY 2048	Physics with Calculus I	4
Or		
PHY 2053	Physics without Calculus I	4
PHY 2049	Physics with Calculus II	4
Or		

PHY 2054	Physics without Calculus II	4
PHY 2048L	General Physics Lab I	1
PHY 2049L	General Physics Lab II	1
STA 3123	Stats for Behav Scien II**	3

\*Students are required to complete both Organic Chemistry I & II and Physics I & II. Students may complete either sequence as part of the Lower Division Common Prerequisites and must complete the other sequence as a requirement for the degree.

\*\*Required only for students who did not take Calculus II.

### Upper Division Program

#### Required Courses

1. PCB 3043	Ecology	3
2. PCB 3063	Genetics	3
3. PCB 4023	Cell Biology	3
4. PCB 4674	Evolution	3
5. BSC 4931	Senior Seminar	1
6. Distribution Requirement		12

One additional lecture course in each of the following areas:

- A. Ecology
  - B. Organismal Diversity
  - C. Physiology/Biochemistry
  - D. Structure/Development
- (If a course satisfies the distribution requirement, the letter of the area that it satisfies is in brackets after the course description).

7. Biology Electives <sup>1</sup>	2 lecture courses	6
8. Laboratory Requirement <sup>2</sup>	(Four Labs, regardless of credits per lab)	4
9. General Electives		12
10. A minimum of 45 credits must be earned in Upper Division courses.		

<sup>1</sup>Two upper division lecture courses (3000-level and above) to be chosen at the student's discretion from courses in any of the distribution areas. The following courses are not allowed as Biology Electives: Cellular Chemistry (BCH 3034), Student Research Labs (BSC 3915, 4914, and 6916); Workshop Biology Labs (BSC 5928, PCB 5238, BSC 6926, etc.); Cooperative Education credits (BSC 3949); Biology of Women (BSC 3027); Research Methods in Biological Sciences (BSC 3910); and courses for non-science majors (BOT 1010, PCB 2061, PCB 2099, MCB 2000, BSC 2023, EVR 3013, OCB 2000, and OCE 3014).

<sup>2</sup>Laboratory requirement is met with any four upper division Biology labs

Students interested in a career in health should visit FIU's pre-health advising (<https://case.fiu.edu/pre-health/>) for details on how to get a pre-health advisor, requirements for various health professional schools, events, student organizations, and more.

## Bachelor of Science in Biological Sciences: Quantifying Biology in the Classroom (QBIC) Track

Degree Program Hours: 120

### Courses Required for the Degree Lower Division Program

### Common Prerequisite Courses and Equivalencies

FIU Course(s)	Equivalent Course(s)
BSC 2010, BSC 2010L	BSCX010/X010L or BSCX010C or BSCX040/X040L
BSC 2011, BSC 2011L	BSCX011/X011L or BSCX011C or BSCX041C
CHM 1045, CHM 1045L	CHMX045/X045L or CHMX045C or CHMX040 and CHMX041
CHM 1046, CHM 1046L	CHMX046/X046L or CHMX046C
CHM 2210, CHM 2210L	CHMX210/X210L or CHMX210C
CHM 2211, CHM 2211L	CHMX211/X211L or CHMX211C
PHY 2048, PHY 2048L	PHYX048/X048L or PHY053/X053L
PHY 2049, PHY 2049L	PHYX049/X049L or PHY054/X054L
MAC 2311	MACX311 or MACX233 or MACX253 or MACX081 or MACX241
MAC 2312 or STA 2122	MACX312 or MACX282 or MACX234 or STAX023 or STAX024 or STAX321

Courses which form part of the statewide articulation between the State University System and the Florida College System will fulfill the Lower Division Common Prerequisites.

Please visit <https://cpm.flvc.org> for a current list of state-approved common prerequisites.

### Lower Division Common Prerequisites

A grade of "C" or better required

<b>BSC 2010</b>	<b>General Biology I &amp; General Biology I Lab</b>
<b>BSC 2010L</b>	<b>General Biology I Lab</b>
<b>BSC 2011</b>	<b>General Biology II &amp; General Biology II Lab</b>
<b>BSC 2011L</b>	<b>General Biology II Lab</b>
<b>CHM 1045</b>	<b>General Chemistry I &amp; General Chemistry I Lab</b>
<b>CHM 1045L</b>	<b>General Chemistry I Lab</b>
<b>CHM 1046</b>	<b>General Chemistry II &amp; General Chemistry II Lab</b>
<b>CHM 1046L</b>	<b>General Chemistry II Lab</b>
<b>CHM 2210</b>	<b>Organic Chemistry I<sup>1</sup> &amp; Organic Chemistry I Lab<sup>1</sup></b>
<b>CHM 2210L</b>	<b>Organic Chemistry I<sup>1</sup> &amp; Organic Chemistry I Lab<sup>1</sup></b>
<b>CHM 2211</b>	<b>Organic Chemistry II<sup>1</sup> &amp; Organic Chemistry II Lab<sup>1</sup></b>
<b>CHM 2211L</b>	<b>Organic Chemistry II Lab<sup>1</sup></b>
<b>Or<sup>1</sup></b>	
<b>PHY 2048</b>	<b>Physics with Calculus I<sup>1,2</sup> &amp; General Physics Lab I<sup>1</sup></b>
<b>PHY 2048L</b>	<b>General Physics Lab I<sup>1</sup></b>
<b>PHY 2049</b>	<b>Physics with Calculus II<sup>1,2</sup> &amp; General Physics Lab II<sup>1</sup></b>
<b>PHY 2049L</b>	<b>General Physics Lab II<sup>1</sup></b>
<b>MAC 2311</b>	<b>Calculus I</b>
<b>MAC 2312</b>	<b>Calculus II</b>

<sup>1</sup>Organic Chemistry I & II or Physics I & II are not sufficient to meet the requirements for the degree. Students must complete both Organic Chemistry and Physics sequences to fulfill degree requirements.

### OTHER DEGREE REQUIREMENTS: 60 credits

CHM 2210	Organic Chemistry I &	4
CHM 2210L	Organic Chemistry I Lab	1

CHM 2211	Organic Chemistry II &	3
CHM 2211L	Organic Chemistry II Lab and*	1
PHY 2048	Physics with Calculus I&	4
PHY 2048L	General Physics Lab I	1
PHY 2049	Physics with Calculus II &	4
PHY 2049L	General Physics Lab II	1

\*Students are required to complete both Organic Chemistry I & II and Physics I & II. Students may complete either sequence as part of the Lower Division Common Prerequisites and must complete the other sequence as a requirement for the degree.

**QBIC Prerequisites**

<b>BSC 2921</b>	<b>QBIC Journal Club I</b>	<b>1</b>
<b>BSC 2922</b>	<b>QBIC Journal Club II</b>	<b>1</b>
<b>STA 3193</b>	<b>Statistics for Biology I<sup>2</sup></b>	<b>3</b>
<b>STA 3194</b>	<b>Statistics for Biology II<sup>2</sup></b>	<b>3</b>

<sup>2</sup>Statistics I and II are upper division but taken during the Sophomore Year and coordinated with Ecology and Genetics labs.

For consideration for QBIC track admission entering freshman must have >3.3 GPA (unweighted), >1750 SAT with MATH >600, have completed Precalculus Math (or Algebra and Trigonometry) and have an interest in pursuing graduate studies (MD, DVM, DDS, PhD, MD/PhD). Transfer and continuing FIU students can apply on a space available basis if they have maintained >3.3 GPA in college-level work and have completed Calculus I with a grade above 'B-'. QBIC students are required to maintain cumulative GPA above 3.0.

**Upper Division Program****Required Courses**

1. PCB 3043	Ecology	3
2. PCB 3063	Genetics	3
3. PCB 4023	Cell Biology	3
4. PCB 4674	Evolution	3
5. BSC 4927	QBIC Science Café	1
6. Distribution Requirement <sup>1</sup>		12

One additional lecture course in each of the following areas:

- Ecology
  - Organismal Diversity
  - Physiology/Biochemistry
  - Structure/Development
- (If a course satisfies the distribution requirement, the letter of the area that it satisfies is in brackets after the course description).

**7. QBIC Required Corequisites**

BSC 3923	QBIC Ecology Journal Club <sup>1</sup>	1
BSC 3924	QBIC Genetics Journal Club <sup>1</sup>	1
BSC 4925	QBIC Cell Biology Journal Club <sup>1</sup>	1
BSC 4926	QBIC Evolution Journal Club <sup>1</sup>	1

**8. Biology Electives<sup>1</sup>** 1 lecture courses 3

**9. Laboratory Requirement<sup>2</sup>**  
(QBIC sections of PCB 3043L, PCB 3063L, PCB 4023L, and another upper division lab) 4

**10. Electives outside major** 6  
(Modeling+Simulation and Higher Math courses are recommended)

**11. A minimum of 45 credits must be earned in Upper Division courses.**

<sup>1</sup>Lecture courses (3000-level and above) to be chosen in consultation with a faculty advisor. Journal Club courses count as one elective and are corequisites to PCB 3043, PCB 3063, PCB 4023 and PCB 4674. The following courses are not allowed as Biology Electives: Cellular Chemistry (BCH 3034), Student Research Labs (BSC 3915, 4914, and 6916); Workshop Biology Labs (BSC 5928, PCB 5238, BSC 6926, etc.); Cooperative Education credits (BSC 3949); Biology of Women (BSC 3027); Research Methods in Biological Sciences (BSC 3910); and courses for non-science majors (BOT 1010, PCB 2061, PCB 2099, MCB 2000, EVR 3013, OCB 2000, and OCE 3014).

<sup>2</sup>Laboratory requirement is met with any upper division Biology lab.

## Bachelor of Science in Biological Sciences: Forensic Biomolecular Biology (FBB) Track

**Degree Program Hours: 120**

**Courses Required for the Degree****Lower Division Program**

<u>FIU Course(s)</u>	<u>Equivalent Course(s)</u>
BSC 2010, BSC 2010L	BSCX010/X010L or BSCX010C or BSCX040/X040L
BSC 2011, BSC 2011L	BSCX011/X011L or BSCX011C or BSCX041C
CHM 1045, CHM 1045L	CHMX045/X045L or CHMX045C or CHMX040 and CHMX041
CHM 1046, CHM 1046L	CHMX046/X046L or CHMX046C
CHM 2210, CHM 2210L	CHMX210/X210L or CHMX210C
CHM 2211, CHM 2211L	CHMX211/X211L or CHMX211C
PHY 2048, PHY 2048L	PHYX048/X048L or PHY053/X053L
PHY 2049, PHY 2049L	PHYX049/X049L or PHY054/X054L
MAC 2311	MACX311 or MACX233 or MACX253 or MACX081 or MACX241
MAC 2312 or STA 2122	MACX312 or MACX282 or MACX234 or STAX023 or STAX024 or STAX321

Courses which form part of the statewide articulation between the State University System and the Florida College System will fulfill the Lower Division Common Prerequisites.

Please visit <https://cpm.flvc.org> for a current list of state-approved common prerequisites.

\*FIU does not accept MAC 2233 (Calculus for Business) as a substitute for MAC 2311 (Calculus I).

\*\* STA 3111 and STA 3112 may be substituted for STA 2122 and STA 3123.

**Lower Division Common Prerequisites**

A grade of "C" or better required

**BSC 2010**      **General Biology I**

<b>BSC 2010L</b>	<b>General Biology I Lab</b>	
<b>BSC 2011</b>	<b>General Biology II</b>	
<b>BSC 2011L</b>	<b>General Biology II Lab</b>	
<b>CHM 1045</b>	<b>General Chemistry I</b>	
<b>CHM 1045L</b>	<b>General Chemistry I Lab</b>	
<b>CHM 1046</b>	<b>General Chemistry II</b>	
<b>CHM 1046L</b>	<b>General Chemistry II Lab</b>	
<b>CHM 2210</b>	<b>Organic Chemistry I<sup>1</sup></b>	
<b>CHM 2210L</b>	<b>Organic Chemistry I Lab<sup>1</sup></b>	
<b>CHM 2211</b>	<b>Organic Chemistry II<sup>1</sup></b>	
<b>CHM 2211L</b>	<b>Organic Chemistry II Lab<sup>1</sup></b>	
<b>PHY 2048</b>	<b>Physics with Calculus I<sup>1,2</sup></b>	
or		
<b>PHY 2053</b>	<b>Physics without Calculus I<sup>1</sup></b>	
<b>PHY 2048L</b>	<b>General Physics Lab I<sup>1,2</sup></b>	
<b>PHY 2049</b>	<b>Physics with Calculus II<sup>1,2</sup></b>	
or		
<b>PHY 2054</b>	<b>Physics without Calculus II<sup>1</sup></b>	
<b>PHY 2049L</b>	<b>General Physics Lab II<sup>1,2</sup></b>	
<b>MAC 2311</b>	<b>Calculus I<sup>3</sup></b>	

<sup>1</sup>For common prerequisites, students must complete either the organic chemistry sequence or the physics sequence. However, students must complete both Organic Chemistry and Physics sequences to fulfill degree requirements.

<sup>2</sup>Calculus I and Statistics I alone are not sufficient to meet the requirements for the degree. Statistics II is required for students who do not take Calculus II. STA 3111 and STA 3112 may be substituted for STA 2122 and STA 3123.

#### OTHER DEGREE REQUIREMENTS: 60 credits

CHM 2210	Organic Chemistry I &	4
CHM 2210L	Organic Chemistry I Lab	1
CHM 2211	Organic Chemistry II &	3
CHM 2211L	Organic Chemistry II Lab	1
PHY 2048	Physics with Calculus I &	4
or		
PHY 2053	Physics without Calculus I	4
PHY 2049	Physics with Calculus II &	4
or		
PHY 2054	Physics without Calculus II	4
PHY 2048L	General Physics Lab I	1
PHY 2049L	General Physics Lab II	1
STA 3123	Stats for Behav Scien II**	3

\*Students are required to complete both Organic Chemistry I & II and Physics I & II. Students may complete either sequence as part of the Lower Division Common Prerequisites and must complete the other sequence as a requirement for the degree.

\*\*Required only for students who did not take Calculus II.

#### Upper Division Program

##### Required Courses

1. PCB 3043	Ecology	3
2. PCB 3063	Genetics	3
3. PCB 4023	Cell Biology	3
4. PCB 4674	Evolution	3
5. BSC 4931	Senior Seminar	1

##### Required FBB Courses

6. BSC 3400	Wildlife Conservation, Forensic And Crime Science (B) <sup>1</sup>	3
7. BSC 4401	Principles of Forensic Biology (D) <sup>1</sup>	3
8. BCH 3303	General Biochemistry (C) <sup>1</sup>	3

9. BSC 3905	Internship (1 required) (Minimum 30 hours required for course)	0-4
-------------	---	-----

10. Biology Electives <sup>2</sup>	3 lecture courses	9
------------------------------------	-------------------	---

#### Suggested electives to fulfill above requirement

ENY 4060	Entomology (3) & Entomology Lab (1)	4
PCB 4553	General Population Genetics (GL)(A)	3

11. Laboratory Requirement		4
----------------------------	--	---

#### Required FBB Courses and Biology electives apply to Laboratory Requirement

BSC 4401L	Principles of Forensic Biology Lab	1
BCH 3303L	General Biochemistry Lab	1
ENY 4060L	Entomology Lab	1
PCB 3063L	Genetics Lab	1

12. General Electives		12
-----------------------	--	----

13. A minimum of 45 credits must be earned in Upper Division courses.

<sup>1</sup>The letter in parenthesis indicates the distribution area of each course; A: Ecology, B: Organismal Diversity, C: Physiology/Biochemistry, D: Structure/Development

<sup>2</sup> Three upper division lecture courses (3000-level and above) to be chosen at the student's discretion from courses in any of the distribution areas. At least one of these three courses must be taken from the department's "Distribution A (Ecology)" courses. Courses that satisfy this distribution have the letter [A] in brackets after the course description. The following courses are not allowed as Biology Electives: Cellular Chemistry (BCH 3034), Student Research Labs (BSC 3915, 4914, and 6916); Workshop Biology Labs (BSC 5928, PCB 5238, BSC 6926, etc.); Cooperative Education credits (BSC 3949); Biology of Women (BSC 3027); Research Methods in Biological Sciences (BSC 3910); and courses for nonscience majors (BOT 1010, PCB 2061, PCB 2099, MCB 2000, EVR 3013, OCB 2003, and OCE 3014).

## Special Programs

### Bachelor of Science in Marine Biology

#### Admission to the Program

Students wishing to pursue the BS in Marine Biology must meet the same entry requirements as identified for admission to the BS in Biological Sciences.

Marine Biology Program activities and upper-division coursework will be concentrated at the Biscayne Bay Campus, although some course requirements may be met elsewhere at FIU.

Continuity in academic advisement is an objective in this specialized degree program. Students in the BS Marine Biology Program will be advised by a dedicated Marine Biology Advising Office. Faculty in Biological Sciences, including Marine Biology faculty, also are available to provide academic and career advice for students in the Marine Biology Program.

#### Common Prerequisite Courses and Equivalencies

<u>FIU Course(s)</u>	<u>Equivalent Course(s)</u>
BSC 2010, BSC 2010L	BSCX010/X010L or BSCX010C or

	BSCX040/X040L or PCBX011C	CHM 2211L	Organic Chemistry II Lab <sup>1</sup>	1
BSC 2011, BSC 2011L	BSCX011/X011L or BSCX011C or BSCX041/X041L or CHMX045/X045L or CHMX045C or CHMX040 and CHMX041	PHY 2049	Physics with Calculus II <sup>1</sup>	4
CHM 1045, CHM 1045L	CHMX046/X046L or CHMX046C	<b>or</b>		
CHM 1046, CHM 1046L	CHMX210/X210L or CHMX210C <sup>1</sup>	PHY 2054	Physics without Calculus II <sup>1</sup>	4
CHM 2210, CHM 2210L	CHMX211/X211L or CHMX211C1	PHY 2049L	General Physics Lab II <sup>1</sup>	1
CHM 2211, CHM 2211L	PHYX048/X048L or PHY053/X053L	MAC 2311	Calculus I	4
PHY 2048, PHY 2048L	PHYX049/X049L or PHY054/X054L	MAC 2312	Calculus II	4
PHY 2049, PHY 2049L	MACX311 or MACX233 or MACX253 or MACX081 or MACX241	<b>or</b>		
MAC 2311	MACX312 or MACX282 or MACX234 or STAX023 or STAX024 or STAX321**	STA 2122	Stats for Behav Scien I	3
MAC 2312 or STA 2122				

Courses which form part of the statewide articulation between the State University System and the Florida College System will fulfill the Lower Division Common Prerequisites.

Please visit <https://cpm.flvc.org> for a current list of state-approved common prerequisites.

\*FIU does not accept MAC 2233 (Calculus for Business) as a substitute for MAC 2311 (Calculus I).

\*\*Calculus I and Statistics I alone are not sufficient to meet the requirements for the degree. STA 3111 and STA 3112 may be substituted for STA 2122 and STA 3123

### Lower Division Common Prerequisites

The lower Division component of the Marine Biology Bachelor of Science is similar to that of the BS in Biological Sciences, in which common prerequisites in Biological Sciences, Chemistry<sup>1</sup>, Physics, Calculus, and Statistics must be met. All requirements for completion of the lower division in Biological Sciences apply to the BS in Marine Biology, including the grade of "C" or better in required courses, the lower division physics, calculus, and statistics requirements, options, and acceptable substitutions.

A grade of "C" or better required

BSC 2010	General Biology I &	3
BSC 2010L	General Biology I Lab	1
BSC 2011	General Biology II &	3
BSC 2011L	General Biology II Lab	1
CHM 1045	General Chemistry I &	3
CHM 1045L	General Chemistry I Lab	1
CHM 1046	General Chemistry II I &	3
CHM 1046L	General Chemistry II Lab	1
CHM 2210	Organic Chemistry I1 &	4
CHM 2210L	Organic Chemistry I Lab <sup>1</sup>	1
PHY 2048	Physics with Calculus I <sup>1</sup>	4
<b>or</b>		
PHY 2053	Physics without Calculus I <sup>1</sup>	4
PHY 2048L	General Physics Lab I <sup>1</sup>	1
CHM 2211	Organic Chemistry II <sup>1</sup> &	3

CHM 2211L	Organic Chemistry II Lab <sup>1</sup>	1
PHY 2049	Physics with Calculus II <sup>1</sup>	4
<b>or</b>		
PHY 2054	Physics without Calculus II <sup>1</sup>	4
PHY 2049L	General Physics Lab II <sup>1</sup>	1
MAC 2311	Calculus I	4
MAC 2312	Calculus II	4
<b>or</b>		
STA 2122	Stats for Behav Scien I	3

<sup>1</sup>For common prerequisites, students must complete either the organic chemistry sequence or the physics sequence. Chemistry I & II or Physics I & II are not sufficient to meet the requirements for the degree. Students must complete both Organic Chemistry and Physics sequences to fulfill degree requirements.

### OTHER DEGREE REQUIREMENTS: 60 credits

OCB 1930	Marine Biology at FIU <sup>1</sup>	1
CHM 2210	Organic Chemistry I <sup>2,3</sup> &	4
CHM 2210L	Organic Chemistry I Lab <sup>2,3</sup>	1
PHY 2048	Physics with Calculus I <sup>2</sup>	4
<b>or</b>		
PHY 2053	Physics without Calculus I <sup>2</sup>	4
PHY 2048L	General Physics Lab I <sup>2</sup>	1
CHM 2211	Organic Chemistry II <sup>2,3</sup> &	3
CHM 2211L	Organic Chemistry II Lab <sup>2,3</sup>	1
PHY 2049	Physics with Calculus II <sup>2</sup>	4
<b>or</b>		
PHY 2054	Physics without Calculus II <sup>2</sup>	4
PHY 2049L	General Physics Lab II <sup>2</sup>	1
STA 3123	Stats for Behav Scien II <sup>4</sup>	3

<sup>1</sup>All freshman and first-year transfer students entering the Marine Biology major are required to complete a one-semester course introducing the degree program

<sup>2</sup>Students are required to complete both Organic Chemistry I & II and Physics I & II. Students may complete either sequence as part of the Lower Division Common Prerequisites and must complete the other sequence as a requirement for the degree.

<sup>3</sup>Organic chemistry sequence may be fulfilled by taking CHM 2210, CHM 2210L (lecture **and** lab) **and** CHM 2211, CHM 2211L (lecture **and** lab)

**or**

CHM 2200, CHM 2200L (Survey of Organic Chemistry lecture **and** lab) **and**  
CHM3120, CHM3120L (Introduction to Analytical Chemistry lecture **and** lab) **and**  
CHS 4600 Marine Chemistry

<sup>4</sup>Required only for students who did not take Calculus II.

### Upper Division Program

The upper-division requirements for the BS in Marine Biology include a selection of six common requirements, one required laboratory, and a choice of four marine electives, including selections from among the physical sciences. The Marine Biology Distribution Requirement provides for disciplinary breadth in Marine Biology electives.

### Common Requirements

PCB 3043	Ecology	3
PCB 3063	Genetics	3
PCB 4674	Evolution	3
OCB 3043	Marine Biology and Oceanography	3
OCB 3043L	Marine Biology and Oceanography Lab	1
OCP 3002	Physical Oceanography	3

BSC 4931 Senior Seminar 1

**Upper-Division Electives**

Students are required to choose at least 15 credits spread among the following four areas. At least 1 class per area (A,B,C,D) needs to be taken plus one additional class from any of the four categories for a total of 15 credits. Requirement (A): Biology and Physiology of Marine Organisms; Requirement (B): Marine Ecology and Conservation Biology; Requirement (C): Field Marine Biology Experience; Requirement (D): Marine Molecular Biology:

- (A) Biology and Physiology of Marine Organisms
  1. Invertebrate Zoology ZOO 3205C (4)
  2. Marine Botany BOT 4402C (4); Phycology BOT 4404 (3)
  3. Biology of Marine Mammals OCB 4303 (3)
  4. Marine Microbial Ecology OCB 4632 (3)
  5. Fish Biology ZOO 4454 (3)
  6. Animal Physiology PCB 4723 (3) or Comparative Physiology PCB 4724 (3) or Physiological and Behavioral Ecology of Marine Animals PCB 4776 (3)
- (B) Marine Ecology and Conservation Biology
  1. Coastal Marine Conservation OCB 4070 (3)
  2. Coral Reef Biology OCB 3264
  3. Marine Community Ecology OCB 4633 (3)
  4. Fisheries Science OCB 4711 (3)
  5. Marine Protected Areas PCB 4467C (4)
- (C) Field Marine Biology Experience
  1. Field Methods in Marine Ecology OCB 4104C (4)
  2. Biological Oceanography at Sea I or II OCB 4004 (3) or OCB 4005C (4)
  3. Scientific Diving BSC 4473C\* (3) (\*does not count as a lab).
  4. Student Research Lab I BSC 3915 (3) Independent study with a Marine Biology faculty member, requires permission of Marine Biology Director
  5. Honors Research Lab BSC 4970 (3), requires permission of Marine Biology Director
- (D) Marine Molecular Biology
  1. Cell Biology PCB 4023 (3)
  2. Molecular Biology PCB 4524 (3)
  3. Bioinformatics for Biologists BSC 4434 (3)
  4. Immunology PCB 4233 (3)
  5. Population Genetics PCB 4553 (3)

**Laboratory Requirement 3 credits**

In addition to OCB 3043L Marine Biology and Oceanography Lab, students must complete three (3) other upper division biology laboratories

**General Electives – 11-12 credits**

Eleven to twelve additional credits must be completed.

## Bachelor of Science with Honors in Biology or Marine Biology

**Admission to the Program**

1. Permission of the department. Application should be made by letter to the Honors Committee from the applicant after completion of two semesters at the University and prior to two semesters before graduation. The letter should state the intended research problem and be countersigned by the Thesis Committee (advisor and mentor).
2. A minimum GPA of 3.5 in biology, chemistry, physics, geology, and mathematics courses.

**Graduation Requirements**

1. A minimum GPA of 3.5 in biology, chemistry, physics, geology, and mathematics courses.
2. Completion of the BS requirements in Biology or Marine Biology, and Honors Research Lab (BSC 4915L, 1 to 3 credits, and Honors Thesis (BSC 4970, 3 credits).
3. Completion of Honors research in collaboration with a two-person Honors Committee, consisting of the honors advisor and one other member. The honors advisor must be a tenured or tenure-earning member of the department. The research results must be written in the form of an honors thesis and approved by the Honors Committee.
4. Deposit two completed approved copies of the Honors Thesis with the Department's Office: one copy to be kept in the department and the other to be deposited in the Library.
5. Presentation of the results of the Honors Research in a departmental seminar.

## Bachelor of Science in Biological Sciences: Biology Education Major (FIUteach)

This program prepares students interested in biology careers and certification to teach biology. Additional science and/or mathematic certifications at the secondary level may be added (below). Students are encouraged to contact the FIUteach program ([FIUteach.fiu.edu](http://FIUteach.fiu.edu)) for opportunities to try out teaching at no cost. Interested students are encouraged to contact the department, the FIUteach program, or the secondary science advisor for additional details and certification requirements.

Additional coursework in science and/or mathematics is required to prepare for certification in additional subject areas. Students must contact the FIUteach program or the secondary science advisor for details and requirements.

**Admission to the Program**

To qualify for admission to the program, undergraduate candidates must have met all of the lower division requirements including: 60 credit hours of lower-division courses, all general education requirements, lower division GPA of 2.5 higher, and achieve the competencies of the FTCE General Knowledge Exam (GK). All students must pass the GK Exam by the time they reach 72 credit hours in their program of study. All stated admission requirements are to be considered minimum. A student who meets these minimum requirements is not automatically assured admission. Program admission requirements are subject to change. It is the responsibility

of the student to assure that he/she has met the requirements.

### Lower Division Requirements

#### Lower Division Common Prerequisites

A grade of "C" or better required

<b>BSC 2010</b>	<b>General Biology I &amp;</b>
<b>BSC 2010L</b>	<b>General Biology I Lab</b>
<b>BSC 2011</b>	<b>General Biology II &amp;</b>
<b>BSC 2011L</b>	<b>General Biology II Lab</b>
<b>CHM 1045</b>	<b>General Chemistry I &amp;</b>
<b>CHM 1045L</b>	<b>General Chemistry I Lab</b>
<b>CHM 1046</b>	<b>General Chemistry II &amp;</b>
<b>CHM 1046L</b>	<b>General Chemistry II Lab</b>
<b>CHM 2210</b>	<b>Organic Chemistry I<sup>1</sup> &amp;</b>
<b>CHM 2210L</b>	<b>Organic Chemistry I Lab<sup>1</sup></b>
<b>CHM 2211</b>	<b>Organic Chemistry II<sup>1</sup> &amp;</b>
<b>CHM 2211L</b>	<b>Organic Chemistry II Lab<sup>1</sup></b>
<b>or</b>	
<b>PHY 2048</b>	<b>Physics with Calculus I<sup>1,2</sup> &amp;</b>
<b>PHY 2048L</b>	<b>General Physics Lab I<sup>1,2</sup></b>
<b>PHY 2049</b>	<b>Physics with Calculus II<sup>1,2</sup> &amp;</b>
<b>PHY 2049L</b>	<b>General Physics Lab II<sup>1,2</sup></b>

<b>MAC 2311</b>	<b>Calculus I<sup>3</sup></b>
<b>MAC 2312</b>	<b>Calculus II<sup>3</sup></b>

**OR**

<b>STA 2122</b>	<b>Stats for Behav Scien I<sup>3</sup></b>
<b>STA 3123</b>	<b>Stats for Behav Scien II<sup>3</sup></b>

<sup>1</sup> Students are required to complete both Organic Chemistry I with lab and Physics I with lab.

<sup>2</sup> Physics without Calculus I and II (PHY 2053 and PHY 2054) can be substituted for Physics with Calculus I and II.

<sup>3</sup> STA 3111 and STA 3112 may be substituted for STA 2122 and STA 3123.

#### OTHER DEGREE REQUIREMENTS: 60 credits

CHM 2210	Organic Chemistry I* &	4
CHM 2210L	Organic Chemistry I* Lab	1
PHY 2048	Physics with Calculus I*	4
<b>or</b>		
PHY 2053	Physics without Calculus I*	4
PHY 2048L	General Physics Lab I*	1
SMT 2661	Step 1: Inquiry Approaches to Teaching Mathematics and Science	1
SMT 2662	Step 2: Inquiry-Based Lesson Design in Mathematics and Science	1
<b>or</b>		
SMT 2044	Combined STEP 1 & 2: Inquiry-Based Approaches and Lesson Design for Teaching Mathematics and Science	2

\* Students may complete either course with lab as part of the Lower Division Common Prerequisites and must complete the other course with lab as a requirement for the degree.

#### Recommended courses

CHM 2211	Organic Chemistry II** &	3
CHM 2211L	Organic Chemistry II Lab**	1
PHY 2049	Physics with Calculus II**	4
<b>or</b>		
PHY 2054	Physics without Calculus II	4
PHY 2049L	General Physics Lab II**	1

\*\*Students planning to apply to medical school, PA, pharmacy, etc. are strongly advised to complete both physics and organic chemistry sequences. Students interested in a career in health should visit FIU's pre-health advising (<https://case.fiu.edu/pre-health/>) for details on how to get a pre-health advisor, requirements for various health professional schools, events, student organizations, and more.

### Upper Division Biology Education Program

#### Required Courses

PCB 3043	Ecology	3
PCB 3063	Genetics	3
PCB 4023	Cell Biology	3
PCB 4674	Evolution	3
BSC 4931	Senior Seminar	1

#### Biology Education Upper Division Electives

Select one course each of the following areas:

A.	Ecology	3
B.	Organismal Diversity	3
C.	Physiology/Biochemistry	3
D.	Structure/Development	3

(If a course satisfies the distribution requirement, the letter of the area it satisfies is in brackets after the course description)

#### Biology Laboratory Requirement

One Upper Division Lab 1

#### Education Requirements

BSC 3910	Research Methods in Biological Sciences	3
SMT 3100	Knowing and Learning in Mathematics and Science	3
SMT 4301	Classroom Interactions in Mathematics and Science Teaching	3
SMT 4664	Problem-Based Instruction (PBI) in Mathematics and Science	3
SCE 4194	Perspectives in Science and Math Education – GL	3
SCE 4944	Student Teaching	6
RED 4325	Subject Area Reading	3
TSL 4324	ESOL Issues and Strategies for Content Area Teachers – GL	3

### Minor in Biology

#### Required Courses

BSC 2010 and BSC 2011 with labs, and one upper division course (3000-level or above) in three of the following areas: A. Ecology, B. Organismal Diversity, C. Physiology/Biochemistry, or D. Structure/Development.

One of these elective courses must be at the 4000-level or higher and one must include a lab. Total upper division biology credits must number 10 or more. Grades of 'C' or better are required for all courses and labs. The following courses do not count as electives: Student Research Labs (BSC 3915, 4914, and 6916), Biological Sciences Research Internship (BSC 3941), Workshop Biology Labs (BSC 5928, PCB 5238, BSC 6926, etc.); Cooperative Education credits (BSC 3949), and any course for non-science majors (e.g. EVR 3013 and OCE 3014). Students obtaining a BS in Marine Biology wishing

to obtain a minor in Biology must take three electives and an upper division lab different from those used to satisfy the BS in Marine Biology. Students obtaining a Bachelor degree in a major other than Biology or Marine Biology wishing to obtain both Biology and Marine Biology minors must use different upper division courses for each of the two minors.

## Minor in Marine Biology

### Required Courses

Students must complete, with a grade of "C" or better, BSC 2010 and BSC 2011 with labs, OCB 3043 Marine Biology and Oceanography and OCB 3043L, and at least two courses from among the selection of upper-division Marine Electives that meet the BS in Marine Biology requirement. One of these elective courses must be at the 4000-level or higher. Total upper division biology credits must number 10 or more. The following courses do not count as electives: Student Research Labs (BSC 3915, 4914, and 6916), Biological Sciences Research Internship (BSC 3941), Workshop Biology Labs (BSC 5928, PCB 5238, BSC 6926, etc.); Cooperative Education credits (BSC 3949), and any course for non-science majors (e.g., EVR 3013 and OCE 3014). Students obtaining a BS or BA in Biology wishing to obtain a Minor in Marine Biology must take three electives and an upper division lab different from those used to satisfy the BS or BA in Biology. Students obtaining a Bachelor degree in a major other than Biology or Marine Biology wishing to obtain both Biology and Marine Biology minors must use different upper division courses for each of the two minors.

### Pre-Medical, Dental, Optometry, and Veterinary Curricula

Students who have fulfilled the requirements for the BS in Biology will also have satisfied the course requirements for admission to the above mentioned professional schools. Some professional schools may have additional course requirements. Interested students should consult the Pre-Medical Advisor (<https://case.fiu.edu/pre-health/>) for arranging a curriculum to enhance their potential to gain admission.

## Course Descriptions

Note: Laboratories should be taken concurrently with or subsequent to lectures. Students should register for each separately.

### Definition of Prefixes

BCH - Biochemistry; BOT - Botany; BSC - Biological Science; ENY - Entomology; IDS-Interdisciplinary Studies; MCB - Microbiology; OCB - Oceanography (Biological); PCB - Process Biology; SCE - Science Education; ZOO - Zoology

Courses that meet the University's Global Learning requirement are identified as GL.

**BCH 3033 General Biochemistry (3).** **BCH 3033L Biochemistry Lab (1).** Chemistry of proteins, lipids, carbohydrates, and nucleic acids; principles of enzymology, metabolism, and bioenergetics. Prerequisites (Lecture): CHM 2211 and BSC 2010. Prerequisite or Corequisite: BCH 3033 [C]

**BCH 3034 Cellular Chemistry (3).** An analysis of the biochemical principles that determine cellular processes. Explores the interactions of macromolecules in cells and their environment, and the metabolic pathways that govern life. Prerequisites: BSC 2010, CHM 1045 & CHM 1045L

**BOT 1010 Introductory Botany (3).** **BOT 1010L Introductory Botany Lab (1).** A history of mankind's study and use of plants, and a survey of plants of economic importance. Includes lab. No science prerequisite. (Lab fees assessed)

**BOT 3014 Plant Life Histories (3).** **BOT 3014L Plant Life Histories Laboratory (1).** Plant form, function, and reproduction: the lives of algae, fungi, bryophytes, ferns, gymnosperms, and flowering plants. This course is designed for majors and certificate students. Prerequisite (Lecture): BSC 2011. Prerequisite or Corequisite: (lab) BOT 3014 [B]

**BOT 3154 Local Flora (3).** **BOT 3154L Local Flora Lab (1).** Introduction to the taxonomy and ecology of common native, cultivated, and exotic plant species in southern Florida. Laboratory observation of the gross features of vascular plants and practice in the use of keys for identification. Basic ecology of principal plant communities of Southern Florida. Field trips. Prerequisites (Lecture): BOT 1010 or BSC 2011. Corequisite (Lab): BOT 3154 Concurrent registration in lecture and lab courses. [B]

**BOT 3353 Morphology of Vascular Plants (3).** **BOT 3353L Morphology of Vascular Plants Lab (1).** Origin and evolution of plants, especially vascular plants of tropical origin. Analysis of vascular plant anatomy and morphology, emphasizing the underlying principles of plant construction. Prerequisites (Lecture): A course in General Biology or permission of the instructor. Prerequisite or Corequisite (Lab): BOT 3353. [D]

**BOT 3434 Mycology (3).** **BOT 3434L Mycology Lab (1).** An introduction to the taxonomy, genetics, and physiology of fungi with special emphasis on commercially important fungi and plant and animal pathogenic fungi. Prerequisites (Lecture): BSC 2010, BSC 2011. Prerequisites or Corequisite: BOT 3434 [B]

**BOT 3663 Tropical Botany (3).** **BOT 3663L Tropical Botany Lab (1).** How environmental factors affect the distribution of vegetation, and the morphology and physiology of plants in the tropics. Emphasis on tropical plants of economic importance. Prerequisites (Lecture): BSC 2011 or equivalent. Prerequisites or Corequisites: BOT 3663. [B]

**BOT 3810 Economic Botany (3).** The origins, domestication and uses of economically important plants. Prerequisites: BSC 2011 or BOT 1010. [B]

**BOT 4401 Plant Conservation Biology (3).** Overview of the causes and consequences of local and global-scale human disturbances on plant diversity, including evaluation of strategies to mitigate these impacts. Prerequisite: PCB 3043. [A]

**BOT 4402C Marine Botany (3-4).** Introduction to the taxonomy, biology of seaweeds, seagrass and mangroves, including species identification in the field and lab. Prerequisites: BSC 2011 or equivalent. [B]

**BOT 4404 Phycology (3). BOT 4404L Phycology Lab (1).** The biology of marine and freshwater algae, with an emphasis on structure, function, reproduction, classification, and ecology. Prerequisites (Lecture): BSC 2010, BSC 2011. Prerequisites or Corequisites: BOT 4404. [B]

**BOT 4503 Plant Physiology (3).** Plant growth and metabolism in relationship to environment. Photobiology, nutrient relations, transport, and hormones in relation to plant development and function. Prerequisites: BSC 2010, BSC 2011, CHM 1045, CHM 1046. [C]

**BOT 4503L Plant Physiology Lab (1).** Plant growth and metabolism in relationship to environment. Photobiology, nutrient relations, transport, and hormones in relation to plant development and function. Prerequisite or Corequisite: BOT 4503. [C]

**BOT 4601 General Plant Ecology – GL (3). BOT 4601L General Plant Ecology Lab (1).** An examination of the ecology of plants at the individual, population, and community levels. Prerequisites (Lecture): PCB 3043 or permission of the instructor. Prerequisite or Corequisite: BOT 4601. [A]

**BOT 4684 Taxonomy of Tropical Plants (3). BOT 4684L Taxonomy of Tropical Plants Lab (1).** Introduction to higher plant taxonomy, including nomenclature, modern systems of angiosperm classification, and angiosperm evolution. Emphasis on identification of tropical plant families and plants of economic importance. Prerequisites (Lecture): BOT 3154 or BOT 3663 or permission of the instructor. Prerequisites or Corequisites (Lab): BOT 4684. [B]

**BSC 2010 General Biology I (3). BSC 2010L General Biology I Lab (1).** Biomolecules, cells, energy flow, genetics, and physiology. Science background or Biology major recommended. Concurrent registration in both lecture and laboratory is required. Prerequisite or Corequisite (Lab): BSC 2010. (Lab fees assessed)

**BSC 2011 General Biology II (3). BSC 2011L General Biology Lab II (1).** A survey of organismal biology with emphasis on botany and zoology. Science background or Biology major recommended. Concurrent registration in both lecture and laboratory is required. Prerequisite or Corequisite: BSC 2011L. (Lab fees assessed)

**BSC 2023 Human Biology (3). BSC 2023L Human Biology Lab (1).** Biological and general scientific principles governing human structure, function, health, and relationship to the planetary environment. For non-science majors. (Lab fees assessed)

**BSC 2077 Career Planning; How To Make The Most of Your Biology Degree (1).** We explore career paths, develop professional skills, review what is needed for your path and plan your remaining time at FIU to advance your goals. For sophomore level and transfer biology majors.

**BSC 2917 (1). CAChe Discovery 1: Research in Aquatic Ecosystems.** Exploration of South Florida's aquatic ecosystems through hands-on research experiences and introduction to career opportunities in science.

**BSC 2921 QBIC Journal Club I (1).** Topics complement General Biology I Lecture (BSC 2010) and reinforce concepts QBIC students learn in that class through discussion of relevant scientific literature. Corequisite: BSC 2010.

**BSC 2922 QBIC Journal Club II (1).** Topics complement General Biology II Lecture (BSC 2011) and reinforces concepts QBIC students learn in that class through discussion of relevant scientific literature. Corequisite: BSC 2011.

**BSC 3027 Biology of Women (3).** Consideration of women's bodies: how they work, how they have been regarded over time, and how biology affects abilities, health, and self-esteem. Course does not count as a biology or marine biology major elective.

**BSC 3392 Science Concept Mapping: Biological Sciences (1).** An introduction to the process of concept mapping and its application to the Biological Sciences. Topics include those included in standardized exams such as the MCAT and DAT. Prerequisites: BSC 2010 and BSC 2011.

**BSC 3400 Wildlife Conservation, Forensic and Crime Science (3).** An interdisciplinary approach to wildlife conservation, critical aspects of conservation strategy as it relates to illegal trafficking and the role of forensics/crime science in its prevention. Prerequisite: BSC2010, BSC2011 [B]

**BSC 3466L Make Your Mutant (1).** Mutating existing proteins to study their structure/function relationship in their relation to health and disease. Good preparation for going into biotech, biomedical and biopharma fields. Corequisite: PCB 3063 or BCH 3033

**BSC 3812 Biology Teacher Examination Preparation (0).** A review of the main principles in Biology and the scientific process. Prerequisites: BSC 2010, BSC 2011.

**BSC 3848 Scientific Literacy: Integrating Biological Content And Skills (1).** You will develop science process skills such as how to read scientific literature and practice science communication. You will integrate these process skills with the core concepts in biology. Prerequisite & Corequisites: BSC 2010 & BSC 2011

**BSC 3910 Research Methods in Biological Sciences (3).** Experimental development and design for future biology teachers. Independent biological sciences experiments are designed, conducted and analyzed. Includes statistical analysis techniques. Prerequisite: SMT 2662.

**BSC 3915, 4914 Student Research Lab I and II (1-12).** Independent laboratory study in a project or projects of the student's choice. Registration by consultation with instructor. May be repeated for additional credit.

**BSC 3923 QBIC Ecology Journal Club (1).** A seminar styled course teaching QBIC students how to dissect and analyze complex analytically written scientific articles in Ecology (PCB 3043). Corequisite: PCB 3043.

**BSC 3924 QBIC Genetics Journal Club (1).** A seminar styled course teaching QBIC students how to dissect and analyze complex analytically written scientific articles in Genetics (PCB 3063). Corequisite: PCB 3063.

**BSC 3930 CACHe Discovery 2: Professional Pathways in Aquatic and Environmental Science (1).** Explores the options for students to pursue careers and graduate work in STEM fields, through professional development training in resume building and improved written and oral communication skills.

**BSC 3941 Biological Sciences Research Internship (0-12).** Supervised, practical experience in a professional, laboratory or field setting in which biologists may work. Department permission is required. May be repeated. Prerequisites: Permission from FIU faculty advisor is required.

**BSC 3949 Cooperative Education in Biology (1-3).** A student majoring in biological sciences may spend several terms employed in industry or government in a capacity relating to the major. Prerequisites: Permission of Co-op Education and major department.

**BSC 4205 Topics in Organismal Diversity (3).** An intensive study of a topic or topics in organismal diversity not otherwise offered in the curriculum. Prerequisites: BSC 2010, BSC 2010L and BSC 2011, BSC 2011L. [B]

**BSC 4303 Biogeography (3).** Current issues concerning geographic distribution of plants and animals. Prerequisites: PCB 3043 and PCB 4674. [A]

**BSC 4304 Environments of the Past (3).** The biogeography, diversity and ecology of ancient life is combined with the study of sediments and stable isotopes to interpret environmental changes of the past at the local to global scale. [A]

**BSC 4363 Biodiversity in the Caribbean Basin (3).** Current issues on evolution, conservation, and diversification of biota of the Caribbean Basin. Prerequisites: BSC 2010, BSC 2011. [A]

**BSC 4401 Principles of Forensic Biology (3).** Molecular techniques used in forensic biology and how they, along with genetics, are used to generate a DNA profile in order to aid the administration of justice. Prerequisite: BSC 2010. [D]

**BSC 4401L Principles of Forensic Biology Lab (1).** Forensic Biology Lab will introduce students to lab techniques and processes that are commonly encountered in Molecular or Forensic labs such as Chain of Custody, Serology and DNA Analysis Prerequisites: PCB3063 Corequisite: BSC4401 or permission of instructor [D].

**BSC 4422 Biotechnology: Applications in Industry, Agriculture and Medicine (3).** Biological, biochemical, ecological, engineering, entrepreneurial, and ethical aspects of biotechnology in industry, agriculture, and medicine. [D]

**BSC 4422L Biotechnology Laboratory (1).** A laboratory course that is experiment-based in which students use biotechnology to explore such topics as recombinant DNA techniques, DNA sequencing, and tissue culture. Prerequisite or Corequisite: BSC 4422

**BSC 4434 Bioinformatics for Biologists (3).** Introduction to bioinformatic resources/methods for biologists. Accessing, searching, retrieving, and analyzing data, including sequence alignment, phylogenetic analysis, and structure prediction. Prerequisites: BSC 2010, BSC 2011, PCB 3063. [B]

**BSC 4443 Functional Genomics and Proteomics (3).** Introduction to the importance of functional genomics and proteomics in biological research. Prerequisite: PCB 3063. [C]

**BSC 4473C Introduction to Scientific Diving (3).** Covers all aspects of conducting safe underwater research, including theoretical and practical aspects of diving, diving equipment, and scientific techniques. Prerequisites: OCB 3043+lab or PCB 3043+lab or CHS 4600 or OCE 3014, open water diving certification, permission of the instructor, FIU Diving Medical clearance, pass standardized swim test, at least 18 years old.

**BSC 4450L Computational Biology Lab of Emerging Infectious Disease (1).** Research intensive computational biology lab investigating emerging pathogens to gather insights to the genetic cause of emergence using basic bioinformatics, evolutionary and structural biology. Prerequisite: PCB 3063 or BCH 3033

**BSC 4915L Honors Research (1-3).** Laboratory and/or field study in consultation with an Honors Thesis advisor. Prerequisite: Admission into Honors in Biological Sciences Program.

**BSC 4925 QBIC Cell Biology Journal Club (1).** A seminar styled course teaching QBIC students how to dissect and analyze complex analytically written scientific articles in Cell Biology (PCB 4023).

**BSC 4926 QBIC Evolution Journal Club (1).** A seminar styled course teaching QBIC students how to dissect and analyze complex analytically written scientific articles in Evolution (PCB 4674).

**BSC 4927 QBIC Science Café (1).** QBIC students will develop and host their own Science Café to transmit scientific subjects to and engage in a dialog with the general public. Prerequisites: BSC 3923, BSC 3924, BSC 4925, BSC 4926.

**BSC 4931 Senior Seminar (1).** An exploration of various research works in biological sciences. Oral presentation by the students required. Prerequisite: Senior standing. Prerequisites or Corequisites: PCB 3043, PCB 3063, and PCB 4674, and PCB 4023 or BCH 2020, or OCP 3002.

**BSC 4934 Topics in Biology (1-3).** An intensive study of a particular topic or limited number of topics not otherwise offered in the curriculum.

**BSC 4970 Honors Thesis (3).** Writing an Honors Thesis. Prerequisite: BSC 4915L.

**ENY 4060 Entomology (3).** **ENY 4060L Entomology Laboratory (1).** Explorations of the morphology, physiology, behavior and metabolism of insects in the context of their evolutionary, environmental and economic significance. Prerequisites (Lecture): BSC 2010 and BSC 2011, or permission of the instructor. Prerequisite or Corequisite(Lab): ENY 4060. [B]

**IDS 3214 Our Coastal Environment from the Bay to the World – GL (3).** Natural science principles applied to the world's coastal and marine environments, with emphasis on human use of and interaction with those environments, using cases from Florida and around the globe.

**MCB 2000 Introductory Microbiology – GL (3). MCB 2000L Introductory Micro Lab (1).** Basic concepts of microbes as pathogens, food spoilage and fermentative organisms. Microbial relationships to immunology, sanitation, pollution and geochemical cycling. Not applicable for majors in Biological Sciences. (Lab fees assessed)

**MCB 3007 Living with Microbes – GL (3).** Explore the intricate relationship between human and planetary well-being and the microbes that inhabit us, both inside and outside our bodies.

**MCB 3020 General Microbiology (3). MCB 3020L General Microbiology Lab (1).** Introduction to the principles and techniques of microbiology, genetics, taxonomy, biochemistry and ecology of microorganisms. Prerequisites (Lecture): CHM 2210; and BSC 2010 and BSC 2011; or permission of the instructor. Prerequisite or Corequisite (Lab): MCB 3020. [B]

**MCB 4022 Diversity of Microbes (3).** An introduction to the diversity of microbes to include the structural and functions dynamics and interactions as assessed by traditional or genetic methods. Prerequisites: MCB 3020 or instructor's permission. [B]

**MCB 4203 Microbial Pathogenicity (3). MCB 4203L Microbial Path Lab (1).** Host-parasite relationships: physiology of bacterial, fungal and viral pathogens emphasizing mechanisms of pathogenicity and the host response. Prerequisite (Lecture): MCB 3020. Prerequisite or Corequisite (Lab): MCB 4203 [C]

**MCB 4404 Microbial Physiology (3).** Introduction to the study of physiological and metabolic activities of microorganisms and processes that affect them. Prerequisites: MCB 3020, MCB 3020L. [C]

**MCB 4404L Microbial Physiology Lab (1).** Introduction to the study of physiological and metabolic activities of microorganisms and processes that affect them. Prerequisites: MCB 3020, MCB 3020L. Prerequisite or Corequisite: MCB 4404. [C]

**MCB 4503 Virology (3). MCB 4503L Virology Lab (1).** Principles and methods of study of bacterial, plant, and animal viruses. Molecular aspects of viral development, virus pathogens, and carcinogens. Prerequisites: CHM 2210. [C]

**MCB 4603 Microbial Ecology (3). MCB 4603L Microbial Ecology Lab (1).** Principles and applications of microbial interactions with the environment: physical, chemical, and biological. Prerequisites: MCB 3020 and MCB 3020L. [A]

**MCB 5412 Advanced Microbial Physiology (3).** Overview of microbial metabolic diversity, including prokaryotic metabolic pathways, stress responses, cell signaling, and metabolic regulation. Prerequisite: Permission of the instructor.

**MCB 5453L Workshop: Prokaryotic Cell Signaling (1).** Covers chemical signals used by prokaryotes for cell-to-cell communications. Prerequisites: MCB 3020 or permission of the instructor.

**MCB 5605 Microbial Ecology (3).** Principles and applications of microbial interactions with the environment. Current research areas are emphasized. Prerequisite: Graduate Level Standing.

**OCB 1930 Marine Biology at FIU (1).** Seminar course for freshmen or 1st year transfer students majoring in Marine biology. Topics will include an outline of the major, marine research being done at FIU, and careers in marine biology.

**OCB 2000 Introductory Marine Biology – GL (3). OCB 2000L Introductory Marine Biology Lab (1).** A survey of marine biological environments and zones, including the relationship of the physical and chemical environment to the distribution of marine plants and animals. (Lab fees assessed)

**OCB 3043 Marine Biology and Oceanography (3). OCB 3043L Marine Biology and Oceanography Laboratory (1).** An ecological approach to the biology of organisms in the marine environment with an emphasis on zonation and adaptation to the physical environment. Intended for biology majors or other science majors. Prerequisites (Lecture): BSC 2010 and BSC 2011. Prerequisites or Corequisites (Lab): OCB 3043 [A]

**OCB 3264 Biology of Coral Reefs (3).** Biology and ecological relationships of reef plants and animals with emphasis on their role in reef construction or bioerosion; reef constructional environments symbiotic relationships and biogeography. Prerequisites: BSC 2011 or Zoology. Ecology recommended. [A]

**OCB 4004 Biological Oceanography at Sea I (3).** An overview of current methods applied in biological oceanography including design of and working on research vessels and planning of research cruises. Prerequisite: OCB 3043. [A]

**OCB 4005C Biological Oceanography at Sea II (4).** Experience in research at sea involving cruise planning, participation in a research cruise, and sample data analysis. Methods oriented lectures/seminars and participation in lab and shipboard work. Prerequisites: OCB 4004 or permission of the instructor. [A]

**OCB 4070 Coastal Marine Conservation (3).** An overview of the basic subdisciplines - including science, governance, and policy - required for a detailed understanding of the most pressing problems threatening our coastal ecosystems. Prerequisites: OCB 3043 or PCB 3043. [A]

**OCB 4104C Field Methods in Marine Ecology (4).** Introduction to field and analytical methods applied in marine ecology research focusing on integrating principles of the scientific method, experimental design, data collection and analysis. Prerequisites: OCB 3043 or PCB 3043. [A]

**OCB 4303 Biology of Marine Mammals (3).** A survey of marine mammals including evolution, systematics, morphology, physiology, behavior, population dynamics, ecology, conservation and theory relevant to these areas of biology. Prerequisites: PCB 3043 or OCB 3043. [B]

**OCB 4632 Marine Microbial Ecology (3).** Diversity, ecology and physiology of marine viruses, bacteria and protozoa, their role in marine food webs and the biogeochemical cycling of carbon and nutrients, and the significance of microbial food webs for marine productivity. Prerequisites: OCB 3043. [A]

**OCB 4633 Marine Community Ecology (3).** A survey of the ecological patterns, processes, and interactions in marine environments with an emphasis on the ecology of different ecosystems and interactions among organisms. Prerequisite: PCB 3043. [A]

**OCB 4711 Fisheries Science (3).** Fundamental theory and techniques of fisheries science, including population dynamics, recruitment, migration, growth, measurement techniques and modeling. Prerequisites: BSC 2010 and BSC 2011. [A]

**PCB 2061 Introductory Genetics (3). PCB 2061L Introductory Genetics Lab (1).** Principles of Mendelian and molecular genetics with selected examples of applications such as genetic engineering and twin studies.

**PCB 2099 Foundations of Human Physiology (3). PCB 2099L Foundations of Human Physiology Lab (1).** Functional survey of the organ systems of the human body. Intended primarily for non-science majors. (Lab fees assessed)

**PCB 3043 Ecology (3). PCB 3043L Ecology Lab (1).** The basic principles governing the interaction of organism and environment. Trophic structure and energetics, species diversity, evolution of populations, biogeochemical cycles. Prerequisites (Lecture): BSC 2010 and BSC 2011. Prerequisites or Corequisites: PCB 3043 [A]

**PCB 3063 Genetics (3). PCB 3063L Genetics Lab (1).** Mendelian inheritance and introduction to molecular genetics. Prerequisites (Lecture): BSC 2010. Prerequisite or Corequisite: PCB 3063. [D]

**PCB 3241 Biology of Aging (3).** Biologic changes that occur in aging with emphasis on underlying regulatory mechanisms, including the aging genome and structural and functional changes in organ systems. Prerequisites: BSC 2010 and BSC 2011. [C]

**PCB 3374 Tropical Ecology (3).** In-depth survey of tropical climatology, ecological processes characteristic of tropical habitats, and biodiversity and conservation of tropical regions. Prerequisite: PCB 3043. [A]

**PCB 3702 Intermediate Human Physiology (3).** Functions of the human body and the physio-chemical mechanisms responsible for each organ's function. Prerequisites: BSC 2010 or BSC 2011. [C]

**PCB 3702L Intermediate Human Physiology Lab (1).** Functions of the human body and the physio-chemical mechanisms responsible for each organ's function. Prerequisite or Corequisite: PCB 3702. [C]

**PCB 3703 Human Physiology I (3). PCB 3703L Human Physiology I Lab (1).** Basic facts and concepts relating to the physiology of cells and nervous, muscular, and cardiovascular systems, with emphasis on regulatory mechanisms and abnormal physiology. Prerequisite (Lecture): BSC 2010. Prerequisite or Corequisite (Lab): PCB 3703. [C]

**PCB 3704 Human Physiology II (3). PCB 3704L Human Physiology II Lab (1).** Physiology of respiratory, gastrointestinal, excretory, endocrine and reproductive systems. Continuation of PCB 3703. Prerequisite (Lecture): BSC 2010. Prerequisite or Corequisite (Lab): PCB 3704. [C]

**PCB 4023 Cell Biology (3).** A structural and molecular analysis of cell function. Prerequisites: PCB 3063 and CHM 1046. [C]

**PCB 4023L Cell Biology Lab (1).** Fundamentals of cell/histological identification and current techniques used to study cells. Prerequisite or Corequisite: PCB 4023.

**PCB 4133 Topics in Structure/Development (3).** An intensive study of a particular topic or topics in Structure-Development not otherwise offered in the curriculum. Prerequisites: BSC 2010, BSC 2010L and BSC 2011, BSC 2011L. [D]

**PCB 4232 The Biology of Acquired Immune Deficiency Syndrome (AIDS) (3).** An overview of Acquired Immune Deficiency Syndrome (AIDS) from biomedical and psychosocial perspectives. Prerequisites: BSC 2010, BSC 2011, CHM 1045, and II CHM 1046. [C]

**PCB 4233 Immunology (3). PCB 4233L Immunology Lab (1).** Fundamentals of immunology including antibody structure, immunopathology, molecular recognition at cell surfaces and immunological aspects of cancer biology. Prerequisite (Lecture): PCB 3063. Prerequisite or Corequisite (Lab): PCB 4233. [C]

**PCB 4234 Biology of Cancer (3).** Explore fundamental biology of cancer as a dynamic system governed by evolutionary and ecological principles. Prerequisites: PCB 3063 and PCB 3043. [C]

**PCB 4253 Developmental Biology (3).** Comprehensive survey of principles of development and critical analysis of methods used to study these problems. Prerequisites: PCB 3063 or BCH 3033. [D]

**PCB 4301 Freshwater Ecology (3). PCB 4301L Freshwater Ecology Laboratory (2).** Community-level analysis of marshes, lakes and rivers from theoretical and practical viewpoints, emphasizing quantitative description of community structure and function. Prerequisite (Lecture): PCB 3043. Prerequisite or Corequisite (Lab): PCB 4301. [A]

**PCB 4373 Amphibian Ecology (3).** In-depth survey of the ecology of members of the vertebrate class Amphibia (caecilians, salamanders, and frogs). Prerequisite: PCB 3043. [A]

**PCB 4401 Global Change Ecology: How humans changed the face of Earth (3).** This course will examine the global consequences of human activities and illuminate how anthropogenic changes in the Earth system alter terrestrial, freshwater and marine ecosystems. [A] Prerequisite: PCB 3043

**PCB 4414 Behavioral Ecology (3).** Investigation of the adaptive significance of behavior. Synthesis and discussion of literature and theory pertaining to the strategies and tactics organisms use to survive and reproduce. Prerequisite: PCB 3043. [A]

**PCB 4442 Community Ecology (3).** Dynamic and descriptive community ecology: interactions among >2 species, patterns in species co-occurrences across space and time. Terrestrial, aquatic, and marine examples and applications. Prerequisites: PCB 3043, MAC 2311. [A]

**PCB 4452 Introduction to Wetland Ecology and Management (3).** Principles of wetland ecology and their application to management of freshwater and estuarine wetlands. Prerequisites: PCB 3043 or permission of the instructor. [A]

**PCB 4462C Introduction to Landscape Ecology with GIS (4).** This course is a combined lecture and lab course that introduces students to concepts and practices of landscape ecology and uses of a geographic information system (GIS) in landscape ecology. Prerequisite: BSC 2010 and BSC 2011 Corequisite: have taken or are enrolled in PCB 3043. [A]

**PCB 4467C Marine Protected Areas – GL (4).** Introduction to the theory and methods for the design and management of Marine Protected Areas. Prerequisites: BSC 2010 and BSC 2011. [A]

**PCB 4514 Advanced Genetics (3).** Advanced level treatment of topics such as meiotic disjunction-uniparental disomy, transcription & splicing -differential splicing, polymorphisms, chromatin organization, horizontal gene transfer, etc. Prerequisite: PCB 3063. [C]

**PCB 4524 Molecular Biology (3). PCB 4524L Molecular Biology Lab (1).** Advanced nucleic acid and protein biochemistry: biosynthesis of macro-molecules and molecular genetics. Prerequisites (Lecture): PCB 3063, BCH 3033 or CHM 4304. Prerequisite or Corequisite: PCB 4524. [C]

**PCB 4553 General Population Genetics – GL (3).** Analysis of gene and genotype frequencies in theoretical and real populations. Topics include genetic drift, mutation, and selection. Prerequisite: PCB 3063. [A]

**PCB 4561 Epigenetics (3).** An overview of the mechanisms involved in epigenetic inheritance and their role in reproduction, development, environmental responses and health. Prerequisites: BSC1011, PCB3063 [D]

**PCB 4663 General Human Genetics (3).** Examination of genetics as it applies to the normal and abnormal human condition. Includes topics such as genetic engineering, cloning, and human evolution. Prerequisite: PCB 3063. [D]

**PCB 4673 Evolutionary Ecology (3). PCB 4673L Evolutionary Ecology Lab (1).** Adaptation and interaction of plants and animals in natural and disturbed habitats. Prerequisites (Lecture): PCB 3043 and PCB 3063. Prerequisite or Corequisite (Lab): PCB 4673. [A]

**PCB 4674 Evolution (3).** A study of the synthetic theory of evolution, its historic and experimental justification and the mechanisms of natural selection. Prerequisites: PCB 3063, PCB 3043. [B]

**PCB 4676 Human Evolution (3).** The evolutionary processes and relationships that have led to the unique biocultural development of the human species. Hominin origins and taxonomy are examined through fossil evidence. Prerequisites: BSC 2011 and PCB 3063. [B]

**PCB 4717 Topics in Physiology/Biochemistry (3).** An intensive study of a particular topic or topics in Physiology/Biochemistry not otherwise offered in the curriculum. Prerequisites: BSC 2010, BSC 2010L and BSC 2011, BSC 2011L. [C]

**PCB 4723 Animal Physiology (3). PCB 4723L Animal Physiology Lab (1).** Advanced study of physiological mechanisms employed by animals to maintain function of the organ systems and to interact with the environment. Prerequisites (Lecture): BSC 2010, BSC 2011, and CHM 2211. Prerequisite or Corequisite: PCB 4723. [C]

**PCB 4724 Comparative Physiology (3). PCB 4724L Comparative Physiology Lab I (1).** Regulation of the internal environment: osmotic gastrointestinal, metabolic, circulatory and respiratory physiology. Prerequisites (Lecture): BSC 2010 and BSC 2011 and CHM 2210. Prerequisite or Corequisite (Lab): PCB 4724. [C]

**PCB 4733 Human Systemic Physiology I (3). PCB 4733L Human Systemic Physiology Lab (1).** Selected topics in human physiology with emphasis on topics of clinical significance. Prerequisite (Lecture): BSC 2010. Prerequisite or Corequisite (Lab): PCB 4733. [C]

**PCB 4734 Human Systemic Physiology II (3).** Selected topics in human physiology with emphasis on topics of clinical significance. Prerequisites: BSC 2010. [C]

**PCB 4776 Physiological and Behavioral Ecology of Marine Animals (3).** An overview of the physiological and behavioral adaptations of marine animals to their environments. Prerequisites: BSC2010, BSC2011, and PCB3043. [C]

**PCB 4805 Endocrinology (3).** Biochemistry, physiology and anatomy of the endocrine systems of vertebrates and invertebrates. Steroid, peptide, and terpenoid hormones which control reproduction, growth, and other parameters. Prerequisites: BSC 2011, CHM 2211, and one physiology course. [C]

**PCB 4805L Endocrinology Laboratory (1).** A series of lab exercises and experiments designed to supplement lecture material in PCB 4805, and coordinated with that content. Corequisite: PCB 4805.

**PCB 4810 Biology of Stress (3).** An overview of the physiological processes, neural and hormonal mechanisms of the stress response. Integrates multiple disciplines in biology explaining the mechanisms and consequences of stress. [C] Prerequisite: BSC 2010 & BSC 2011

**PCB 4932 Topics in Ecology (3).** An intensive study of a particular topic or topic in Ecology not otherwise offered in the curriculum. Prerequisites: BSC 2010, BSC 2010L and BSC 2011, BSC 2011L. [A]

**SCE 3813 Biology Education Seminar (1).** theoretical and practical introduction to pedagogical elements such as Cooperative, Inquiry and Problem-Based Learning. Students will learn how to teach biology effectively in the modern classroom. Prerequisite: Permission of the instructor.

**ZOO 3205C Invertebrate Zoology (4).** Taxonomy, anatomy, development, physiology and ecology of major invertebrate groups, including terrestrial and aquatic phyla. Prerequisite: BSC 2011. [B]

**ZOO 3303 Vertebrate Zoology (3). ZOO 3303L Vertebrate Zoology Lab (1).** Systematics, anatomy, physiology, development and ecology of vertebrate animals. Prerequisites (Lecture): BSC 2010 and BSC 2011 with BSC 2010L and BSC 2011L. Prerequisite or Corequisite: ZOO 3303. [B]

**ZOO 3378C Forensic Osteology (4).** A detailed examination of the human skeleton revealing such individual traits as sex, age, height, and race in order to assist law enforcement investigation in forensic identifications. Prerequisite: Permission of the instructor.[D]

**ZOO 3603 Embryology (3). ZOO 3603L Embryology Lab (1).** Animal morphogenesis. Laboratory must be taken with lecture. Prerequisites (Lecture): BSC 2010 and BSC 2011 with BSC 2010L and BSC 2011L. Prerequisite or Corequisite (Lab): ZOO 3603. [D]

**ZOO 3713C Comparative Vertebrate Anatomy (4).** Study of the structural diversity and classification of vertebrates and the evolution of various organ systems. Dissection of a variety of vertebrate specimens to reveal relationships of the various organ systems. Prerequisites: BSC 2010 and BSC 2011. [D]

**ZOO 3731 Human Anatomy (3). ZOO 3731L Human Anatomy Demonstration (1).** Survey of organ systems of the human body with major emphasis on the skeletal, muscular, and peripheral nervous system. Guided examination of prosected human cadavers. Prerequisites (Lecture): BSC 2010 or PCB 2099 or BSC 2023 or MCB 2000 or HSC 3549. Prerequisite or Corequisite (Lab): ZOO 3731. Concurrent enrollment in both lecture and laboratory required. [D]

**ZOO 3753 Histology (3). ZOO 3753L Histology Lab (1).** Microscopic anatomy of cells, tissues and organs. Prerequisites (Lecture): BSC 2010 and CHM 2210 and CHM 2211. Prerequisite or Corequisite (Lab) : ZOO 3753L or instructor permission. [D]

**ZOO 4114 Principles of Paleobiology (3).** Concepts and methods of paleobiology. Covers the nature of fossils, adaptation, systematics, evolutionary trends through time, global origination and extinction, paleoecology and paleobiogeography. Prerequisite: BSC 2011. [B]

**ZOO 4234 General Parasitology (3). ZOO 4234L General Parasitology Lab (1).** Modern concepts of biology, development, immunology and pathology of animal parasites. Prerequisite: BSC 2010. Corequisite: Concurrent registration of lecture and lab course. [B]

**ZOO 4454 Fish Biology (3).** Covers the systematics, anatomy, physiology, reproductive biology, and ecology of fish. Prerequisites: BSC 2010, BSC 2011, PCB 3043. [B]

**ZOO 4462C Herpetology (4).** Study of the biology of reptiles and amphibians with emphasis on the natural history and ecology of local species. Prerequisites: BSC 2010 and BSC 2011 and PCB 3043 or permission of the instructor. [B]

**ZOO 4472 Ornithology (3). ZOO 4472L Ornithology Lab (2).** Avian systematics, anatomy, physiology, behavior, ecology, evolution, and conservation. Labs teach visual and auditory identification, census techniques, banding, and taping. Field trips alternate Saturdays and at least one overnight weekend field trip. Prerequisites (Lecture): BSC 2010 and BSC 2011. Prerequisite or Corequisite (Lab): ZOO 4472. Concurrent registration of lecture with lab course. [B]

**ZOO 4484 Primate Biology (3). ZOO 4484L Primate Biology Field Lab (1).** Survey of the natural history of the prosimians, monkeys, and apes with special emphasis on primate anatomy, evolution, ecology, and behavior. Prerequisites (Lecture): BSC 2010 and BSC 2011 or permission of the instructor. Prerequisite or Corequisite (Lab): ZOO 4484. [B]

**ZOO 4513 Animal Behavior (3). ZOO 4513L Animal Behavior Laboratory (2).** Evolutionary approach to understanding the diversity of behavioral strategies. Ecological and physiological mechanisms of behavior will be emphasized. Prerequisites (Lecture): BSC 2010, BSC 2011. Prerequisite or Corequisite (Lab): ZOO 4513. [A]

**ZOO 4733 Survey of Regional Anatomy (3). ZOO 4733L Survey of Regional Anatomy Lab (2).** The regional anatomy of the human body as revealed by dissections, radiographs, models and videos. Prerequisites (Lecture): BSC 2011, BSC 2011L, CHM 1046, CHM 1046L, and PHY 2054 or PHY 2049. Prerequisite or Corequisite: ZOO 4733. (Lab fees assessed) [D]

**ZOO 4743C Neuroscience (4).** Structure and function of the human nervous system. Dissection and demonstration of human nervous system and various neurophysiology labs. Prerequisites: BSC 2010, BSC 2011, CHM 2211. [D]

**ZOO 4744 Neurobiology (3).** A comparative overview of the function of the nervous system covering neurons, sensory and motor systems, and the neural basis of behavior. Prerequisites: BSC 2010 and BSC 2011. [C]

**ZOO 4781 Sensory Systems in Neurobiology (3).** A comparative overview of sensory systems covering environmental stimuli, physical transduction, neural processing, and behavioral responses. Prerequisites: BSC 2010 and BSC 2011. [C]