Cover Sheet: Request 12335

Microbiology and Cell Science major - program changes

Info

Process	Major Curriculum|Modify|Ugrad/Pro
Status	Pending at PV - University Curriculum Committee (UCC)
Submitter	Monika Oli moli@ufl.edu
Created	2/20/2018 2:29:57 PM
Updated	4/9/2018 2:27:10 PM
Description of request	Several changes to our major are requested as outlined in the submission

Actions

Step	Status	Group	User	Comment	Updated
Department	Approved	CALS - Microbiology and Cell Science 514910000	Eric Triplett		2/21/2018
No document changes					
College	Approved	CALS - College of Agricultural and Life Sciences	Joel H Brendemuhl	Approved at the CALS CC on 3/16/18.	3/23/2018
CALS CLAS comparison and 8 semester plan 3-14 without quest.xlsx					3/14/2018
Associate Provost for Undergraduate Affairs	Approved	PV - Associate Provost for Undergraduate Affairs	Angela Lindner		4/9/2018
8 semester tracking for MCB and MCY 4-3-18.docx CALSMicrobioChange 4-4-18.docx					4/3/2018 4/4/2018
University Curriculum Committee	Pending	PV - University Curriculum Committee (UCC)			4/9/2018
No document changes					
Office of the Registrar					
No document changes					
Student Academic Support System					
No document changes					
Catalog					
No document changes					
Academic Assessment Committee Notified					
No document changes					
College Notified					
No document changes					

Major|Modify_Curriculum for request 12335

Info

Request: Microbiology and Cell Science major - program changes
Description of request: Several changes to our major are requested as outlined in the submission
Submitter: Monika Oli moli@ufl.edu
Created: 3/14/2018 2:11:58 PM
Form version: 3

Responses

Major Name Microbiology and Cell Science
Major Code MCB
Degree Program Name BSc in Microbiology and Cell Science
Undergraduate Innovation Academy Program No
Effective Term Earliest Available
Effective Year Earliest Available
Current Curriculum for Major Coursework for the Major

All majors must take 28-29 credits: 15 credits are core requirements, 10 credits are upper-division department electives and 3-4 credits are the quantitative requirement. A minimum of one credit in an advanced laboratory is required as part of the 10 department-elective credits.

Minimum grades of C, attained within two attempts (including withdrawals), are required in all critical-tracking courses, major courses, department core requirements, department electives and the quantitative requirement. Second attempts must be completed the next semester of enrollment. A 2.0 cumulative GPA of also is required.
Required Coursework

Integrated Principles of Biology 1 and 2 and laboratories (BSC 2010/2010L and BSC 2011/2011L). AGR 3033 may be substituted for BSC 2011 and 2011L
General Chemistry 1 and laboratory (CHM 2045 and 2045L)
General Chemistry 2 Qualitative Analysis and laboratory (CHM 2046 and 2046L)
Analytic Geometry and Calculus 1 (MAC 2311)
Physics 1 and 2 and laboratories (PHY 2053/2053L and PHY 2054/2054L or PHY 2048/2048L and PHY 2049/2049L)
Organic Chemistry and laboratory (CHM 2210, 2211 and 2211L)
All majors must complete the biology and general chemistry sequences and calculus by the end of the sophomore year. CHM 2210 Organic Chemistry must be completed by the end of tracking term five. To continue in the major, students must attain a minimum 2.5 cumulative GPA in these graded courses with no grade lower than a C.

Core Requirements

BCH 4024 or CHM 3218 Biochemistry or Organic Chemistry/Biochemistry 2
MCB 3023 and 3023L Principles of Microbiology and laboratory
MCB 4203 Pathogens or PCB 4233 Immunology
MCB 4304 Genetics of Microorganisms or PCB 4522 Molecular Genetics

Students must take MCB 4203 Pathogens or PCB 4233 Immunology as a core course. If they take both, one will count as a core course and the other will roll over into the 10-credit department elective requirement.
Department Elective Requirements

A total of 10 credits of approved department electives, including one credit in an advanced lab, are required. The list of approved department electives is available on the department website. A maximum of four credits of approved department electives with course prefixes of CHM, FOS, HOS, SWS and ZOO (excluding ZOO 4232) may be taken in other departments. The remaining six credits must be chosen from approved department electives and may include these BSC and ZOO courses: BSC 2891, BSC 4434 and ZOO 4232.

Quantitative Requirement

A total of 3-4 credits of approved courses meets this requirement. Courses include CHM 3120 and 3120L, or STA 2023, or COP 3275, or PCB 3063, or MCB 4320C, or BSC 4434, or BSC 2891. Several of these courses are also department electives and cannot be used to fulfill both the quantitative and the department elective requirements. No overlap is allowed.
Proposed Curriculum Changes Changes include
1. Include one more class in core requirement instead of departmental elective (3CR)
2. Change Quantitative requirement to Programming or Biostatitics with programming (different course selection) and
3. Delete old departmental electives
4. Add new departmental electives
5. Add 8 semester tracking courses

Coursework for the Major

All majors must take 28-29 credits: 18 credits are core requirements, 10 credits are upper-division department electives and 3 credits are the quantitative requirement. A minimum of one credit in an advanced laboratory is required as part of the 10 department-elective credits.

Minimum grades of C, attained within two attempts (including withdrawals), are required in all critical-tracking courses, major courses, department core requirements, department electives and the quantitative requirement. Second attempts must be completed the next semester of enrollment. A 2.0 cumulative GPA of also is required.

Required Coursework

Integrated Principles of Biology 1 and 2 and laboratories (BSC 2010/2010L and BSC 2011/2011L). AGR 3033 may be substituted for BSC 2011 and 2011L
General Chemistry 1 and laboratory (CHM 2045 and 2045L)
General Chemistry 2 Qualitative Analysis and laboratory (CHM 2046 and 2046L)
Analytic Geometry and Calculus 1 (MAC 2311)
Physics 1 and 2 and laboratories (PHY 2053/2053L and PHY 2054/2054L or PHY 2048/2048L and PHY 2049/2049L)
Organic Chemistry and laboratory (CHM 2210, 2211 and 2211L)
All majors must complete the biology and general chemistry sequences and calculus by the end of the sophomore year. CHM 2210 Organic Chemistry must be completed by the end of tracking term five. To continue in the major, students must attain a minimum 2.5 cumulative GPA in these graded courses with no grade lower than a C.

Core Requirements

BCH 4024 or CHM 3218 Biochemistry or Organic Chemistry/Biochemistry 2
MCB 3023 and 3023L Principles of Microbiology and laboratory
MCB 4203 Pathogens or PCB 4233 Immunology
MCB 4304 Genetics of Microorganisms or PCB 4522 Molecular Genetics
MCB4403 Prokaryotic Cell Structure and Function or PCB 3134 Cell Structure and Function
Students must take MCB 4203 Pathogens or PCB 4233 Immunology as a core course. If they take both, one will count as a core course and the other will roll over into the 10-credit department elective requirement.

Department Elective Requirements

A total of 10 credits of approved department electives, including one credit in an advanced lab, are required. The list of approved department electives is available on the department website. A maximum of four credits of approved department electives may be taken in other departments. The remaining six credits must be chosen from approved department electives.

Programming or Biostatistics with Programming

A total of 3 credits of approved courses meets this requirement. Selectr from BSC2891 , MCB 4325c, or any equivalent programming class. Several of these courses are also department electives and

cannot be used to fulfill both the quantitative and the department elective requirements. No overlap is allowed. STA2023 will not fulfill this requirement

Pedagogical Rationale/Justification The reasons for the changes are as follows
1. Include one more class in core requirement instead of departmental elective: we are the department of microbiology and cell biology and the faculty feels that a cell biology course should be mandatory as part of the curriculum which it is currently not
2. Change Quantitative requirement to Programming or Biostatitics with programming (different course selection): the faculty wants to encourage more quantitative skills and programming skills for all majors and making a programming class mandatory is beneficial to the educational goals of the students
3. Delete old departmental electives: several of the course in the catalog are no longer offered or have not been chosen by students for a long time
4. Add new departmental electives: with new faculty hires we have added several new electives to our course offerings
5. Add 8 semester tracking courses: as per mandate

Impact on Enrollment, Retention, Graduation There should be no impact of the curriculum changes on students who are currently in the major. More choices are available for students to select from electives and students will be better educated students upon graduation. All course are available with sufficient enrollment for all students to be accommodated. No other departments are affected by these changes.
Assessment Data Review We will adjust our curriculum map to incorporate tracking of the new requirements. The changes to be implemented are based on the literature (enhance quantitative requirements) and on a holistic approach to have students take a cell biology class when they major in a degree in "Microbiology and Cell Science".
The added SLOs are delineated in the attached document
Academic Learning Compact and Academic Assessment Plan We will add the cell biology course (MCB4403 or PCB 3134) to our curriculum map and will incorporate data into our annual report.

8 semester tracking for MCB and MCY

Semester 1	**Credits**	**Tracking**
MAC 2311 Analytic Geometry and Calculus 1	4	x
CHM 2045 General Chemistry 1	3	x
CHM 2045L Chemistry 1 Laboratory	1	x
Semester 2	**Credits**	
CHM 2046 General Chemistry 2 (GE-P)	3	x
CHM 2046L General Chemistry 2 Laboratory (GE-P)	1	x
BSC 2010 Integrated Principles of Biology 1, GE-B	3	x
BSC 2010L Integrated Principles of Biology Laboratory 1, GE-B	1	x
Semester 3	**Credits**	
CHM 2210 Organic Chemistry 1	3	semester 5 tracking
BSC 2011 Integrated Principles of Biology 2, GE-B	3	x
BSC 2011L Integrated Principles of Biology Laboratory 2, GE-B	1	x
Semester 4	**Credits**	
MCB 3023 Principles of Microbiology*, 3 credits, and*	3	semester 6 tracking
Semester 5	**Credits**	
MCB 4203 Bacterial Pathogens (taught only in Fall) or PCB4233 Immunology (taught only in spring)	3	semester 7 tracking
PCB3134 Eukaryotic Cell Structure or MCB4403 Prokaryotic Cell Structure	3	or semester 7 tracking
Semester 6	**Credits**	
MCB 4034L Advanced Microbiology Laboratory	1	semester 8 tracking

Old

https://catalog.ufl.edu/ugrad/current/agriculture/majors/microbiology-and-cell-science.aspx#op

Coursework for the Major

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Required Coursework

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General Chemistry 2 Qualitative Analysis and laboratory (CHM 2046 and 2046L)
Analytic Geometry and Calculus 1 (MAC 2311)
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A total of 10 credits of approved department electives, including one credit in an advanced lab, are required. The list of approved department electives is available on the department website. A maximum of four credits of approved department electives with course prefixes of CHM, FOS, HOS, SWS and ZOO (excluding ZOO 4232) may be taken in other departments. The remaining six credits must be chosen from approved department electives and may include these BSC and ZOO courses: BSC 2891, BSC 4434 and ZOO 4232.

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A total of 3-4 credits of approved courses meets this requirement. Courses include CHM 3120 and 3120L, or STA 2023, or COP 3275, or PCB 3063, or MCB 4320C, or BSC 4434, or BSC 2891. Several of these courses are also department electives and cannot be used to fulfill both the quantitative and the department elective requirements. No overlap is allowed.

New

https://catalog.ufl.edu/ugrad/current/agriculture/majors/microbiology-and-cell-science.aspx#op

Coursework for the Major

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Minimum grades of C, attained within two attempts (including withdrawals), are required in all critical-tracking courses, major courses, department core requirements, department electives and the quantitative requirement. Second attempts must be completed the next semester of enrollment. A 2.0 cumulative GPA of also is required.

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MCB4403 Prokaryotic Cell Structure and Function or PCB 3134 Cell Structure and Function

If students take both "or" classes, one will count as a core course and the other will roll over into the 10-credit department elective requirement.

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A total of 3 credits of approved courses meets this requirement. Select from BSC2891 , MCB 4325c, or any equivalent programming class. Several of these courses are also department electives and cannot be used to fulfill both the quantitative and the department elective requirements. No overlap is allowed. STA2023 will not fulfill this requirement

All majors must take 28-29 credits: 1~~5~~8 credits are core requirements, 10 credits are ~~upper-division~~ department electives and 3~~-4~~ credits are the quantitative requirement. A minimum of one credit in an advanced laboratory is required as part of the 10 department-elective credits.

Minimum grades of C, attained within two attempts (including withdrawals), are required in all critical-tracking courses, major courses, department core requirements, department electives and the quantitative requirement. Second attempts must be completed the next semester of enrollment. A 2.0 cumulative GPA of also is required.

Required Coursework

- Integrated Principles of Biology 1 and 2 and laboratories (BSC 2010/2010L and BSC 2011/2011L). AGR 3033 may be substituted for BSC 2011 and 2011L
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- Organic Chemistry and laboratory (CHM 2210, 2211 and 2211L)
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Core Requirements

- BCH 4024 or CHM 3218 Biochemistry or Organic Chemistry/Biochemistry 2
- MCB 3023 and 3023L Principles of Microbiology and laboratory
- MCB 4203 Pathogens or PCB 4233 Immunology
- MCB 4304 Genetics of Microorganisms or PCB 4522 Molecular Genetics
- MCB4403 Prokaryotic Cell Structure and Function or PCB 3134 Cell Structure and Function 3 credits
- BSC2891, MCB 4325c or similar Programming or Biostatistics with Programming class

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If students take both "or" classes, one will count as a core course and the other will roll over into the 10-credit department elective requirement.

~~Students must take MCB 4203 Pathogens or PCB 4233 Immunology as a core course. If they take both, one will count as a core course and the other will roll over into the 10-credit department elective requirement.~~

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A total of 3 credits of approved courses meets this requirement. Select from BSC2891 , MCB 4325c, or any equivalent programming class. Several of these courses are also department electives and cannot be used to fulfill both the quantitative and the department elective requirements. No overlap is allowed. STA2023 will not fulfill this requirement

~~A total of 3-4 credits of approved courses meets this requirement. Courses include CHM 3120 and 3120L, or STA 2023, or COP 3275, or PCB 3063, or MCB 4320C, or BSC 4434, or BSC 2891. Several of these courses are also department electives and cannot be used to fulfill both the quantitative and the department elective requirements. No overlap is allowed.~~

MCB 4911 Supervised Research may be taken for a maximum of three credits per semester and six credits total. This policy applies to all microbiology and cell science majors registered for undergraduate research in other out-of-department undergraduate research courses such as BCH 4905, BMS 4905, ZOO 4905, etc.

MCB 4934 Special Topics is often used for TA positions as "Supervised Teaching". ~~TA lab positions.~~ TA positions may be repeated for two semesters with one lab assignment per semester.

Enrollment in MCB 4911 Supervised Research, MCB 4905 Independent Study and MCB 4934 Special Topics: ~~Teaching Assistantship~~S will not fulfill any credits toward the microbiology department elective requirements; they will count only as general elective credit toward the 120 credits for the B.S. degree.

Relevant Minors and/or Certificates

The Microbiology and Cell Science Department also offers an undergraduate minor in bioinformatics to students majoring in any biology-related subject, including and not limited to microbiology, biology, or biochemistry.

So integrated is bioinformatics with biology that it is difficult to find an active research program that does not rely on bioinformatic analysis to achieve results. Unfortunately, the integration of

bioinformatic and traditional methods is not stressed in many undergraduate programs, leaving the next generation of biologists without the skills they need to succeed in tomorrow's research environment. The undergraduate minor in bioinformatics provides this critical training to future professionals in the biological disciplines.

A majority of majors are actively involved in undergraduate research for credit with mentors throughout the university. Preprofessional and graduate school-bound majors are encouraged to do a minimum of two semesters of undergraduate research. The department has a comprehensive list of mentors across campus who allow undergraduate students to do valuable research under their guidance. Please refer to the department website for more information on undergraduate research, finding a mentor and a contact list of UF faculty who have worked with microbiology and cell science majors.

Commented [MO1]: New link: http://microcell.ufl.edu/undergraduate-programs/

Enrollment in MCB 4911 Supervised Research will not fulfill any credits toward the microbiology major requirements; they will count only as general elective credit toward the 120 credits for the B.S. degree.

Critical Tracking

Critical Tracking records each student's progress in courses that are required for entry to each major. Please note the critical-tracking requirements below on a per-semester basis.

Equivalent critical-tracking courses as determined by the State of Florida Common Course Prerequisites may be used for transfer students.

Semester 1

- Complete CHM 1025 or CHM 2045/2045L
- 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 2

- Complete CHM 2045/2045L and MAC 2311
- 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 3

- Complete CHM 2046/2046L and BSC 2010/2010L
- 2.5 GPA required for all critical-tracking courses

- 2.0 UF GPA required

Semester 4

- Complete BSC 2011/2011L
- 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 5

- Complete CHM 2210
- 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 6

- Complete MCB3023
- 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 7

- Complete MCB 4203 (Fall) or PCB 4233 (Spring) or PCB3134 or MCB4403 (Fall)
- 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 8

- Complete MCB 4034L
- 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Model Semester Plan

Students are expected to complete the writing requirement while in the process of taking the courses below. Students are also expected to complete the general education international (GE-N) and diversity (GE-D) requirements concurrently with another general education requirement (typically, GE-C, H or S).

Degree comparison between the colleges

CALS (MCB)	CLAS (MCY)
Effective Oral Communication (AEC3030C, SPC2608)	College level Foreign Language Sequence (8-10 CR)
Technical Writing (ENC2210, ENC3254, AEC3033C)	1 additional Humanity
Economics (ECO2013, ECO2023, AEB2014)	1 additional Social Science

Commented [MO2]: This new plan replaces the old 8-semester plan

To remain on track, students must complete the appropriate critical-tracking courses, which appear in bold. These courses must be completed by the terms as listed above in the Critical Tracking criteria.

This semester plan represents an example progression through the major. Actual courses and course order may be different depending on the student's academic record and scheduling availability of courses. Prerequisites still apply.

MCB CALS

Semester 1	Credits	Tracking?	Total Credits
MAC 2311 Analytic Geometry and Calculus 1	4	x	
CHM 2045 General Chemistry 1	3	x	
CHM 2045L Chemistry 1 Laboratory	1	x	
IUF 1000 What is the Good Life, GE-H	3		
Composition, State Core GE-C; WR; ENC 1101 recommended	3		
Total	14		14
Semester 2	**Credits**		
CHM 2046 General Chemistry 2 (GE-P)	3	x	
CHM 2046L General Chemistry 2 Laboratory (GE-P)	1	x	
BSC 2010 Integrated Principles of Biology 1, GE-B	3	x	
BSC 2010L Integrated Principles of Biology Laboratory 1, GE-B	1	x	
BSC2891 Python Programming for Biology	3		
Composition, State Core GE-C; WR;	3		
Total	14		14
Semester 3	**Credits**		
CHM 2210 Organic Chemistry 1	3	~~seemster~~semester 5 tracking	
Social and Behavioral Sciences, State Core GE-S	3		

BSC 2011 Integrated Principles of Biology 2, GE-B	3	x	
BSC 2011L Integrated Principles of Biology Laboratory 2, GE-B	1	x	
AEB 2014 Economic Issues, Food and You, *3 credits, or AEB 3103 Principles of Food and Resource Economics, 4 credits, or ECO 2013 Principles of Macroeconomics, 4 credits, or ECO 2023 Principles of Microeconomics, 4 credits, (GE-S)*	3-4		
Total	13-14		14
Semester 4	**Credits**		
AEC 3033C Research and Business Writing in Agricultural and Life Sciences ENC 2210 Technical Writing (WR)	3		
CHM 2211 Organic Chemistry 2	3		
CHM 2211L Organic Chemistry Laboratory	2		
MCB 3023 Principles of Microbiology, *3 credits, and*	3	semester 6 tracking	
MCB 3023L Principles of Microbiology Laboratory, *2 credits*	2		
QUEST 2	3		
Total	16		16
Semester 5	**Credits**		
AEC 3030C Effective Oral Communication *or SPC 2608 Introduction to Public Speaking*	3		
MCB 4203 Bacterial Pathogens (taught only in Fall) or PCB4233 Immunology (taught only in spring)	3	semester 7 tracking	
Diversity elective GE-D	3		
PCB3134 Eukaryotic Cell Structure or MCB4403 Prokaryotic Cell Structure	3	or semester 7 tracking	
General elective	2		
Total	14		14
A 2.5 GPA with minimum grades of C in the bolded science and math courses listed above is required to continue in the major.		x	
Semester 6	**Credits**		
MCB4304 Genetics of Microorganisms (Taught only in Fall) or PCB 4522 Molecular Genetics (Taught only in Spring)	3		

Math Course *GE-M*	3		
Department elective	3		
BCH 4024 Biochemistry *or CHM 3218 Organic Chemistry/Biochemistry 2*	4		
MCB 4034L Advanced Microbiology Laboratory	1	semester 8 tracking	
Total	14		14
Semester 7	**Credits**		
Department elective	3		
PHY 2053 Physics 1 or PHY 2048 Physics with Calculus 1	3-4		
PHY 2053L Laboratory for Physics 1 or PHY 2048 L Laboratory for Physics with Calculus 1	1		
OTHER GENERAL Electives	3		
Writing elective, WR	3		
Humanities, State Core GE-H	3		
Total	16-17		17
Semester 8	**Credits**		
PHY 2054 Physics 2 or PHY 2049 Physics with Calculus 2	3-4		
PHY 2054L Laboratory for Physics 2 or PHY 2049L Laboratory for Physics with Calculus 2	1		
Department electives	3		
Humanities, State Core GE-H	3		
International Credit GE-N	3		
OTHER GENERAL Electives	3		
Total	16-17		17
			120

Original formatting for catalogue

Semester 1	Credits
BSC 2010 Integrated Principles of Biology 1, *3 credits, and* **BSC 2010L Integrated Principles of Biology Laboratory 1**, *1 credit* *GE-B*	**4**

CHM 2045 and General Chemistry 1, *3 credits, and* **CHM 2045L Chemistry 1 Laboratory**, *1 credit* *State Core GE-B/P*	**4**
IUF 1000 What is the Good Life *GE-H*	3
Composition *State Core GE-C; WR; ENC 1101 recommended*	3
	Total 14

Semester 2	**Credits**
AEB 2014 Economic Issues, Food and You, *3 credits, or* AEB 3103 Principles of Food and Resource Economics, *4 credits, or* ECO 2013 Principles of Macroeconomics, *4 credits, or* ECO 2023 Principles of Microeconomics, *4 credits, (GE-S)*	3-4
BSC 2011 Integrated Principles of Biology 2, *3 credits, and* **BSC 2011L Integrated Principles of Biology Laboratory 2**, *1 credit* *GE-B*	**4**
CHM 2046 General Chemistry 2, *3 credits, and* **CHM 2046L General Chemistry 2 Laboratory**, *1 credit* *GE-P*	**4**
Humanities *State Core GE-H*	3
	Total 14-15

Semester 3	**Credits**
CHM 2210 Organic Chemistry 1	**3**
MAC 2311 Analytic Geometry and Calculus 1 *State Core GE-M*	**4**
PHY 2053 Physics 1, *4 credits, and* PHY 2053L Laboratory for Physics 1, *1 credit* *OR* PHY 2048 and Physics with Calculus 1, *3 credits, and* PHY 2048L Laboratory for Physics with Calculus 1, *1 credit*	4-5
Social and Behavioral Sciences *State Core GE-S*	3
	Total 14-15

Semester 4	**Credits**
AEC 3033C Research and Business Writing in Agricultural and Life Sciences *or* ENC 2210 Technical Writing *WR*	3

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CHM 2211 Organic Chemistry 2, *3 credits, and* CHM 2211L Organic Chemistry Laboratory, *2 credits*	5
MCB 3023 Principles of Microbiology, *3 credits, and* MCB 3023L Principles of Microbiology Laboratory, *2 credits*	5
Composition *GE-C; WR*	3
	Total 16

A 2.5 GPA with minimum grades of C in the bolded science and math courses listed above is required to continue in the major.

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Semester 5	**Credits**
AEC 3030C Effective Oral Communication *or* SPC 2608 Introduction to Public Speaking	3
BCH 4024 Biochemistry *or* CHM 3218 Organic Chemistry/Biochemistry 2	4
PHY 2054 Physics 2, *4 credits, and* PHY 2054L Laboratory for Physics 2, *1 credit* *OR* PHY 2049 Physics with Calculus 2, *3 credits, and* PHY 2049L Laboratory for Physics with Calculus 2, *1 credit*	4-5
Diversity elective *GE-D*	3
	Total 14-15

Semester 6	**Credits**
MCB4304 Genetics of Microorganisms (Taught only in Fall) or PCB 4522 Molecular Genetics	3
Math Course ~~STA 2023 Introduction to Statistics 1~~ *GE-M*	3
Department elective	3
PCB3134 Eukaryotic Cell Structure or MCB4403 Prokaryotic Cell Structure~~Electives~~	4~~3~~
International elective	3
	Total 15~~6~~

Semester 7	**Credits**
MCB 4203 Bacterial and Viral Pathogens or PCB4233 Immunology (Taught only in Spring)	3
Department electives	6

BSC2891 Python Programming for Biology	3
Electives	24
Writing elective *WR*	3
Total	176

Semester 8	**Credits**
MCB 4034L Advanced Microbiology Laboratory	1
Electives	15
Total	16