

MICROBIOLOGY AND CELL SCIENCE UF ONLINE

The Bachelor of Science in Microbiology and Cell Science offers a flexible curriculum that develops an excellent knowledge base and an understanding of concepts in microbiology, cell biology and the bio-molecular sciences. Emphasis is placed on application of the scientific method to gain an understanding of the biological world at the cellular and molecular levels. Students learn to evaluate hypotheses, interpret experimental data, and communicate results effectively.

About this Program

- **College:** Agricultural and Life Sciences (<http://catalog.ufl.edu/UGRD/colleges-schools/UGAGL/>)
- **Degree:** Bachelor of Science
- **Credits for Degree:** 120
- **Contact:** 1.855.99GATOR
- **More Info**

To graduate with this major, students must complete all university, college, and major requirements.

Department Information

The Department of Microbiology & Cell Science is committed to excellence in education, research and service to the community. The curriculum provides an excellent preparation for students who wish to enter the workforce or continue their education in professional programs such as medical, dental, pharmacy, veterinary programs, graduate school, or public health degrees. BS degrees are offered through both the College of Agricultural and Life Sciences and the College of Liberal Arts and Sciences and the MS and PhD degrees are offered through the College of Agricultural and Life Sciences. Combination degrees are available.

Website (<http://microcell.ufl.edu/>)

CONTACT

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MICROBIOLOGY AND CELL SCIENCE BUILDING (MCSB)
GAINESVILLE FL 32611-0700
Map (<http://campusmap.ufl.edu/#/index/0981>)

Curriculum

- Bioinformatics Minor
- Bioinformatics Minor UF Online
- Combination Degrees
- Microbiology and Cell Science UF Online
- Microbiology and Cell Science | CALS
- Microbiology and Cell Science | CLAS
- Pathogenesis Minor
- Pathogenesis Minor UF Online

This major prepares students for entry into professional programs in medicine, dentistry and veterinary medicine and provides a strong foundation for graduate studies in microbiology, cell biology and related cellular and biomedical sciences. The major also provides a background for entry into government, industrial research and diagnostic laboratories.

The curriculum develops fundamental knowledge of prokaryotic and eukaryotic cells and viruses. Courses include the physiology and genetics of microorganisms, mechanisms of pathogenesis and innate immunity systems, astrobiology, bacterial and genome sequencing and bioinformatics.

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.

Code	Title	Credits
Required Coursework		
BSC 2010 & 2010L	Integrated Principles of Biology 1 and Integrated Principles of Biology Laboratory 1 ¹	4
BSC 2011 & 2011L	Integrated Principles of Biology 2 and Integrated Principles of Biology Laboratory 2 ¹	4
CHM 2045 & 2045L	General Chemistry 1 and General Chemistry 1 Laboratory ¹	4
CHM 2046 & 2046L	General Chemistry 2 and General Chemistry 2 Laboratory ¹	4
MAC 2311	Analytic Geometry and Calculus 1 ¹	4
Select one:		8-10
Option One		
PHY 2053 & 2053L	Physics 1 and Laboratory for Physics 1	
PHY 2054 & 2054L	Physics 2 and Laboratory for Physics 2	
Option Two		
PHY 2048 & 2048L	Physics with Calculus 1 and Laboratory for Physics with Calculus 1	
PHY 2049 & 2049L	Physics with Calculus 2 and Laboratory for Physics with Calculus 2	
CHM 2210	Organic Chemistry 1 ²	3
CHM 2211 & 2211L	Organic Chemistry 2 and Organic Chemistry Laboratory	5
Core Requirements		
BCH 4024 or CHM 3218	Introduction to Biochemistry and Molecular Biology Organic Chemistry/Biochemistry 2	4
MCB 3015C	Lab Skills Bootcamp	1
MCB 3023	Principles of Microbiology	3
Select one: ³		3
MCB 4203	Bacterial Pathogens (offered Fall)	
PCB 4233	Immunology (offered Spring)	
Select one:		
MCB 4304	Genetics of Microorganisms (offered Fall)	
PCB 4522	Molecular Genetics (offered Spring)	
MCB 4934	Special Topics in Microbiology and Cell Science ⁴	1-4
Department Elective Requirements		
MCB 4034L	Advanced Microbiology Laboratory	1
Select three:		9
BSC 2891	Python Programming for Biology	
MCB 3703	Astrobiology	
MCB 4203	Bacterial Pathogens	
MCB 4320C	The Microbiome	
MCB 4403	Prokaryotic Cell Structure and Function	
MCB 4503	General Virology	
MCB 4782	Extremophiles	
PCB 3134	Eukaryotic Cell Structure and Function	
ZOO 4232	Human Parasitology	
Quantitative Requirement		
BSC 2891	Python Programming for Biology	3
MCB 4320C	The Microbiome	3
STA 2023	Introduction to Statistics 1	3
General Elective Requirement		
General elective coursework at the University of Florida (any 3000/4000 level course will be accepted) ⁵		18
Total Credits		85-90

¹ All majors must complete the biology and general chemistry sequences and calculus by the end of the sophomore year. 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.

² Must be completed by the end of tracking term five.

³ Students must take MCB 4203 or PCB 4233 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.

⁴ Often used for TA lab positions. TA positions may be repeated for two semesters with one lab assignment per semester.

⁵ Enrollment in MCB 4911, MCB 4905 and MCB 4934 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 BS degree.

Course Details

MCB 4911 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.

Undergraduate Research

A majority of MCS students are actively involved in undergraduate research for credit with mentors throughout the university. The department encourages preprofessional and graduate school bound students to complete a minimum of two semesters of undergraduate research. The department maintains a list of mentors across campus who allow undergraduate students to participate in valuable research under their guidance. Additional information is available about undergraduate research and faculty mentors who have worked with microbiology and cell science students.

Preparation for Graduate Study

This major prepares students for entry into graduate studies in microbiology, cell biology, biochemistry and other areas.

All students interested in graduate education should develop a strong background in chemistry. Suggested schedules for students who plan to attend graduate school are available on the website. Students planning graduate study in microbiology, biochemistry or molecular biological sciences should consider taking these courses:

Code	Title	Credits
CHM 3218	Organic Chemistry/Biochemistry 2 (biochemistry requirement)	4
MAC 2312	Analytic Geometry and Calculus 2	4
STA 2023	Introduction to Statistics 1	3
MCB 4403	Prokaryotic Cell Structure and Function (required department elective)	3
PCB 3134	Eukaryotic Cell Structure and Function (required department elective)	3
CHM 3400	Physical Chemistry for the Biosciences (required department elective)	3
MCB 5305L	Microbial Genetics and Biotechnology Laboratory (microbiology advanced laboratory requirement)	2
PCB 4233	Immunology (pathogens or immunology requirement)	3
MCB 4905	Independent Study (valuable laboratory research experience)	4
Total Credits		29

Relevant Minors and/or Certificates

The Department of Microbiology and Cell Science also offers a minor in bioinformatics to students majoring in any life sciences subject, including and not limited to microbiology, biology or biochemistry.

So integrated is bioinformatics with the life sciences that it is difficult to find an active research program that does not rely on bioinformatic analysis to achieve results. By integrating bioinformatic and traditional methods, the minor in bioinformatics provides critical training to future professionals in the life science disciplines.

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 (<https://cpm.flvc.org/advance-search/>) may be used for transfer students.

Semester 1

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

Semester 2

- Complete CHM 2045/CHM 2045L and BSC 2010/BSC 2010L
- 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 3

- Complete CHM 2046/CHM 2046L and MAC 2311
- 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 4

- Complete BSC 2011/BSC 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 MCB 3023
- 2.0 Upper division GPA required
- 2.0 UF GPA required

Semester 7

- Complete MCB 4203 (Fall) or PCB 4233 (Spring) or PCB 3134 (Fall/Spring) or MCB 4403 (Fall)
- 2.0 Upper division GPA required
- 2.0 UF GPA required

Semester 8

- Complete MCB 4034L
- 2.0 Upper division GPA required
- 2.0 UF GPA required

Model Semester Plan

To remain on track, students must complete the appropriate critical-tracking courses, which appear in bold.

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.

Course	Title	Credits
Semester One		
Quest 1 (Gen Ed Humanities)		3
MAC 2311	Analytic Geometry and Calculus 1 (Critical Tracking ; State Core Gen Ed Mathematics)	4
CHM 2045 & 2045L	General Chemistry 1 and General Chemistry 1 Laboratory (Critical Tracking ; State Core Gen Ed Physical Sciences)	4
State Core Gen Ed Composition (http://catalog.ufl.edu/UGRD/academic-programs/general-education/#genedcoursestext); Writing Requirement ¹		3
	Credits	14
Semester Two		
BSC 2010 & 2010L	Integrated Principles of Biology 1 and Integrated Principles of Biology Laboratory 1 (Critical Tracking ; Gen Ed Biological Sciences)	4
BSC 2891	Python Programming for Biology (Or similar quantitative elective)	3

CHM 2046 & 2046L	General Chemistry 2 and General Chemistry 2 Laboratory (Critical Tracking ; Gen Ed Physical Sciences)	4
Gen Ed Composition		3
Credits		14
Semester Three		
Select one:		3-4
AEB 2014	Economic Issues, Food and You	
AEB 3103	Principles of Food and Resource Economics	
ECO 2013	Principles of Macroeconomics	
ECO 2023	Principles of Microeconomics (Gen Ed Social and Behavioral Sciences)	
BSC 2011 & 2011L	Integrated Principles of Biology 2 and Integrated Principles of Biology Laboratory 2 (Critical Tracking ; Gen Ed Biological and Physical Sciences)	4
CHM 2210	Organic Chemistry 1 (Critical Tracking)	3
State Core Gen Ed Social and Behavioral Sciences (http://catalog.ufl.edu/UGRD/academic-programs/general-education/#genedcoursestext)		3
Credits		13-14
Semester Four		
Quest 2 (Gen Ed Diversity or International)		3
AEC 3033C or ENC 2210	Research and Business Writing in Agricultural and Life Sciences (Writing Requirement) or Technical Writing	3
CHM 2211 & 2211L	Organic Chemistry 2 and Organic Chemistry Laboratory	5
MCB 3023 & 3023L	Principles of Microbiology and Principles of Microbiology Laboratory (Critical Tracking)	5
Credits		16
Semester Five		
AEC 3030C or SPC 2608	Effective Oral Communication or Introduction to Public Speaking	3
MCB 4203 or PCB 4233	Bacterial Pathogens (Critical Tracking) ² or Immunology	3
MCB 4403 or PCB 3134	Prokaryotic Cell Structure and Function (Critical Tracking) or Eukaryotic Cell Structure and Function	3
Gen Ed Diversity or Gen Ed International ³		3
Electives		5
Credits		17
Semester Six		
BCH 4024 or CHM 3218	Introduction to Biochemistry and Molecular Biology or Organic Chemistry/Biochemistry 2	4
MCB 4304 or PCB 4522	Genetics of Microorganisms ⁴ or Molecular Genetics	3
MCB 4034L	Advanced Microbiology Laboratory (Critical Tracking)	1
Gen Ed Mathematics		3
Department elective		3
Credits		14
Semester Seven		
Select one:		4-5
PHY 2048 & 2048L	Physics with Calculus 1 and Laboratory for Physics with Calculus 1	
PHY 2053 & 2053L	Physics 1 and Laboratory for Physics 1	
State Core Gen Ed Humanities (http://catalog.ufl.edu/UGRD/academic-programs/general-education/#genedcoursestext)		3
Writing Requirement		3
Department elective		3
Elective		3
Credits		16-17
Semester Eight		
Select one:		4-5
PHY 2049 & 2049L	Physics with Calculus 2 and Laboratory for Physics with Calculus 2	

PHY 2054 & 2054L	Physics 2 and Laboratory for Physics 2	
Gen Ed Social and Behavioral Sciences		3
Department elective		3
Science Elective		3
Elective		3
Credits		16-17
Total Credits		120

- ¹ ENC 1101 recommended.
- ² MCB 4203 is taught in the Fall and the Spring. PCB 4233 is taught only in the Spring.
- ³ Choice depends on courses taken in Semesters 3 and 4.
- ⁴ MCB 4304 is taught only in the Fall. PCB 4522 is taught only in the Spring.

Academic Learning Compact

The Bachelor of Science in Microbiology and Cell Science, offered by both the College of Agricultural and Life Sciences and the College of Liberal Arts and Sciences, offers students flexibility in a curriculum that develops an excellent knowledge base and an understanding of concepts in microbiology, cell biology and the biomolecular sciences. Emphasis will be placed on application of the scientific method to gain an understanding of the biological world at the cellular and molecular levels. Students will learn to evaluate hypotheses, to interpret experimental data and to communicate results effectively.

Before Graduating Students Must

Complete requirements for the baccalaureate degree, as determined by faculty.

Students in the Major will Learn to

Student Learning Outcomes | SLOs

Content

1. Describe fundamental concepts, skills and processes in microbiology, molecular biology, and in host/pathogen interactions.
2. Apply fundamental concepts, skills and protocols used to conduct research in fields of microbiology, molecular biology, and in host/pathogen.

Critical Thinking

3. Evaluate information and data in the general areas of microbiology and the cellular and molecular biological sciences.
4. Solve typical problems that are encountered in general areas of microbiology and cellular and molecular biological sciences.

Communication

5. Communicate effectively in written form in a manner appropriate in microbiology and the cellular and molecular biological sciences.
6. Communicate orally (including visual aids) in an effective manner appropriate in microbiology and the cellular and molecular biological sciences.

Curriculum Map

I = Introduced; R = Reinforced; A = Assessed

Courses	SLO 1	SLO 2	SLO 3	SLO 4	SLO 5	SLO 6
AEC 3030C						I, R, A
AEC 3033C					I, R, A	
MCB 3023	I, A		I	I		
MCB 3023L	I, R	I, R	R	I, R, A		R
MCB 4034L	I, R	I, R, A	I, R, A	I, R	R	I, R
MCB 4203 or PCB 4233	I, R, A	I, R	I, R	I, R	I, R	I, R
MCB 4304 or PCB 4522	I, R, A	I, R	R, A	R	R	R

Assessment Types

- Genome and lab projects
- Presentations

- Exams
 - Final grades
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