The study of small living organisms, Microbiology and Cell Science includes emphasis on molecular biology and genetics; immunology; virology; host-pathogen interactions; cellular ultrastructure; environmental microbiology; and microbial physiology, metabolism and regulation. Microbiology and Cell Science students study chemistry, physics, bacterial pathogens, and genetics.

About this Program

- **College:** Agricultural and Life Sciences (http://catalog.ufl.edu/UGRD/colleges-schools/UGAGL/)
- **Degree:** Bachelor of Science
- **Credits for Degree:** 120

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

Department Information

The Department of Microbiology and 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. B.S. degrees are offered through both the College of Agricultural and Life Sciences and the College of Liberal Arts and Sciences and the M.S. and Ph.D. degrees are offered through the College of Agricultural and Life Sciences. Combination degrees are available. Website (http://microcell.ufl.edu/)

CONTACT

Email (bkorithoski@ufl.edu) | 352.392.1906 (tel) | 352.846.0950 (fax)

PO. Box 110700
1355 Museum Drive
MICROBIOLOGY AND CELL SCIENCE BUILDING (MCSB)
GAINESVILLE FL 32611-0700
Map (http://campusmap.ufl.edu/#/index/0981)

Curriculum

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

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 credits: 18 credits are core requirements, 7 credits are department electives and 3 credits are the quantitative requirement. A minimum of one credit in an advanced laboratory is required as part of the 7 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

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BSC 2010 &amp; 2010L</td>
<td>Integrated Principles of Biology 1 and Integrated Principles of Biology Laboratory 1</td>
<td>4</td>
</tr>
<tr>
<td>BSC 2011 &amp; 2011L</td>
<td>Integrated Principles of Biology 2 and Integrated Principles of Biology Laboratory 2</td>
<td>4</td>
</tr>
<tr>
<td>CHM 2045 &amp; 2045L</td>
<td>General Chemistry 1 and General Chemistry 1 Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>CHM 2046 &amp; 2046L</td>
<td>General Chemistry 2 and General Chemistry 2 Laboratory</td>
<td>4</td>
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<tr>
<td>MAC 2311</td>
<td>Analytic Geometry and Calculus 1</td>
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Select one:

**Option One**

<table>
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<tr>
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<th>Credits</th>
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<tr>
<td>PHY 2053 &amp; 2053L</td>
<td>Physics 1 and Laboratory for Physics 1</td>
<td>3</td>
</tr>
<tr>
<td>PHY 2054 &amp; 2054L</td>
<td>Physics 2 and Laboratory for Physics 2</td>
<td>3</td>
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**Option Two**

<table>
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<th>Title</th>
<th>Credits</th>
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</thead>
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<td>PHY 2048 &amp; 2048L</td>
<td>Physics with Calculus 1 and Laboratory for Physics with Calculus 1</td>
<td>4</td>
</tr>
<tr>
<td>PHY 2049 &amp; 2049L</td>
<td>Physics with Calculus 2 and Laboratory for Physics with Calculus 2</td>
<td>4</td>
</tr>
<tr>
<td>CHM 2210</td>
<td>Organic Chemistry 1</td>
<td>3</td>
</tr>
<tr>
<td>CHM 2211 &amp; 2211L</td>
<td>Organic Chemistry 2 and Organic Chemistry Laboratory</td>
<td>3</td>
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</tbody>
</table>

**Total Credits:** 36-38

All majors must complete the biology and general chemistry sequences and calculus by the end of the sophomore year. CHM 2210 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

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSC 2891 or MCB 4325C</td>
<td>Python Programming for Biology or Functional Genomics</td>
<td>3</td>
</tr>
<tr>
<td>BCH 4024 or CHM 3218</td>
<td>Introduction to Biochemistry and Molecular Biology or Organic Chemistry/Biochemistry 2</td>
<td>4</td>
</tr>
<tr>
<td>MCB 3023 &amp; 3023L</td>
<td>Principles of Microbiology and Principles of Microbiology Laboratory</td>
<td>5</td>
</tr>
<tr>
<td>MCB 4203 or PCB 4233</td>
<td>Bacterial Pathogens or Immunology</td>
<td>3</td>
</tr>
</tbody>
</table>
the biological disciplines. In bioinformatics provides this critical training to future professionals in tomorrow's research environment. The undergraduate minor leaves the next generation of biologists without the skills they need to succeed in traditional methods is not stressed in many undergraduate programs, to achieve results. Unfortunately, the integration of bioinformatic and active research program that does not rely on bioinformatic analysis are closely integrated with biology that it is difficult to find an active research program that does not rely on bioinformatic analysis to achieve results. Fortunately, 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.

### Relevant Minors and/or Certificates

The Department of Microbiology and Cell Science also offers a minor in bioinformatics to students majoring in any biology-related subject, including and not limited to microbiology, biology, or biochemistry. More Info (http://catalog.ufl.edu/UGRD/colleges-schools/UGAGL/BIF_UMN/)

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.

### Programming or Biostatistics with Programming Requirement

A total of 3 credits of approved courses meets this requirement. Select from BSC 2891, 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. STA 2023 will not fulfill this requirement.

### 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.

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

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 B.S. degree.

### Relevant Minors and/or Certificates

The Department of Microbiology and Cell Science also offers a minor in bioinformatics to students majoring in any biology-related subject, including and not limited to microbiology, biology, or biochemistry. More Info (http://catalog.ufl.edu/UGRD/colleges-schools/UGAGL/BIF_UMN/)

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.

### Research

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.

More Info (http://microcell.ufl.edu/programs/)

Enrollment in MCB 4911 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 progress toward 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 (http://www.flvc.org/cpp/displayRecord.jsp?cip=260503&track=01) may be used for transfer students.
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

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). 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.

Degree Comparison between the Colleges

<table>
<thead>
<tr>
<th>CALS</th>
<th>MCB</th>
<th>CLAS</th>
<th>MCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective Oral Communication (AEC 3030C, SPC 2608)</td>
<td>College-level Foreign Language Sequence (8-10 credits)</td>
<td>Technical Writing (ENC 2210, ENC 3254, AEC 3033C)</td>
<td>1 additional Humanity course</td>
</tr>
<tr>
<td>Economics (ECO 2013, ECO 2023, AEB 2014)</td>
<td>1 additional Social Science course</td>
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</tr>
<tr>
<td>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.</td>
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</table>

Semester Three

Select one:

- 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)

Semester Four

- BSC 2011 Integrated Principles of Biology 2
- & 2011L and Integrated Principles of Biology Laboratory 2 (Critical Tracking; Gen Ed Biological and Physical Sciences)
- CHM 2210 Organic Chemistry 1 (Critical Tracking)
- State Core Gen Ed Social and Behavioral Sciences; potentially with Gen Ed International or Gen Ed Diversity

Semester Five

- AEC 3033C or ENC 2210 Research and Business Writing in Agricultural and Life Sciences (Writing Requirement) or Technical Writing
- CHM 2211 & 2211L Organic Chemistry Laboratory
- MCB 3023 Principles of Microbiology and Principles of Microbiology Laboratory (Critical Tracking)

Semester Six

- BSC 2891 Python Programming for Biology (Or similar quantitative elective)
- CHM 2046 General Chemistry 2 and General Chemistry 2 Laboratory (Critical Tracking; Gen Ed Physical Sciences)
- Gen Ed Composition

Credits 14

Semester Seven

Select one:

- 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)

Semester Eight

- BSC 2011 Integrated Principles of Biology 2
- & 2011L and Integrated Principles of Biology Laboratory 2 (Critical Tracking; Gen Ed Biological and Physical Sciences)
- CHM 2210 Organic Chemistry 1 (Critical Tracking)
- State Core Gen Ed Social and Behavioral Sciences; potentially with Gen Ed International or Gen Ed Diversity

Credits 16

Semester Nine

- BSC 2011 Integrated Principles of Biology 2
- & 2011L and Integrated Principles of Biology Laboratory 2 (Critical Tracking; Gen Ed Biological and Physical Sciences)
- CHM 2210 Organic Chemistry 1 (Critical Tracking)
- State Core Gen Ed Social and Behavioral Sciences; potentially with Gen Ed International or Gen Ed Diversity

Credits 17

Semester Ten

- BSC 2011 Integrated Principles of Biology 2
- & 2011L and Integrated Principles of Biology Laboratory 2 (Critical Tracking; Gen Ed Biological and Physical Sciences)
- CHM 2210 Organic Chemistry 1 (Critical Tracking)
- State Core Gen Ed Social and Behavioral Sciences; potentially with Gen Ed International or Gen Ed Diversity

Credits 14
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

**Semester Eight**
Select one:
PHY 2049 & 2049L
Physics with Calculus 2 and Laboratory for Physics with Calculus 2
PHY 2054 & 2054L
Physics 2 and Laboratory for Physics 2

Department elective 3
Electives 6

**Credits** 16-17

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 after Semester 4.

1 ENC 1101 recommended.
2 MCB 4203 is taught only in the fall; PCB 4233 is taught only in the spring.
3 Choice depends on courses taken in Semesters Three and Four.
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

<table>
<thead>
<tr>
<th>Courses</th>
<th>SLO 1</th>
<th>SLO 2</th>
<th>SLO 3</th>
<th>SLO 4</th>
<th>SLO 5</th>
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<td>MCB 4034R, R</td>
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<td>PCB 4522</td>
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**Assessment Types**

- Genome and lab projects
- Presentations
- Exams
- Final grades