MICROBIOLOGY, BS (CALS)

REQUIREMENTS

UNIVERSITY GENERAL EDUCATION REQUIREMENTS

All undergraduate students at the University of Wisconsin-Madison are required to fulfill a minimum set of common university general education requirements to ensure that every graduate acquires the essential core of an undergraduate education. This core establishes a foundation for living a productive life, being a citizen of the world, appreciating aesthetic values, and engaging in lifelong learning in a continually changing world. Various schools and colleges will have requirements in addition to the requirements listed below. Consult your advisor for assistance, as needed. For additional information, see the university Undergraduate General Education Requirements (https://guide.wisc.edu/undergraduate/#requirementsforundergraduatestudytext) section of the Guide.

General Education

- Breadth—Humanities/Literature/Arts: 6 credits
- Breadth—Natural Science: 4 to 6 credits, consisting of one 4- or 5-credit course with a laboratory component; or two courses providing a total of 6 credits
- Breadth—Social Studies: 3 credits
- Communication Part A & Part B *
- Ethnic Studies *
- Quantitative Reasoning Part A & Part B *

* The mortarboard symbol appears before the title of any course that fulfills one of the Communication Part A or Part B, Ethnic Studies, or Quantitative Reasoning Part A or Part B requirements.

COLLEGE OF AGRICULTURAL AND LIFE SCIENCES REQUIREMENTS

In addition to the University General Education Requirements, all undergraduate students in CALS must satisfy a set of college and major requirements. Courses may not double count within university requirements (General Education and Breadth) or within college requirements (First-Year Seminar, International Studies, Science, and Capstone), but courses counted toward university requirements may also be used to satisfy a college and/or a major requirement; similarly, courses counted toward college requirements may also be used to satisfy a university and/or a major requirement.

COLLEGE REQUIREMENTS FOR ALL CALS BS DEGREE PROGRAMS

Code	Title	Credits
Quality of Work: Students must maintain a minimum cumulative grade point average of 2.000 to remain in good standing and be eligible for graduation.		
Residency: Students must complete 30 degree credits in residence at UW–Madison after earning 86 credits toward their undergraduate degree.		
First year seminar (https://guide.wisc.edu/undergraduate/agricultural-life-sciences/#CALSFirstYearSeminarCourses)		1
International studies (https://guide.wisc.edu/undergraduate/agricultural-life-sciences/#CALSInternationalStudiesCourses)		3
Physical science fundamentals		4-5
CHEM 103	General Chemistry I	
or CHEM 108	Chemistry in Our World	
or CHEM 109	Advanced General Chemistry	
Biological science		5
Additional science (biological, physical, or natural)		3
Science breadth (biological, physical, natural, or social)		3
CALS Capstone Learning Experience: included in the requirements for each CALS major (see "major requirements") (https://guide.wisc.edu/undergraduate/agricultural-life-sciences/#CALSCapstoneRequirement)		

MAJOR REQUIREMENTS

Code	Title	Credits
Mathematics		
Complete one of the following:		5-10
MATH 171 & MATH 217	Calculus with Algebra and Trigonometry I and Calculus with Algebra and Trigonometry II	
MATH 221	Calculus and Analytic Geometry 1	
Statistics		
Complete one of the following:		3
STAT 371	Introductory Applied Statistics for the Life Sciences (Recommended)	
STAT 301	Introduction to Statistical Methods	
STAT 240	Data Science Modeling I	
General Chemistry		
Complete one of the following:		5-10
CHEM 103 & CHEM 104	General Chemistry I and General Chemistry II	
CHEM 109	Advanced General Chemistry	
CHEM 115 & CHEM 116	Chemical Principles I and Chemical Principles II	
Organic Chemistry		
Complete ALL of the following:		
CHEM 343	Organic Chemistry I	3
CHEM 344	Introductory Organic Chemistry Laboratory	2
CHEM 345	Organic Chemistry II	3
Biology Foundation		
Complete one of the following:		10-13

BIOLOGY/ BOTANY/ ZOOLOGY 151 & BIOLOGY/ BOTANY/ ZOOLOGY 152	Introductory Biology and Introductory Biology [1]	
BIOCORE 381 & BIOCORE 382 & BIOCORE 383 & BIOCORE 384 & BIOCORE 485	Evolution, Ecology, and Genetics and Evolution, Ecology, and Genetics Laboratory and Cellular Biology and Cellular Biology Laboratory and Principles of Physiology [1]	
ZOOLOGY/ BIOLOGY 101 & ZOOLOGY/ BIOLOGY 102 & BOTANY/ BIOLOGY 130	Animal Biology and Animal Biology Laboratory and General Botany	

Physics

Select one of the following:		8-10
PHYSICS 103 & PHYSICS 104	General Physics and General Physics [2]	
PHYSICS 207 & PHYSICS 208	General Physics and General Physics [2]	
PHYSICS 201 & PHYSICS 202	General Physics and General Physics	

Biochemistry

Complete one of the following:		3-6
BIOCHEM 501	Introduction to Biochemistry	
BIOCHEM 507 & BIOCHEM 508	General Biochemistry I and General Biochemistry II	

Microbiology Courses

Microbiology Core:

Complete all of the following courses (except where noted, all microbiology core courses are offered every fall and spring semester):

MICROBIO 303	Biology of Microorganisms	3
MICROBIO 304	Biology of Microorganisms Laboratory	2
MICROBIO 305	Critical Analyses in Microbiology	1
MICROBIO 450	Diversity, Ecology and Evolution of Microorganisms (Spring only)	3
MICROBIO 470	Microbial Genetics & Molecular Machines	3
MICROBIO 526	Physiology of Microorganisms	3
MICROBIO 527	Advanced Laboratory Techniques in Microbiology (Fall only)	2

Microbiology Capstone (required):

MICROBIO 551	Capstone Research Project in Microbiology (Spring only)	2

Microbiology Electives

Complete at least 6 credits; at least 3 credits must come from Set A. Note that not all elective courses are offered every semester.

Set A:		3-6
MICROBIO/ FOOD SCI 324	Food Microbiology Laboratory	
MICROBIO/ FOOD SCI 325	Food Microbiology	
MICROBIO/ AN SCI/ BOTANY 335	The Microbiome of Plants, Animals, and Humans	
MICROBIO 345	Introduction to Disease Biology	
MICROBIO 357	General Bioinformatics for Microbiologists	
MICROBIO/SOIL SCI 425	Environmental Microbiology	
MICROBIO 520	Planetary Microbiology: What Life Here Tells Us About Life Out There	
MICROBIO/SOIL SCI 523	Soil Microbiology and Biochemistry	
MICROBIO 525	Field Studies of Planetary Microbiology and Life in the Universe	
MICROBIO/ ONCOLOGY 545	Topics in Biotechnology (topics vary by semester)	
MICROBIO/ BIOCHEM/ GENETICS 612	Prokaryotic Molecular Biology	
MICROBIO 626	Microbial and Cellular Metabolomics	
MICROBIO 657	Bioinformatics for Microbiologists	
MICROBIO/ BMOLCHEM 668	Microbiology at Atomic Resolution	
Set B:		0-3
BIOCHEM/M M & I 575	Biology of Viruses	
BIOCHEM 601	Protein and Enzyme Structure and Function	
BOTANY 330	Algae	
BOTANY/PL PATH 332	Fungi	
BOTANY/ ENTOM/PL PATH 505	Plant-Microbe Interactions: Molecular and Ecological Aspects	
CHEM 665	Biophysical Chemistry	
COMP SCI/ B M I 576	Introduction to Bioinformatics	
F&W ECOL/SURG SCI 548	Diseases of Wildlife	
FOOD SCI 550	Fermented Foods and Beverages	
M M & I 301	Pathogenic Bacteriology	
M M & I 341	Immunology	
M M & I/ENTOM/ PATH-BIO/ ZOOLOGY 350	Parasitology	
M M & I 554	Emerging Infectious Diseases and Bioterrorism	
ONCOLOGY/ M M & I/ PL PATH 640	General Virology-Multiplication of Viruses	
PATH-BIO/ M M & I 528	Immunology	
PL PATH 622	Plant-Bacterial Interactions	

PL PATH/ BOTANY/ GENETICS/ M M & I 655	Biology and Genetics of Fungi	
Total Credits		**64-88**

1 (BIOLOGY/BOTANY/ZOOLOGY 151 and BIOLOGY/BOTANY/ ZOOLOGY 152) or (BIOCORE 381 / BIOCORE 382 / BIOCORE 383 / BIOCORE 384 / BIOCORE 485) are recommended.

2 (PHYSICS 103 / PHYSICS 104) or (PHYSICS 207 / PHYSICS 208) are recommended.

HONORS IN THE MAJOR

Students admitted to the university and to the College of Agricultural and Life Sciences are invited to apply to be considered for admission to the CALS Honors Program.

Admission Criteria for New First-Year Students:

- Complete program application including essay questions

Admission Criteria for Transfer and Continuing UW-Madison Students:

- UW-Madison cumulative GPA of at least 3.25
- Complete program application including essay questions

HOW TO APPLY

The application is available on the CALS Honors Program website (https://cals.wisc.edu/academics/undergraduate/current-students/honors-program/). Applications are accepted at any time.

New first-year students with accepted applications will automatically be enrolled in Honors in Research. It is possible to switch to Honors in the Major in the student's first semester on campus after receiving approval from the advisor for that major. Transfer and continuing students may apply directly to Honors in Research or Honors in the Major (after approval from the major advisor).

REQUIREMENTS

All CALS Honors programs have the following requirements:

- Earn at least a cumulative 3.25 GPA at UW-Madison (some programs have higher requirements)
- Complete the program-specific requirements listed below
- Submit completed thesis documentation to CALS Academic Affairs

MICROBIOLOGY HONORS IN THE MAJOR REQUIREMENTS

To earn honors in the major in Microbiology, students must satisfy the requirements for the major (above) as well as the following requirements. All courses used for honors in the major requirements must receive "B" or better grades to fulfill requirements.

- Earn a 3.300 overall university GPA.
- Earn a 3.300 GPA for all MICROBIO courses, and all courses accepted in the major.
- Complete a two-semester senior honors thesis (MICROBIO 681 and MICROBIO 682) for 6 credits total and present research in a public forum. Students completing their senior honors theses in laboratories or departments outside of microbiology may be able to count that thesis toward honors in the major.
- Complete at least 20 credits from the following coursework:
  - 6 or more of the 20 credits must be courses taken for honors from the Core and Foundation Honors Coursework (p. 3) list. Courses completed from this list may count towards both major requirements and honors requirements.
  - Other courses taken for honors that fulfill requirements for the major (see major requirements above). Includes the following coursework: set A microbiology electives, set B microbiology electives, BIOCORE 381, BIOCORE 382, BIOCORE 383, BIOCORE 384, BIOCORE 485, BIOLOGY/BOTANY/ ZOOLOGY 151, BIOLOGY/BOTANY/ZOOLOGY 152. Independent study and thesis credits do not count to meet this honors requirement.
  - Set A microbiology electives completed beyond the major requirements. See major requirements above for the list of set A microbiology electives. This coursework does not need to be taken for honors but cannot count towards both major requirements and honors requirements.
  - Honors coursework in MATH (p. 3), CHEM (p. 4), PHYSICS (p. 4), or BIOCORE (p. 4) from the lists below.

Core and Foundation Honors Coursework

Code	Title	Credits
MICROBIO 303	Biology of Microorganisms	3
MICROBIO 304	Biology of Microorganisms Laboratory	2
MICROBIO 305	Critical Analyses in Microbiology	1
MICROBIO 450	Diversity, Ecology and Evolution of Microorganisms	3
MICROBIO 470	Microbial Genetics & Molecular Machines	3
MICROBIO 526	Physiology of Microorganisms	3
MICROBIO 527	Advanced Laboratory Techniques in Microbiology	2
MICROBIO 551	Capstone Research Project in Microbiology	2
BIOCHEM 507	General Biochemistry I	3
BIOCHEM 508	General Biochemistry II	3-4
PHYSICS 201	General Physics	5
PHYSICS 202	General Physics	5
PHYSICS 207	General Physics	5
PHYSICS 208	General Physics	5
STAT 301	Introduction to Statistical Methods	3
STAT 371	Introductory Applied Statistics for the Life Sciences	3

Math

Code	Title	Credits
MATH 341	Linear Algebra	3
MATH 375	Topics in Multi-Variable Calculus and Linear Algebra	5
MATH 376	Topics in Multi-Variable Calculus and Differential Equations	5
MATH 521	Analysis I	3
MATH 522	Analysis II	3

MATH 541	Modern Algebra	3
MATH 542	Modern Algebra	3

Chemistry

Code	Title	Credits
CHEM 109	Advanced General Chemistry	5
CHEM 115	Chemical Principles I	5
CHEM 116	Chemical Principles II	5
CHEM 343	Organic Chemistry I	3
CHEM 345	Organic Chemistry II	3
CHEM 344	Introductory Organic Chemistry Laboratory	2
CHEM 329	Fundamentals of Analytical Science	4
CHEM 547	Advanced Organic Chemistry	3
CHEM 561	Physical Chemistry I	3
CHEM 563	Physical Chemistry Laboratory I	1
CHEM 562	Physical Chemistry II	3
CHEM 564	Physical Chemistry Laboratory II	1
CHEM 665	Biophysical Chemistry	3

Physics

Code	Title	Credits
PHYSICS 201	General Physics	5
PHYSICS 202	General Physics	5
PHYSICS 207	General Physics	5
PHYSICS 208	General Physics	5
PHYSICS 241	Introduction to Modern Physics	3
PHYSICS 247	A Modern Introduction to Physics	5
PHYSICS 248	A Modern Introduction to Physics	5
PHYSICS 249	A Modern Introduction to Physics	4

Biocore

Code	Title	Credits
BIOCORE 486	Principles of Physiology Laboratory	2
BIOCORE 587	Biological Interactions	3

UNIVERSITY DEGREE REQUIREMENTS

Total Degree	To receive a bachelor's degree from UW–Madison, students must earn a minimum of 120 degree credits. The requirements for some programs may exceed 120 degree credits. Students should consult with their college or department advisor for information on specific credit requirements.
Residency	Degree candidates are required to earn a minimum of 30 credits in residence at UW–Madison. "In residence" means on the UW–Madison campus with an undergraduate degree classification. “In residence” credit also includes UW–Madison courses offered in distance or online formats and credits earned in UW–Madison Study Abroad/Study Away programs.
Quality of Work	Undergraduate students must maintain the minimum grade point average specified by the school, college, or academic program to remain in good academic standing. Students whose academic performance drops below these minimum thresholds will be placed on academic probation.