

MICROBIOLOGY, BS (CAL S)

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 (<http://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 CAL S 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 CAL S BS DEGREE PROGRAMS

Code	Title	Credits
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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 (http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#CALSThirdYearSeminarCourses)	1
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International studies (http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#CALSIInternationalStudiesCourses)	3
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Physical science fundamentals	4-5
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CHEM 103	General Chemistry I
or CHEM 108	Chemistry in Our World
or CHEM 109	Advanced General Chemistry

Biological science	5
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Additional science (biological, physical, or natural)	3
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Science breadth (biological, physical, natural, or social)	3
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CAL S Capstone Learning Experience: included in the requirements for each CAL S major (see "major requirements") (<http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#CALSCapstoneRequirement>)

MAJOR REQUIREMENTS

Code	Title	Credits
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Mathematics

Complete one of the following:	5-10
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MATH 171	Calculus with Algebra and Trigonometry I
& MATH 217	and Calculus with Algebra and Trigonometry II

MATH 221	Calculus and Analytic Geometry I
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Statistics

Complete one of the following:	3
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STAT 301	Introduction to Statistical Methods
STAT 371	Introductory Applied Statistics for the Life Sciences

General Chemistry

Complete one of the following:	5-10
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CHEM 103	General Chemistry I
& CHEM 104	and General Chemistry II

CHEM 109	Advanced General Chemistry
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CHEM 115	Chemical Principles I
& CHEM 116	and Chemical Principles II

Organic Chemistry

Complete ALL of the following:	
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CHEM 343	Organic Chemistry I	3
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CHEM 344	Introductory Organic Chemistry Laboratory	2
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CHEM 345	Organic Chemistry II	3
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Biology Foundation

Complete one of the following:	10-13
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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
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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
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MICROBIO/ FOOD SCI 325	Food Microbiology
MICROBIO 330	Host-Parasite Interactions
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 607	Advanced Microbial Genetics
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 570	Computational Modeling of Biological Systems
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/](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 list below. Courses completed from this list may count towards
both major requirements and honors requirements.

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

- 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, CHEM, or PHYSICS from the lists
below:

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	3
CHEM 563	Physical Chemistry Laboratory I	1
CHEM 562	Physical Chemistry	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

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.

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.