# **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 (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 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

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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.

Resi resic their	dency: Students lence at UW–Mad undergraduate c	must complete 30 degree credits in dison after earning 86 credits toward degree.		
first unde calsf	first year seminar/ (http://guide.wisc.edu/ undergraduate/agricultural-life-sciences/bacteriology/ calsfirstyearseminarcourses/)			
inter unde calsi	international studies/ (http://guide.wisc.edu/ 3 undergraduate/agricultural-life-sciences/bacteriology/ calsinternationalstudiescourses/)			
Phys	sical science fund	amentals	4-5	
С	HEM 103	General Chemistry I		
	or CHEM 108	Chemistry in Our World		
	or CHEM 109	Advanced General Chemistry		
Biolo	ogical science		5	
Addi	tional science (bi	ological, physical, or natural)	3	
Science breadth (biological, physical, natural, or social)			3	
cals requ requ unde calso	cals capstone learning experience: included in the requirements for each cals major (see "major requirements")/ (http://guide.wisc.edu/ undergraduate/agricultural-life-sciences/bacteriology/ calscapstonerequirement/)			

# MAJOR REQUIREMENTS

Code	Title	Credits
Mathematics		
Complete one of the	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 301	Introduction to Statistical Methods	
STAT 371	Introductory Applied Statistics for the Life Sciences	
<b>General Chemistry</b>		
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	
<b>Organic Chemistry</b>		
Complete ALL of the	following:	
CHEM 343	Organic Chemistry I	3
CHEM 344	Introductory Organic Chemistry Laboratory	2
CHEM 345	Organic Chemistry II	3
<b>Biology Foundation</b>		
Complete one of the	following:	10-13

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BIOLOGY/ BOTANY/	Introductory Biology and Introductory Biology <sup>1</sup>		MICROBIO/ FOOD SCI 325	Food Microbiology	
ZOOLOGY 151			MICROBIO 330	Host-Parasite Interactions	
& BIOLOGY/ BOTANY/ ZOOLOGY 152			MICROBIO/ AN SCI/ BOTANY 335	The Microbiome of Plants, Animals, and Humans	
BIOCORE 381	Evolution, Ecology, and Genetics		MICROBIO 345	Introduction to Disease Biology	
& BIOCORE 382 & BIOCORE 383 & BIOCORE 384	and Evolution, Ecology, and Genetics Laboratory and Cellular Biology		MICROBIO 357	General Bioinformatics for Microbiologists	
& BIOCORE 485	and Cellular Biology Laboratory and Principles of Physiology <sup>1</sup>		MICROBIO/SOIL SCI 425	Environmental Microbiology	
ZOOLOGY/ BIOLOGY 101	Animal Biology and Animal Biology Laboratory		MICROBIO 520	Planetary Microbiology: What Life Here Tells Us About Life Out There	
& ZOOLOGY/ BIOLOGY 102 & BOTANY/ BIOLOGY 120	and General Botany		MICROBIO/SOIL SCI 523 MICROBIO 525	Field Studies of Planetary	
BIOLOGT 150				Microbiology and Lite in the	
Filysics Salast and of the fall	outing:	9 10		Topics in Biotechnology (topics vary	
	Caparal Physics	8-10	ONCOLOGY 545	by semester)	
& PHYSICS 103	and General Physics <sup>2</sup>		MICROBIO 607	Advanced Microbial Genetics	
PHYSICS 207	General Physics		MICROBIO/	Prokarvotic Molecular Biology	
& PHYSICS 208 PHYSICS 201	and General Physics <sup>2</sup> General Physics		BIOCHEM/ GENETICS 612	, .,	
& PHYSICS 202	and General Physics		MICROBIO 626	Microbial and Cellular Metabolomics	
Biochemistry			MICROBIO 657	Bioinformatics for Microbiologists	
Complete one of the	following:	3-6	MICROBIO/	Microbiology at Atomic Resolution	
BIOCHEM 501	Introduction to Biochemistry		BMOLCHEM 668		
BIOCHEM 507	General Biochemistry I	ç	Set B:		0-3
& BIOCHEM 508	and General Biochemistry II		BIOCHEM 570	Computational Modeling of Biological Systems	
Microbiology Cours	ies			Biology of Virusos	
Microbiology Core:			1575	bloogy of viruses	
noted, all microbio	e following courses (except where logy core courses are offered every lester):		BIOCHEM 601	Protein and Enzyme Structure and Function	
MICROBIO 303	Biology of Microorganisms	.3	BOTANY 330	Algae	
MICROBIO 304	Biology of Microorganisms	2	BOTANY/PL PATH 332	Fungi	
MICROBIO 305	Critical Analyses in Microbiology	1	BOTANY/	Plant-Microbe Interactions:	
MICROBIO 450	Diversity, Ecology and Evolution of Microorganisms (Spring only)	3	ENTOM/PL PATH 505	Molecular and Ecological Aspects	
MICROBIO 470	Microbial Genetics & Molecular	3	CHEM 665	Biophysical Chemistry	
	Machines		COMP SCI/	Introduction to Bioinformatics	
MICROBIO 526	Physiology of Microorganisms	3		Disaasas of Wildlife	
MICROBIO 527	Advanced Laboratory Techniques in Microbiology (Fall only)	2	SCI 548		
Microbiology Capston	ne (required):		M M & L201	Pathogonic Pactoriology	
MICROBIO 551	Capstone Research Project in Microbiology (Spring only)	2	M M & I 301 M M & I 341	Immunology	
Microbiology Elective	S		M M & I/ENTOM/	Parasitology	
Complete at least 6 credits; at least 3 credits must come from Set A. Note that not all elective courses are offered			PATH-BIO/ ZOOLOGY 350	Emoraing Infactious Disasson and	
every semester.			11110101554	Bioterrorism	
Set A:		3-6			
MICROBIO/ FOOD SCL 324	Food Microbiology Laboratory				

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	BOTANY/ GENETICS/ M M & I 655		
	PL PATH/	Biology and Genetics of Fungi	
	PL PATH 622	Plant-Bacterial Interactions	
	PATH-BIO/ M M & 1 528	Immunology	
	ONCOLOGY/ M M & I/ PL PATH 640	General Virology-Multiplication of Viruses	

#### Total Credits

64-88

- <sup>1</sup> (BIOLOGY/BOTANY/ZOOLOGY 151 and BIOLOGY/BOTANY/ ZOOLOGY 152) or (BIOCORE 381 / BIOCORE 382 / BIOCORE 383 / BIOCORE 384 / BIOCORE 485) are recommended.
- <sup>2</sup> (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/honorsprogram/). 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:

Core and Foundation Honors 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.

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
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.