BACTERIOLOGY, MS

The primary goal of the master of science (MS) degree program is to give students a solid understanding of the scientific process and to provide the opportunity to obtain advanced training in microbiology. The master's degree is the terminal degree in this program, and completion of this degree does not allow automatic admission to a PhD program.

This program provides the opportunity to tailor a curriculum of advanced coursework and research to fit the needs of each student, with two different pathways (coursework or research pathways, see below). Students may acquire a general overview of microbiology or may focus on a specialized subject area in microbiology such as bacterial physiology, molecular microbiology, food microbiology, environmental microbiology, biotechnology or medical microbiology. The self-tailored program must meet the requirements of the Department of Bacteriology and the Graduate School for the MS degree. Full-time students can expect to complete the MS degree in about two years. The MS program also can accommodate part-time students with consequent increased time to degree.

The coursework pathway serves students who want to acquire knowledge about current topics in microbiology primarily in a classwork setting. Examples of students who benefit from this pathway are those currently employed in research, clinical, or biotechnology labs seeking an advanced degree; lawyers and law students who wish to specialize in biotechnology or environmental law; and students preparing for health professions.

The research pathway serves students who seek to improve scientific research skills. This pathway is chosen by laboratory technicians who want advanced technical training; students seeking laboratory skills for employment; and students who desire laboratory experience and advanced coursework before applying to PhD programs.

ADMISSIONS

ADMISSIONS

Please consult the table below for key information about this degree program's admissions requirements. The program may have more detailed admissions requirements, which can be found below the table or on the program's website.

Graduate admissions is a two-step process between academic programs and the Graduate School. ***Applicants must meet* the minimum requirements *(https://grad.wisc.edu/apply/requirements/) of the Graduate School as well as the program(s).*** Once you have researched the graduate program(s) you are interested in, apply online (https://grad.wisc.edu/apply/).

Requirements	Detail
Fall Deadline	May 1
Spring Deadline	September 20
Summer Deadline	This program does not admit in the summer.
GRE (Graduate Record Examinations)	Not required but may be considered if available.
English Proficiency Test	Refer to the Graduate School: Minimum Requirements for Admission policy: https://policy.wisc.edu/library/UW-1241 (https://policy.wisc.edu/library/UW-1241/).
Other Test(s) (e.g., GMAT, MCAT)	n/a
Letters of Recommendation Required	3

APPLICATION DEADLINES

Early review of fall applications begins January 10.

The Graduate Record Examination (GRE) is not required for admission to the MS program, but scores may be submitted.

Minimum Coursework for Admissions

Applicants applying to the program should have taken some or all of these courses prior to admission to the program for either coursework or research tracks. Applicants may correct deficiencies (up to 6 credits) after admission, but these credits do not apply toward the credits of coursework required for the degree, and all deficiencies must be absolved before completion of the master's degree.

Code	Title	Credits
Biology		
Two semesters, such as the following UW-Madison courses:		
BIOLOGY/BOTANY/ ZOOLOGY 151 & BIOLOGY/ BOTANY/ ZOOLOGY 152	Introductory Biology and Introductory Biology	10
or		
BIOLOGY/ ZOOLOGY 101 & BIOLOGY/ ZOOLOGY 102	Animal Biology and Animal Biology Laboratory	5
Chemistry		
Four semesters, including two semesters of organic chemistry, such as the following UW-Madison courses:		
CHEM 103 & CHEM 104 & CHEM 343 & CHEM 345	General Chemistry I and General Chemistry II and Organic Chemistry I and Organic Chemistry II	15
Math		
One course in math beyond algebra/trigonometry such as calculus, statistics, or computer science, such as the following UW-Madison courses:		
MATH 171	Calculus with Algebra and Trigonometry I	3-5
or MATH 221	Calculus and Analytic Geometry 1	
or STAT 301	Introduction to Statistical Methods	
or STAT 371	Introductory Applied Statistics for the Life Sciences	
Physics		
One semester, such as the following UW-Madison courses:		
PHYSICS 103	General Physics	4-5

or PHYSICS 201	General Physics
or PHYSICS 207	General Physics

FUNDING

FUNDING

GRADUATE SCHOOL RESOURCES

The Bursar's Office provides information about tuition and fees associated with being a graduate student. Resources to help you afford graduate study might include assistantships, fellowships, traineeships, and financial aid. Further funding information is available from the Graduate School. Be sure to check with your program for individual policies and restrictions related to funding.

PROGRAM RESOURCES

The MS in Bacteriology program has limited financial support for students. Because the program is flexible, some students are able to work part-time at jobs on or off campus while enrolled. There are a limited number of Teaching Assistantships in Bacteriology and other programs that coursework track students can apply for. Students in the research track must find a faculty member that is able to support them with a Research Assistantship prior to starting the program.

REQUIREMENTS

MINIMUM GRADUATE SCHOOL REQUIREMENTS

Review the Graduate School minimum degree requirements (https://guide.wisc.edu/graduate/#requirementstext) and policies (https://guide.wisc.edu/graduate/#policiestext), in addition to the program requirements listed below.

MAJOR REQUIREMENTS

MODE OF INSTRUCTION

Face to Face	Evening/ Weekend	Online	Hybrid	Accelerated
Yes	No	No	No	No

Mode of Instruction Definitions

Accelerated: Accelerated programs are offered at a fast pace that condenses the time to completion. Students typically take enough credits aimed at completing the program in a year or two.

Evening/Weekend: Courses meet on the UW–Madison campus only in evenings and/or on weekends to accommodate typical business schedules. Students have the advantages of face-to-face courses with the flexibility to keep work and other life commitments.

Face-to-Face: Courses typically meet during weekdays on the UW-Madison Campus.

Hybrid: These programs combine face-to-face and online learning formats. Contact the program for more specific information.

Online: These programs are offered 100% online. Some programs may require an on-campus orientation or residency experience, but the courses will be facilitated in an online format.

CURRICULAR REQUIREMENTS

Requirement	Detail
Minimum Credit Requirement	30 credits
Minimum Residence Credit Requirement	21 credits
Minimum Graduate Coursework Requirement	15 credits must be graduate-level coursework. Refer to the Graduate School: Minimum Graduate Coursework (50%) Requirement policy: https://policy.wisc.edu/library/UW-1244 (https://policy.wisc.edu/library/UW-1244/).
Overall Graduate GPA Requirement	3.00 GPA required. Refer to the Graduate School: Grade Point Average (GPA) Requirement policy: https://policy.wisc.edu/library/UW-1203 (https://policy.wisc.edu/library/UW-1203/).
Other Grade Requirements	n/a
Assessments and Examinations	• Research path: thesis is required • Coursework path: writing assessment is required
Language Requirements	n/a

REQUIRED COURSES

Students select one of the following pathways to complete the MS degree.

1. Coursework Pathway (https://masters.bact.wisc.edu/coursework-track/): This requires primarily formal coursework. There is no research requirement.
2. Research Pathway (https://masters.bact.wisc.edu/research-track/): This requires significant laboratory research with a formal written component describing and analyzing the work performed.

These pathways are internal to the program and represent different curricular paths a student can follow to earn this degree. Pathway names do not appear in the Graduate School admissions application, and they will not appear on the transcript.

Coursework Pathway

Code	Title	Credits
Core		
Students must complete the following courses.		
MICROBIO 303	Biology of Microorganisms	3
MICROBIO 526	Physiology of Microorganisms	3
MICROBIO 470	Microbial Genetics & Molecular Machines	3
BIOCHEM 501	Introduction to Biochemistry	3
Masters Seminar		
MICROBIO 875	Special Topics [1]	1
Elective Coursework		
Students must complete at least 15 credits of electives from the "Elective Coursework" table below.		15
Research		

Students may complete up to nine credits of Research (990), Special Problems (699, 999), and Independent Study (899) courses. These courses do not fulfill the 15-credit electives requirement.	
Additional Coursework	
Students must complete additional coursework chosen in consultation with program advisor to reach the 30-credit minimum requirement. Seminar credits and one-credit courses must be approved by the program advisor.	2
Total Credits	**30**

[1] The Ethics Workshop has the goal of fostering ethical and professional conduct. This workshop will be part of MICROBIO 875 Special Topics and will occur every year in the fall semester. This is a requirement for both pathway options.

Research Pathway

Code	Title	Credits
Core		
Students must complete the following courses. Students may use up to six credits from the core requirements towards the required ten credits of elective coursework if taken while enrolled in the MS program.		
MICROBIO 303	Biology of Microorganisms	3
MICROBIO 526	Physiology of Microorganisms	3
MICROBIO 470	Microbial Genetics & Molecular Machines	3
BIOCHEM 501	Introduction to Biochemistry	3
Masters Seminar		
MICROBIO 875	Special Topics (Masters Degree Seminar and Ethics Workshop) [1]	1
Elective Coursework		
Students must complete at least 10 credits of elective coursework. This requirement may be fulfilled with electives chosen from the list below or coursework approved by the program advisor or research advisor. Students may use up to six credits from the core requirements towards the required ten credits of elective coursework if taken while enrolled in the MS program.		4-10
Research		
Students must complete at least 12 credits of Research (990), Special Problems (699, 999), and Independent Study (899) courses chosen in consultation with research advisor. Students are strongly encouraged to enroll in additional credits.		12+
Total Credits		**30**

[1] The Ethics Workshop has the goal of fostering ethical and professional conduct. This workshop will be part of MICROBIO 875 Special Topics and will occur every year in the fall semester. This is a requirement for both pathway options.

Elective Coursework

Code	Title	Credits
MICROBIO 520	Planetary Microbiology: What Life Here Tells Us About Life Out There	3
MICROBIO/ SOIL SCI 523	Soil Microbiology and Biochemistry	3
MICROBIO 525	Field Studies of Planetary Microbiology and Life in the Universe	3
MICROBIO/ ONCOLOGY 545	Topics in Biotechnology	1
MICROBIO/ BIOCHEM/ GENETICS 612	Prokaryotic Molecular Biology	3
MICROBIO 626	Microbial and Cellular Metabolomics	3
MICROBIO 657	Bioinformatics for Microbiologists	3
MICROBIO/ BMOLCHEM 668	Microbiology at Atomic Resolution	3
MICROBIO 710	Microbial Symbiosis	3
M M & I/PATH-BIO 528	Immunology	3
M M & I 554	Emerging Infectious Diseases and Bioterrorism	2
M M & I/ BIOCHEM 575	Biology of Viruses	2
M M & I 704	Infectious Diseases of Human Beings	3
M M & I 740	Mechanisms of Microbial Pathogenesis	3
M M & I/PATH-BIO 750	Host-Parasite Relationships in Vertebrate Viral Disease	3
GENETICS/ MD GENET 565	Human Genetics	3
GENETICS/ PLANTSCI 615	Genetic Mapping	3
GENETICS/ENTOM/ ZOOLOGY 624	Molecular Ecology	3
GENETICS/ CHEM 626	Genomic Science	2
GENETICS/ BIOCHEM 631	Plant Genetics and Development	3
GENETICS 633	Population Genetics	3
GENETICS/ MD GENET/ POP HLTH 636	Public Health Genomics	1
GENETICS/ BOTANY/M M & I/ PL PATH 655	Biology and Genetics of Fungi	3
GENETICS/ BOTANY/ENTOM/ ZOOLOGY 820	Foundations of Evolution	2
GENETICS 885	Advanced Genomic and Proteomic Analysis	3
GENETICS/B M E/ B M I/BIOCHEM/ CBE/COMP SCI 915	Computation and Informatics in Biology and Medicine	1
BIOCHEM/ NUTR SCI 510	Nutritional Biochemistry and Metabolism	3
BIOCHEM 601	Protein and Enzyme Structure and Function	2

BIOCHEM/B M I/ BMOLCHEM/ MATH 609	Mathematical Methods for Systems Biology	3
BIOCHEM/ NUTR SCI 619	Advanced Nutrition: Intermediary Metabolism of Macronutrients	3
BIOCHEM/ GENETICS/ MD GENET 620	Eukaryotic Molecular Biology	3
BIOCHEM/ BOTANY 621	Plant Biochemistry	3
BIOCHEM 919	Synthetic Biology Seminar	1
BIOCHEM 924	Membrane Protein Structure and Function	1
CHEM 665	Biophysical Chemistry	3
PUBLHLTH 710	Introduction to Global Health: History, Current Issues, and Health Statistics	2
PUBLHLTH 711	Global Public Health and Healthcare Systems: Organizations, Governance, Financing, and Workforce	2
BOTANY/ANTHRO/ ZOOLOGY 410	Evolutionary Biology	3
BOTANY/ENTOM/ PL PATH 505	Plant-Microbe Interactions: Molecular and Ecological Aspects	3
ONCOLOGY/ M M & I/ PL PATH 640	General Virology-Multiplication of Viruses	3
ONCOLOGY 675	Advanced or Special Topics in Cancer Research	1-3
LSC 560	Scientific Writing	3
LSC 561	Writing Science for the Public	3
STAT/B M I 541	Introduction to Biostatistics	3
STAT/F&W ECOL 571	Statistical Methods for Bioscience I	4

POLICIES

GRADUATE SCHOOL POLICIES

The Graduate School's Academic Policies and Procedures (https://grad.wisc.edu/acadpolicy/) serve as the official document of record for Graduate School academic and administrative policies and procedures and are updated continuously. Note some policies redirect to entries in the official UW-Madison Policy Library (https://policy.wisc.edu/). Programs may set more stringent policies than the Graduate School. Policies set by the academic degree program can be found below.

MAJOR-SPECIFIC POLICIES

PRIOR COURSEWORK

Graduate Credits Earned at Other Institutions

With permission of the program advisor, up to 7 credits (Coursework Pathway) or 3 credits (Research Pathway) from another institution may be applied toward degree requirements.

The course must focus on central processes of microorganisms and be outside the core requirements of the Bacteriology MS Program. The student must have earned a B or better in the course. Decisions are made by the MS program advisor. Credits earned ten or more years prior to admission to a master's degree are not allowed to satisfy requirements.

Undergraduate Credits Earned at UW-Madison or Other Institutions

With permission of the program advisor, up to 7 credits (Coursework Pathway) or 3 credits (Research Pathway) from UW-Madison or another institution may be applied toward degree requirements.

The course must focus on central processes of microorganisms and be outside the core requirements of the Bacteriology MS Program. The student must have earned a B or better in the course. These credits are not allowed to count toward the 50% graduate coursework minimum unless numbered 700 or above from UW-Madison. Decisions are made by the MS program advisor. Credits earned ten or more years prior to admission to a master's degree are not allowed to satisfy requirements.

Credits Earned as a Professional Student at UW-Madison (Law, Medicine, Pharmacy, and Veterinary careers)

Refer to the Graduate School: Transfer Credits for Prior Coursework (https://policy.wisc.edu/library/UW-1216/) policy.

Credits Earned as a University Special student at UW–Madison

With permission of the program advisor, up to 9 credits (Coursework Pathway) or 3 credits (Research Pathway) of courses numbered 300 or above may be applied toward degree requirements.

The course must focus on central processes of microorganisms, and the student must have earned a B or better in the course. These credits are not allowed to count toward the 50% graduate coursework minimum unless numbered 700 or above or are taken to meet the requirements of a capstone certificate and has the "Grad 50%" attribute from UW-Madison. Decisions are made by the MS program advisor. Credits earned ten or more years prior to admission to a master's degree are not allowed to satisfy requirements.

PROBATION

Refer to the Graduate School: Probation (https://policy.wisc.edu/library/UW-1217/) policy.

ADVISOR / COMMITTEE

Refer to the Graduate School: Advisor (https://policy.wisc.edu/library/UW-1232/) and Graduate School: Committees (Doctoral/Master's/MFA) (https://policy.wisc.edu/library/UW-1201/) policies.

CREDITS PER TERM ALLOWED

15 credits (recommended: only 8–10 credits per semester, or 4–5 credits per summer term)

TIME LIMITS

Refer to the Graduate School: Time Limits (https://policy.wisc.edu/library/UW-1221/) policy.

GRIEVANCES AND APPEALS

These resources may be helpful in addressing your concerns:

- Bias or Hate Reporting (https://doso.students.wisc.edu/bias-or-hate-reporting/)
- Graduate Assistantship Policies and Procedures (https://hr.wisc.edu/policies/gapp/#grievance-procedure)

- Hostile and Intimidating Behavior Policies and Procedures (https://hr.wisc.edu/hib/)
  - Office of the Provost for Faculty and Staff Affairs (https://facstaff.provost.wisc.edu/)
- Employee Assistance (http://www.eao.wisc.edu/) (for personal counseling and workplace consultation around communication and conflict involving graduate assistants and other employees, post-doctoral students, faculty and staff)
- Employee Disability Resource Office (https://employeedisabilities.wisc.edu/) (for qualified employees or applicants with disabilities to have equal employment opportunities)
- Graduate School (https://grad.wisc.edu/) (for informal advice at any level of review and for official appeals of program/departmental or school/college grievance decisions)
- Office of Compliance (https://compliance.wisc.edu/) (for class harassment and discrimination, including sexual harassment and sexual violence)
- Office Student Assistance and Support (OSAS) (https://osas.wisc.edu/) (for all students to seek grievance assistance and support)
- Office of Student Conduct and Community Standards (https://conduct.students.wisc.edu/) (for conflicts involving students)
- Ombuds Office for Faculty and Staff (http://www.ombuds.wisc.edu/) (for employed graduate students and post-docs, as well as faculty and staff)
- Title IX (https://compliance.wisc.edu/titleix/) (for concerns about discrimination)

College of Agricultural and Life Sciences: Grievance Policy

In the College of Agricultural and Life Sciences (CALS), any student who feels unfairly treated by a member of the CALS faculty or staff has the right to complain about the treatment and to receive a prompt hearing. Some complaints may arise from misunderstandings or communication breakdowns and be easily resolved; others may require formal action. Complaints may concern any matter of perceived unfairness.

To ensure a prompt and fair hearing of any complaint, and to protect the rights of both the person complaining and the person at whom the complaint is directed, the following procedures are used in the College of Agricultural and Life Sciences. Any student, undergraduate or graduate, may use these procedures, except employees whose complaints are covered under other campus policies.

1. The student should first talk with the person at whom the complaint is directed. Most issues can be settled at this level. Others may be resolved by established departmental procedures.
2. If the student is unsatisfied, and the complaint involves any unit outside CALS, the student should seek the advice of the dean or director of that unit to determine how to proceed.
   a. If the complaint involves an academic department in CALS the student should proceed in accordance with item 3 below.
   b. If the grievance involves a unit in CALS that is not an academic department, the student should proceed in accordance with item 4 below.
3. The student should contact the department's grievance advisor within 120 calendar days of the alleged unfair treatment. The departmental administrator can provide this person's name. The grievance advisor will attempt to resolve the problem informally within 10 working days of receiving the complaint, in discussions with the student and the person at whom the complaint is directed.
   a. If informal mediation fails, the student can submit the grievance in writing to the grievance advisor within 10 working days of the date the student is informed of the failure of the mediation attempt by the grievance advisor. The grievance advisor will provide a copy to the person at whom the grievance is directed.
   b. The grievance advisor will refer the complaint to a department committee that will obtain a written response from the person at whom the complaint is directed, providing a copy to the student. Either party may request a hearing before the committee. The grievance advisor will provide both parties a written decision within 20 working days from the date of receipt of the written complaint.
   c. If the grievance involves the department chairperson, the grievance advisor or a member of the grievance committee, these persons may not participate in the review.
   d. If not satisfied with departmental action, either party has 10 working days from the date of notification of the departmental committee action to file a written appeal to the CALS Equity and Diversity Committee. A subcommittee of this committee will make a preliminary judgement as to whether the case merits further investigation and review. If the subcommittee unanimously determines that the case does not merit further investigation and review, its decision is final. If one or more members of the subcommittee determine that the case does merit further investigation and review, the subcommittee will investigate and seek to resolve the dispute through mediation. If this mediation attempt fails, the subcommittee will bring the case to the full committee. The committee may seek additional information from the parties or hold a hearing. The committee will present a written recommendation to the dean who will provide a final decision within 20 working days of receipt of the committee recommendation.
4. If the alleged unfair treatment occurs in a CALS unit that is not an academic department, the student should, within 120 calendar days of the alleged incident, take his/her grievance directly to the Associate Dean of Academic Affairs. The dean will attempt to resolve the problem informally within 10 working days of receiving the complaint. If this mediation attempt does not succeed the student may file a written complaint with the dean who will refer it to the CALS Equity and Diversity Committee. The committee will seek a written response from the person at whom the complaint is directed, subsequently following other steps delineated in item 3d above.

OTHER

n/a

PROFESSIONAL DEVELOPMENT

PROFESSIONAL DEVELOPMENT

GRADUATE SCHOOL RESOURCES

Take advantage of the Graduate School's professional development resources (https://grad.wisc.edu/pd/) to build skills, thrive academically, and launch your career.

LEARNING OUTCOMES

LEARNING OUTCOMES

1. Apply the central theoretical principles and skill-based competencies necessary for a professional career in microbiology.
2. Describe and critique research approaches and findings in the microbiology literature.
3. Generate and assemble appropriate data or evidence pertaining to questions in microbiology.
4. Communicate effectively about concepts in microbiology to various audiences.
5. Demonstrate personal and professional ethical conduct.