BACTERIOLOGY, M.S.

The primary goal of the master of science (M.S.) 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 Ph.D. 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 tracks (coursework or research tracks, 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 M.S. degree. Full-time students can expect to complete the M.S. degree in about two years. The M.S. program also can accommodate part-time students with consequent increased time to degree.

The coursework track serves students who want to acquire knowledge about current topics in microbiology primarily in a classwork setting. Examples of students who benefit from this track 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 track serves students who seek to improve scientific research skills. This track 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 Ph.D. programs.

ADMISSIONS

APPLICATION DEADLINES

• To begin fall semester:
  • Early deadline: March 1 (notification by April 1)
  • Regular deadline: June 1 (notification by July 1)

• To begin spring semester:
  • Deadline: October 15 (notification by November 15)

Although students may apply to begin the program in any semester, summer application is not encouraged. Students pursuing the research option who have found a lab in which to carry out their research may apply for summer admission. Students who plan to pursue the coursework option will be considered for summer admission only if they need to take a prerequisite or general requirement course that is offered in the summer.

MINIMUM COURSEWORK FOR ADMISSIONS

Students 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. Students 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.

- Biology: two semesters
- Chemistry: four semesters of chemistry including two organic with lab component
- Math: one course in math beyond algebra/trigonometry such as calculus, statistics, or computer science
- Physics: two semesters; exceptions will be considered.

The Graduate Record Examination (GRE) is not required for admission to the M.S. program, but scores may be submitted. International students whose undergraduate instruction was not in English must provide evidence of English proficiency by taking the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS).

GRADUATE SCHOOL ADMISSIONS

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

FUNDING

GRADUATE SCHOOL RESOURCES

Resources to help you afford graduate study might include assistantships, fellowships, traineeships, and financial aid. Further funding information (https://grad.wisc.edu/funding) is available from the Graduate School. Be sure to check with your program for individual policies and processes related to funding.

PROGRAM RESOURCES

Financial aid for students in the M.S. program is not available from the department. Some M.S. students in the research track are supported through their research advisor, but such support is available on a very limited basis.

REQUIREMENTS

MINIMUM GRADUATE SCHOOL REQUIREMENTS

Review the Graduate School minimum academic progress and degree requirements (http://guide.wisc.edu/graduate/#policiesandrequirementstext), in addition to the program requirements listed below.

MAJOR REQUIREMENTS

MODE OF INSTRUCTION

<table>
<thead>
<tr>
<th></th>
<th>Face to Face</th>
<th>Evening/Weekend</th>
<th>Online</th>
<th>Hybrid</th>
<th>Accelerated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Mode of Instruction Definitions

Evening/Weekend: These programs are offered in an evening and/or weekend format to accommodate working schedules. Enjoy the advantages of on-campus courses and personal connections, while keeping your day job. For more information about the meeting schedule of a specific program, contact the program.
Online: These programs are offered primarily online. Many available online programs can be completed almost entirely online with all online programs offering at least 50 percent or more of the program work online. Some online programs have an on-campus component that is often designed to accommodate working schedules. Take advantage of the convenience of online learning while participating in a rich, interactive learning environment. For more information about the online nature of a specific program, contact the program.

Hybrid: These programs have innovative curricula that combine on-campus and online formats. Most hybrid programs are offered on-campus with a partial or completely online semester. For more information about the hybrid schedule of a specific program, contact the program.

Accelerated: These on-campus programs are offered in an accelerated format that allows you to complete your program in a condensed time-frame. Enjoy the advantages of on-campus courses with minimal disruption to your career. For more information about the accelerated nature of a specific program, contact the program.

**CURRICULAR REQUIREMENTS**

<table>
<thead>
<tr>
<th>Minimum Credit Requirement</th>
<th>30 credits</th>
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</thead>
<tbody>
<tr>
<td>Minimum Residence Credit Requirement</td>
<td>22 credits</td>
</tr>
<tr>
<td>Minimum Graduate Coursework Requirement</td>
<td>Half of degree coursework (15 credits out of 30 total credits) must be completed graduate-level coursework; courses with the Graduate Level Coursework attribute are identified and searchable in the university's Course Guide (<a href="https://registrar.wisc.edu/course-guide/">https://registrar.wisc.edu/course-guide/</a>).</td>
</tr>
<tr>
<td>Overall Graduate GPA Requirement</td>
<td>3.00 GPA required.</td>
</tr>
<tr>
<td>Other Grade Requirements</td>
<td>The Graduate School requires an average grade of B or better in all coursework (300 or above, not including research credits) taken as a graduate student unless conditions for probationary status require higher grades. Grades of Incomplete are considered to be unsatisfactory if they are not removed during the next enrolled semester.</td>
</tr>
<tr>
<td>Assessments and Examinations</td>
<td>Contact the program for information on required assessments and examinations.</td>
</tr>
<tr>
<td>Language Requirements</td>
<td>n/a</td>
</tr>
</tbody>
</table>

**REQUIRED COURSES**

The following courses (or equivalent) are required for completion of the M.S. degree for both the coursework and research tracks, and may be fulfilled by courses taken prior to entrance to the M.S. program or as part of the M.S. program.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MICROBIO 303</td>
<td>Biology of Microorganisms</td>
<td>3</td>
</tr>
<tr>
<td>MICROBIO 526</td>
<td>Physiology of Microorganisms</td>
<td>3</td>
</tr>
<tr>
<td>MICROBIO 470</td>
<td>Microbial Genetics &amp; Molecular Machines</td>
<td>3</td>
</tr>
<tr>
<td>BIOCHEM 501</td>
<td>Introduction to Biochemistry</td>
<td>3-4</td>
</tr>
<tr>
<td>or BIOCHEM 507</td>
<td>General Biochemistry I</td>
<td></td>
</tr>
<tr>
<td>or BIOCHEM 508</td>
<td>General Biochemistry II</td>
<td></td>
</tr>
</tbody>
</table>

There are two tracks for the M.S. degree: one involving primarily formal coursework with no research requirement (coursework option (https://bact.wisc.edu/pro_ms.php?i=ms3)), and the other requiring significant laboratory research with a formal written component describing and analyzing the work performed (research option (https://bact.wisc.edu/pro_ms.php?i=ms4)).

**Coursework Track**

- At least nine credits of formal coursework must be at the 600 level or above.
- Research (990), special problems (699, 999), and coordinative internship (399) credits may constitute up to nine credits of the 30 required, but cannot be used to satisfy the requirement for nine credits of formal coursework at the 600 or above level.
- General coursework requirements (see above), can be counted towards the 30 credits if taken after entering the program.
- Seminar credits and one-credit courses graded solely on attendance / participation will NOT count toward the 30 credits.
- Students may request to have up to eight graduate microbiology or biochemistry course credits taken prior to entering the MS program apply toward the 30-credit minimum. The student must provide verification that those credits were not used to satisfy any degree, major, or University requirements from any prior degree they have earned. Decisions are made by the M.S. program advisor.

**Research Track**

- At least ten credits of formal graduate-level coursework is required; five of these credits must meet at least one of the following criteria.
  a. Graduate course at the 600 level or above
  b. Courses that otherwise adhere to the Graduate School definition of Graduate level classes (courses with the Graduate Level Coursework attribute are identified and searchable in the university’s Course Guide (https://registrar.wisc.edu/course-guide)).
  c. By approval of M.S. program advisor. See below for a list of commonly-taken courses.

- A minimum of 12 credits of independent research is required, although more are strongly encouraged.
- Seminar credits and one-credit courses graded solely on attendance / participation will NOT count toward the 30 credits.
- Students may request to have up to three graduate microbiology or biochemistry course credits taken prior to entering the MS program apply toward the 10-credit minimum. The student must provide verification that those credits were not used to satisfy any degree, major, or University requirements from any prior degree they have earned. Decisions are made by the M.S. program advisor.

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

Courses commonly taken by students in the Research Track:
<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MICROBIO/GENETICS 607</td>
<td>Advanced Microbial Genetics</td>
<td>3</td>
</tr>
<tr>
<td>MICROBIO/BIOCHEM/GENETICS 612</td>
<td>Prokaryotic Molecular Biology</td>
<td>3</td>
</tr>
<tr>
<td>MICROBIO 625</td>
<td>Advanced Microbial Physiology</td>
<td>3</td>
</tr>
<tr>
<td>MICROBIO 632</td>
<td>Industrial Microbiology/ Biotechnology</td>
<td>2</td>
</tr>
<tr>
<td>MICROBIO/BMOLCHEM 668</td>
<td>Microbiology at Atomic Resolution</td>
<td>3</td>
</tr>
<tr>
<td>MICROBIO 710</td>
<td>Microbial Symbiosis</td>
<td>3</td>
</tr>
<tr>
<td>MICROBIO/BIOCHEM 726</td>
<td>Regulation of Gene Expression in Prokaryotes</td>
<td>3</td>
</tr>
<tr>
<td>MICROBIO/M M &amp; I/ PATH-BIO 790</td>
<td>Immunology of Infectious Disease</td>
<td>3</td>
</tr>
<tr>
<td>MICROBIO 875</td>
<td>Special Topics (Topic: Bioinformatics for Microbiologists)</td>
<td>1-4</td>
</tr>
<tr>
<td>M M &amp; I/MICROBIO/PATH-BIO 528</td>
<td>Immunology</td>
<td>3</td>
</tr>
<tr>
<td>M M &amp; I/ POP HLTH 603</td>
<td>Clinical and Public Health</td>
<td>5</td>
</tr>
<tr>
<td>BIOCHEM 601</td>
<td>Protein and Enzyme Structure and Function</td>
<td>2</td>
</tr>
<tr>
<td>BIOCHEM/GENETICS/MD GENET 620</td>
<td>Eukaryotic Molecular Biology</td>
<td>3</td>
</tr>
<tr>
<td>STAT/F&amp;W ECOL/HORT 571</td>
<td>Statistical Methods for Bioscience I</td>
<td>4</td>
</tr>
<tr>
<td>ZOOLOGY 430</td>
<td>Comparative Anatomy of Vertebrates</td>
<td>5</td>
</tr>
</tbody>
</table>

**POLICIES**

**GRADUATE SCHOOL POLICIES**

The Graduate School's Academic Policies and Procedures (https://grad.wisc.edu/acadpolicy) provide essential information regarding general university policies. Program authority to set degree policies beyond the minimum required by the Graduate School lies with the degree program faculty. Policies set by the academic degree program can be found below.

**MAJOR-SPECIFIC POLICIES**

**GRADUATE PROGRAM HANDBOOK**

A Graduate Program Handbook containing all of the program’s policies and requirements is forthcoming from the program.

**PRIOR COURSEWORK**

**Graduate Work from Other Institutions**

With permission of the program advisor, up to 8 graduate course credits from another university may be applied toward the credit requirements.

**UW–Madison Undergraduate**

No credits from the UW–Madison undergraduate degree may count toward the credit requirements.

**UW–Madison University Special**

No credits from the UW–Madison University Special student career may count toward the credit requirements.

**PROBATION**

The Graduate School regularly reviews the record of any student who earned grades of BC, C, D, F, or Incomplete in a graduate course (300 or above), or grade of U in research credits. This review could result in academic probation with a hold on future enrollment or in being suspended from the Graduate School.

**ADVISOR / COMMITTEE**

Every graduate student is required to have an advisor. To ensure that students are making satisfactory progress toward a degree, the Graduate School expects students to meet with their advisor on a regular basis.

**CREDITS PER TERM ALLOWED**

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

**TIME CONSTRAINTS**

Master’s degree students who have been absent for five or more consecutive years lose all credits that they have earned before their absence. Individual programs may count the coursework students completed prior to their absence for meeting program requirements; that coursework may not count toward Graduate School credit requirements.

**OTHER**

The M.S. in Bacteriology program does not provide funding for any student in the program and financial support for master’s students is limited. Because the program is flexible, students are able to work part or full-time at jobs on or off campus while enrolled. Students in the research option may be paid as research assistants by their research mentor if funds are available.

**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**

1. The department’s goal is to ensure that every student demonstrates understanding of the central principles of microbiology and the necessary skills for a professional career in microbiology.

2. The department’s goal is to ensure that every student demonstrates the ability to articulate and critique the approaches and findings in the microbiology literature.

3. The department’s goal is to ensure that every student demonstrates capability to identify sources, generate, and assemble data or evidence pertaining to questions in microbiology.
4. The department's goal is to ensure that every student demonstrates effective writing and speaking skills.

5. The department's goal is to ensure that every student demonstrates personal and professional ethics.

**PEOPLE**

**Faculty:** Professors Charles Kaspar (chair), Jean-Michel Ané, Cameron Currie, Timothy Donohue, Marcin Filutowicz, Katrina Forest, Richard Gourse, Eric Johnson, Katherine McMahon, Michael Thomas, Jade (Jue) Wang, Karen Wassarman, Jae-Hyuk Yu; Associate Professor Garret Suen; Assistant Professors Daniel Amador-Noguez, Karthik Anantharaman, Briana Burton, Federico Rey, Kalin Vetsigian. In addition, many faculty members from other departments supervise training of graduate students.