

BIOLOGICAL SCIENCES (MS)

Department website (<https://www.uwp.edu/learn/programs/msbiologicalsciences.cfm>)

College: College of Natural & Health Sciences

This graduate program aims to prepare students for successful careers in the biological sciences by offering dynamic research experiences highlighting the breadth of biological disciplines and advanced courses to support a concentration in either molecular biology or ecology, evolution and conservation. The program emphasizes practical applications of principles and theories and prepares students for research through training in field and laboratory techniques as well as biostatistics. Graduates from this program can transition directly into the workforce in a variety of biological fields or continue training in other graduate or professional programs.

The faculty of the Master of Science in Biological Sciences Program have active research programs in the following areas: animal behavior, aquatic ecology, biogeography, conservation biology, enzymology, functional morphology, gene structure and DNA-protein interaction, genome organization, herpetology, insect genetics and molecular biology, invertebrate ecology, landscape ecology, microbiology, molecular evolution, paleontology, parasitology, phylogenetic analysis, plant ecology, prokaryotic and eukaryotic gene expression, protein biochemistry, reproductive physiology, and vertebrate biology, and evolution.

Course of Study

There are two routes to a master of science degree in biological sciences

1. a two-year graduate program in which students with a B.S. degree in biology, biochemistry, chemistry, or one of the life sciences may enroll;
2. a five-year combined B.S./M.S. program into which UW-Parkside undergraduates in the molecular biology and bioinformatics major are accepted at the end of their third year. At the end of their fourth year, these students receive a B.S. in molecular biology and bioinformatics.

Financial Assistance

Students may receive a stipend (research assistantships, traineeships) to assist with educational expenses. Students who complete the FAFSA (fafsa.gov (<http://fafsa.gov>)) may also qualify for Federal Student Loans.

Continuation

1. The master of science in applied molecular biology program requires a cumulative GPA of 3.00 (B) or better in all graduate courses taken in the program unless conditions for probationary status require higher grades.
2. With approval of the department's graduate committee, students with a grade of C in a graduate course may be allowed to continue. However, a maximum of two C's is allowed.
3. Students who have finished all course and credit requirements (30 credits) and are still working on a thesis project require a continuous registration of at least 1 credit each fall and spring semester. Students who have not maintained continuous registration must apply for reinstatement.
4. Students should select a faculty advisor at the time of matriculation or at least by the end of the first semester. With the assistance of the advisor, the student will formulate a research problem. The advisor

will provide space, equipment and supplies, and technical assistance when possible. By the end of the first semester, the student should select a thesis committee that consists of the faculty advisor and two other faculty members. The thesis committee provides oversight of the student's research progress and approves the student's course of study. The program culminates in a written thesis that thoroughly documents the research activity, and an oral presentation open to the public.

Time Limit

It is expected that most students will complete the degree within two years. A candidate for the master of science degree who fails to complete the degree within three years will be placed on probation for one semester before being dropped from the program. Exceptions to this limit require authorization by the Biology Graduate Programs Committee.

Requirements for the Master of Science in Biological Sciences

Plan A: Two-Year Graduate Program

A minimum of 30 graduate credits (courses numbered 600-799) are required for the degree. Courses taken at the undergraduate level cannot be repeated for graduate credit.

Code	Title	Credits
Required Core Courses		
Thesis		16
		-
		18
BIOS 711	Thesis ¹	
Graduate Seminar		
BIOS 731	Graduate Seminar	4
Concentration Courses		
Select one concentration		8-11
Total Credits		30-31

¹ Students are required to complete a research thesis, and the research thesis must be aligned with the chosen concentration and approved by the thesis committee. Students enroll in BIOS 711 Thesis for 16 to 18 credits depending on previous course work. Fulfillment of the thesis requirement depends upon satisfactory completion, documentation, and oral presentation of the thesis research, as judged by the student's thesis committee.

Concentration Options

Ecology, Evolution and Conservation Concentration

This concentration provides innovative training in the theory and application of biological sciences with an emphasis on ecological and evolutionary patterns and processes including aspects of conservation biology and natural resource management. Graduates will participate in advanced course work and supervised independent research resulting in a research thesis. Graduates achieve specialized skills and training toward careers in the private and public natural resource management sector, including positions with local, state and federal agencies, or continue their education in Ph.D. or professional programs.

Code	Title	Credits
Required Course		
BIOS 645	Research Methods in Ecology and Evolution	2

Elective Courses

Select two of the following: ¹		6-8
BIOS 612	Biometry	
BIOS 614	Molecular Evolution ²	
BIOS 636	Conservation Ecology Lab ²	
BIOS 690	Advanced Topics in Molecular Biology	
BIOS 699	Independent Study	

Total Credits **8-10**

¹ Students must complete a minimum of 6 elective credits. Electives must be approved by the student's thesis committee. Electives will be chosen to complement the student's previous education and experience, and to support the student's educational and career goals.

² Course cross-listed with undergraduate offerings (courses numbered 300-499).

Molecular Biology Concentration

This concentration provides advanced training in the theory and application of molecular biology, in conjunction with supervised independent research culminating in a research thesis. Graduates achieve specialized skills and training toward advanced-level technical careers in biotechnology and related industries or continue their education in Ph.D. or professional programs.

Code	Title	Credits
Required Course		
BIOS 675	Advanced Molecular Biology	3
Elective Courses		
Select two of the following: ¹		6-8
BIOS 611	Microbial Physiology and Diversity	
BIOS 612	Biometry	
BIOS 614	Molecular Evolution ²	
BIOS 653	Molecular Biology and Bioinformatics of Nucleic Acids ²	
BIOS 655	Protein Biochemistry and Bioinformatics ²	
BIOS 690	Advanced Topics in Molecular Biology	
BIOS 699	Independent Study	
CHEM 620	Advanced Biochemistry ²	
Total Credits		9-11

¹ Students must complete a minimum of 6 elective credits. Electives must be approved by the student's thesis committee. Electives will be chosen to complement the student's previous education and experience, and to support the student's educational and career goals.

² Course cross-listed with undergraduate offerings (courses numbered 300-499).

Plan B: Combined B.S./M.S. Program

Students in this program meet Plan A requirements with the following modifications: only 2 credits of BIOS 731 Graduate Seminar are required; research completed to meet the undergraduate senior thesis requirement may be applied toward the credit requirement for the M.S. degree. A minimum of 30 graduate credits (courses numbered 500-799) are required for the degree, and 50% of the required credits must be at the 700-level. Elective course requirements are defined by each student's thesis committee.

University Requirements for Master's Degree Programs

To receive a master's degree from UW-Parkside, students must meet the following minimum requirements (note that individual programs may impose more stringent requirements):

1. Complete at least 30 graduate credits, of which no more than 12 may be transferred from another institution.
2. Have an overall GPA of at least 3.00 for all graduate work taken at UW-Parkside that is applicable to the degree program.
3. Satisfy all requirements of the graduate degree program.

Students may take no more than seven years to complete a degree, beginning with the semester in which they complete their first course as a UW-Parkside degree-seeking graduate student, unless they apply for and receive an extension through the appropriate graduate program. Some programs may impose a shorter time limit. To graduate, students must file a request for graduation. The request form, signed by the student's advisor and filed in the appropriate graduate program office, initiates the final review of the candidate's records. Students also need to apply to graduate with the Office of the Registrar.

Plan A: Two-year Program

To qualify for admission an applicant must have:

1. B.S. or B.A. degree from a regionally accredited institution.
2. Grade point average (GPA) of at least 3.00 in their major (4.00 basis).
3. Satisfactory Graduate Record Examination (GRE) scores.
4. Completed the following courses, or their equivalents:
 - Chemistry: two semesters of general chemistry, two semesters of organic chemistry for applicants to the molecular biology concentration.
 - Biology: two semesters of introductory biology with laboratory and at least two upper-level courses in the area of study (for example, biochemistry, ecology, evolution, or molecular biology).
 - Mathematics: one semester of calculus, discrete mathematics or probability.

Plan B: Combined B.S./M.S. Program

Students in the biological sciences or molecular biology and bioinformatics B.S. programs can apply for admission to the M.S. program in the spring of their junior year. To qualify for admission an applicant must have:

1. Cumulative GPA of at least 3.30 (4.00 basis).
2. At least three credits of BIOS 499 Independent Study culminating in a report honors thesis, or presentation.
3. At least three credits of upper level electives in the area of study (300-level or above).
4. Approval of the Biology Graduate Programs Committee.

Foundational Courses

Students admitted to the program, but lacking necessary coursework to support their thesis research must obtain fundamental knowledge in their area of study. Therefore, this program offers graduate-level preparatory foundation courses to support the molecular biology and ecology, evolution and conservation concentrations. These courses do not count for credit toward the degree. Enrollment in any of these courses may be required for successful degree completion and is determined by

the individual student's graduate committee based on previous course work and thesis topic.

Application Deadlines

The master of science in applied biological sciences uses a rolling admissions system, which means that when an application file is complete, it will be reviewed and decision will be made by a faculty committee. In general, applications should be submitted at least four months prior to the semester that the applicant wishes to start. For international students - please note that international student applications take longer to process, so it is recommended that international student applications be submitted at least six months prior to the semester that the applicant wishes to start.

Application Procedure

All applications must be submitted online. Please visit <https://www.uwp.edu/apply/admissions/graduate/> to submit the following:

1. A completed online application form.
2. A non-refundable application fee, payable to University of Wisconsin-Parkside.
3. A cover letter that states how obtaining a master of science in biological sciences fits with the applicant's goals and identifies at least three UW-Parkside faculty whose research is of interest to the applicant.
4. GRE scores¹
5. Official transcripts from each undergraduate and post-graduate institution the applicant attended¹
6. Curriculum vitae¹
7. Three letters of recommendation.¹ All submitted letters must have the official letterhead of the recommender's institution.
8. (Optional) Additional materials such as those listed below for applicants seeking probationary admission.

¹ Not required for students completing their B.S. degree at UW-Parkside.

International students are required to meet the additional requirements in the section below.

Please know that we do **not** review partially complete materials.

International Student Application

In addition to submitting the above application materials, international applicants must submit the following items:

1. A completed online Application for Graduate International Student Admission.
2. Application fee.
3. If applicant's native language is not English, then an Official Test of English as a Foreign Language (TOEFL) score must be obtained. A score of 525 on the paper test (197 computer based or 71 internet based) is required. For information regarding the location of the test centers nearest you and for making arrangements to take the TOEFL test visit the website: <http://www.ets.org/toefl> (<http://www.ets.org/toefl/>)
4. A Sponsorship Statement Form documenting support for one year of study.

5. Original bank statement or bank letter documenting sufficient funds for one year of study. Photocopies and FAX cannot be accepted.
6. Official transcripts from all secondary schools, colleges and universities attended. Records must be in the original language with certified English translations. Official records should include all exam, test results, certificates, diplomas or degrees received.
7. To receive transfer credits from a foreign university a prospective student must have their transcripts evaluated through one of the recommended companies:
 - ECE (Educational Credential Evaluators)
 - WES (World Education Services)
 - One Earth International Credit Evaluators

Note: Potential Graduate students must purchase the "Catalog Match Request" to ensure transferability of coursework.

Transfer Student Admissions

Transfer applicants who are admitted to the master of science in applied molecular biology program receive a statement of advanced standing indicating which courses have been accepted from the previous institutions and how they equate to UW-Parkside courses; the statement also identifies their advisor. Students should contact their advisor as soon as possible after receiving the statement of advanced standing. Generally, students are allowed to transfer up to 12 credits of graduate work from regionally accredited institutions.

Courses in Biological Sciences

BIOS 503 | Microbiology | 4 cr

Advanced treatment of the structure, growth, and activities of microorganisms including medical microbiology, microbial pathogenesis and environmental microbiology. Three hour lecture; three-hour lab. Multi-career cross-listing: BIOS 303.

Prerequisites: BIOS 260.

Offered: Spring.

BIOS 505 | Principles of Ecology | 4 cr

Introduces the relations of plants and animals to their organic and inorganic environments emphasizing phenomena and causes of distribution and abundance at the population and community levels. Includes a field-oriented laboratory. Three-hour lecture; three-hour lab; field trips. Requires lab fees. Multi-career cross-listing: BIOS 305.

Prerequisites: BIOS 101, BIOS 102 and BIOS 210.

Offered: Fall (odd years).

BIOS 509 | Molecular Biology | 3 cr

Regulation of DNA, RNA, and protein synthesis and the control of the synthesis of other macromolecules. Three-hour lecture/discussion. Multi-career cross-listing: BIOS 309.

Prerequisites: BIOS 260; CHEM 322 and consent of instructor.

Offered: Spring.

BIOS 510 | Freshwater Ecology | 4 cr

Examines fundamental concepts in freshwater ecology, including the physical and chemical aspects of water and the significance of these properties for plants and animals at the individual, population and community levels. Includes experimental research and field surveys. Three-hour lecture; three-hour lab. Multi-career cross-listing: BIOS 310.

Prerequisites: BIOS 101, BIOS 102, BIOS 210 (concurrent enrollment) or equivalent, or consent of instructor.

Offered: Fall (even years).

BIOS 514 | Evolutionary Biology | 3 cr

Introduces basic mechanisms of evolutionary change including population genetics and speciation. Considers evolutionary history including phylogenetic estimation, the fossil record, and biogeography. Three-hour lecture. Multi-career cross-listing: BIOS 314.

Prerequisites: BIOS 101, BIOS 102, BIOS 260.

Offered: Spring.

BIOS 536 | Conservation Ecology | 3 cr

Examines the fundamental ecological and cultural drivers of the biodiversity crisis emphasizing proven strategies for maintaining and improving ecological diversity in our local and regional ecosystems. Three-hour lecture. Multi-career cross-listing: BIOS 336.

Prerequisites: BIOS 101, BIOS 102, and BIOS 210.

Offered: Spring (odd years).

BIOS 611 | Microbial Physiology and Diversity | 3 cr

Explores diverse molecular mechanisms of microbial physiology. Topics include microbial regulation of gene expression, metabolism, behavior, symbiosis, and applications to biotechnology. Three-hour lecture/discussion. Multi-career cross-listing: BIOS 411.

Prerequisites: BIOS 303 or consent of instructor.

BIOS 612 | Biometry | 4 cr

Covers statistical methods for ecological and evolutionary studies. Three-hour lecture; three-hour lab.

Prerequisites: BIOS 210 or equivalent; and consent of instructor.

Offered: Spring.

BIOS 614 | Molecular Evolution | 3 cr

Examines the evolution of nucleic acids and proteins. Five major topics: genetic variability; the causes of molecular evolution and the neutral theory; methods of detecting genetic variability; the use of molecular markers for estimating phylogeny; and the evolution of genome structure. Three-hour lecture/discussion. Multi-career cross-listing: BIOS 414.

Prerequisites: BIOS 309 or BIOS 314, or consent of instructor.

Offered: Occasionally.

BIOS 636 | Conservation Ecology Lab | 2 cr

Provides practical experience applying the theories from general ecology and conservation ecology toward developing strategies for protecting and enhancing ecological diversity. Emphasizes mastering the multi-dimensional methods, tools and skills needed by modern conservation professionals. Multi-career cross-listing: BIOS 436.

Prerequisites: BIOS 305 or 336 or concurrent registration; or consent of instructor.

Offered: Spring (odd years).

BIOS 645 | Research Methods in Ecology and Evolution | 2 cr

Provides a capstone experience in applied field and laboratory research. Includes sampling natural and experimental populations and ecological communities coupled with multivariate statistical and analytical methods commonly used in ecology and evolutionary biology. One-hour lecture; three-hour lab. Requires lab fees. Multi-career cross-listing: BIOS 445.

Prerequisites: BIOS 305, BIOS 310 or BIOS 314 (or concurrent enrollment), and consent of instructor.

Offered: Fall.

BIOS 653 | Molecular Biology and Bioinformatics of Nucleic Acids | 4 cr

Covers techniques and theory of nucleic acid isolation (DNA and RNA) and analysis including laboratory and computational methods. Includes common laboratory methods for isolating and characterizing nucleic acids. Eight-hour lecture/lab. Requires lab fee. Multi-career cross-listing: BIOS 453.

Prerequisites: BIOS 260, BIOS 309, and consent of instructor.

Offered: Fall.

BIOS 655 | Protein Biochemistry and Bioinformatics | 4 cr

Provides practical experience in protein expression, purification, and characterization with emphasis on enzymology and use of computer programming for development of relevant bioinformatics applications.

Not open to students with credit in BIOS 455. Eight-hour lecture/lab.

Requires lab fee. Multi-career cross-listing: BIOS 455.

Prerequisites: BIOS 260, BIOS 309, and consent of instructor.

Offered: Spring.

BIOS 675 | Advanced Molecular Biology | 3 cr

In-depth coverage of selected research topics in molecular biology, including DNA replication, transcription, translation, and other current topics. Three-hour lecture.

Prerequisites: BIOS 260, BIOS 309 or BIOS 509, and consent of instructor.

Offered: Yearly.

BIOS 690 | Advanced Topics in Molecular Biology | 1-4 cr

Selected advanced topics in the molecular biology.

Prerequisites: BIOS 260, BIOS 309 or BIOS 509; and consent of instructor.

Offered: Occasionally.

BIOS 699 | Independent Study | 1-6 cr

Advanced study performed under the supervision of a regular faculty member. Suitability as an elective for the masters of applied molecular biology is determined on a case-by-case basis by the MAMB program committee.

Prerequisites: Consent of instructor and department chair.

Offered: Fall, Spring.

BIOS 711 | Thesis | 1-9 cr

Dissertation for master of science in applied molecular biology. Graded on a credit/no-credit basis.

Prerequisites: Consent of instructor.

Offered: Fall, Spring.

BIOS 731 | Graduate Seminar | 1 cr

Examines research reports and special topics from recent literature in biological sciences. Graded on a credit/no-credit basis.

Prerequisites: Consent of instructor.

Offered: Fall, Spring.