MS IN BIOLOGY - CELL AND MOLECULAR BIOLOGY CONCENTRATION

Cell/Molecular Biology Concentration

The master's degree in biology (cell/molecular biology concentration) is awarded to a student who has demonstrated mastery in the field of biology and a distinct ability to make substantial contributions to the field. It is not awarded merely as a result of courses taken, nor for years spent in studying or research. The quality of work and the resourcefulness of the student must be such that the faculty can expect a continuing effort toward the advancement of knowledge and significant achievement in research and related activities.

The master's degree in biology prepares students to enter research careers in industrial and entrepreneurial settings, and non-research careers in a variety of areas including public policy, science communication, intellectual property law, and science education.

30 credit hours are required to earn the the master's degree and work and typically takes two-three years of study beyond the bachelor's degree. A substantial portion of this time is spent in independent research leading to a thesis.

Cell/Molecular Biology Concentration

Track A (Research Thesis)

For the degree of Master of Science in Biology (cell/ molecular biology concentration), a student must complete a minimum of 30 semester hours of graduate course work approved by an advisory committee, including:

Code	Title	Hours
BIOL 6000	Introduction To Scientific Thought And Expression	1
BIOL 6010	Advanced Molecular Biology	3
BIOL 6090	Advanced Cell Biology	3
BIOL 6100	Research Methodology: Cell And Molecular Biology	3
BIOL 6200	Advanced Signal Transduction	3
BIOL 6930	Seminar In Biology (take twice)	2
BIOL 6030	Introduction to Graduate Studies	2
BIOL 6040	Introduction to Graduate Cell and Molecular Biology and Methods	3
BIOL 6960	Masters Thesis Research	10
Total Hours		**30**

Track B (Capstone, Non-Research Thesis)

For the degree of Master of Science in biology, a student must complete a minimum of 30 semester hours of graduate course work approved by an advisory committee, including:

Code	Title	Hours
BIOL 6010	Advanced Molecular Biology	3
BIOL 6090	Advanced Cell Biology	3
BIOL 6930	Seminar In Biology (take twice)	2
BIOL 6030	Introduction to Graduate Studies	2
BIOL 6040	Introduction to Graduate Cell and Molecular Biology and Methods	3
BIOL 6200	Advanced Signal Transduction	3
BIOL 6990	Advanced Readings In Biology	3
Select additional course and research credits at 5000-6000 level		10
BIOL 6000	Introduction To Scientific Thought And Expression	1
Total Hours		**30**

Up to 10 hours of graduate credit may be transferred from another accredited institution, as the student's advisory committee recommends.

Track C (Combined BS to MS Research Thesis)

Undergraduate students accepted to the BS to MS in Research Thesis track are allowed to complete up to 9 credit hours during their final academic year of undergraduate studies. The graduate coursework (up to nine hours) may be applied to meet both undergraduate and graduate degree requirements. Students admitted into this pipeline program must apply for admission to the College of Graduate Studies for the semester that they intend to matriculate in graduate courses. After completing the undergraduate degree requirements, they will continue in the graduate program. To enter the program, an undergraduate student needs to have an overall ~~BS or BA with a~~ GPA of 3.00 or an overall GPA of 2.75 with a GPA of at least 3.00 in the last 30 credit hours.

It will be the joint responsibility of the faculty and administrators in the undergraduate and graduate programs to supervise students admitted to the combined program option, to ensure that the limit of nine hours taken as an undergraduate is strictly enforced, and to request that the College of Graduate Studies change their matriculation from Undergraduate to Graduate when they meet all undergraduate degree requirements.

The following provisions apply for classes taken for graduate credit:

1) Students interested in the combined program must submit a graduate admission application to the College of Graduate Studies.

2) Graduate classes are taken at The University of Toledo only after the student is accepted into the program,

3) The four graduate-level classes (nine credit hours) during their final academic year of undergraduate studies are:

Code	Title	Hours
BIOL 6030	Introduction to Graduate Studies	2
BIOL 6040	Introduction to Graduate Cell and Molecular Biology and Methods	3
BIOL 6960	Masters Thesis Research	1
BIOL 6200	Advanced Signal Transduction	3

All other classes are as stipulated in track A.

Track D (Combined BS to MS Capstone, Non-Research Thesis)

Undergraduate students accepted to the BS or BA to MS with Capstone (Non-Research Thesis) track are allowed to complete up to 9 credit hours during their final academic year of undergraduate

studies. The graduate coursework (up to nine hours) may be applied to meet both undergraduate and graduate degree requirements. Students admitted into this pipeline program must apply for admission to the College of Graduate Studies for the semester that they intend to matriculate in graduate courses. After completing the undergraduate degree requirements, they will continue in the graduate program. To enter the program, an undergraduate student needs to have an overall ~~BS or BA with a~~ GPA of 3.00 or an overall GPA of 2.75 with a GPA of at least 3.00 in the last 30 credit hours.

It will be the joint responsibility of the faculty and administrators in the undergraduate and graduate programs to supervise students admitted to the combined program option, to ensure that the limit of nine hours taken as an undergraduate is strictly enforced, and to request that the College of Graduate Studies change their matriculation from Undergraduate to Graduate when they meet all undergraduate degree requirements.

The following provisions apply for classes taken for graduate credit:

1) Students interested in the combined program must submit a graduate admission application to the College of Graduate Studies.

2) Graduate classes are taken at The University of Toledo only after the student is accepted into the program,

3) The four graduate-level classes (nine credit hours) during their final academic year of undergraduate studies are:

Code	Title	Hours
BIOL 6030	Introduction to Graduate Studies	2
BIOL 6040	Introduction to Graduate Cell and Molecular Biology and Methods	3
BIOL 6960	Masters Thesis Research	1
BIOL 6200	Advanced Signal Transduction	3
or BIOL 6090	Advanced Cell Biology	

All other classes are as stipulated in track B.

First Term		Hours
BIOL 6030	Introduction to Graduate Studies	2
BIOL 6040	Introduction to Graduate Cell and Molecular Biology and Methods	3
BIOL 6930	Seminar In Biology	1
BIOL 6960	Masters Thesis Research	3
BIOL 6000	Introduction To Scientific Thought And Expression	3
	Hours	**12**
Second Term		
BIOL 6090	Advanced Cell Biology	3
BIOL 6200	Advanced Signal Transduction	3
BIOL 6960	Masters Thesis Research	1
	Hours	**7**
Third Term		
BIOL 6960	Masters Thesis Research	1
	Hours	**1**
Fourth Term		
BIOL 6010	Advanced Molecular Biology	3
BIOL 6100	Research Methodology: Cell And Molecular Biology	3
BIOL 6930	Seminar In Biology	1
BIOL 6960	Masters Thesis Research	3
	Hours	**10**
	Total Hours	**30**

- PLO 1. Students will demonstrate an in-depth understanding of and the ability to communicate scientific information within an area of specialized study within the biological sciences.
- PLO2. Students will demonstrate an understanding of how to conduct experiments, collect and interpret data, and disseminate those data in written and verbal modalities.
- PLO 3. Thesis track: Students will demonstrate an ability to conduct experiments, collect and interpret data, and disseminate those data in written and verbal modalities.
- PLO 4. Non-thesis track: Students will demonstrate an ability to review and evaluate the published literature and effectively communicate their findings in verbal and written modalities.
- PLO 5. Students will demonstrate knowledge of their ethical responsibility when conducting research in terms of proper scientific conduct and the rights of human subjects.