DEPARTMENT OF BIOLOGICAL SCIENCES

Song-Tao Liu, Chair
William Taylor, Associate Chair
Tomer Avidor-Reiss, graduate adviser

Mission

The Department of Biological Sciences strives to improve the human condition in the region and the world through cutting-edge molecular and cellular biology research, high quality instruction and experiential learning for undergraduates pursuing medical and scientific careers, and intensive personalized training for graduate students pursuing scientific careers in academia, industry, and beyond.

General description

The department offers M.S. and Ph.D. degrees in biology, along with B.S. and B.A. degrees in biology, B.S. in Neuroscience, and a B.S. in Medical Laboratory Science. Faculty research interests are concentrated in cellular architecture and dynamics, cancer biology, immunology, neuroscience, and plant science, united by a common interest in discovering fundamental molecular mechanisms. Coursework at both graduate and undergraduate levels emphasizes cell biology, molecular biology, genetics and related areas.

Accreditations

Our Medical Laboratory Science training program currently is fully accredited under National Accrediting Agency for Clinical Laboratory Sciences (NAACLS).

Degrees Offered

- MS in Biology (Cell and Molecular Biology Concentration) (https://catalog.utoledo.edu/graduate/natural-sciences-mathematics/departments/biological-sciences/ms-biology/)
- PhD in Biology (Cell And Molecular Biology Concentration) (https://catalog.utoledo.edu/graduate/natural-sciences-mathematics/departments/biological-sciences/phd-biology/)

BIOL 5030 Advanced Microbiology
[3 credit hours]
Lectures on the principles of modern microbiology and virology, including metabolism, growth, cellular morphology, genetics and host parasite relationships. Bacterial and viral diseases will be illustrated.
Term Offered: Spring

BIOL 5040 Advanced Microbiology Laboratory
[1 credit hour]
Laboratories utilizing basic microbiological techniques and illustrating principles of growth, identification and genetics of microbes.
Corequisites: BIOL 5030
Term Offered: Spring

BIOL 5050 Advanced Immunology
[3 credit hours]
The development, genetics and physiology of the immune response.
Term Offered: Spring, Fall

BIOL 5230 Advanced Comparative Animal Physiology
[3 credit hours]
Lectures on the comparative and environmental physiology of vertebrates and invertebrates including metabolism, temperature regulation, respiration, circulation excretion and osmotic regulation.
Prerequisites: BIOL 3030 with a minimum grade of D- and BIOL 3070 with a minimum grade of D-
Term Offered: Spring, Summer

BIOL 6000 Introduction To Scientific Thought And Expression
[3 credit hours]
A writing intensive course for new graduate students that focuses on scientific hypothesis testing and reading the original literature in biology.
Term Offered: Spring, Fall

BIOL 6010 Advanced Molecular Biology
[3 credit hours]
Analysis of recent developments in prokaryotic and eukaryotic molecular biology through evaluation and discussion of current literature.
Term Offered: Fall

BIOL 6020 Advanced Molecular Biology Laboratory
[2 credit hours]
Students will gain a working knowledge of essential laboratory techniques used in molecular biology. These techniques, including polymerase chain reaction (PCR), electrophoresis, DNA cloning, microscopy and transfection, will be used in a course project to express and analyze a protein of interest in cultured mammalian cells. The concepts underlying these procedures will be studied online before the lab. This course is designed to prepare students for careers in research, biotechnology and science education.
Term Offered: Summer

BIOL 6030 Introduction to Graduate Studies
[2 credit hours]
This course is designed to provide new UToledo graduate students with essential information and tips to help them achieve their academic goals at the University of Toledo. Students will be given an overview of the various research options they have in the UToledo Department of Biological Sciences. Students will be given some basic training in statistical methods typically used in the biological sciences. Students will receive training in responsible conduct so they may perform research to a high ethical standard. This course will provide a foundation for students to properly conduct research and supply them with the information and resources for them to be successful in graduate school.
Term Offered: Fall

BIOL 6040 Introduction to Graduate Cell and Molecular Biology and Methods
[3 credit hours]
The main goals of this course are to provide basic knowledge of methods used in research laboratories to study molecular and cellular processes and to provide basic knowledge of those processes. This information is to provide the fundamental background knowledge necessary basis for our graduate students to succeed in our graduate program. Specific topics include cell culture, nucleic acid manipulation, electrophoresis, structure of nucleic acids and proteins, basic concepts of transcription and translation, cell membranes, protein sorting, the cytoskeleton, regulation of cell death and cancer.
Term Offered: Fall

BIOL 6090 Advanced Cell Biology
[3 credit hours]
An advanced course that stresses the experimental basis for current concepts of cell structure and function.
Term Offered: Spring

BIOL 6100 Research Methodology: Cell And Molecular Biology
[3 credit hours]
An in-depth discussion of techniques used in the study of cell and molecular biology. Examples include chromatography and fractionation, electrophoresis cell and molecular cloning.
Term Offered: Fall

BIOL 6200 Advanced Signal Transduction
[3 credit hours]
This course will provide an in-depth discussion of signal transduction topics important for cell/molecular biology research, emphasizing the interplay between intracellular signaling molecules needed to regulate physiological responses.
Prerequisites: BIOL 6010 with a minimum grade of D-
Term Offered: Spring

BIOL 6300 Advanced Microscopy and Imaging
[3 credit hours]
This course focuses on advanced quantitative fluorescence imaging methods used to visualize single molecules, organelles, cells and tissues in vitro and in vivo. Students will gain theoretical understanding of fluorescence-based imaging techniques such as confocal, TIRF, and super-resolution microscopy, and hands-on experience on the fundamentals of image analysis and quantification.
Prerequisites: BIOL 6090 with a minimum grade of D- and BIOL 6100 with a minimum grade of D-
Term Offered: Fall

BIOL 6830 Molecular and Cellular Biology
[4 credit hours]
Essential concepts of molecular genetics and cell biology. Major topics include gene structure and composition, transcription, translation, protein structure and function, cell cycle, cell movement, and cell signaling. Primarily intended for Master students enrolled in a non-laboratory research based degree program. Students who have received credit for either BIOL 6010 or BIOL 6090 cannot receive credit for BIOL 6830.
Term Offered: Summer

BIOL 6920 Special Projects In Biology
[2-4 credit hours]
Introduction to research on a selected problem under the direction of an individual faculty member.
Term Offered: Spring, Summer, Fall

BIOL 6930 Seminar In Biology
[1 credit hour]
Presentation on research or current literature by graduate students, faculty, or guest speakers.
Term Offered: Spring, Fall

BIOL 6960 Masters Thesis Research
[1-15 credit hours]
Research that normally contributes to the fulfillment of the M.S. thesis requirement.
Term Offered: Spring, Summer, Fall

BIOL 6980 Advanced Topics In Biology
[2-4 credit hours]
Seminar/discussion of significant current topics or problems in biology.
Term Offered: Spring

BIOL 6990 Advanced Readings In Biology
[2-4 credit hours]
Faculty directed readings or projects in a specific area of Biology.
Term Offered: Spring, Summer, Fall

BIOL 7030 Advanced Microbiology
[3 credit hours]
Lectures on the principles of modern microbiology and virology, including metabolism, growth, cellular morphology, genetics and host parasite relationships. Bacterial and viral diseases will be illustrated.
Term Offered: Spring

BIOL 7040 Advanced Microbiology Laboratory
[1 credit hour]
Laboratories utilizing basic microbiological techniques and illustrating principles of growth, identification and genetics of microbes.
Corequisites: BIOL 7030
Term Offered: Spring

BIOL 7050 Advanced Immunology
[3 credit hours]
The development, genetics and physiology of the immune response.
Term Offered: Spring, Fall

BIOL 8000 Introduction To Scientific Thought And Expression
[3 credit hours]
A writing intensive course for new graduate students that focuses on scientific hypothesis testing and reading the original literature in biology.
Term Offered: Spring, Fall

BIOL 8010 Advanced Molecular Biology
[3 credit hours]
Analysis of recent developments in prokaryotic and eukaryotic molecular biology through evaluation and discussion of current literature.
Term Offered: Fall

BIOL 8030 Introduction to Graduate Studies
[2 credit hours]
This course is designed to provide new UToledo graduate students with essential information and tips to help them achieve their academic goals at the University of Toledo. Students will be given an overview of the various research options they have in the UToledo Department of Biological Sciences. Students will be given some basic training in statistical methods typically used in the biological sciences. Students will receive training in responsible conduct so they may perform research to a high ethical standard. This course will provide a foundation for students to properly conduct research and supply them with the information and resources for them to be successful in graduate school.
Term Offered: Fall

BIOL 8040 Introduction to Graduate Cell and Molecular Biology and Methods
[3 credit hours]
The main goals of this course are to provide basic knowledge of methods used in research laboratories to study molecular and cellular processes and to provide basic knowledge of those processes. This information is to provide the fundamental background knowledge necessary basis for our graduate students to succeed in our graduate program. Specific topics include cell culture, nucleic acid manipulation, electrophoresis, structure of nucleic acids and proteins, basic concepts of transcription and translation, cell membranes, protein sorting, the cytoskeleton, regulation of cell death and cancer.
Term Offered: Fall

BIOL 8090 Advanced Cell Biology
[3 credit hours]
An advanced course that stresses the experimental basis for current concepts of cell structure and function.
Term Offered: Spring

BIOL 8100 Research Methodology: Cell And Molecular Biology
[3 credit hours]
An in-depth discussion of techniques used in the study of cell and molecular biology. Examples include chromatography and fractionation, electrophoresis cell and molecular cloning.
Term Offered: Fall

BIOL 8200 Advanced Signal Transduction
[3 credit hours]
This course will provide an in-depth discussion of signal transduction topics important for cell/molecular biology research, emphasizing the interplay between intracellular signaling molecules needed to regulate physiological responses.
Prerequisites: BIOL 8010 with a minimum grade of D-
Term Offered: Spring

BIOL 8300 Advanced Microscopy and Imaging
[3 credit hours]
This course focuses on advanced quantitative fluorescence imaging methods used to visualize single molecules, organelles, cells and tissues in vitro and in vivo. Students will gain theoretical understanding of fluorescence-based imaging techniques such as confocal, TIRF, and super-resolution microscopy, and hands-on experience on the fundamentals of image analysis and quantification.
Prerequisites: BIOL 8090 with a minimum grade of D- and BIOL 8100 with a minimum grade of D-
Term Offered: Fall

BIOL 8920 Special Projects In Biology
[2-4 credit hours]
Introduction to research on a selected problem under the direction of an individual faculty member.
Term Offered: Spring, Summer, Fall

BIOL 8930 Seminar In Biology
[1 credit hour]
Presentation on research or current literature by graduate students, faculty, or guest speakers.
Term Offered: Spring, Fall

BIOL 8960 Doctoral Dissertation Research
[1-15 credit hours]
Research normally leading to the fulfillment of the Ph.D. dissertation requirement.
Term Offered: Spring, Summer, Fall

BIOL 8990 Advanced Readings In Biology
[2-4 credit hours]
Faculty directed readings or projects in a specific area of Biology.
Term Offered: Spring, Summer, Fall