



**The Ph.D./M.S. IN BIOMEDICAL SCIENCE PROGRAM at
the University of Toledo College of Medicine & Life
Sciences,
Health Science Campus**



The University of Toledo offers research-intensive Ph.D. and M.S. in Biomedical Science degrees through the College of Medicine (<http://www.utoledo.edu/med/grad/>). In addition, dual-degree (M.D./Ph.D., and M.D./M.S.) programs are available. Specific scientific tracks are available for Ph.D. and M.S. students in Biomedical Science, as described below. For further questions please email BioMedScienceGrad@UToledo.Edu

- **CANCER BIOLOGY**
(<http://www.utoledo.edu/med/grad/biomedical/biochem/index.html>) – The CB track takes an integrated approach to training the next generation of cancer researchers by developing both depth and breadth of knowledge in cancer biology. Through course work aimed at understanding the molecular nature of cancer and mentored thesis research in cancer biology disciplines, graduates will be equipped with both the scientific expertise and cutting edge research skills to make important contributions in the fight against a disease that affects the lifespan and quality of life of millions of individuals. The Track Director is Dr. Kandace Williams, Professor, Department of Biochemistry and Cancer Biology (Kandace.williams@utoledo.edu or BioMedScienceGrad@UToledo.Edu ; 419-383-4135).
- **CARDIOVASCULAR AND METABOLIC DISEASES**
(<http://www.utoledo.edu/med/grad/biomedical/cvmd/index.html>) – The CMD track trains students to conduct research on the genetics and pathophysiology of diabetes, obesity, fatty liver disease, infertility and cardiovascular diseases, such as hypertension and atherosclerosis. The track emphasizes the use of genetically engineered rodents as a first step toward translating basic science research to the clinic. By fostering research on these diseases, which constitute the major causes of death in the US, this track prepares its graduates for active and independent research careers. The Track Director is Dr. Andy Beavis, Professor, Department of Physiology, Pharmacology, Metabolism and Cardiovascular Sciences (andrew.beavis@utoledo.edu or BioMedScienceGrad@UToledo.Edu ; 419-383-4183).
- **INFECTION, IMMUNITY AND TRANSPLANTATION**
(<http://www.utoledo.edu/med/grad/biomedical/iit/index.html>) – The IIT track provides students an education and training in understanding microorganisms relevant to human health, and the immune system that allows us to overcome infection as well as rejecting organ transplants or causing autoimmune diseases. Faculty members study a) individual microbes (bacteria or viruses), focusing on their biology, evolution or pathogenic mechanisms; b) the autoimmune diseases of asthma, lupus and rheumatoid arthritis; or c) the development and control of the innate and adaptive immune systems. The Track Director is Dr. Kevin Pan, Professor, Department of Medical Microbiology and Immunology (kevin.pan@utoledo.edu or BioMedScienceGrad@UToledo.Edu ; 419-383-5446).
- **NEUROSCIENCES AND NEUROLOGICAL DISORDERS**
(<http://www.utoledo.edu/med/grad/biomedical/neuro/index.html>) – The NND track emphasizes training in both basic and translational neuroscience. Students gain hands-on experience using a variety of state-of-the-art cellular/molecular biological, neuroanatomical and physiological approaches to investigate fundamental questions relating to synaptic function, neuronal signaling, and development and plasticity of the nervous system. Areas of study emphasize both normal function in the nervous system and the basis of neurodevelopmental disorders and neurological diseases. Students prepare for an independent career in neuroscience research through advanced courses in the neurosciences complemented by active participation in faculty-mentored laboratory research. The Track Director is Dr. Nicolas Chiaia, Professor, Department of Neurosciences (nicolas.chiaia@utoledo.edu or BioMedScienceGrad@UToledo.Edu ; 419-383-4506).

All of these tracks are research-intensive and combine rigorous coursework with sufficient time for intensive research activity. Students enter the Ph.D. or M.S. Biomedical Science program in the Fall semester and take introductory core courses and perform laboratory rotations in their first year, then join a faculty laboratory in one of the four tracks for specialized training. All students are required to identify a faculty major advisor within the first year of study, so that work on the students' thesis or dissertation projects typically begins by the summer term of the first year.

Previous students on average have completed the Ph.D. in Biomedical Sciences program in five years or less and the M.S. in Biomedical Sciences program in approximately three years. Graduates progress to research, teaching, and other positions in academia, industry, and the government.

- **BIOINFORMATICS & PROTEOMICS/GENOMICS, BRIM CENTER OF EXCELLENCE** (<http://www.utoledo.edu/med/depts/bioinfo/degrees.html>) – In addition to the above four tracks for Ph.D. and M.S. students, the University of Toledo also offers four degree programs:
 - ✓ Certificate in Biomarkers & Bioinformatics. This involves completing four core courses. The Certificate program can be completed in association with the Ph.D. or M.D. as the courses are available online for those who cannot attend in person. This is jointly offered by the Bioinformatics Program on the Biomarker Research & Individualized Medicine Center.
 - ✓ M.S. in Bioinformatics & Proteomics/Genomics. The M.S. program includes core courses, independent research, and elective areas of interest. Both Certificate and M.S. students are trained in the theory, methods and applications of bioinformatics, proteomics, and genomics. This training is foundational for biomedical research, modern medicine, genetic counseling, intellectual property law, and many other fields.
 - ✓ B.S./M.S. dual degree pipeline in Bioinformatics & Proteomics/Genomics. UT offers a combined B.S. in Biology/M.S. in Bioinformatics & Proteomics/Genomics dual degree path that enables students to earn both degrees in approximately 5.5 years. Ohio residents in this program may be eligible for full tuition support (junior, senior and graduate years) through Choose Ohio First.
 - ✓ P.S.M. in Biomarkers & Diagnostics. The professional science masters is a new degree primarily designed for those interested in a biotechnology/pharmaceutical industry career. It resembles the M.S. described above, but with some business courses and with an industrial internship in place of thesis research. Ohio residents in this program may be eligible for full tuition support through Choose Ohio First.

The Bioinformatics & Proteomics/Genomics program Director is Dr. Robert Blumenthal, Professor, Department of Medical Microbiology and Immunology (robert.blumenthal@utoledo.edu; 419-383-5422).

- **OTHER MASTER OF SCIENCE IN BIOMEDICAL SCIENCE OPTIONS**
Several clinically-oriented tracks or majors are available for students in the Master of Science in Biomedical Science program. These include Assistant in Pathology, Human Donation Science, Medical Physics, Medical Sciences, Oral Biology, Orthopedic Sciences, and Physician Assistant. For more information, please visit <http://www.utoledo.edu/med/grad/>.

Financial Support

Ph.D. students – All incoming Ph.D. students (domestic and international) in good academic standing will receive a full tuition scholarship and stipend that is at the National Institutes of Health/National Research Service Award level (currently \$22,920 per year). Ph.D. students are not required to be teaching assistants to receive the tuition scholarship and stipend, although teaching experiences are available to interested students.

M.S. students – Full tuition scholarships are available to Masters students who enter the program in good academic standing. A limited number of stipends (\$10,000 per year) are also available on a competitive basis to incoming students with a 3.0 GPA. Full tuition scholarships for Ohio residents are also available to students in the B.S./M.S. pipeline and P.S.M. degree programs in Bioinformatics & Proteomics/Genomics described above, through the state's Choose Ohio First Scholarship program.

Dual Degree Programs – M.D./Ph.D. and M.D./M.S.

The Ph.D. and M.S. in Biomedical Science degrees are also offered in combination with the Doctor of Medicine degree (M.D.) through the College of Medicine. Typically the M.D./M.S. and M.D./Ph.D. dual degree students complete the first two years of medical school, then complete the graduate degree, and follow that with their last two years of medical school. The same financial aid described above for graduate students is available to dual degree candidates during their graduate school training. In addition, tuition scholarships for medical school are available. More information can be found at <http://www.utoledo.edu/med/mdphd/index.html>.

Parallel programs in which a student pursues two degrees in tandem (e.g., Ph.D. and J.D., Ph.D. and M.P.H., or Ph.D. and M.B.A.) are also possible.

Application Process and Admission Standards

Students wishing to apply to the Ph.D. or M.S. in Biomedical Science program will need to complete an online application and submit additional materials and an application fee as instructed on the website. To apply online: <http://apply.utoledo.edu>. The application fee is \$75 for international applicants and \$45 for domestic applicants and permanent resident/green card holders. Additional information may be found at <http://www.utoledo.edu/graduate/prospectivestudents/admission/guidelines.html>.

Applicants must hold an earned baccalaureate degree (or equivalent) from an accredited college or university, and have a minimum overall GPA of 3.0 on a 4.0 scale.

Typically, applicants will have an undergraduate major in Biology or a related discipline such as Biochemistry or Biophysics. Coursework should include chemistry through organic chemistry, physics, and math through calculus. Students with other majors such as Chemistry or Physics are encouraged to apply, but their coursework should include several semesters in biology.

The Graduate Record Examination (GRE) is required of all applicants. With the new GRE scoring system, **scores above the 50th percentile are recommended to be competitive**. In the old system, scores of 1100 (combined Verbal and Quantitative scores) and 4.0 (Analytical Writing Test) for Ph.D. applicants and 1050/4.0 for M.S. applicants are recommended.

International students also will need to provide scores for the Test of English as a Foreign Language (TOEFL), unless they have already received a degree from a U.S. institution. A PBT score at or above 550 or an iBT score at or **above 79-80 is recommended**.

Both the GRE and TOEFL scores must be submitted through ETS (www.ets.org) using institution code: 1845.

Three letters of recommendation are required. The online application process will provide you with the opportunity to send electronic requests to your recommenders.

Official transcripts are required from all universities/colleges you have attended.

A Statement of Purpose and a Resume will also be required as part of the online application process.

For all applicants, laboratory research experience is highly recommended. A Master's degree is not required to apply to the Ph.D. program.

Applications are considered for **Fall semester entrance only**, except for the Bioinformatics program. The application deadline is January 15th. International applicants should also have completed their current degree program by May 1st. The number of available Ph.D. and M.S. positions varies each year and depends upon faculty research funding. Only funded faculty can accept students into their lab.

Undergraduate Research Opportunities

A ten-week Summer Undergraduate Research Fellowship (SURF) with stipend is available within each track for undergraduate students who are interested in exploring a biomedical science research career. More information can be found at <http://www.utoledo.edu/med/grad/surf.html>.

For Additional Information

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