



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 & Life Sciences (<http://www.utoledo.edu/med/grad/biomedical/>). 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 and within the above website.

- **CANCER BIOLOGY**  
([http://www.utoledo.edu/med/grad/biomedical/biochem/Admission\\_Requirements.html](http://www.utoledo.edu/med/grad/biomedical/biochem/Admission_Requirements.html)) – The CAB 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 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. Please note that Cancer Biology is not currently accepting MS applicants, although PhD applicants are still accepted. The Track Director are Dr. Kandace Williams, Professor, and Dr. Dayanidhi Raman, Assistant Professor, Department of Cancer Biology [Kandace.Williams@utoledo.edu](mailto:Kandace.Williams@utoledo.edu), [Dayanidhi.Raman@utoledo.edu](mailto:Dayanidhi.Raman@utoledo.edu), or [BioMedScienceGrad@UToledo.Edu](mailto:BioMedScienceGrad@UToledo.Edu) ; 419-383-4135.
- **MOLECULAR MEDICINE**  
([https://www.utoledo.edu/med/grad/biomedical/cvmd/Admission\\_Requirements.html](https://www.utoledo.edu/med/grad/biomedical/cvmd/Admission_Requirements.html)) – The MOME track trains students to conduct research on the genetics and pathophysiology of cardiovascular diseases, such as hypertension and atherosclerosis, and diabetes, obesity, fatty liver disease, and infertility. 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](mailto:Andrew.Beavis@utoledo.edu) or [BioMedScienceGrad@UToledo.Edu](mailto:BioMedScienceGrad@UToledo.Edu) ; 419-383-4183).
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- **MEDICAL MICROBIOLOGY & IMMUNOLOGY** (<http://www.utoledo.edu/med/depts/micro/>) – The Medical Microbiology and Immunology (MMI) track is dedicated to the fight against infectious pathogens that remain major causes of human diseases and to the study of defective or excessive immune responses that cause many other disorders, including cancer, autoimmune disease, and allergic disease. Students in the MMI track explore the relationships between microbial pathogens and their human hosts and examine the nature of host defense systems against environmental insults. MMI Track Directors are Drs. Kevin Pan, Professor and Chairman ([sKevin.Pan@utoledo.edu](mailto:sKevin.Pan@utoledo.edu); 419-383-5446) and Jason F. Huntley, Associate Professor ([Jason.Huntley@UToledo.edu](mailto:Jason.Huntley@UToledo.edu); 419-383-5456). Inquiries also can be made to [BioMedScienceGrad@UToledo.Edu](mailto:BioMedScienceGrad@UToledo.Edu)
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- **NEUROSCIENCES AND NEUROLOGICAL DISORDERS**  
<http://www.utoledo.edu/med/grad/biomedical/neuro/app.html>) –The combination of modern neuroanatomical, neurophysiological, proteomic and genetic techniques is transforming both our ability to examine and to understand the nervous system. Ongoing research by the faculty in the Neurosciences and Neurological Disorders graduate program is providing insights into neurotransmission, development and plasticity of the nervous system, regeneration and repair following neural damage, the basis of neuropsychiatric disorders and behavior. As one of four biomedical science degree programs in the University of Toledo, College of Medicine & Life Sciences, the Neurosciences and Neurological Disorders program is an interdisciplinary course of studies whose primary goal is to train students for independent, creative careers in biomedical research and/or teaching. The program awards both PhD and MSBS\* in biomedical sciences degrees and participates in the MD/PhD and MD/MSBS combined degree programs. Nationally recognized, NIH-funded Neuroscience faculty who serve as research mentors are drawn from a number of departments including: Neurosciences, Neurology, Physiology and Pharmacology, Psychiatry and Radiation Therapy. Modern, state-of-the-art research laboratory and core facilities are available

through the program and these participating departments. The Track Director is Dr. David Giovannucci, Professor, Department of Neurosciences ([David.Giovannucci@utoledo.edu](mailto:David.Giovannucci@utoledo.edu) or [BioMedScienceGrad@UToledo.Edu](mailto:BioMedScienceGrad@UToledo.Edu) ; 419-383-5004).

All tracks are research-intensive and combine rigorous coursework with 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. Work on the students' thesis or dissertation projects typically begins by the summer semester of the first year.

Students on average complete the Ph.D. in Biomedical Science Program in five years or less and the M.S. in Biomedical Science Program in approximately two - three years. Graduates progress to research, teaching, and other positions in academia, industry, and the government.

- **BIOINFORMATICS & PROTEOMICS/GENOMICS, BRIM CENTER OF EXCELLENCE** (<https://www.utoledo.edu/med/depts/bioinfo/pages/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.
  - ✓ M.S. in Bioinformatics & Proteomics/Genomics. The M.S. program includes core courses, independent research, and electives in 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 degree primarily designed for those interested in a biotechnology/pharmaceutical industry career. It resembles the M.S. described above, but with business courses and 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](mailto: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 or greater 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 through the College of Graduate Studies and submit additional materials and an application fee as instructed on the website. (M.S. applicants are currently **not** accepted within the Cancer Biology or Neurosciences and Neurological Disorders tracks) 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.
- Official transcripts will be required via postal mail. Electronic transfer of transcripts by the applicant will not be accepted.
- 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.
- Applicants will be required to submit a Resume, and a Statement of Purpose. **Relevant research experience is highly recommended** to be a competitive applicant, especially for the PhD training program, and should be discussed within the Statement of Purpose by the applicant.
- The Graduate Record Examination (GRE), taken within the last 5 years, is required of all applicants. With the new GRE scoring system, **scores above the 50<sup>th</sup> percentile in each of the three categories are recommended to be competitive**.
- 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 80 is required for admission into UT graduate studies**.

**Both the GRE and TOEFL scores must be submitted through ETS ([www.ets.org](http://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.

## HOW TO SUBMIT MATERIALS

GRE/GMAT/TOEFL Scores	Must be submitted through ETS ( <a href="http://www.ets.org">www.ets.org</a> ) using institution code: 1845.
Official Transcripts	Must be mailed by the institution to the College of Graduate Studies office, or delivered by the applicant in an envelope sealed by the institution.
Letters of Recommendation	May be mailed to the College of Graduate Studies office, uploaded on the online application or emailed to <a href="mailto:graduateonlineapplication@utoledo.edu">graduateonlineapplication@utoledo.edu</a> .
Resumes/Curriculum Vitae, Statements of Purpose, Writing Samples, Other Required Documents	May be uploaded with application, mailed to the College of Graduate Studies office, or emailed to <a href="mailto:graduateonlineapplication@utoledo.edu">graduateonlineapplication@utoledo.edu</a> .

*Please note: Documents (Resumes, Statements of Purpose and Writing Samples) uploaded with the online application should not be resent by email or mail. This may delay the processing of the application file.*

College of Graduate Studies Address:

College of Graduate Studies  
The University of Toledo  
Mail Stop 933  
2801 W. Bancroft St.  
Toledo, OH 43606

- 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 15<sup>th</sup>. International applicants should also have completed their current degree program by May 1<sup>st</sup>. 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.

### For Additional Information

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