

MSBS IN MOLECULAR MEDICINE

Code	Title	Hours
BMSP 6330	Current Problems and Research Approaches in Proteins	2
BMSP 6340	Curr Prob Res App Genes/Genom	2
BMSP 6360	Current Problems and Research Approaches in Cell Membranes	2
BMSP 6380	Methods in Biomedical Sciences	2
BMSP 6390	Mentored Research	1
MOME 6300	Seminars in Molecular Medicine	1
MOME 6600	Journal Paper Review in Molecular Medicine	1
BMSP 6470	System Pathophysiology	4
BMSP 6350	Cell Biology & Signaling	3
MOME 6730	Research in Molecular Medicine	1-9
BMSP 5320	Statistical Methods I	3
INDI 6020	On Being a Scientist	1
MOME 6990	Thesis Research in Molecular Medicine	1-9

The minimum number of credits required for MSBS is 40, with a minimum of 18 credits of didactic coursework (letter grade).

The MSBS curriculum includes advanced electives in Molecular Medicine or other areas to make up the 18 required didactic credit hours.

A minimum of 10 credits of Thesis Research is required for graduation.

Code	Title	Hours
FIRST TERM		9
Introduction to Biomedical Research ¹		0
Current Problems and Research Approaches (CPRA) in:		
BMSP 6330	Current Problems and Research Approaches in Proteins	2
BMSP 6340	Curr Prob Res App Genes/Genom	2
BMSP 6360	Current Problems and Research Approaches in Cell Membranes	2
BMSP 6380	Methods in Biomedical Sciences	2
BMSP 6390	Mentored Research (two 5 week lab rotations)	1
SECOND TERM		9
MOME 6600	Journal Paper Review in Molecular Medicine	1
BMSP 6470	System Pathophysiology	4
or		
BMSP 6350	Cell Biology & Signaling	3
MOME 6730	Research in Molecular Medicine	1-8
or		
BMSP 6390	Mentored Research ((if needed))	1
Electives		0-7

Code	Title	Hours
THIRD TERM		6
BMSP 5320	Statistical Methods I	3
INDI 6020	On Being a Scientist	1
MOME 6730	Research in Molecular Medicine	2

The MSBS First year Qualifying Examination (successful completion required in third term) is taken at the end of the first year

Code	Title	Hours
FOURTH TERM		9
MOME 6300	Seminars in Molecular Medicine	1
MOME 6600	Journal Paper Review in Molecular Medicine	1
MOME 6990	Thesis Research in Molecular Medicine (and/or Electives)	1-7

Code	Title	Hours
FIFTH TERM		9
BMSP 6470	System Pathophysiology	4
or		
BMSP 6350	Cell Biology & Signaling	3
MOME 6300	Seminars in Molecular Medicine	1
MOME 6600	Journal Paper Review in Molecular Medicine	1
MOME 6990	Thesis Research in Molecular Medicine (and/or Electives)	3-4

Code	Title	Hours
SIXTH TERM		6
MOME 6990	Thesis Research in Molecular Medicine	0-6
and/or		
Electives		0-6

Code	Title	Hours
SEVENTH TERM (if necessary)		9
MOME 6990	Thesis Research in Molecular Medicine ²	1-9
and/or		
Electives		0-8

Code	Title	Hours
EIGHTH TERM (if necessary)		9
MOME 6990	Thesis Research in Molecular Medicine ²	1-9
and/or		
Electives		0-8

Code	Title	Hours
NINTH TERM (if necessary)		6
MOME 6990	Thesis Research in Molecular Medicine ²	1-6
and/or		
Electives		0-5

¹ Required.

² Seventh, Eighth, and Ninth Terms if necessary. Fall/Spring Semester (9 credits each), Summer (6 credits)

- PLO 1. FY1. Identify and summarize the structure and function of cells, tissues, and organs
- PLO 2. FY2. Describe the molecular, biochemical, and cellular mechanisms that maintain the normal function, development, and plasticity of cells, tissues, and organs
- PLO 3. FY3. Summarize basic disease causes and processes that affect the structure and function of cells, tissues, and organs
- PLO 4. FY4. Assess and critically analyze relevant basic science and clinical literature.
- PLO 5. FY5. Design and conduct applicable biomedical sciences experiments
- PLO 6. FY6. Organize, interpret and summarize results of applicable biomedical sciences experiments.
- PLO 7. FY7. Demonstrate ethical and responsible conduct in research and all other scholarly activities consistent with the University of Toledo, Health Science Campus, Standards of Conduct
- PLO 8. K1 Describe the normal structure and function of the body and its major organ systems, with emphasis on the systems studied in MOME laboratories (e.g., cardiovascular, renal, digestive, endocrine and neuroendocrine systems)
- PLO 9. K2 Describe biochemical, molecular and cellular mechanisms that are important in maintaining cardiac and vascular function as well as metabolism and energy balance.
- PLO 10. K3 Explain the pathophysiology of prevalent cardiovascular and metabolic diseases, such as diabetes, obesity, fatty liver disease, hypertension, heart failure, and ischemic heart disease.
- PLO 11. K4 Describe the genetic and environmental basis of prevalent cardiovascular and metabolic diseases, such as hypertension, diabetes and obesity
- PLO 12. K5 Describe the epidemiology of prevalent cardiovascular and metabolic diseases, such as hypertension, diabetes and obesity
- PLO 13. K6 Describe the basic principles of pharmacology (drug action) and pharmacology of specific drugs used in the treatment of prevalent cardiovascular and metabolic diseases
- PLO 14. K7 Apply statistical methods in the design and interpretation of research projects
- PLO 15. K8 Recognize and explain the principles that govern ethical decision making in the design and apply them in the conduct of research projects, including the publication and reporting of results.
- PLO 16. K9 Describe the various approaches used to develop research proposals and to raise funds to finance biomedical research projects.
- PLO 17. S1 The ability to perform most basic laboratory procedures that are commonly used in the track laboratories.
- PLO 18. S2 The ability to perform advanced/specialized procedures that are necessary for the completion of the student's thesis research project(s)
- PLO 19. S3 The ability to design and complete independent research projects, including the introduction and optimization of unfamiliar techniques and the development of new research techniques
- PLO 20. S4 The ability to perform productively as a member of a research team and train junior students in routine and basic laboratory techniques
- PLO 21. S5 The ability to recognize hazardous procedures in the laboratory and follow appropriate precautions to protect the laboratory and institutional personnel
- PLO 22. S6 The ability to communicate effectively, both verbally and in writing, with other students, post-doctoral fellows, faculty members and other collaborators
- PLO 23. S7 The ability to present their results at local, and national meetings
- PLO 24. S8 The ability to retrieve biomedical information from electronic databases and other sources; to manage, and utilize the information, including by use of bioinformatics, in order to develop hypotheses to address scientific issues and the means to test them and to discuss the results in the context of reports in the literature.
- PLO 25. S9 The ability to write and submit manuscripts and to communicate effectively with scientific journal editors and reviewers
- PLO 26. S10 The ability to write a comprehensible research proposal.
- PLO 27. P1 Students will demonstrate ethical, responsible, reliable, and dependable behavior in all aspects of their professional lives, and a commitment to the profession and society.
- PLO 28. P2 Students will demonstrate honesty and integrity in all interactions with faculty advisors, colleagues, faculty members, laboratory and institutional staff, research subjects, and others with whom students may interact in their professional lives.
- PLO 29. P3 Honesty and integrity in research conduct and reporting of results.
- PLO 30. P4 Students will demonstrate responsible behavior while using shared equipment and facilities.
- PLO 31. P5 Students will demonstrate responsible behavior and willingness to train and teach junior students to the best of their knowledge.
- PLO 32. P6 Students will demonstrate professionalism in dress and grooming in compliance with health and safety rules applicable to the research laboratories and other research sites.
- PLO 33. P7 Students will demonstrate compassionate treatment of patients as subjects of research, and respect for their privacy and dignity.
- PLO 34. P8 Students will demonstrate compassionate treatment of experimental animals, and respect for all laws and regulations applicable to the use of animals in medical research.
- PLO 35. P9 Students will demonstrate professionalism in following rules and regulations set by different committees of the institution, e.g. IACUC, IRB, Biohazard committee, Radiation Safety etc.