

2019-2020 Graduate Calendar

The information published in this Graduate Calendar outlines the rules, regulations, curricula, programs and fees for the 2019-2020 academic year, including the Summer Semester 2019, Fall Semester 2019 and the Winter Semester 2020.

For your convenience the Graduate Calendar is available in PDF format.

If you wish to link to the Graduate Calendar please refer to the [Linking Guidelines](#).

The University is a full member of:

- Universities of Canada

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UNIVERSITY
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Disclaimer

The Office of Graduate and Postdoctoral Studies has attempted to ensure the accuracy of this on-line Graduate Calendar. However, the publication of information in this document does not bind the university to the provision of courses, programs, schedules of studies, fees, or facilities as listed herein.

Limitations

The University of Guelph reserves the right to change without notice any information contained in this calendar, including any rule or regulation pertaining to the standards for admission to, the requirements for the continuation of study in, and the requirements for the granting of degrees or diplomas in any or all of its programs.

The university will not be liable for any interruption in, or cancellation of, any academic activities as set forth in this calendar and related information where such interruption is caused by fire, strike, lock-out, inability to procure materials or trades, restrictive laws or governmental regulations, actions taken by the faculty, staff or students of the university or by others, civil unrest or disobedience, Public Health Emergencies, or any other cause of any kind beyond the reasonable control of the university.

The University of Guelph reaffirms section 1 of the Ontario Human Rights Code, 1981, which prohibits discrimination on the grounds of race, ancestry, place of origin, colour, ethnic origin, citizenship, creed, sex, sexual orientation, handicap, age, marital status or family status.

The university encourages applications from women, aboriginal peoples, visible minorities, persons with disabilities, and members of other under-represented groups.

Introduction

Collection, Use and Disclosure of Personal Information

Personal information is collected under the authority of the University of Guelph Act (1964), and in accordance with Ontario's Freedom of Information and Protection of Privacy Act (FIPPA) http://www.e-laws.gov.on.ca/DBLaws/Statutes/English/90f31_e.htm. This information is used by University officials in order to carry out their authorized academic and administrative responsibilities and also to establish a relationship for alumni and development purposes. Certain personal information is disclosed to external agencies, including the Ontario Universities Application Centre, the Ministry of Advanced Education and Skills Development, and Statistics Canada, for statistical and planning purposes, and is disclosed to other individuals or organizations in accordance with the Office of Registrarial Services Departmental Policy on the Release of Student Information. For details on the use and disclosure of this information call the Office of Registrarial Services at the University at (519) 824-4120 or see <https://www.uoguelph.ca/registrar/>

Statistics Canada - Notification of Disclosure

For further information, please see Statistics Canada's web site at <http://www.statcan.gc.ca> and Section XIV Statistics Canada.

Address for University Communication

Depending on the nature and timing of the communication, the University may use one of these addresses to communicate with students. Students are, therefore, responsible for checking all of the following on a regular basis:

Email Address

The University issued email address is considered an official means of communication with the student and will be used for correspondence from the University. Students are responsible for monitoring their University-issued email account regularly.

Home Address

Students are responsible for maintaining a current mailing address with the University. Address changes can be made, in writing, through Registrarial Services.

Name Changes

The University of Guelph is committed to the integrity of its student records, therefore, each student is required to provide either on application for admission or on personal data forms required for registration, their complete, legal name. Any requests to change a name, by means of alteration, deletion, substitution or addition, must be accompanied by appropriate supporting documentation.

Student Confidentiality and Release of Student Information Policy Excerpt

The University undertakes to protect the privacy of each student and the confidentiality of their record. To this end the University shall refuse to disclose personal information to any person other than the individual to whom the information relates where disclosure would constitute an unjustified invasion of the personal privacy of that person or of any other individual. All members of the University community must respect the confidential nature of the student information which they acquire in the course of their work.

Complete policy at <https://www.uoguelph.ca/secretariat/office-services/university-secretariat/university-policies>.

Learning Outcomes

Graduate Degree Learning Outcomes

On May 27, 2013, the University of Guelph Senate approved the following five University-wide Learning Outcomes as the basis from which to guide the development of graduate degree programs, specializations and courses:

1. Critical and Creative Thinking
2. Literacy
3. Global Understanding
4. Communication
5. Professional and Ethical Behaviour

These learning outcomes are also intended to serve as a framework through which our educational expectations are clear to students and the broader public; and to inform the process of outcomes assessment through the quality assurance process (regular reviews) of programs and departments.

An on-line guide to the learning outcomes, links to the associated skills, and detailed rubrics designed to support the development and assessment of additional program and discipline-specific outcomes, are available for reference on the [Learning Outcomes website](#)

Critical and Creative Thinking

Critical and creative thinking is a concept in which one applies logical principles, after much inquiry and analysis, to solve problems with a high degree of innovation, divergent thinking and risk taking. Those mastering this outcome show evidence of integrating knowledge and applying this knowledge across disciplinary boundaries. Depth and breadth of understanding of disciplines is essential to this outcome. At the graduate level, originality in the application of knowledge (master's) and undertaking of research (doctoral) is expected.

In addition, Critical and Creative Thinking includes, but is not limited to, the following outcomes: Independent Inquiry and Analysis; Problem Solving; Creativity; and Depth and Breadth of Understanding.

Literacy

Literacy is the ability to extract information from a variety of resources, assess the quality and validity of the material, and use it to discover new knowledge. The comfort in using quantitative literacy also exists in this definition, as does using technology effectively and developing visual literacy.

In addition, Literacy includes, but is not limited to, the following outcomes: Information Literacy, Quantitative Literacy, Technological Literacy, and Visual Literacy.

Global Understanding

Global understanding encompasses the knowledge of cultural similarities and differences, the context (historical, geographical, political and environmental) from which these arise, and how they are manifest in modern society. Global understanding is exercised as civic engagement, intercultural competence and the ability to understand an academic discipline outside of the domestic context.

In addition, Global Understanding includes, but is not limited to, the following outcomes: Global Understanding, Sense of Historical Development, Civic Knowledge and Engagement, and Intercultural Competence.

Communication

Communication is the ability to interact effectively with a variety of individuals and groups, and convey information successfully in a variety of formats including oral and written communication. Communication also comprises attentiveness and listening, as well as reading comprehension. It includes the ability to communicate and synthesize information, arguments, and analyses accurately and reliably.

In addition, Communication includes, but is not limited to, the following outcomes: Oral Communication, Written Communication, Reading Comprehension, and Integrative Communication.

Professional and Ethical Behaviour

Professional and ethical behaviour requires the ability to accomplish the tasks at hand with proficient skills in teamwork and leadership, while remembering ethical reasoning behind all decisions. The ability for organizational and time management skills is essential in bringing together all aspects of managing self and others. Academic integrity is central to mastery in this outcome. At the graduate level, intellectual independence is needed for professional and academic development and engagement.

In addition, Professional and Ethical Behaviour includes, but is not limited to, the following outcomes: Teamwork, Ethical Reasoning, Leadership, Personal Organization and Time Management, and Intellectual Independence.

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Biomedical Sciences

The Department specializes in scientific disciplines which are basic to human and veterinary medicine. Within this context, the research activities of the faculty are focused under the general umbrella of biomedical science and biotechnology. The MBS, MSc and PhD programs provide emphasis in one of the department's seven major fields:

- Reproductive Biology and Development
- Cellular and Molecular Basis of Health & Disease
- Cancer Biology
- Cardiovascular Physiology
- Stem Cell Biology and Regenerative Medicine
- Biomedical Toxicology and Pharmacology
- Neuroscience

The department also participates in the Doctor of Veterinary Science (DVSc) program.

Administrative Staff

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BSc Leeds, PhD London - Professor

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Tami Martino

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Roger A. Moorehead

BSc, PhD McMaster - Professor

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James J. Petrik

BA, MA, PhD Western Ontario - Professor

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Tarek M. Saleh

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Jeffrey J. Thomason

BA Cambridge, MSc, PhD Toronto - Professor

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Alicia Vilorio-Petit

BSc, MSc Venezuela, PhD Toronto - Assistant Professor

Associated Graduate Faculty

Gabriela Mastromonaco

BSc, MSc Toronto, PhD Guelph - Curator, Reproductive Programs & Research, Toronto Zoo

MBS program

Students may wish to focus their Master of Biomedical Sciences in a range of subject areas, including 1) reproductive biology and development; 2) cellular and molecular basis of health and disease; 3) cancer biology; 4) cardiovascular physiology; 5) stem cell biology and regenerative medicine; 6) biomedical toxicology and pharmacology; and 7) neuroscience. The research projects are varied in topic and scope and may involve: molecular, cellular, or developmental aspects of tissue or animal differentiation and growth; physiological, morphological, or biomechanical investigations of normal function or disease processes in a variety of organs and tissues; or pharmacological mechanisms related to therapy and drug toxicity. Research projects may also involve pedagogical research related to teaching in the biomedical sciences. Practicum experiences, also varied in topic and nature, expose students to real-world applications of their areas of study, and connect them with employers in government agencies, consulting firms, research organizations, etc.

Admission Requirements

Applicants should have an Honours baccalaureate degree in the Biological Sciences or a Doctor of Veterinary Medicine degree (or the equivalent) with a minimum 'B+' standing in the final two years of study. Letters of reference from two individuals who can adequately evaluate the academic and research capabilities of the applicant must be provided with the application. In addition, a short statement of the applicant's area of interest and career goals is required to assist in the selection of faculty advisors. Students may be admitted into the Fall, Winter, or Summer semester. Provisional acceptance may be granted to students who do not meet this 'B+' standard if there is additional evidence that the applicant is capable of successfully completing the graduate program (e.g., outstanding letters of recommendation, or evidence of prior relevant work or research experience). Transfer to regular status will normally be recommended when the student obtains a minimum grade of 'A-' in their first two graduate course and displays current research ability to their advisory committee. These courses will be credited to the degree program.

Program Requirements

Students must obtain at least an overall weighted average of 'B-' in prescribed courses. The number of course credits prescribed will not be fewer than 4.0 credits. As part of their studies, all MBS students must complete either a research project through BIOM*6900 or an applied practicum through BIOM*6900. The remaining courses selected will depend on the student's prior experience and the nature of the research project or practicum. All students are required to present a poster seminar as a component of BIOM*6900 or BIOM*6910. The program is completed when all components of BIOM*6900 or BIOM*6910 have been submitted and the related written report is deemed appropriate by the student's Advisory Committee.

MSc Program

Students may wish to focus their MSc degree in one of the three major fields: 1) reproductive biology and development; 2) cellular and molecular basis of health and disease; 3) cancer biology; 4) cardiovascular physiology; 5) stem cell biology and regenerative medicine; 6) biomedical toxicology and pharmacology; and 7) neuroscience. The research project may involve: molecular, cellular or developmental aspects of tissue or animal differentiation and growth; physiological, morphological or biomechanical investigations of normal function or disease processes in a variety of organs and tissues; or pharmacological mechanisms related to therapy and drug toxicity.

Admission Requirements

Applicants should have an Honours baccalaureate degree in the Biological Sciences or a Doctor of Veterinary Medicine degree (or the equivalent) with a minimum 'B+' standing in the final two years of study. Letters of reference from two individuals who can adequately evaluate the academic and research capabilities of the applicant must be provided with the application. In addition, a short statement of the applicant's research interests and career goals, is required to assist in the selection of faculty advisors. Students may be admitted into the Fall, Winter or Summer semester. Provisional acceptance may be granted to students who do not meet this 'B+' standard if there is additional evidence that the applicant is capable of successfully completing the graduate program (e.g., outstanding letters of recommendation, or evidence of prior relevant work or research experience). Transfer to regular status will normally be recommended when the student obtains a minimum grade of 'A-' in their first two graduate course and displays current research ability to their advisory committee. These courses will be credited to the degree program.

Program Requirements

Students must obtain at least an overall weighted average of 'B-' in prescribed courses. The number of graduate course credits prescribed will not be fewer than 1.5 credits. Prescribed and additional courses are selected by the student in consultation with the student's advisory committee. The courses selected will depend on the student's prior experience and the nature of the research project. The student must also prepare and defend an acceptable thesis and meet the Department's minimum scientific communication requirement. The minimum scientific communication requirement is one conference presentation (oral or poster) at a suitable Regional, National or International scientific conference. If this requirement has not been achieved, written justification must be provided to the Department of Biomedical Sciences Graduate Program Committee outlining the reasons why these requirements have not been achieved. The Chair of the Department of Biomedical Sciences Graduate Program Committee will provide a written response outlining the decision of the Graduate Program Committee to either grant or reject the request that the defence proceed even though the minimum scientific communication requirement has not been completed. All students are required to present two departmental seminars during their program. The thesis research proposal, developed by the student in consultation with the advisor, must receive approval from the supervisory committee no later than the end of the second semester of the program. The program is completed by the successful oral defence of a written thesis.

PhD Program

Students may undertake a PhD degree in aspects of 1) reproductive biology and development; 2) cellular and molecular basis of health and disease; 3) cancer biology; 4) cardiovascular physiology; 5) stem cell biology and regenerative medicine; 6) biomedical toxicology and pharmacology; and 7) neuroscience. Wherever appropriate, students are encouraged to incorporate the methodologies of more than one of these fields into their research project. The PhD program is research based and provides instructional opportunities and experiences that are intended to develop the student's ability to formulate hypotheses and design and execute experiments or to conduct observational studies.

Admission Requirements

Students entering the PhD program must show evidence of potential for independent, productive and original research. Admission to the PhD program generally requires completion of an MSc program with a research component, a minimum 'B+' average in the prescribed courses taken during the master's degree program, and strong recommendations from referees who have a sound knowledge of the student's strengths and weaknesses. In addition, a short statement of the applicant's research interests and career goals is required. In exceptional cases, where a candidate has demonstrated excellence in academic work and extraordinary ability to plan and initiate original research, transfer to the PhD program without completion of the MSc program may be recommended. This transfer must take place before the end of the fourth semester in accordance with university regulations. In all cases, students who do not hold an approved research-based MSc degree must register as MSc students regardless of their ultimate goals. Students may be admitted into the Fall, Winter or Summer semester. In those cases where the student is continuing her or his MSc research program into the PhD program, the student must clearly explain how the PhD research program represents a significant advance over that of the MSc.

Program Requirements

The PhD program offers opportunities for students to become investigators in veterinary and human-health-related sciences. Students will be expected to demonstrate the originality and skill needed to contribute to the knowledge base in a manner that transcends the mere acquisition of data. All students are required to present departmental seminars (one per annum). Students must also successfully complete a qualifying examination. Details of the qualifying examination which includes written and oral components can be found on the [Department's website](#). Successful completion of the qualifying examination is a prerequisite for continuation in the PhD program. The advisory committee is required to evaluate the student's research productivity periodically and to report on the student's progress to the Department Graduate Program Committee each semester in which the student is registered.

The PhD program culminates in the preparation, presentation and defence of the thesis, which contains a substantial component of original research. Preparation and defence of an acceptable thesis based on research data and hypotheses generated during the duration of the study are the main criteria used to assess the satisfactory completion of the PhD program. In addition the student must meet the Department's minimum scientific communication requirements. The minimum scientific communication requirements are two manuscripts which **must** at least have been submitted to a scientific journal prior to the student graduating with their PhD degree. One of these manuscripts **must** be based on the student's PhD research project and the student **must** be the first or senior author on this manuscript. The second manuscript may be either an original research manuscript or a review manuscript. The student is not required to be the first author on this manuscript but the manuscript must be generated during the student's tenure as a PhD candidate (i.e. the manuscript cannot be based on work performed while an undergraduate student or work presented in an MSc thesis). Students transferring from the MSc program to the PhD program can use any publications generated while enrolled in the graduate program of the Department of Biomedical Sciences. If these requirements have not been achieved, written justification must be provided to the Department of Biomedical Sciences Graduate Program Committee outlining the reasons why these requirements have not been achieved. The Chair of the Department of Biomedical Sciences Graduate Program Committee will provide a written response outlining the decision of the Graduate Program Committee to either grant or reject the request that the defence proceed even though the minimum scientific communication requirements have not been completed.

DVSc Program

The Department of Biomedical Sciences participates in the DVSc program offering specialization in clinical science. This program provides a balance between advanced training in the discipline, in-service training and a thesis-research project.

Interdepartmental Program

Biophysics MSc/PhD

The Department of Biomedical Sciences participates in the MSc/PhD program in biophysics. Please consult the Biophysics listing for a detailed description of the MSc/PhD program.

Collaborative Specializations

Neuroscience

The Department of Biomedical Sciences participates in the MBS/MSc/PhD collaborative specialization in neuroscience. Please consult the Neuroscience listing for a detailed description of the MBS/MSc/PhD collaborative specialization.

One Health

The Department of Biomedical Sciences participates in the collaborative specialization in One Health. Master's and Doctoral students wishing to undertake thesis research or their major research paper/project with an emphasis on one health are eligible to apply to register concurrently in Biomedical Sciences and the collaborative specialization. Students should consult the One Health listing for more information.

Toxicology

The Department of Biomedical Sciences participates in the masters/doctoral collaborative specialization in toxicology. The research and teaching expertise of these faculty include aspects of toxicology; they may serve as advisors for masters and doctoral students. Please consult the Toxicology listing for a detailed description of the masters/doctoral collaborative specialization.

Courses

BIOM*6070 Pregnancy, Birth and Perinatal Adaptations S [0.50]

This course promotes understanding of the physiology of the placenta, and its role in fetal, perinatal and adult health. It is offered through videoconference involving University of Guelph, Queen's University and University of Waterloo. Parts are customized to student's interests within pregnancy physiology.

Department(s): Department of Biomedical Sciences

BIOM*6110 Research Methods in Biomedical Sciences F-W [0.50]

To provide a theoretical and practical introduction to basic and advanced laboratory techniques for graduate students in Biomedical Sciences. Routine and specialized procedures for light microscopy and various lab techniques, including but not limited to qPCR, protein assays, HPLC, Histology, cell culture and flow cytometry, are examined. Each technique is extensively examined through lectures, discussions and practical exercises. (This is a two semester course that begins in the Fall semester.)

Department(s): Department of Biomedical Sciences

BIOM*6130 Vertebrate Developmental Biology U [0.50]

The principles of vertebrate development are examined through lectures, discussions and practical exercises. Topics include aspects of gametogenesis, fertilization, implantation, embryonic and fetal development and experimental manipulation of embryos. Emphasis is on mammalian development and topics may vary depending on student needs and interests.

Department(s): Department of Biomedical Sciences

BIOM*6160 Cellular Biology U [0.50]
An integrative course that examines aspects of cell biology in the context of recent research advancements. Topics are chosen based on student interest and faculty expertise and are explored through a combination of lectures, student seminars and group discussions. <i>Department(s):</i> Department of Biomedical Sciences
BIOM*6300 Cancer Biology W [0.50]
Directed to students pursuing cancer research and based on two 1.5-hour lectures and a 2-hour tutorial per week, the general aim of this course is to familiarize students with general concepts in cancer biology and the most commonly used methodologies in cancer research. Apart from improving students' general understanding of cancer biology, the course seeks to enhance critical thinking, writing and oral presentation skills by means of a seminar presentation, weekly tutorial discussions and the preparation of two literature reviews. Offered in conjunction with BIOM*4150. Extra work is required for graduate students. <i>Restriction(s):</i> Credit may be obtained for only one of BIOM*4150 or BIOM*6300. <i>Department(s):</i> Department of Biomedical Sciences
BIOM*6310 Advanced Cancer Biology F [0.50]
This course explores advanced topics in cancer biology including cancer etiology, detection and screening and therapeutic strategies. Students will also critically evaluate the scientific literature as well as cancer related articles disseminated to the general public. <i>Restriction(s):</i> Instructor consent required. <i>Department(s):</i> Department of Biomedical Sciences
BIOM*6400 Critical Thinking in Medical Research F [0.50]
This course will explore a variety of issues related to the scientific ideals and practical realities of research in the health sciences. Topics include critical thinking, critical appraisal of the medical literature (with emphasis on clinical trials), the principles of evidence-based medicine, and selected issues related to scientific integrity. <i>Prerequisite(s):</i> Undergraduate or graduate course in statistics. <i>Department(s):</i> Department of Biomedical Sciences
BIOM*6490 Introduction to Drug Development W [0.50]
Drug development is the process of integrating scientific data from several disciplines in order to demonstrate efficacy and safety of the new chemical entity for regulatory approval. This course will provide an overview of the drug development process including preclinical and clinical aspects of drug development. <i>Restriction(s):</i> Instructor consent required. <i>Department(s):</i> Department of Biomedical Sciences
BIOM*6570 Biochemical Regulation of Physiological Processes U [0.50]
This course focuses on the regulation of vertebrate physiological processes, such as electrolyte and water balance, temperature regulation, growth and energy metabolism, by hormones and other biological regulators that act through cellular receptors and intracellular biochemical-control pathways. <i>Department(s):</i> Department of Biomedical Sciences
BIOM*6601 Special Topics in Reproductive Biology and Biotechnology U [0.25]
Permits in-depth exploration of interdisciplinary aspects of biomedical research. Topics such as inflammation, reproductive immunology and neoplasia have been offered. <i>Department(s):</i> Department of Biomedical Sciences
BIOM*6602 Applied Reproductive Biotechnologies F-W [0.50]
The production of embryos in the laboratory requires considerable manual dexterity and expertise as well as theoretical knowledge and problem-solving skills. This is a 2-semester course consisting of laboratory training in bovine in vitro embryo production, seminars, field trips, group discussions and the placement in IVF clinics. <i>Restriction(s):</i> Instructor consent required. <i>Department(s):</i> Department of Biomedical Sciences
BIOM*6610 Vascular Biology U [0.50]
An interdisciplinary course in which the interrelationships between vascular proteins, cellular elements and the maintenance of vascular integrity are examined. Structural-functional relationships in vascular biology are explored through seminar presentations, group discussions and small group participation in problem based examples of vascular dysfunction. <i>Department(s):</i> Department of Biomedical Sciences
BIOM*6701 Special Topics in Development, Cell and Tissue Morphology U [0.25]
Permits further in depth study of developmental and morphological sciences. <i>Department(s):</i> Department of Biomedical Sciences
BIOM*6702 Special Topics in Development, Cell and Tissue Morphology U [0.50]
See BIOM*6701 <i>Department(s):</i> Department of Biomedical Sciences

BIOM*6712 Special Topics in Physiology & Biochemistry U [0.50]
This course involves an appropriate combination of an experimental procedure (or project), seminars, selected reading or a literature review outside the thesis subject, developed according to the student's requirements. <i>Department(s):</i> Department of Biomedical Sciences
BIOM*6721 Special Topics in Pharmacology-Toxicology U [0.25]
This course will comprise a combination of an experimental procedure (or project), seminars, selected reading or a literature review outside the thesis subject, developed based on the student's requirements. Topics could include clinical pharmacology/toxicology, pharmaco-epidemiology/economics, gerontological or perinatal pharmacology and toxicokinetics. <i>Department(s):</i> Department of Biomedical Sciences
BIOM*6722 Special Topics in Biomedical Pharmacology-Toxicology U [0.50]
See BIOM*6721 <i>Department(s):</i> Department of Biomedical Sciences
BIOM*6800 Gene Expression in Health and Disease W [0.50]
This course presents the molecular concepts of gene expression and the functional consequences of abnormal expression in pathological conditions. The conceptual, methodological and applied aspects of gene expression will be illustrated through student and faculty seminars, written reports, group discussions, and debates. <i>Department(s):</i> Department of Biomedical Sciences
BIOM*6900 Research Project in Biomedical Sciences W,S,F [1.00]
This course is a lab-based, one-semester research project course for students in the course-based Master of Biomedical Sciences (MBS). As part of this course, students will complete a research paper and grant proposal pertaining to the research topic as well as a poster presentation of the project. <i>Restriction(s):</i> Course restricted to students registered in the course-based MBS. Instructor consent required. <i>Department(s):</i> Department of Biomedical Sciences
BIOM*6910 Practicum in Biomedical Sciences S [1.00]
This is a one-semester practicum project course for students in the Master of Biomedical Sciences (MBS) program. Students receive applied training by working in a host organization or agency for a 12- to 14-week period, focusing on a major project of significance to the host. <i>Restriction(s):</i> Course restricted to students registered in the course-based MBS. Instructor consent required. <i>Department(s):</i> Department of Biomedical Sciences