

LIFE SCIENCES

Program Notes

Subject Code for Anatomy: **ANAT**

Subject Code for Biochemistry: **BCHM**

Subject Code for Cancer Research: **CANC**

Subject Code for Cardiorespiratory Science: **CRSS**

Subject Code for Drug Discovery and Human Toxicology: **DDHT**

Subject Code for Life Sciences: **LISC**

Subject Code for Microbiology and Immunology: **MICR**

Subject Code for Neuroscience: **NSCI**

Subject Code for Pathology and Molecular Medicine: **PATH**

Subject Code for Pharmacology and Toxicology: **PHAR**

Subject Code for Physiology: **PHGY**

Subject Code for Community Health and Epidemiology: **EPID**

Subject Code for Reproduction and Development: **REPD**

World Wide Web Address: www.healthsci.queensu.ca/liscbchm/life_sciences (https://www.healthsci.queensu.ca/liscbchm/life_sciences/)

Associate Dean of Life Sciences, Biochemistry, and Health Sciences: Michael A. Adams (adams@queensu.ca)

Director of Life Sciences: Robert Campbell (robert.campbell@queensu.ca)

Departmental Office: Botterell Hall, Room 815

Departmental Telephone: 613-533-6527

Undergraduate Office E-mail Address: lifesci@queensu.ca

Overview

The hallmark of the Life Sciences program is a unique blend of disciplines represented by basic and clinical biomedical science departments in the Faculty of Health Sciences. These departments include Biomedical and Molecular Sciences, Public Health Sciences, and Pathology and Molecular Medicine, in collaboration with the Cancer Research Institute, the Centre for Neuroscience Studies, the Cardiac, Circulation and Respiratory Group, and the Research Group in Reproduction and Development.

The subjects that fall under the umbrella of the Life Sciences program include traditional biomedical disciplines devoted to the anatomical, biochemical, epidemiological, immunological, microbiological, pathological, pharmacological, and physiological sciences. In addition, there are Sub-plans dedicated to contemporary trans-disciplinary themes in the cardiovascular and respiratory sciences, drug development and human toxicology, cancer biology and genetics, and neuroscience.

The Department of Biomedical and Molecular Sciences is responsible for *Biochemistry Plans* (General (<https://queensu-ca-public.courseleaf.com/arts-science/schools-departments->

<https://queensu-ca-public.courseleaf.com/arts-science/schools-departments-programs/biochemistry/biochemistry-general-science-bs/>)/Minor (<https://queensu-ca-public.courseleaf.com/arts-science/schools-departments-programs/biochemistry/biochemistry-minor-science/>) (Science), Major (<https://queensu-ca-public.courseleaf.com/arts-science/schools-departments-programs/biochemistry/biochemistry-major-science-bs-honours/>), Specialization (<https://queensu-ca-public.courseleaf.com/arts-science/schools-departments-programs/biochemistry/biochemistry-specialization-science-bs-honours/>)) and plays a primary role in the *Life Sciences Plans* (General (<https://queensu-ca-public.courseleaf.com/arts-science/schools-departments-programs/life-sciences/life-sciences-general-science-bs/>)/Minor (<https://queensu-ca-public.courseleaf.com/arts-science/schools-departments-programs/life-sciences/life-sciences-minor-science/>) (Science), Major (<https://queensu-ca-public.courseleaf.com/arts-science/schools-departments-programs/life-sciences/life-sciences-major-science-bs-honours/>), Specialization (<https://queensu-ca-public.courseleaf.com/arts-science/schools-departments-programs/life-sciences/life-sciences-specialization-science-bs-honours/>)). The Department is a unique amalgam of scientists and teachers who share a common goal: to ameliorate the consequences of disease and trauma by training the next generation of health care scientists and professionals. To meet this goal, the Department draws on the depth and breadth of the scientific expertise of its members. Contemporary courses are offered in the anatomical, biochemical, microbiological, immunological, pharmacological, and physiological sciences and in a wide range of cross-disciplinary studies (e.g. cardiovascular and respiratory sciences, drug development, cancer biology and genetics, and neuroscience). These courses are integral to the various Biochemistry and Life Sciences Plans.

Program Policies

Laboratory Safety

Departmental Safety Rules are strictly enforced. A standard white laboratory coat is required for all laboratory courses. Shoes must be closed at both heel and toe. Additional safety requirements will be described at the first laboratory in each laboratory-based course.

Access to Third and Fourth Year Courses

Students in the Life Sciences Specialization Plan (LISC-P-BSH) (<https://queensu-ca-public.courseleaf.com/arts-science/schools-departments-programs/life-sciences/life-sciences-specialization-science-bs-honours/>) will be given priority enrolment to those courses that are required to meet third- and fourth-year core and option requirements. Students in



both the Life Sciences Specialization (<https://queensu-ca-public.courseleaf.com/arts-science/schools-departments-programs/life-sciences/life-sciences-specialization-science-bs-honours/>) and the Life Sciences Major Plans (<https://queensu-ca-public.courseleaf.com/arts-science/schools-departments-programs/life-sciences/life-sciences-major-science-bs-honours/>) (LISC-P-BSH and LISC-M-BSH) should further note that a minimum cumulative GPA of 2.50 is a required prerequisite to access those fourth-year courses to complete these Plans. See Academic Regulations (<https://queensu-ca-public.courseleaf.com/arts-science/academic-regulations/#text>) **2.4** and **2.6**.

Advice to Students

Students should seek **academic counselling** from staff in the Associate Dean's office:

Course Prefix	Counsellor	Contact Information
BCHM and LISC	TBD	lifesci@queensu.ca
BCHM and LISC	Katherine Rudder	lifesci@queensu.ca
BCHM and LISC	Beatriz Sugarman	biochem@queensu.ca

Students may also seek **academic counselling** from one of the counselors listed below.

Course Prefix	Counsellor	Contact Information
ANAT	Leslie MacKenzie	mackenzl@queensu.ca
BCHM	TBD	
CANC and PATH	Christopher Nicol	nicolc@queensu.ca
CRSS	Shetuan Zhang	shetuan.zhang@queensu.ca
EPID	Ana Johnson	ana.johnson@queensu.ca
DDHT and PHAR	TBD	
MICR	Christopher Lohans	christopher.lohans@queensu.ca
NSCI	Fernanda de Felice	fernanda.defelice@queensu.ca
PHGY	Alan Lomax	lomaxa@queensu.ca

- The Biomedical Discovery Sub-plan (<https://queensu-ca-public.courseleaf.com/arts-science/schools-departments-programs/life-sciences/life-sciences-specialization-science-bs-honours/#Biomedical-Discovery-SubPlan>) is recommended to students who wish to gain advanced laboratory experience or experiential learning in Anatomy or Epidemiology/Public Health or Immunology or Microbiology or Pathology or Pharmacology or Physiology, or Reproduction and Development.
- The Biomedical Sciences Sub-plan (<https://queensu-ca-public.courseleaf.com/arts-science/schools-departments-programs/life-sciences/life-sciences-specialization-science-bs-honours/#Biomedical-Sciences-SubPlan>) provides more

flexibility in choice of options and electives than other sub-plans, and is recommended to students who wish to obtain a wide-ranging foundation in the life sciences with opportunities for advanced study in selected topics.

The remaining four sub-plans are devoted to contemporary trans-disciplinary streams and place a high premium on laboratory-based research and seminar-based learning.

- The Cancer Sub-plan (<https://queensu-ca-public.courseleaf.com/arts-science/schools-departments-programs/life-sciences/life-sciences-specialization-science-bs-honours/#Cancer-Research>) is recommended to students who wish to proceed to graduate studies and research in Cancer Biology and Genetics. Students intending to take this sub-plan should consult the list of option courses required for completion of the program, and consider appropriate courses in Year 3.
- The Cardiorespiratory Sub-plan (<https://queensu-ca-public.courseleaf.com/arts-science/schools-departments-programs/life-sciences/life-sciences-specialization-science-bs-honours/#Cardiorespiratory-Science>) is recommended to students who wish to proceed to graduate studies and research in the cardiovascular and respiratory sciences. Students intending to take this sub-plan should complete PHGY 355 Biomedical Respiratory Physiology/3.0 in Year 3.
- The Drug Discovery and Human Toxicology Sub-plan (<https://queensu-ca-public.courseleaf.com/arts-science/schools-departments-programs/life-sciences/life-sciences-specialization-science-bs-honours/#Drug-Discovery&Human-Toxicology>) is recommended to students who are interested in enriched study in the fields of drug discovery and development as well as in mechanisms of drug and toxicant action. Students will gain advanced knowledge which will make them competitive for graduate studies and marketable in particular employment areas (e.g. government regulatory agencies and pharmaceutical companies).
- The Neuroscience Sub-plan (<https://queensu-ca-public.courseleaf.com/arts-science/schools-departments-programs/life-sciences/life-sciences-specialization-science-bs-honours/#Neuroscience>) is recommended to students who wish to proceed to graduate studies and research in the neurosciences. Students intending to take this option should complete either NSCI 323 Cellular Neuroscience/3.0 or NSCI 324 Systems Neuroscience/3.0 in Year 3. It is strongly recommended that students in this sub-plan complete both courses.

Life Sciences Major Plan (<https://queensu-ca-public.courseleaf.com/arts-science/schools-departments-programs/life-sciences/life-sciences-major-science-bs-honours/>) is recommended to students who wish to pursue

a wider range of study than is possible with the Life Sciences Specialization Plan. Access to specialized courses at the 400 level may be limited, with priority given to students in the Life Sciences Specialization Plan program.

Preparation for a Teaching Career

Students wishing to enter teaching as a career are advised to consult the Faculty of Education concerning the prerequisites for the B.Ed. program options.

Note Students enrolled in this program will be required to work with animals and tissues obtained from animals.

Faculty

For more information, please visit: <https://dbms.queensu.ca/faculty> (<https://dbms.queensu.ca/faculty/>)

- Sheela Abraham
- Michael A. Adams
- John Allingham
- R. David Andrew
- Bruce W. Banfield
- Sam Basta
- Gunnar Blohm
- Susan Boehnke
- Faith Brennan
- Chantelle Capicciotti
- Cheryl Cline
- Che Colpitts
- Andrew Craig
- Peter L. Davies
- Fernanda De Felice
- Sarah Dick
- Nicole Domnik
- Qingling Duan
- Eric C. Dumont
- Kimberly Dunham-Snary
- Alastair V. Ferguson
- Jason Gallivan
- Katrina Gee
- Nader Ghasemlou
- Charles H. Graham
- Charles Hindmarch
- Zongchao Jia
- Glenville Jones
- Eva Kaufman
- Michael D. Kawaja
- Madhuri Koti

- Alan Lomax
- Leslie W. MacKenzie
- Neil S. Magoski
- Donald H. Maurice
- Christopher R. Mueller
- Jeanne Mulder
- Douglas P. Munoz
- Mark Ormiston
- Terence Ozolins
- Stephen C. Pang
- Martin Paré
- P. Martin Petkovich
- Lynne-Marie Postovit
- James N. Reynolds
- Stephen H. Scott
- Amber Simpson
- Steven P. Smith
- Patrick Stroman
- Myron R. Szewczuk
- Sebastian Talbot
- Chandrakant Tayade
- Christopher A. Ward
- Louise M. Winn
- Shetuan Zhang

Specializations

- Environmental Life Sciences – Specialization (Science) – Bachelor of Science (Honours) (<https://queensu-ca-public.courseleaf.com/arts-science/schools-departments-programs/life-sciences/environmental-life-science-specialization-science-bs-honours/>)
- Life Sciences – Specialization (Science) – Bachelor of Science (Honours) (<https://queensu-ca-public.courseleaf.com/arts-science/schools-departments-programs/life-sciences/life-sciences-specialization-science-bs-honours/>)

Major

- Life Sciences – Major (Science) – Bachelor of Science (Honours) (<https://queensu-ca-public.courseleaf.com/arts-science/schools-departments-programs/life-sciences/life-sciences-major-science-bs-honours/>)

General/Minor

- Life Sciences – General (Science) – Bachelor of Science (<https://queensu-ca-public.courseleaf.com/arts-science/schools-departments-programs/life-sciences/life-sciences-general-science-bs/>)



- Life Sciences – Minor (Science) (<https://queensu-ca-public.courseleaf.com/arts-science/schools-departments-programs/life-sciences/life-sciences-minor-science/>)

Courses

Anatomy and Cell Biology (ANAT)

ANAT 100 Anatomy of the Human Body Units: 3.00

This anatomy course is designed to introduce students to the basic structure and functional relationship of the human body. Through a series of weekly learning modules, students will learn about the basic language of Gross Anatomy and Histology in order to understand the working of various body systems. This course is also suitable for individuals who have a general interest in human anatomy.

Requirements: Exclusion ANAT 101/3.0; IDIS 150/6.0 One-Way Exclusion May not be taken with or after: ANAT 215/3.0; ANAT 216/3.0; ANAT 312/3.0; ANAT 315/3.0; ANAT 316/3.0

Offering Faculty: Faculty of Health Sciences

ANAT 101 Introductory Human Anatomy Units: 3.00

A basic anatomy course with an emphasis on clinical relevance of structure and function of human body systems. RECOMMENDATION 4U Biology.

Requirements: Exclusion ANAT 101/3.0; IDIS 150/6.0 One-Way Exclusion May not be taken with or after: ANAT 215/3.0; ANAT 216/3.0; ANAT 312/3.0; ANAT 315/3.0; ANAT 316/3.0

Offering Faculty: Faculty of Health Sciences

ANAT 215 Principles of Human Morphology I Units: 3.00

The general principles of human structure and function as appreciated through a survey of the morphological sciences, including: history of anatomy; embryology; neuroanatomy; developmental, microscopic and gross anatomy of the locomotor system.

NOTE Priority will be given to students registered in a LISC Specialization Plan.

Requirements: Prerequisite (BIOL 102 and BIOL 103) or (BIOL 201 and BIOL 202) or permission of the Department of Biomedical Molecular Sciences. Exclusion ANAT 315.

Offering Faculty: Faculty of Health Sciences

ANAT 216 Principles of Human Morphology II Units: 3.00

The general principles of human structure and function as appreciated through a survey of the development, microscopic and gross anatomy of the body systems: cardiovascular, respiratory, immune/lymphatic, endocrine, digestive and genitourinary.

NOTE Priority will be given to students registered in a LISC Specialization Plan.

Requirements: Prerequisite ANAT 215. Exclusion ANAT 316.

Offering Faculty: Faculty of Health Sciences

ANAT 270 Human Anatomy and Morphology Units: 3.00

This course is designed to introduce the foundations of human structure and function to students at all levels of post-secondary education. Through a series of learning modules, students will develop an understanding of the architecture of the human body through interactive study using a virtual cadaver. This course will survey the gross and microscopic anatomy of the body organ systems including the skeletal, muscular, nervous, endocrine, cardiovascular, lymphatic/immune, respiratory, digestive, urinary and reproductive systems.

NOTE Only offered online. Consult the Bachelor of Health Sciences program office.

NOTE May not be taken for credit towards the Plan requirements of the LISC Specialization or Major Plans.

Learning Hours: 120 (60 Online Activity, 60 Private Study)

Requirements: Prerequisite Level 2 and one of (ANAT 100; BIOL 102; PHGY 170) One-Way Exclusion May not be taken with or after ANAT215; ANAT216; ANAT315; ANAT316.

Offering Faculty: Faculty of Health Sciences

ANAT 309 Functional Histology Units: 3.00

Introduction to mammalian histology, or microscopic anatomy, a branch of anatomical sciences focusing on structures and functions of tissues and cells at the light and electron microscope level. Structure-function relationships within many tissues and organs at the cell and tissue level will be a focus.

NOTE Priority will be given to students registered in a LISC Specialization Plan or Health Sciences plan.

Learning Hours: 120 (36 Lecture, 24 Laboratory, 60 Private Study)

Requirements: Prerequisite Level 3 or above and (PHGY 170 or BIOL 102 or BIOL 103 or BIOL 202).

Offering Faculty: Faculty of Health Sciences

ANAT 312 Functional Neuroanatomy Units: 3.00

Study of the structure and function of the nervous system by lectures, hands-on laboratories, brain dissection, and readings. Topics include, but are not limited to, sensory and motor systems, brain imaging, and clinical examples.

Requirements: Prerequisite (ANAT 215 and ANAT 216) or (ANAT 315 and ANAT 316) or (PHGY 215 and PHGY 216).

Offering Faculty: Faculty of Health Sciences

ANAT 315 The Human Musculoskeletal System Units: 3.00

Gross and functional anatomy of the back, body wall, upper and lower limbs, including blood supply and neural controls.

Requirements: Prerequisite (BIOL 102 and BIOL 103) or (BIOL 201/3.0 and BIOL 202/3.0) or KNPE 153. Exclusion ANAT 215.

Offering Faculty: Faculty of Health Sciences

ANAT 316 The Human Visceral Systems Units: 3.00

Gross and functional anatomy of the thorax, abdomen and pelvis, head and neck.

Requirements: Prerequisite ([BIOL 102 and BIOL 103] or [BIOL 201/3.0 and BIOL 202/3.0] or KNPE 153) or permission of the Department of Biomedical and Molecular Sciences. Exclusion ANAT 216.

Offering Faculty: Faculty of Health Sciences

ANAT 380 Clinically Relevant Human Anatomy Units: 3.00

ANAT 380 will explore regional anatomy of the human body focusing on the major organ systems, their components, and the relationships between them. In this course, students will apply anatomical knowledge to collaboratively solve case-based clinical scenarios, and develop a realistic clinical case based on an underlying anatomical issue.

Note: Also offered online.

Learning Hours: 120 (48 Online Activity, 72 Private Study)

Requirements: Minimum 3rd year standing one of: ANAT 100 OR ANAT 101 OR ANAT 215/216 OR ANAT 315/316 AND one of: PHGY 215/216 OR KNPE 125/225

Offering Faculty: Faculty of Health Sciences

ANAT 391 Introduction to Cadaveric Dissection Units: 3.00

Students work individually and collaboratively to develop macro and microdissection skills using human cadaveric specimens. Students learn how cadaveric dissection for teaching purposes (prosection) influences communication and teaching of anatomy.

Learning Hours: 120 (36 Laboratory, 48 Online Activity, 36 Private Study)

Requirements: Prerequisite Minimum 3rd year (level 3) standing, registration in a LISC/BCHM/BHSc Major or Specialization Plan, and a minimum standing of B+ in one of ([ANAT 100/3.0 or ANAT 101/3.0; and ANAT 380/3.0]; [ANAT 215/3.0 and ANAT 216/3.0]; [ANAT 315/3.0 and ANAT 316/3.0]).

Offering Faculty: Faculty of Health Sciences

ANAT 409 Selected Topics in Histology Units: 3.00

A focused histological and cell biological study of three selected mammalian tissues, organs and/or systems.

Requirements: Prerequisite Minimum 4th year (Level 4) standing, registration in a LISC/BHSc Major or SSP, a GPA of 2.5, and one of ([ANAT 215/3.0 and ANAT 216/3.0]; [ANAT 315/3.0 and ANAT 316/3.0]; ANAT 309/3.0).

Offering Faculty: Faculty of Health Sciences

ANAT 417 Mammalian Embryonic Development Units: 3.00

Comprehensive overview of cellular and molecular mechanisms that direct embryogenesis including gastrulation, neurulation, establishment of body axes, differentiation, sex determination, limb development, organogenesis, and teratology. Participation in seminar presentations and group discussions is required.

Learning Hours: 114 (24 Lecture, 12 Seminar, 1 Individual Instruction, 77 Private Study)

Requirements: Prerequisite Level 4 and a GPA of 2.5 and (registration in a LISC Major or Specialization Plan) and (ANAT 309 or [ANAT 215 and ANAT 216] or [ANAT 315 and ANAT 316]).

Course Equivalencies: ANAT 417, ANAT 471

Offering Faculty: Faculty of Health Sciences

ANAT 471 Human Embryology Units: 3.00

In ANAT 471, students work individually/collaboratively to explore stages of normal human embryonic and fetal development and how changes in underlying mechanisms link to common congenital or developmental abnormalities. Various assessments include quizzes, a journal club, a PBL investigating a developmental abnormality, a midterm and final exam.

Learning Hours: 120 (48 Online Activity, 72 Private Study)

Requirements: Prerequisite Level 3 or above and one of ([ANAT 100 and ANAT 380] or [ANAT 101 and ANAT 380] or [ANAT 215 and ANAT 216] or [ANAT 315 and ANAT 316]).

Course Equivalencies: ANAT 417, ANAT 471

Offering Faculty: Faculty of Health Sciences



ANAT 499 Research Project in Anatomy and Cell Biology Units: 12.00

An examination of the development and present state of knowledge in selected research areas of Anatomy and Cell Biology. Research project involves experimental design, data collection and analysis, written report, poster presentation and oral presentation. Students will be required to attend seminars and tutorials on topics related to research. Limited enrolment; restricted to fourth year honours, permission of the department required.

NOTE Acceptance by a supervisor required prior to registration.

NOTE Students whose research requires the care and/or handling of animals must also complete the Introductory Animal Care Course and if required the appropriate Animal Use workshops through the Office of the University Veterinarian.

Learning Hours: 480 (288 Laboratory, 24 Group Learning, 24 Individual Instruction, 144 Private Study)

Requirements: Prerequisite Level 4 and registration in a LISC Specialization Plan and a cumulative GPA of 2.50 or higher and ([ANAT 215 and ANAT 216] or ANAT 309 or [ANAT 315 and ANAT 316]). Exclusion CANC 499; EPID 499; LISC 499; MICR 455; MICR 499; NSCI 499; PATH 499; PHAR 499; PHGY 499; REPD 499.

Offering Faculty: Faculty of Health Sciences

Biochemistry (BCHM)

BCHM 102 Introduction to Biochemistry Units: 3.00

Chemical principles as applied to biochemistry, human and clinical biochemistry.

NOTE Primarily intended for students in Nursing, Life Sciences, or Biochemistry programs. Other Arts and Science students require permission of the Department to enrol.

Learning Hours: 118 (24 Lecture, 16 Tutorial, 6 Group Learning, 36 Online Activity, 36 Private Study)

Requirements: Prerequisite None. Recommended 4U Chemistry. One-Way Exclusion May not be taken with or after BCHM 270; BCHM 310; BCHM 315; BCHM 316.

Offering Faculty: Faculty of Health Sciences

BCHM 218 Molecular Biology Units: 3.00

Molecules and macromolecules that participate in the replication and expression of genes. Current methods for exploring the structure, function, and manipulation of genetic material.

NOTE Also offered online. Consult the Bachelor of Health Sciences program office.

LEARNING HOURS may vary. 120 (36L;12T;72P)

EQUIVALENCY MBIO 218/3.0.

Requirements: Minimum 2nd year (Level 2) standing and one of (BIOL 102/3.0; PHGY 170/3.0) and one of (CHEM 112/6.0; CHEM 114/3.0).

Course Equivalencies: BCHM218; MBIO218; MBIO318

Offering Faculty: Faculty of Health Sciences

BCHM 270 Biochemical Basis of Health and Disease Units: 3.00

This course will introduce general biochemical concepts that will allow for an understanding of the biological and chemical principles underlying human physiology, health and disease. The course will provide self-paced learning and utilize evidence-based teaching principles, small group learning, peer-learning and guided-independent learning methodologies to provide an inclusive learning environment. Students will gain an enhanced appreciation of general applications of biochemistry as applied in day to day healthy life and during the disease states, diagnosis and clinical management of metabolic disorders.

NOTE Also offered online. Consult the Bachelor of Health Sciences program office.

NOTE This introductory biochemistry online course is intended for prospective students in Nursing, Environmental Sciences, Engineering, Commerce, and general science programs.

NOTE May not be taken for credit towards the Plan requirements of the BCHM or LISC Specialization or Major Plans.

Learning Hours: 126 (66 Online Activity, 60 Private Study)

Requirements: Minimum 2nd year (Level 2) standing and [(PHGY 170/3.0) or (BIOL 102/3.0 and BIOL 103/3.0)], or permission of the instructor. One-Way exclusion May not be taken with or after BCHM 310/6.0; BCHM 315/3.0.

Offering Faculty: Faculty of Health Sciences

BCHM 310 General Biochemistry Units: 9.00

Principles of protein biochemistry, enzymology, and protein engineering. Metabolism of carbohydrates, amino acids and lipids. Role of coenzymes. Generation and storage of metabolic energy. Principles of regulatory mechanisms, membrane structure and function, hormone action, and cellular signalling.

NOTE Students lacking the prerequisites CHEM 222/3.0 or CHEM 282/3.0 may take these courses as a corequisite with permission of the Department.

Learning Hours: 348 (72 Lecture, 36 Laboratory, 240 Private Study)

Requirements: Prerequisite Level 3 or above and BCHM 218 and ([CHEM 222 and CHEM 223] or CHEM 282). Exclusion BCHM 102/3.0; BCHM 315/3.0; BCHM 316/3.0.

Offering Faculty: Faculty of Health Sciences

BCHM 313 Molecular Biochemistry Units: 3.00

This course will provide an in depth view of the molecular mechanisms controlling how genes are organized, regulated and expressed in mammalian cells. Once you understand how proteins are made, you will learn a variety of approaches to visualize and measure proteins and enzymatic activities in mammalian cells.

NOTE If you have taken or are currently registered in BCHM 310/9.0 you may contact the department for permission to enrol.

Learning Hours: 120 (36 Lecture, 84 Private Study)

Requirements: Prerequisite Level 3 or above and BCHM 315.

Offering Faculty: Faculty of Health Sciences

BCHM 315 Proteins and Enzymes Units: 3.00

Principles of protein biochemistry, enzymology, and protein engineering.

NOTE Students lacking the prerequisites CHEM 222 or CHEM 282 may take these courses as a corequisite with permission of the Department.

Learning Hours: 120 (36 Lecture, 12 Online Activity, 72 Private Study)

Requirements: Prerequisite Level 3 or above and BCHM 218 and ([CHEM 222 and CHEM 223] or CHEM 282). Exclusion BCHM 102; BCHM 310.

Offering Faculty: Faculty of Health Sciences

BCHM 316 Metabolism Units: 3.00

Metabolism of carbohydrates, amino acids and lipids. Role of coenzymes. Generation and storage of metabolic energy. Principles of regulatory mechanisms, membrane structure and function, hormone action, and cellular signalling.

Learning Hours: 122 (36 Lecture, 8 Online Activity, 78 Private Study)

Requirements: Prerequisite BCHM 315 Exclusion BCHM 310

Offering Faculty: Faculty of Health Sciences

BCHM 317 Introductory Biochemistry Laboratory Units: 6.00

Application of separation and assay techniques to the study of proteins, metabolism and molecular biology. Attendance required in both terms. Enrollment will be limited because of laboratory constraints, and selection will be based on academic standing.

Learning Hours: 360 (96 Laboratory, 264 Private Study)

Requirements: Prerequisite Registration in a BCHM Plan.

Corequisite BCHM 315/3.0 and BCHM 316/3.0. Exclusion

Maximum of 6.0 units from: BCHM 317/6.0; BCHM 319/3.0.

Offering Faculty: Faculty of Health Sciences

BCHM 319 Introductory Biochemistry Laboratory Units: 3.00

Application of separation and essay techniques to the study of proteins, metabolism and molecular biology.

NOTE This course is for outgoing Biochemistry Honours exchange students who are not able to obtain the equivalent of BCHM 317/6.0 when on exchange.

Learning Hours: 180 (48 Laboratory, 132 Private Study)

Requirements: coreq BCHM315

Course Equivalencies: BCHM317B; BCHM319

Offering Faculty: Faculty of Health Sciences

BCHM 370 Genetics and Genomics Units: 3.00

An introduction to the field of applied genomics for identifying genes underlying multi-factorial traits, diseases, and drug treatment outcomes. Basic principles of gene mapping studies will be covered in the context of recent advances in the field including statistical methods, and integrative analyses of biological datasets.

Notes: Also offered online

LEARNING HOURS may vary: 120(48O;72P)

Requirements: Minimum 3rd year (Level 3) standing and one of (BCHM 218/3.0; BCHM 270/3.0; BIOL 205/3.0) or permission of the instructor. . Exclusion BIOL 331/3.0.

Offering Faculty: Faculty of Health Sciences

**BCHM 410 Protein Structure and Function Units: 3.00**

This course presents an integrated approach to the study of protein function. Topics include proteomic techniques, mass spectrometry, protein purification, imaging, surface plasmon resonance, calorimetry, bioinformatics and protein evolution, protein modifications and processing, interpretation and applications of 3-D structure, and structure-function relationships.

Requirements: Prerequisite ([Level 4 or above and registration in the BCHM Specialization or Major Plan] and [a minimum GPA of 2.50 in BCHM 218/3.0; BCHM 313/3.0; BCHM 315/3.0; BCHM 316/3.0; BCHM 317/6.0]) or ([Level 4 or above and registration in the LISC Specialization or Major Plan] and [a minimum GPA of 2.50 in BCHM 218/3.0 and [BCHM 310/9.0 or [BCHM 315/3.0 and BCHM 316/3.0].

Offering Faculty: Faculty of Health Sciences

BCHM 411 Advanced Molecular Biology Units: 3.00

This course concentrates on the molecular biology of mammalian models particularly mechanisms involved in human diseases. The human genome project, forensic analysis, DNA diagnostics of human diseases, models of transcriptional and growth regulation and cancer, DNA repair, RNA processing and translation are all discussed. Emphasis on recent findings and course materials will be drawn from current reviews.

Learning Hours: 120 (36 Lecture, 84 Private Study)

Requirements: Prerequisite ([Level 4 or above and registration in the BCHM Specialization or Major Plan] and [a minimum GPA of 2.50 in BCHM 218/3.0; BCHM 313/3.0; BCHM 315/3.0; BCHM 316/3.0; BCHM 317/6.0]) or ([Level 4 or above and registration in the LISC Specialization or Major Plan] and [a minimum GPA of 2.50 in BCHM 218/3.0 and [BCHM 310/9.0 or [BCHM 315/3.0 and BCHM 316/3.0].

Offering Faculty: Faculty of Health Sciences

BCHM 421 Advanced Biochemistry Laboratory I Units: 6.00

Biochemical research techniques with emphasis on nucleic acids, protein structure and function, regulation of gene expression and metabolic control processes.

NOTE 6.0-unit course offered in the Fall Term.

Requirements: PREREQUISITE Level 4 and registration in a BCHM Specialization Plan and (a GPA of 2.9 in BCHM 218/3.0; BCHM 313/3.0; BCHM 315/3.0; BCHM 316/3.0; BCHM 317/6.0)

Offering Faculty: Faculty of Health Sciences

BCHM 422 Advanced Biochem Lab II Units: 6.00

An independent research project by each student in one of the departmental research labs. Evaluation is based on oral presentation, lab performance and a thesis.

NOTE 6.0-unit course offered in the Fall Term.

Requirements: PREREQUISITE Level 4 and registration in a BCHM Specialization Plan and (a GPA of 2.9 in BCHM 218/3.0; BCHM 313/3.0; BCHM 315/3.0; BCHM 316/3.0; BCHM 317/6.0)

Offering Faculty: Faculty of Health Sciences

BCHM 432 The Molecular Basis of Cellular Function Units: 3.00

Principles of regulatory mechanisms; regulation of cellular function and growth by oncogenes, growth factors, isoprenoids and steroid hormones. Receptors, second messengers and protein phosphorylation. Correlation of cell ultrastructure with biochemical function. Description of the components, assembly, metabolism and evolution of cellular structures are described.

Learning Hours: 120 (30 Lecture, 6 Group Learning, 84 Private Study)

Requirements: Prerequisite ([Level 4 or above and registration in the BCHM Specialization or Major Plan] and [a minimum GPA of 2.50 in BCHM 218/3.0; BCHM 313/3.0; BCHM 315/3.0; BCHM 316/3.0; BCHM 317/6.0]) or ([Level 4 or above and registration in the LISC Specialization or Major Plan] and [a minimum GPA of 2.50 in BCHM 218/3.0 and [BCHM 310/9.0 or [BCHM 315/3.0 and BCHM 316/3.0].

Offering Faculty: Faculty of Health Sciences

BCHM 441 Current Topics in Biochemistry Units: 3.00

Tutorials, assignments and demonstrations in important subjects in biochemistry emphasizing topics of broad interest. Particular emphasis will be paid to the applications of biochemical knowledge and new technologies.

NOTE Students in the BCHM Specialization Plan registered in BCHM 421 and BCHM 422 will not be allowed to register in BCHM 441; Students in the LISC Specialization Plan registered in one of ANAT 499, CANC 499, EPID 499, LISC 499, MICR 455, MICR 499, NSCI 499, PATH 499, PHAR 499 or PHGY 499 will not be allowed to register in BCHM 441.

Learning Hours: 120 (21 Lecture, 9 Seminar, 3 Group Learning, 3 Off-Campus Activity, 84 Private Study)

Requirements: Prerequisite Level 4 or above and registration in a BCHM Major Plan and (a GPA of 2.5 in BCHM 218; BCHM 313; BCHM 315; BCHM 316; BCHM 317).

Offering Faculty: Faculty of Health Sciences

BCHM 442 Seminars in Biochemistry Units: 3.00

Seminars, assignments and demonstrations focused on important subjects in biochemistry, emphasizing the scientific pipeline, from discovery to commercialization. Particular emphasis will be placed on applications of biochemical knowledge and new technologies.

NOTE Students in the BCHM Major Plan registered in BCHM 441/3.0 will not be allowed to register in BCHM 442/3.0.

Learning Hours: 120 (18 Seminar, 18 Group Learning, 84 Private Study)

Requirements: Prerequisites Level 4 and registration in a BCHM Specialization Plan and (a GPA of 2.7 in BCHM 218, BCHM313, BCHM315, BCHM316, BCHM317).

Offering Faculty: Faculty of Health Sciences

BCHM 482 Proteomics and Metabolomics Units: 3.00

This course will focus on the principles of proteomics and metabolomics and their application in the new systems biology `omics approach to scientific discovery. This course will emphasize both the methodologies used in proteomics and metabolomics, as well as their applications in both research, medical diagnostics, and disease management.

NOTE: Only offered online. Consult the Bachelor of Health Sciences program office.

Learning Hours: 114 (36 Online Activity, 78 Private Study)

Requirements: Prerequisite Level 4 or above and registration in a BCHM/LISC Major or Specialization, or BHSc program and a cumulative GPA of 2.5 or higher and ([BCHM 218/3.0 and BCHM 270/3.0 and BCHM 370/3.0] or BCHM 310/9.0 or [BCHM 315/3.0 and BCHM 316/3.0]).

Offering Faculty: Faculty of Health Sciences

BCHM 594 Independent Study Units: 3.00

Offering Faculty: Faculty of Health Sciences

BCHM 595 Independent Study Units: 6.00

Offering Faculty: Faculty of Health Sciences

BCHM 596 Independent Study Units: 12.00

Offering Faculty: Faculty of Health Sciences

Cancer Research (CANC)

CANC 380 Evolutionary Biology of Cancer Units: 3.00

This online course is designed to introduce students to cancer as an evolutionary problem. The material is unique in that it emphasizes the impact of the immune system in fighting cancer while at the same time shaping tumour cell evolution. Students will need to synthesize the impact of factors present in the tumour microenvironment.

NOTE Also offered online.

Learning Hours: 120 (72 Online Activity, 48 Private Study)

Requirements: Minimum 3rd year (Level 3) standing and one of (MICR 270/3.0; MICR 360/3.0; MICR 386/3.0) and one of (BCHM 270/3.0; BCHM 218/3.0).

Offering Faculty: Faculty of Health Sciences

CANC 440 Cancer Biology and Therapeutics Units: 3.00

A consideration of current knowledge and theories about the biology and treatment of cancer. The course will be presented in a small group format, with active student participation required.

NOTE Priority to students in the LISC Specialization Plan, CANC Sub-Plan.

Requirements: Prerequisite (Level 4 or above and registration in a BCHM/LISC Major or Specialization, or BHSc program and a minimum GPA of 3.0 in [BCHM 218/3.0 or BCHM 370/3.0]).

Offering Faculty: Faculty of Health Sciences

CANC 499 Research Project in Cancer Biology and Genetics Units: 12.00

A research project involving the study of cancer biology or genetics. The project will be supervised by a faculty member associated with the Cancer Research Institute, and will provide opportunities for experimental design, data analysis and both written and oral presentation of results. Students must contact a potential faculty supervisor in the Spring preceding registration in fourth year. Enrolment is limited; acceptance by a supervisor required prior to registration. NOTE Acceptance by a supervisor required prior to registration.

NOTE Students whose research requires the care and/or handling of animals must also complete the Introductory Animal Care Course and if required the appropriate Animal Use workshops through the Office of the University Veterinarian.

Learning Hours: 480 (288 Laboratory, 24 Group Learning, 24 Individual Instruction, 144 Private Study)

Requirements: Prerequisite Level 4 and registration in the LISC Specialization Plan (CANC Sub-Plan) and a cumulative GPA of 2.50 or higher. Exclusion ANAT 499; EPID 499; LISC 499; MICR 455; MICR 499; NSCI 499; PATH 499; PHAR 499; PHGY 499; REPD 499.

Offering Faculty: Faculty of Health Sciences



Cardiorespiratory Science (CRSS)

CRSS 453 Principles in Cardiorespiratory Science I Units: 3.00

An advanced organ systems approach to the physiological principles underlying cardiac function and oxygen delivery using lectures, seminars, and selected readings. Topics include mechanics and regulation of heart function as well as perturbations in cardiac function. Oxygen delivery and utilization will be examined at the levels of the lung, blood, and tissue. The responses to alterations in oxygen demand and/or supply will also be addressed. Obstructive sleep apnea will be used as a model of a pathological cardiorespiratory system interactions.

NOTE Priority given to students in the CRSS Sub-Plan.

Requirements: Prerequisite Minimum 4th year (Level 4) standing, registration in a LISC/BHSc Major or SSP, a GPA of 2.5, and one of [(PHGY 215 and PHGY 216); PHGY 214/6.0; PHGY 212/6.0].

Offering Faculty: Faculty of Health Sciences

CRSS 454 Cardiovascular Sciences Units: 3.00

A study of the physiology, pharmacology and anatomy of the cardiovascular system. Topics include integrative mechanisms of control and pharmacotherapy involved in short-term and long-term control of the circulation in health and disease. NOTE Also offered online. Consult the Bachelor of Health Sciences program office.

Learning Hours: 138 (18 Lecture, 10 Seminar, 10 Group Learning, 100 Private Study)

Requirements: Minimum 4th year (Level 4) standing and (registration in a LISC or BCHM MAJ or SSP Plan or BHSc program) and a GPA of 2.50. Exclusion LISC 454.

Course Equivalencies: CRSS454; LISC454

Offering Faculty: Faculty of Health Sciences

CRSS 456 Molecular and Cellular Basis of Cardiovascular Disease Units: 3.00

An intensive course surveying the molecular and cellular mechanisms underlying the pathophysiology of the major cardiovascular diseases, and the current and emerging tools used in their diagnosis and treatment. Alterations in signalling, metabolism, and structure and function will be discussed to present an integrative view of how cardiovascular diseases develop and progress.

NOTE Priority given to students in the CRSS Sub-Plan.

Requirements: Prerequisite (Level 4 and registration in a LISC Specialization or Major, or BHSc program and a minimum GPA of 2.5 and [PHGY 215/3.0 and PHGY 216/3.0]).

Offering Faculty: Faculty of Health Sciences

CRSS 498 Cardiorespiratory Rounds Units: 3.00

An advanced course in which students attend cardiology and respirology rounds in the Department of Medicine and prepare written and oral reports based on the material presented. The course will provide students with an in-depth exposure to topics in clinical cardiorespiratory science. The course will be offered in alternate years.

NOTE Priority given to students in the CRSS Sub-Plan.

Requirements: Prerequisite Level 4 and registration in a LISC Major or Specialization Plan and a GPA of 2.5 and ([PHGY 215 and PHGY 216] or PHGY 214 or PHGY 212 or PHGY 210).

Offering Faculty: Faculty of Health Sciences

Community Health and Epidemiology (EPID)

EPID 301 Principles of Epidemiology Units: 3.00

Basic methods involved in researching the distribution and determinants of health/disease in populations. Core principles of epidemiology are examined, as are the various epidemiological approaches to study design. The latter include descriptive (cross-sectional and ecological), observational (case-control and cohort), and experimental (randomized controlled trials) approaches.

Learning Hours: 117 (13.5L, 13.5T, 6 Group Learning, 12 Online Activity, 72 Private Study)

Requirements: Prerequisite BIOL 243 or CHEE 209 or COMM 162 or ECON 250 or GPHY 247 or KNPE 251 or NURS 323 or POLS 285 (formerly POLS 385/3.0) or PSYC 202 or SOCY 211 or STAM 200 or STAT 263 or STAT 267 or STAT 269 or STAT 367. Exclusion HSCI 270 (formerly BMED 270/3.0); HLTH 323.

Offering Faculty: Faculty of Health Sciences

EPID 401 Biostatistical Data Analysis Units: 3.00

An applied statistics course covering practical topics in tests and confidence intervals for single and multiple samples, ANOVA, linear regression, correlations, methods for categorical data, and nonparametric methods. The lab uses statistical software. The course emphasizes analyzing data arising in life sciences using practical statistical methods.

Requirements: Prerequisite Level 4 or above and registration in the LISC/BCHM Specialization or Major Plan, or BHSc program, and a cumulative GPA of 2.50 or higher, and one of (BIOL 243/3.0; COMM 162/3.0; ECON 250/3.0; HSCI 190/3.0; PSYC 202/3.0; SOCY 211/3.0; STAM 200/3.0; STAT 263/3.0).

Offering Faculty: Faculty of Health Sciences

EPID 499 Research Project in Epidemiology Units: 12.00

An examination of an epidemiological research question chosen by the student with guidance from the supervisor. Project will involve review of the literature, development of a proposal, data collection and/or processing, data analysis, a written report and oral presentation. Students will be required to attend and report on seminars of their choosing from a number of venues across campus. Limited enrolment. NOTE Acceptance by a supervisor required prior to registration.

NOTE Students whose research requires the care and/or handling of animals must also complete the Introductory Animal Care Course and if required the appropriate Animal Use workshops through the Office of the University Veterinarian.

Learning Hours: 480 (288 Laboratory, 24 Group Learning, 24 Individual Instruction, 144 Private Study)

Requirements: Prerequisite Level 4 and registration in the LISC Specialization Plan and a cumulative GPA of 2.50 or higher and (BMED 270 or EPID 301 or HLTH 323). Corequisite EPID 401. Exclusion ANAT 499; CANC 499; LISC 499; MICR 455; MICR 499; NSCI 499; PATH 499; PHAR 499; PHGY 499; REPD 499.

Offering Faculty: Faculty of Health Sciences

EPID 595 Independent Study Units: 6.00

Offering Faculty: Faculty of Health Sciences

Drug Development and Human Toxicology (DDHT)**DDHT 459 Principles of Drug Discovery Units: 3.00**

Advanced study of the early stage components involved in the complex process of drug development including target identification, design and synthesis, structure activity relationships, in vitro and in vivo efficacy determination, biochemical and biological optimization.

NOTE Priority given to students in the LISC Specialization Plan, DDHT Sub-Plan.

Learning Hours: 120 (12 Lecture, 24 Group Learning, 84 Private Study)

Requirements: Prerequisite PHAR 270/3.0 or PHAR 340 or PHAR 370. Recommended PHAR 416. Exclusion PHAR 480.

Offering Faculty: Faculty of Health Sciences

DDHT 460 Principles of Drug Development Units: 3.00

Advanced study of the component parts of the complex process of drug discovery and development and the assessment of human toxicology including drug delivery and formulation, directed toxicology studies, drug disposition, clinical trials, legal issues and regulatory approval. NOTE Priority given to students in the LISC Specialization Plan, DDHT Sub-Plan.

Learning Hours: 120 (36 Lecture, 84 Private Study)

Requirements: Prerequisite PHAR 270/3.0 or PHAR 340 or PHAR 370. Recommended DDHT 459 and PHAR 416. Exclusion PHAR 480.

Offering Faculty: Faculty of Health Sciences

Life Sciences (LISC)**LISC 171 Social and Physical Determinants of Health and Disease Units: 3.00**

This course will use an evidence-based approach to address the impact of social and environmental exposures and circumstances on health at both an individual and population level.

Requirements: Prerequisite Registration in a LISC or BCHM Plan. Exclusion GLPH 171; HLTH 101; HLTH 102; GPHY 339.

Offering Faculty: Faculty of Health Sciences

LISC 173 History and Philosophy of Health and Healthcare Units: 3.00

Multidisciplinary course organized around five major fields of scientific endeavour: anatomy, physiology, pathology, pharmacology, and population and global health

Requirements: Prerequisite Registration in a LISC or BCHM Plan. Exclusion IDIS 173 (formerly BMED 173/3.0); PHIL 201.

Offering Faculty: Faculty of Health Sciences

LISC 270 Fundamentals of Health Research Methodology Units: 3.00

Introduction to fundamentals of health-related research methods with a focus on developing critical reasoning skills. Using examples from a wide range of health-related research topics, students will gain familiarity and skills to assess primary literature at a basic level.

Requirements: Pre Lvl 2 one from STAT263; BIOL243; STAM200; CHEE209; ECON250; GPHY247; KNPE 251; NURS323; POLS385; PSYC202; SOCY211; STAT267; STAT367; COMM162 or permission from the instructor. Exclusions No more than 3 units in BMED270; SOCY210; GPHY240; LISC270
*Please see 20/21 Courses of Instructions for full exclusion list

Offering Faculty: Faculty of Health Sciences

**LISC 271 Global Population and Health Units: 3.00**

Emphasis will be placed on population health, instead of the health of individuals. Population and Global health prioritize partnerships and resource sharing, instead of unilateral relationships, and focuses on advocacy.

Requirements: Prerequisite (Level 2 or above and registration in a LISC or BCHM Plan) or permission of the Department. Exclusion GLPH 271.

Offering Faculty: Faculty of Health Sciences

LISC 300 The Process of Discovery in the Biomedical Sciences Units: 3.00

Teams of students will identify the critical questions that must be answered to resolve major controversies or gaps of knowledge that impede the application of fundamental principles in the Life Sciences to health care. The end product will be a written report and public presentation that is accessible to a wide audience.

NOTE Restricted to students registered in Level 3 or above in a (LISC Specialization or Major Plan or BCHM Specialization or Major Plan or BIOL Plan or PSYC Plan).

NOTE Limited enrollment available to BIOL and PSYC students.

Learning Hours: 126 (6 Lecture, 6 Seminar, 33 Group Learning, 33 Online Activity, 48 Private Study)

Requirements: Prerequisite Minimum 3rd year (Level 3) standing and registration in one of (LISC Honours Plan; BCHM Honours Plan; BHSc Program; BIOL Plan; PSYC Plan).

Offering Faculty: Faculty of Health Sciences

LISC 373 Health Ethics, Law and Policy Units: 3.00

Introduction to ethical, legal and regulatory requirements for people working in the health professions.

Requirements: Prerequisite Level 3 or above and registration in a LISC or BCHM Plan. Exclusion IDIS 373 (formerly BMED 373/3.0).

Offering Faculty: Faculty of Health Sciences

LISC 383 Advanced Research Methodologies Units: 3.00

Students will develop an understanding of the three primary types of research employed in health sciences: Experimental quantitative, observational quantitative, and qualitative

Requirements: Prerequisite Level 3 or above and registration in a LISC or BCHM Plan and (HSCI 270 [formerly BMED 270/3.0] or LISC 270 or EPID 301 or HLTH 252 or PSYC 203 or SOCY 210) or permission of the instructor. Exclusion HSCI 383 (formerly BMED 383/3.0).

Offering Faculty: Faculty of Health Sciences

LISC 385 Biohacking and Gerontechnology Units: 3.00

Examines technologies that are in use/evolving in the aging support and anti-aging arsenal, including gerontechnology and anti-aging technologies.

Requirements: Prerequisite (Level 3 or above and registration in a LISC or BCHM Plan) or permission from the instructor. Exclusion GLPH 385.

Offering Faculty: Faculty of Health Sciences

LISC 387 Sex Differences in Health and Disease Units: 3.00

This course will focus on the role of sex/gender related differences in etiology, pathogenesis and immune responses of human diseases. Conventional and advanced tools in diagnosis and treatment of diseases affecting men and women.

Learning Hours: 120 (24 Lecture, 12 Seminar, 36 Group Learning, 48 Private Study)

Requirements: Prerequisite (Level 3 and registration in a LISC/BCHM Major or Specialization Plan or BHSC program) and (a GPA of 2.5) and one of (MICR 270/3.0; MICR 360/3.0; MICR 386/3.0) and BCHM 218/3.0. Exclusion REPD 387/3.0*.

Offering Faculty: Faculty of Health Sciences

LISC 390 Integrated Life Science Laboratory I Units: 3.00

Students will learn a number of different laboratory techniques, developing skills in scientific methodology, data acquisition, and interpretation. Students will also attain skills in critical thinking and hypothesis development, as well as gain experience in writing a laboratory report, and participating in research presentations.

NOTE Priority will be given to students registered in a LISC Specialization Plan.

Requirements: Prerequisite (PHGY 210/6.0 or PHGY 214/6.0 or [PHGY 215 and PHGY 216]) and (LISC 391 or PHAR 230 or PHAR 340 or PHAR 370 [formerly PHAR 270/3.0]). Exclusion BMED 384.

Offering Faculty: Faculty of Health Sciences

LISC 391 Integrated Life Sciences Laboratory Units: 3.00

An intermediate laboratory course on the Physiology and Pharmacology of Cardiorespiratory Sciences and Neuroscience. Students develop skills to acquire and evaluate data and methods. Critical thinking skills are used for the development of arguments, assumptions, and information required to evaluate concepts and hypotheses.

NOTE Priority will be given to students registered in a LISC Specialization Plan.

Learning Hours: 108 (36 Laboratory, 36 Online Activity, 36 Private Study)

Requirements: Prerequisite PHGY 210/6.0 or PHGY 214/6.0 or (PHGY 215 and PHGY 216). Exclusion BMED 384.

Offering Faculty: Faculty of Health Sciences

LISC 400 Neuro-Immune Interactions in Health and Disease Units: 3.00

This course is designed to advance critical thinking skills, as well as oral and written communication skills, via an inquiry-based approach in neuroimmunology. Teams of students identify the critical cellular and molecular processes regulating neuro-immune interactions in health and disease.

Learning Hours: 120 (24 Group Learning, 36 Individual Instruction, 36 Online Activity, 24 Private Study)

Requirements: Prerequisite Minimum 3rd year (Level 3) standing, registration in a LISC/BCHM/BHSc Major or SSP, a GPA of 2.5, and one of ([PHGY 290/3.0 and MICR 270/3.0]; LISC 300/3.0; NSCI 323/3.0; NSCI 324/3.0; MICR 360/3.0; MICR 386/3.0).

Offering Faculty: Faculty of Health Sciences

LISC 426 Current Concepts in Sensorimotor Neuroscience Units: 3.00

A multi-disciplinary course exploring advanced concepts of sensorimotor integration from a systems neuroscience perspective. Topics include the neural basis of perception, action selection, reinforcement learning, and motor control. Students will learn to critically evaluate scientific literature and present these concepts to classmates.

Requirements: Prerequisite Level 4 or above and registration in the LISC Major or Specialization Plan and a cumulative GPA of 2.50 or higher and (NSCI 323 or NSCI 324).

Offering Faculty: Faculty of Health Sciences

LISC 471 Advanced Global and Population Health Units: 3.00

Students will take knowledge gained from GLPH 271/3.0 or LISC 271/3.0, and apply it in this course, which will focus on more advanced topics of population and global health, as well as provide experiential learning.

Requirements: Prerequisite (Level 4 or above and registration in a LISC or BCHM Plan and [LISC 271/3.0 or GLPH 271/3.0]) or permission of instructor. Exclusion GLPH 471/3.0.

Offering Faculty: Faculty of Health Sciences

LISC 483 Advanced Topics in Infectious Disease Units: 3.00

This course examines basic principles of infectious diseases, including epidemiology, pathophysiology, transmission, and control of infectious agents, with an emphasis on antimicrobial therapy and resistance.

Requirements: Prerequisite ([Level 4 or above and registration in a LISC or BCHM Plan] and [MICR 221 or MICR 270 or MICR 271 or MICR 320]) or permission of the instructor. Exclusion BMED 483.

Offering Faculty: Faculty of Health Sciences

LISC 493 Global Health Practice Units: 3.00

This course will strengthen students' abilities to respond to a community's health needs through a practical service learning position with an approved local or international community health organization

Requirements: Prerequisite Level 4 or above and registration in a LISC or BCHM Plan and GLPH 271. Exclusion GLPH 493.

Offering Faculty: Faculty of Health Sciences

LISC 594 Independent Study Units: 3.00

Offering Faculty: Faculty of Health Sciences

LISC 595 Independent Study Units: 6.00

Offering Faculty: Faculty of Health Sciences

Microbiology and Immunology (MICR)

MICR 121 Microbiology for Nursing Students Units: 3.00

This course provides the student with a foundation in the subdisciplines of bacteriology, virology, parasitology, and immunology. The course is designed to examine common infectious diseases through a body-systems approach. Laboratory and tutorial sessions emphasize diagnostic microbiology.

Requirements: BCHM010 OR BCHM102

Offering Faculty: Faculty of Health Sciences

MICR 221 Fundamental Microbiology Units: 3.00

A fundamental study of the structure, genetics, and growth of microorganisms, focusing on bacteria and viruses. The roles of microbes in the environments in which they exist will be considered.

Learning Hours: 120 (36 Lecture, 18 Laboratory, 66 Private Study)

Requirements: PREREQUISITE (A GPA of 1.90 (obtained in any term) or a `Pass` (obtained in Winter 2020) in BIOL 102/3.0 and BIOL 103/3.0) and CHEM 112/6.0. EXCLUSIONS MICR 271/3.0

Course Equivalencies: MICR221, MICR229

Offering Faculty: Faculty of Health Sciences



MICR 270 Infection, Immunity and Inflammation Units: 3.00

This course focuses on 1) the overall organization of the immune system, 2) the role of the immune system in combating diseases caused by common pathogens as well as adverse reactions of the immune system and 3) application of the basic knowledge of immunology to the field of infectious disease prevention and control by vaccines and treatment of cancer. The unique features of this course lie in its overall structure and delivery that will prepare the student for further in-depth learning in the field of immunology. NOTE This online course in infection and immunity is designed for students from various biological sciences and allied health backgrounds at all levels of post-secondary education and is recommended as a foundation course for students pursuing a life sciences career.

NOTE Also offered online. Consult the Bachelor of Health Sciences program office.

NOTE May not be taken for credit towards the Plan requirements of the LISC Specialization or Major Plans.

Learning Hours: 114 (36 Online Activity, 78 Private Study)

Requirements: Minimum 2nd year (Level 2) standing and one of (BIOL 102/3.0; MICR 121/3.0; PHGY 170/3.0). One-way Exclusion May not be taken with or after MICR 360/3.0; MICR 386/3.0; BMED 386.

Offering Faculty: Faculty of Health Sciences

MICR 271 Introduction to Microbiology Units: 3.00

An introduction to the biology of microbes, including both pathogenic & beneficial bacteria, viruses, fungi, & protozoa. This overview of the biological features of these microorganisms will highlight these organisms' roles in the environment & in human health contributing to infectious diseases vs. maintaining healthy microbiomes.

NOTE Only offered online. Consult the Bachelor of Health Sciences Program office.

Learning Hours: 120 (60 Online Activity, 60 Private Study)

Requirements: Minimum 2nd year (Level 2) standing and one of (PHGY 170/3.0; BIOL 102/3.0). Exclusion MICR 221/3.0

Offering Faculty: Faculty of Health Sciences

MICR 290 Antibiotic Resistance Lab Units: 3.00

This immersive laboratory course is designed to give students the opportunity to apply important microbiological and biochemical research techniques to the study of antibiotic resistance. Students work in small groups on a semester-long project, developing valuable lab skills that will support them with future research opportunities.

Learning Hours: 120 (36 Laboratory, 48 Online Activity, 36 Private Study)

Requirements: Minimum 2nd year (Level 2) standing, registration in a BHSc, LISC, or BCHM degree plan, and one of (MICR 270/3.0; MICR 271/3.0) Exclusion MICR 221/3.0

Offering Faculty: Faculty of Health Sciences

MICR 320 Microbes in Health and Disease Units: 3.00

This course will focus on the roles of microbes in health (human microbiome) and disease (pathogens). The molecular mechanisms of bacterial/viral virulence and the host response will be examined in order to develop an in depth understanding of the etiology of infectious diseases and the benefits derived from the human microbiome. Consult the Bachelor of Health Sciences program office

NOTE Also offered online. Learning Hours may vary.

Requirements: Minimum 3rd year (Level 3) standing and one of (MICR 221/3.0; MICR 271/3.0; MICR 229/3.0) and one of (MICR 360/3.0; MICR 386/3.0; BMED 386/3.0). Exclusion MICR 382/3.0

Offering Faculty: Faculty of Health Sciences

MICR 360 Immunology Units: 3.00

The general principles and mechanism of immune reaction. Immunochemical and immunobiological aspects of antibody formation and cell-mediated immunity in health and disease will be considered.

Learning Hours: 144 (36 Lecture, 36 Online Activity, 72 Private Study)

Requirements: Prerequisite MICR 221 or MICR 271. Exclusion MICR 386.

Offering Faculty: Faculty of Health Sciences

MICR 386 Fundamentals of Immunology in Health and Disease Units: 3.00

Integrates the key principles of immunology to facilitate learning of immunology as it relates to human health and disease. This course offers real-life case studies, problems encountered and solutions applied, immunology virtual laboratory simulation, and extensive coverage of the basic science underlying each topic in the module.

Also offered online.

LEARNING HOURS may vary:120(480;72P)

Requirements: Minimum 3rd year (Level 3) standing and one of (BCHM 218/3.0; BCHM 270/3.0), and one of (MICR 270/3.0; MICR 271/3.0; MICR 221/3.0). Exclusion MICR 360/BMED 877

Offering Faculty: Faculty of Health Sciences

MICR 435 Advanced Prokaryotic Structure and Function Units: 3.00

An in-depth analysis of the genetics, biochemistry, assembly and function of the major structures of the prokaryotic cell. Emphasis on the experimental approaches in the current literature.

Requirements: PREREQUISITES BIOL 205/3.0 and (MICR 221/3.0 or MICR271 or MICR 229/3.0 with a minimum grade of B-) and reg in the LISC Major or Spec. Plan) and (a GPA of 2.5). COREQUISITE BCHM 310/6.0 or BCHM 315/3.0 or BIOL 334/3.0.

Offering Faculty: Faculty of Health Sciences

MICR 436 Microbial Genetics Units: 3.00

A detailed description of the processes of heredity in bacteria including a discussion of gene structure and evolution, gene expression and its control, the exchange of genetic material in the microbial world and genetic engineering and its applications. The laboratory component will emphasize modern approaches to genetic engineering.

NOTE Offered in alternate years to MICR 435/3.0.

Requirements: PREREQUISITES BIOL 205/3.0 and (MICR 221/3.0 or MICR227 or MICR 229/3.0 with a minimum grade of B) and (reg in the LISC Major or Spec. Plan) and (a GPA of 2.5). COREQUISITE BCHM 310/3.0 or BCHM 315/3.0 or BIOL 334/3.0.

Offering Faculty: Faculty of Health Sciences

MICR 450 Principles of Molecular Virology Units: 3.00

Further study of contemporary virology, using the textbook as a guide to particles, genomes, replication, expression, infection and pathogenesis. Emphasizing reading and writing to develop skills in observation and critical thinking, important attributes in understanding the scientific method.

NOTE Offered in alternate years to MICR 451/3.0.

Requirements: PREREQUISITES BIOL 205/3.0 and (MICR 221/3.0 or MICR271 with a minimum grade of B-) and (Level 4 and registration in the LISC Major or Spec. Plan) and (a GPA of 2.5). COREQUISITE BCHM 310/6.0 or BCHM 315/3.0.

Offering Faculty: Faculty of Health Sciences

MICR 451 Viral Pathogenesis Units: 3.00

This molecular virology course covers viral replication strategies and virus-host interactions, with an emphasis on mechanisms of viral pathogenesis, focusing on human pathogenic viruses such as coronaviruses, hepatitis viruses, HIV, and herpesviruses. Tutorials will be in journal club format with group discussion and analysis of recent literature.

Learning Hours: 120 (24 Lecture, 12 Tutorial, 84 Private Study)

Requirements: Prerequisite Level 3 or above and registration in the LISC Major or Specialization Plan, or BHSc program and a minimum CGPA of 2.50 and (MICR 221/3.0 or MICR 271/3.0) and (BCHM 218/3.0 or BIOL 330/3.0).

Offering Faculty: Faculty of Health Sciences

MICR 452 Viral Infection and Immunity Units: 3.00

Course material will focus on the molecular basis for virus pathogenesis including host immune responses to virus infection, and viral countermeasures. Emphasis will be on viral infections that result in gastrointestinal, haematological, neurological, and respiratory diseases. Tutorials will focus on discussion of current and seminal literature.

Requirements: Prerequisite Minimum 4th year (Level 4) standing, registration in a LISC/BHSc Major or SSP, a GPA of 2.5, and one of (MICR 221; MICR 271), and one of (MICR 360; MICR 386).

Offering Faculty: Faculty of Health Sciences

MICR 461 Advanced Immunology Units: 3.00

Advanced immunology course focused on current topics in immunology and immunology-related scientific research.

Requirements: Prerequisite Minimum 4th year (Level 4) standing, registration in a LISC/BHSc Major or SSP, a GPA of 2.5, and a minimum grade of A- in one of (MICR 360; MICR 386).

Offering Faculty: Faculty of Health Sciences



MICR 483 Advanced Topics in Infectious Diseases Units: 3.00

This course will examine basic principles of infectious diseases such as Pathophysiology, Epidemiology and Transmission, and Control of Infectious Agents including an emphasis on Antimicrobial Therapy and Resistance. Selected Infectious Disease syndromes will be examined to explore unique host microbe interactions. Students will work through the topics online using interactive multimedia modules. Student assessment will include weekly online quizzes, group, and individual assignments. Active participation will also form part of student assessment. At the completion of the course, students will have an understanding of the key concepts of emerging topics in infectious diseases.

NOTE Also offered online. Consult the Bachelor of Health Sciences program office.

Requirements: Prerequisite Minimum 4th year (Level 4) standing and one of (MICR 320/3.0; MICR 270/3.0; MICR 221/3.0; MICR 271/3.0), or permission from the instructor. Equivalency BMED 483/3.0*.

Offering Faculty: Faculty of Health Sciences

MICR 499 Research Project in Microbiology and Immunology Units: 12.00

A research project supervised by and closely related to the research program of a faculty member. The research project involves experimental design, data collection and analysis, written report and oral presentation. Students will be required to attend seminars and tutorials on topics related to research. Limited enrolment.

NOTE Acceptance by a supervisor required prior to registration.

NOTE Students whose research requires the care and/or handling of animals must also complete the Introductory Animal Care Course and if required the appropriate Animal Use workshops through the Office of the University Veterinarian.

Learning Hours: 480 (288 Laboratory, 24 Group Learning, 24 Individual Instruction, 144 Private Study)

Requirements: Prerequisite Level 4 and registration in a LISC or ELSC Specialization Plan and cumulative GPA of 2.50 or higher and MICR 221. Exclusion ANAT 499; CANC 499; EPID 499; LISC 499; MICR 455; NSCI 499; PATH 499; PHAR 499; PHGY 499; REPD 499.

Offering Faculty: Faculty of Health Sciences

Neuroscience (NSCI)

NSCI 323 Cellular Neuroscience Units: 3.00

Fundamental properties of the nervous system. Emphasis placed on the properties of neurons that are fundamental to neuron-to-neuron communication, the formation of neural circuits, and the repair of the nervous system following injury. Tutorials introduce techniques and neurological problems that illustrate principles of neural function.

Requirements: Prerequisite BIOL 339 or KNPE 125 or KNPE 225 or (PHGY 215 and PHGY 216) or PSYC 271 or PHGY 210 or PHGY 212 or PHGY 214

Offering Faculty: Faculty of Health Sciences

NSCI 324 Systems Neuroscience Units: 3.00

Fundamental properties of the nervous system. Emphasis placed on the properties of neurons and neural circuits that underlie behaviour and cognitive functions within selected neural systems, such as sensory, motor, reward, and autonomic systems. Tutorials introduce techniques and neurological problems that illustrate principles of neural function.

Requirements: Prerequisite (PHGY 215/3.0 and PHGY 216/3.0) or PSYC 271/3.0 or NSCI 323/3.0 or PHGY 210/6.0 or PHGY 212/6.0 or PHGY 214/6.0.

Offering Faculty: Faculty of Health Sciences

NSCI 325 The Science of Psychedelics Units: 3.00

An active learning-based course aimed at providing a thorough scientific perspective on psychedelics. Students will learn about the historical and cultural relevance of psychedelics, their mechanisms of action, and their current and predicted therapeutic use. Emphasis will be placed on rigorously verified knowledge surrounding psychedelic therapy. Course format encourages students to acquire and/or perfect essential learning competencies such as critical thinking, independent learning, problem-solving, communication and teamwork.

Learning Hours: 120 (24 Lecture, 24 Group Learning, 36 Online Activity, 24 Off-Campus Activity, 12 Private Study)

Requirements: Prerequisite Level 3 or above.

Offering Faculty: Faculty of Health Sciences

NSCI 401 Introduction to Theoretical Neuroscience Units: 3.00

This course will provide an introduction to the main modelling approaches and theoretical concepts in Neuroscience. The computational anatomy of the brain and how it implements perception, learning, memory, decision making and motor control, among other topics, will be discussed.

RECOMMENDATION NSCI 323/3.0, NSCI 324/3.0, ANAT 312/3.0, PSYC 271/3.0.

Requirements: Prerequisite Minimum 4th year (Level 4) standing, registration in a LISC/BHSc Major or SSP, a GPA of 2.5, and one of (BIOL 243; CHEE 209; COMM 162; ECON 250; GPHY 247; HSCI 190; KNPE 251; NURS 323; POLS 285; PSYC 202; SOCY 211; STAM 200; STAT 263; STAT 267; STAT 367).

Offering Faculty: Faculty of Health Sciences

NSCI 403 Introduction to Neuroimaging Units: 3.00

This course covers the theory and practice of modern neuroimaging methods. Topics include data acquisition, research study design, and analysis methods. Functional MRI is presented in the most depth, but computed tomography (CT), positron emission tomography (PET), and single photon emission computed tomography (SPECT), are also covered.

Learning Hours: 120 (36 Lecture, 84 Private Study)

Requirements: Prerequisite Minimum 4th year (Level 4) standing, registration in a LISC/BHSc Major or SSP, a GPA of 2.5, and one of (NSCI 323; NSCI 324; ANAT 312; PSYC 271; PSYC 370).

Offering Faculty: Faculty of Health Sciences

NSCI 414 Progress in Neuroanatomy and Neuropharmacology Units: 3.00

A contemporary and comprehensive assessment of the neurochemical anatomy and neuropharmacology of the mammalian and human nervous systems as they relate to development, function and disease. Topics will include dynamics of neurotransmitter interactions, neuronal drug receptor interactions and second messengers, neurotoxicity associated transmitters and neural growth factors.

NOTE BMCO students should contact the Department regarding prerequisites.

Requirements: Prerequisites A grade of B- in (ANAT312 or NSCI 323 or PHAR 340) and (a GPA of 2.5). Corequisite NSCI 324.

Offering Faculty: Faculty of Health Sciences

NSCI 422 Cellular and Molecular Neuroscience Units: 3.00

A course providing 1) the essentials in cellular and molecular neuroscience to pursue a graduate program and/or a career in neuroscience or related field, and 2) independent learning and communication skills applicable broadly. The course is divided into three segments: 1) neuronal integration, 2) synaptic plasticity, and 3) neuromodulation.

NOTE BMCO students should contact the Department regarding prerequisites.

Learning Hours: 119 (12 Lecture, 24 Seminar, 8 Group Learning, 6 Individual Instruction, 69 Private Study)

Requirements: Prerequisite Minimum 4th year (Level 4) standing, registration in a LISC/BHSc Major or SSP, a GPA of 2.5, and a minimum grade of B in NSCI 323.

Offering Faculty: Faculty of Health Sciences

NSCI 429 Disorders of the Nervous System Units: 3.00

A multi-disciplinary course exploring advanced concepts of clinical neuroscience. Topics include stroke, traumatic brain and cord injuries, neurodegenerative disorders, epilepsy, schizophrenia, depression, deep brain stimulation, pain and placebo effects, normal and abnormal aging, stem cells. Students will learn to critically evaluate scientific literature and present these concepts to classmates during student-led seminars. Restricted to fourth-year students. Enrollment is limited.

Requirements: Prerequisite Minimum 4th year (Level 4) standing, registration in a LISC/BHSc Major or SSP, a GPA of 2.5, and one of (NSCI 322; NSCI 323; NSCI 324; ANAT 312).

Offering Faculty: Faculty of Health Sciences

NSCI 433 Cellular Elements of the Nervous System: Responses to Injury and Disease Units: 3.00

Cellular dysfunction is a critical feature of neural injury and disease among humans. This course will examine the cellular elements of the mammalian central and peripheral nervous system, with an emphasis placed on understanding normal and abnormal cellular function in both humans and animal models.

NOTE Restricted to students registered in the 4th year.

Learning Hours: 114 (36 Lecture, 36 Laboratory, 42 Private Study)

Requirements: Prerequisite Minimum 4th year (Level 4) standing, registration in a LISC/BHSc Major or SSP, a GPA of 2.5, and one of (NSCI 323; NSCI 324), and one of (ANAT 309; ANAT 312).

Offering Faculty: Faculty of Health Sciences

**NSCI 444 Controversies in Neuroscience Units: 3.00**

As insight regarding the human brain expands, so do related issues such as what constitutes personhood, what drives the criminal mind, intelligence-enhancing drugs and end-of-life issues. Lead by experts who deal daily with such concerns, we will focus weekly on a particular topic in neuroscience which impacts on society.

Learning Hours: 108 (12 Lecture, 24 Seminar, 72 Private Study)

Requirements: Prerequisite Minimum 4th year (Level 4) standing, registration in a LISC/BHSc Major or SSP, a GPA of 2.5, and one of (NSCI 322; NSCI 323; NSCI 324; ANAT 312).

Offering Faculty: Faculty of Health Sciences

NSCI 483 Neurobiology of Learning and Memory Units: 3.00

An exploration of brain systems underlying how we learn and remember, and how they become disordered. Online multimedia modules and study of cutting edge research articles reveal how modern techniques and ideas are driving neuroscience forward. Requires interviewing a person with a disorder in order to learn to advocate for them in society.

Requirements: Minimum 4th year (Level 4) standing and one of [(PHGY 215/3.0 and PHGY 216/3.0); PSYC 271/3.0; PHGY 214/6.0; PHGY 210/6.0]. For LISC and BCHM Honours students Level 4 and registration in a LISC or BCHM Major or Specialization Plan and a GPA of 2.5

Offering Faculty: Faculty of Health Sciences

NSCI 491 Directed Special Laboratory Units: 3.00

Laboratory course in a selected area of Neuroscience to be arranged in consultation with individual members of the Centre for Neuroscience Studies. Course involves experimental design, data collection and analysis (approximately 6 hours of laboratory work per week required) as well as a brief communication of the laboratory work. NOTE Students are limited to one NSCI 491/3.0 research project in Year 4.

NOTE Students whose research project requires the care and/or handling of animals must also complete the Introductory Animal Care Course and if required the appropriate Animal Use workshops through the Office of the University Veterinarian.

Requirements: BSCH SSP LISC NSCI

Offering Faculty: Faculty of Health Sciences

NSCI 499 Research Project in Neuroscience Units: 12.00

An investigation into a selected area of neuroscience. The research project involves experimental design, data collection, and analysis, written report and oral presentation. Students will be required to attend seminars and tutorials on topics related to research. Limited enrolment.

NOTE Acceptance by a supervisor required prior to registration.

NOTE Students whose research requires the care and/or handling of animals must also complete the Introductory Animal Care Course and if required the appropriate Animal Use workshops through the Office of the University Veterinarian.

Learning Hours: 480 (288 Laboratory, 24 Group Learning, 24 Individual Instruction, 144 Private Study)

Requirements: Prerequisite Level 4 and registration in a LISC Specialization and a cumulative GPA of 2.50 or higher. Exclusion ANAT 499; CANC 499; EPID 499; LISC 499; MICR 455; MICR 499; PATH 499; PHAR 499; PHGY 499; REPD 499.

Offering Faculty: Faculty of Health Sciences

Pathology and Molecular Medicine (PATH)**PATH 111 Data Science Through Visualization Units: 3.00**

This blended course is designed to bring awareness and raise excitement in data science. Through different types of visualization students will learn key concepts of data science and big data investigation. The course will also explore examples of how data science is applied to solve problems in various disciplines.

Learning Hours: 120 (12 Lecture, 24 Group Learning, 36 Online Activity, 48 Private Study)

Requirements: Prerequisite None.

Offering Faculty: Faculty of Health Sciences

PATH 120 Understanding Human Disease in the 21st Century Units: 3.00

The course provides an introduction to human disease and our understanding of key conditions with major global health and societal impact, including cardiovascular, neurological and infectious diseases and cancer. The basic concepts of disease mechanisms and current management will be explored using specific diseases and clinical example cases. Also offered online.

LEARNING HOURS may vary 120(12L;36G;36O;36P)

Requirements: One-Way Exclusion PATH 310/3.0; CANC 440/3.0

Offering Faculty: Faculty of Health Sciences

PATH 310 Introduction to Pathology and Molecular Medicine Units: 3.00

An introduction to pathology and molecular medicine. The course will be organized around a specific set of diseases, designed to illustrate basic concepts in the molecular biology, biochemistry, and pathology of human disease.

NOTE Also offered online. Consult the Bachelor of Health Sciences program office.

Requirements: Minimum 3rd year (Level 3) standing and one of (BCHM 218/3.0; BCHM 270/3.0).

Course Equivalencies: PATH310, PATH410

Offering Faculty: Faculty of Health Sciences

PATH 381 Clinical Biochemistry Units: 3.00

This upper-year health sciences course covers topics relating to the integrated role of clinical biochemists within a healthcare team. Students will critique analytical techniques in the context of various diseases. Through problem-based learning, students will also explore how to identify and troubleshoot issues in laboratory testing.

Learning Hours: 120 (12 Lecture, 12 Tutorial, 36 Online Activity, 60 Private Study)

Requirements: Minimum 3rd year (Level 3) standing and one of (BCHM 270/3.0 or BCHM 218/3.0), or permission of the instructor.

Offering Faculty: Faculty of Health Sciences

PATH 411 Applied Data Science in Molecular Medicine Units: 3.00

The course introduces data science tools and methods to handle, process and extract knowledge and insights from large molecular medicine datasets. The focus will be on applying statistics, machine learning and related methods for the analysis of various research datasets and digital pathology.

Learning Hours: 120 (18L12pC, 84 Group Learning, 6 Online Activity, 36 Private Study)

Requirements: Prerequisite BIOL 243/3.0 or ECON 250/3.0 or GPHY 247/3.0 or HSCI 190/3.0 or NURS 323/3.0 or POLS 285/3.0 or PSYC 202/3.0 or SOCY 211/3.0 or STAT 263/3.0 or STAM 200/3.0.

Offering Faculty: Faculty of Health Sciences

PATH 425 Current Topics in Human Genetics Units: 3.00

An advanced level course introducing current topics in human genetics. The course will focus on the significance and implications of genetic variation and its role in disease, development and normal human diversity. In particular, the course will explore the future directions and implications of human genetic research in the post genomic era.

Participation in seminars and group discussions is required. Enrollment is limited.

RECOMMENDATION BCHM 218/3.0 or permission of the course coordinator.

Requirements: Prerequisite Minimum 4th year (Level 4) standing, registration in a LISC/BHSc Major or SSP, a GPA of 2.5, and a minimum grade of B in one of (BIOL 205; PATH 310). Exclusion BIOL 441.

Offering Faculty: Faculty of Health Sciences

PATH 430 The Molecular Basis of Disease Units: 3.00

An in-depth perspective of the pathogenesis of human disease. An integration of the genetic, biochemical, physiologic, anatomic, and general etiologic factors which play a role in the progression of several specific diseases from inception to death or recovery. The course will comprise short introductory presentations by teaching faculty followed by the presentation and discussion of relevant scientific papers by students. Given jointly with PATH 826/3.0.

Requirements: Prerequisite Minimum 4th year (Level 4) standing, registration in a LISC/BHSc Major or SSP, a GPA of 2.5, and PATH 310.

Offering Faculty: Faculty of Health Sciences

PATH 499 Research Project in Pathology Units: 12.00

A research project involving the study of human disease processes. The project will be supervised by a Faculty member in the Department and will provide opportunities for experimental design, data analysis and both written and oral presentation of results. Students must contact a potential faculty supervisor in the Spring preceding registration in fourth year.

NOTE Acceptance by a supervisor required prior to registration.

NOTE Students whose research requires the care and/or handling of animals must also complete the Introductory Animal Care Course and if required the appropriate Animal Use workshops through the Office of the University Veterinarian.

Learning Hours: 480 (288 Laboratory, 24 Group Learning, 24 Individual Instruction, 144 Private Study)

Requirements: Prerequisite Level 4 and registration in a LISC Specialization Plan and a cumulative GPA of 2.50 or higher. Exclusion ANAT 499; CANC 499; EPID 499; LISC 499; MICR 455; MICR 499; NSCI 499; PHAR 499; PHGY 499; REPD 499.

Offering Faculty: Faculty of Health Sciences



PATH 595 Independent Study Units: 6.00

Offering Faculty: Faculty of Health Sciences

Pharmacology and Toxicology (PHAR)

PHAR 100 Introductory Pharmacology Units: 3.00

Topics covered include central nervous system stimulants and depressants, narcotics, alcohol, cardiovascular agents, contraceptives, environmental toxicants, mechanism of drug action and disposition, antibiotics, drugs used in sports, over-the-counter drugs, food additives, and vitamins.

NOTE Also offered online. Consult the Bachelor of Health Sciences program office. Learning Hours may vary.

Requirements: One-Way Exclusion PHAR 230/3.0; PHAR 270/3.0; PHAR 340/3.0; PHAR 370/3.0; PHAR 450/3.0

Offering Faculty: Faculty of Health Sciences

PHAR 230 Pharmacology for the Health Sciences Units: 3.00

Lecture series on the following topics: principles of drug action, autonomic pharmacology, cardiovascular-renal pharmacology, neuropsychopharmacology, chemotherapy, drugs acting on the endocrine system, over-the-counter drugs, and therapeutic applications.

Learning Hours: 122 (36 Lecture, 8 Group Learning, 78 Private Study)

Requirements: Corequisite (PHGY 215 and PHGY 216) or KNPE 225 or PHGY 210/6.0 or PHGY 214/6.0. Exclusion PHAR 270/3.0; PHAR 340; PHAR 370.

Offering Faculty: Faculty of Health Sciences

PHAR 340 Principles of General Pharmacology I Units: 3.00

Topics include: fundamental principles of drug action, autonomic nervous system pharmacology, and toxicology.

Learning Hours: 120 (27 Lecture, 24 Tutorial, 69 Private Study)

Requirements: PREREQUISITE (PHGY 215 and PHGY 216) or BIOL 339 or PHGY 210 or PHGY 214 EXCLUSION No more than 3.0 units from PHAR 230; PHAR 270; PHAR 340; PHAR 370.

Offering Faculty: Faculty of Health Sciences

PHAR 370 Fundamentals of Pharmacology and Therapeutics Units: 3.00

An interdisciplinary course that introduces the basic principles and clinical applications of pharmacology. This 12-week course covers six topics. Students will work through the topics online, using a combination of online modules, readings, and short video clips. Students will participate in a variety of assessments throughout the course.

LEARNING HOURS may vary: 120(48O;72P)

Also offered online.

Requirements: Corequisite One of (PHGY 215/3.0 and PHGY 216/3.0) or KNPE 225/3.0. Exclusion PHAR 230/3.0; PHAR 270/3.0; PHAR 340/3.0 One-Way Exclusion PHAR 450/3.0

Offering Faculty: Faculty of Health Sciences

PHAR 380 Drug and Environmental Toxicology Units: 3.00

This course will explore the human toxicology associated with both pharmaceutical and environmental exposures. Topics include metabolism and mechanisms of toxicity of various pharmaceuticals and environmental pollutants. Toxicological effects of specific classes of environmental toxicants and different groups of pharmaceuticals are also discussed.

NOTE Also offered online. Consult Bachelor of Health Sciences program office.

Learning Hours: 120 (60 Online Activity, 60 Private Study)

Requirements: Minimum 3rd year (Level 3) standing and one of (BCHM 102/3.0; BCHM 270/3.0; BCHM 316/3.0; BCHM 218/3.0; BIOL 334/3.0)

Offering Faculty: Faculty of Health Sciences

PHAR 416 Xenobiotic Disposition and Toxicity Units: 3.00

An advanced study of chemical disposition and toxicity. Topics include toxicokinetics, biotransformation, metabolite-mediated toxicity, free radicals, the mechanism of action of toxicants, effects of toxicants on organ systems and a detailed examination of selected toxic agents.

NOTE BCHM, BIOL, BMCO, ELSC, and ETOX students should contact the Department for permission to enrol in this course.

Learning Hours: 120 (36 Lecture, 84 Private Study)

Requirements: Prerequisite Level 4 or above and registration in a LISC/BCHM Major or Specialization, ELSC Specialization, or BHSc program, and a CGPA of 2.5 or higher and (PHAR 370/3.0 or BCHM 310/9.0 or BCHM 316/3.0).

Offering Faculty: Faculty of Health Sciences

PHAR 450 Principles of General Pharmacology II Units: 3.00

Topics include: neuropsychopharmacology, cardiovascular pharmacology, agents acting on the endocrine system, and chemotherapy.

NOTE This course involves team based learning sessions and a drug literature evaluation assignment.

Requirements: Prerequisite (PHAR 230 or PHAR 270 or PHAR 370 with a min grade of B) or PHAR 340.

Offering Faculty: Faculty of Health Sciences

PHAR 480 Drug Discovery and Development Units: 3.00

This survey course covers the life-cycle of pharmaceutical products including discovery, development, and the transition to a generic or over-the-counter medication. Specific themes include target identification, design and synthesis, efficacy determination, optimization, preclinical safety assessment, clinical trials, and the differences between biologics and small chemical entities. Social and economic pressures exerted upon the pharmaceutical industry are also explored.

Requirements: Minimum 4th year (Level 4) standing and one of (PHAR 230/3.0; PHAR 370/3.0; PHAR 340/3.0). LISC MAJ SSP students require a GPA of 2.5. Note this course cannot be used as credit towards the LISC DDHT SSP Plan Exclusion DDHT 459/3.0; DDHT 460/3.0

Offering Faculty: Faculty of Health Sciences

PHAR 499 Research Project in Pharmacology and Toxicology Units: 12.00

An examination of the development and present state of knowledge in selected research areas of pharmacology and toxicology. Research project involves experimental design, data collection and analysis, written report and oral presentation. Students will be required to attend seminars and tutorials on topics related to research.

NOTE Acceptance by a supervisor required prior to registration.

NOTE Students whose research requires the care and/or handling of animals must also complete the Introductory Animal Care Course and if required the appropriate Animal Use workshops through the Office of the University Veterinarian.

Learning Hours: 480 (288 Laboratory, 24 Group Learning, 24 Individual Instruction, 144 Private Study)

Requirements: Prerequisite Level 4 and registration in a LISC or ELSC Specialization Plan and a cumulative GPA of 2.50 or higher. Exclusion ANAT 499; CANC 499; EPID 499; LISC 499; MICR 455; MICR 499; NSCI 499; PATH 499; PHGY 499; REPD 499.

Offering Faculty: Faculty of Health Sciences

Physiology (PHGY)

PHGY 170 Human Cell Physiology Units: 3.00

This is an introductory level course on the structure and function of human cells for students interested in pursuing human health-related disciplines. Students will also learn the principles of energy metabolism, cell growth and proliferation, and how cells interact with their environment. There is also an overall focus to relate cellular processes to human function and disease, culminating in a group presentation focused on one specific cell process and how it affects health. Students taking this course will be well-prepared for upper year molecular biology courses.

NOTE Also offered online. Consult the Bachelor of Health Sciences program office. Learning Hours may vary.

Learning Hours: 114 (36 Online Activity, 78 Private Study)

Requirements: One-Way Exclusion KNPE 225/3.0

Offering Faculty: Faculty of Health Sciences

PHGY 215 Principles of Mammalian Physiology I Units: 3.00

The focus of this course is on the central and peripheral nervous systems, muscle physiology, the heart, and the vascular system.

NOTE This course may be paired with PHGY 216/3.0 to achieve an introductory physiology full course (6.0 units).

NOTE Although it is recommended to take PHGY 215/3.0 first, this course can be taken before, after, or concurrently with PHGY 216/3.0.

NOTE Also offered online. Consult the Bachelor of Health Sciences program office. Learning Hours may vary.

Requirements: Minimum 2nd year (Level 2) standing.

Exclusion (KNPE 125/3.0; KNPE 225/3.0); [PHGY 210/6.0; PHGY 214/6.0; (PHGY 215/3.0 and PHGY 216/3.0)].

Offering Faculty: Faculty of Health Sciences

PHGY 216 Principles of Mammalian Physiology II Units: 3.00

The focus of this course is the physiology of the respiratory, renal, gastrointestinal, endocrine, and reproductive system.

NOTE This course may be paired with PHGY 215/3.0 to achieve an introductory physiology full course (6.0 units).

NOTE Although it is recommended to take PHGY 215/3.0 first, PHGY 216/3.0 can also be taken before or concurrently with PHGY 215/3.0.

NOTE Also offered online. Consult the Bachelor of Health Sciences program office.

Learning hour may vary.

Requirements: Minimum 2nd year (Level 2) standing.

Exclusion (KNPE 125/3.0;KNPE 225/3.0); [PHGY 210/6.0;PHGY 214/6.0;(PHGY 215/3.0 PHGY 216/3.0)]. Note it is recommended to take PHGY 215/3.0 first, PHGY 216/3.0 can be taken before or concurrently with PHGY 215/3.0.

Offering Faculty: Faculty of Health Sciences



PHGY 290 Investigation of Human Physiological Responses Units: 3.00

This course is designed to advance critical thinking and practical lab skills through collaborative experimentation on human physiological responses to various stimuli. Upon completion, students should be able to (i) plan and perform experimental protocols, (ii) collect, analyze and interpret data and (iii) produce quality presentations of findings.

Learning Hours: 120 (36 Laboratory, 48 Online Activity, 36 Private Study)

Requirements: Corequisite Minimum 2nd year (Level 2) standing, registration in a BHSc, LISC, or BCHM program, and co-req PHGY 215/3.0 Note: We recommend that students should have already completed a statistics course (e.g. HSCI 190/3.0 or equivalent)

Offering Faculty: Faculty of Health Sciences

PHGY 350 Pathophysiology Units: 3.00

An introductory course in Pathophysiology in which the underlying functional changes of cell and cell systems will be discussed in association with a variety of disease processes.

Learning Hours: 114 (36 Lecture, 6 Online Activity, 72 Private Study)

Requirements: Prerequisite (PHGY 215 and PHGY 216) or (KNPE 125 and KNPE 225) or PHGY 210 or PHGY 212 or PHGY 214

Offering Faculty: Faculty of Health Sciences

PHGY 355 Biomedical Respiratory Physiology Units: 3.00

An intermediate course focusing on biomedical applications of lung biology. Topics include lung mechanics, gas exchange, acid-base balance and control of breathing.

Requirements: PREREQUISITE (PHGY 215/3.0 and PHGY 216/3.0) or PHGY 210/6.0 or PHGY 212/6.0 or PHGY 214/6.0.

Offering Faculty: Faculty of Health Sciences

PHGY 424 Ion Channels of Excitable Cells Units: 3.00

The electrophysiology and biophysics of neuronal and cardiac membranes; molecular biology, structure, and function of ion channels. Students will learn to critically evaluate scientific literature. Instructional format is primarily student-led seminars.

Requirements: Prerequisite Minimum 4th year (Level 4) standing, registration in a LISC/BHSc Major or SSP, a GPA of 2.5, and a minimum grade of C in one of ([PHGY 215 and PHGY 216]; PHGY 210/6.0; PHGY 214/6.0; PHGY 212/6.0).

Offering Faculty: Faculty of Health Sciences

PHGY 444 Gastrointestinal Physiology Units: 3.00

Cellular and molecular approaches to human intestinal function are described and synthesized into an understanding of intestinal physiology at the organ level. Taught by GI researchers and clinician-scientists; students prepare and present critical appraisals of current primary research papers.

Requirements: PREREQUISITE Level 4 and registration in a LISC Major or Specialization Plan and a GPA of 2.5 and [a minimum grade of C in (PHGY 215/3.0 and PHGY 216/3.0) or PHGY 210/6.0 or PHGY 212/6.0 or PHGY 214/6.0].

Offering Faculty: Faculty of Health Sciences

PHGY 494 Neuroendocrinology Units: 3.00

Students are exposed to an in depth study of selected topics in neuroendocrinology and neuroendocrine techniques. Neuroendocrinology refers to the neural control of endocrine and autonomic function. Areas of focus will include central nervous system control of cardiovascular function, reproduction, and appetite. In addition, students will learn to critically evaluate scientific literature. Instructional format is primarily student led seminars.

Learning Hours: 114 (36 Seminar, 12 Online Activity, 96 Private Study)

Requirements: PREREQUISITE A minimum grade of B in: PHGY 210 or PHGY 212 or PHGY 214 or (PHGY 215 and PHGY 216) and Level 4 in a LISC Major or Specialization Plan and (a GPA of 2.5).

Offering Faculty: Faculty of Health Sciences

PHGY 499 Research Project in Physiology Units: 12.00

An investigation in a selected area of physiology. The project involves experimental design, data collection and analysis, submission of written reports, and oral presentations. Students attend seminars/tutorials on related topics. NOTE Acceptance by a supervisor required prior to registration.

NOTE Students whose research requires the care and/or handling of animals must also complete the Introductory Animal Care Course and if required the appropriate Animal Use workshops through the Office of the University Veterinarian.

Learning Hours: 480 (288 Laboratory, 24 Group Learning, 24 Individual Instruction, 144 Private Study)

Requirements: Prerequisite Level 4 and registration in a LISC Specialization Plan and a cumulative GPA of 2.50 or higher. Exclusion ANAT 499; CANC 499; EPID 499; LISC 499; MICR 455; MICR 499; NSCI 499; PATH 499; PHAR 499; REPD 499.

Offering Faculty: Faculty of Health Sciences

Reproduction and Development (REPD)

REPD 372 Reproduction and Development Units: 3.00

Students will obtain a general background on various aspects of human reproduction, ranging from male and female gamete development to pregnancy and birth. The course will serve as a gateway to more advanced courses in human reproduction and development.

NOTE Also offered online. Consult the Bachelor of Health Sciences program.

Learning Hours: 120 (60 Online Activity, 60 Private Study)

Requirements: Minimum 3rd year (Level 3) standing, one of (ANAT 100/3.0; ANAT 101/3.0; [ANAT 215/3.0 and ANAT 216/3.0]; [ANAT 315/3.0 and ANAT 316/3.0]) and one of (PHGY 210/6.0; PHGY 214/6.0; [KNPE 125/2.0 and KNPE 225/3.0]; [PHGY 215/3.0 and PHGY 216/3.0]).

Offering Faculty: Faculty of Health Sciences

REPD 416 Biology of Reproduction Units: 3.00

Comprehensive overview of cellular and molecular biology of mammalian

reproduction including gametogenesis, fertilization, early embryo development and placentation; selected topics of clinical aspects of reproduction. Participation in seminars and group discussion is required.

Learning Hours: 120 (36 Lecture, 36 Seminar, 48 Private Study)

Requirements: PREREQUISITE Level 4 and (registration in a LISC Major or Specialization plan) and (a GPA of 2.7) and either [(ANAT 215 and ANAT 216) or ANAT 309].

Offering Faculty: Faculty of Health Sciences

REPD 473 Developmental Origins of Health And Disease Units: 3.00

REPD 473, Development Origins of Health and Disease, will cover how the early-life environment contributes to later-life health. Four major topics will be covered: maternal exposures, maternal nutrition, infection, and pregnancy complications. Students will learn about how alterations in the embryonic and fetal environment due to these four parameters can and do contribute to the development of non-communicable diseases that persist throughout life. Students will have the opportunity to explore and consolidate the academic literature pertaining to DOHaD, as well as investigating the resources available to these populations of patients.

Requirements: Minimum 4th year (Level 4) standing and one of (PHAR 230/3.0; PHAR 370/3.0; PHAR 340/3.0; PHAR 380/3.0) and REPD 372/3.0.

Offering Faculty: Faculty of Health Sciences

REPD 499 Research Project in Reproduction and Development Units: 12.00

An examination of the development and present state of knowledge in selected research areas of Reproduction and Development. Research project involves experimental design, data collection and analysis, written report, poster presentation and oral presentation. Students will be required to attend seminars and tutorials on topics related to research.

NOTE Limited enrolment; restricted to 4th year honours; permission of the Department required. Acceptance by a supervisor required prior to registration.

NOTE Students whose research requires the care and/or handling of animals must also complete the Introductory Animal Care Course and if required the appropriate Animal Use workshops through the Office of the University Veterinarian.

Learning Hours: 480 (24 Lecture, 48 Seminar, 192 Laboratory, 168 Private Study)

Requirements: Prerequisite Level 4 and registration in a LISC Specialization Plan and a cumulative GPA of 2.50 or higher. Exclusion ANAT 499; CANC 499; EPID 499; MICR 499; NSCI 499; PATH 499; PHAR 499; PHGY 499.

Offering Faculty: Faculty of Health Sciences