Faculty of Health Sciences

PhD Programme

AREA OF STUDY

- Biomedical Sciences

FACULTY OF HEALTH SCIENCES

PhD Programme

Biomedical Sciences

Courses		Credits
HSCI8001	Methodologies in Molecular Biology and Biomedicine	3
HSCI8002	FHS Graduate Core Course	3
HSCI8003	Research Ethics	0

Required Elective Courses *		Credits
HSCI8101	Current Topics in Cancer Biology and Therapy	3
HSCI8102	Current Topics in Immunology and Infectious Diseases	3
HSCI8103	Current Topics in Neuroscience and Neurodegenerative Diseases	3
HSCI8104	Current Topics in Molecular Medicine	3
HSCI8105	Current Topics in Reproduction, Development and Aging	3
HSCI8106	Current Topics in Metabolism and Metabolic Diseases	3
HSCI8107	Current Topics in Cell and Molecular Biology	3
HSCI8108	Current Topics in Stem Cell Biology and Regenerative Medicine	3
HSCI8109	Current Topics in Bioinformatics	3
HSCI8110	Current Topics in Biomedical Imaging	3
HSCI8111	Current Topics in Biomedical Instrumentation Design	3
HSCI8112	Current Topics in Drug Discovery Technologies	3
HSCI8113	Current Topics in Epigenetics	3
HSCI8114	Current Topics in Genetics, Genomics and Functional Genomics	3
HSCI8115	Current Topics in Mental Health and Clinical Study Design	3
HSCI8116	Current Topics in Proteomics	3
HSCI8117	Current Topics in Nanoprobes for Bioimaging	3

Doctoral Thesis		Credits
HSCI8999	Doctoral Thesis	18

Total Credits for Students with Master's Degree	**27**
Total Credits for Students without Master's Degree	**30**

* Students with Master's Degree are required to take at least one Required Elective Course; and students without Master's Degree are required to take at least two Required Elective Courses.

Bachelor of Science in Biomedical Sciences

Year I		Credits
Compulsory Major Courses		
HSCI1000	General Chemistry	3
HSCI1001	General Chemistry Lab	2
HSCI1002	Introduction to Biological Sciences	3
HSCI1003	General and Clinical Biochemistry	3
HSCI1004	Biochemistry Lab	1.5
Language and Skills Courses*		
EELC1001	Interactive English I	3
EELC1002	Interactive English II	3
1 Language and Skills course selected from the following:		3
CHLL1000	University Chinese	
PORT1000	Introductory Portuguese	
Community and Peer Education Courses		
CPED1000	Residential College Experiential Learning	1
CPED1001	Physical Education I	0.5
CPED1002	Physical Education II	0.5
CPED2000	Communication Skills and Leadership	1
General Education Courses		
GEST1003	Quantitative Reasoning for Health Sciences (Area of Science & Technology)	3
GESB1000	Ethics, Values, Law and Society (Area of Society & Behaviour)	3
GELH1000	Chinese Language and Culture (Area of Literature & Humanities)	3
Total Credits:		**33.5**

Year II		Credits
Compulsory Major Courses		
HSCI2000	Cell and Molecular Biology	3
HSCI2001	Cell and Molecular Biology Lab	1.5
HSCI2002	General and Clinical Microbiology	3
HSCI2003	Microbiology Lab	1.5
HSCI2004	Genetics and Epigenetics	3

HSCI2005	Development and Aging	3
HSCI2006	Physiology and Pathophysiology	3
Language and Skills Course*		
EELC1003	Academic English	3
General Education Courses		
1 course from area of Global Awareness		3
1 course from area of Science & Technology		3
1 course from area of Literature & Humanities		3
2 Free Elective Courses		6
Total Credits:		**36**

Year III		**Credits**
Compulsory Major Courses		
HSCI3000	Neuroscience and Neurodegenerative Diseases	3
HSCI3001	Endocrinology and Metabolic Diseases	3
HSCI3002	Immunology and Infectious Diseases	3
HSCI3003	Biostatistics and Experimental Design	3
HSCI3004	Genomics and Bioinformatics	3
HSCI3005	Genetics, Genomics and Bioinformatics Laboratory	1.5
Language and Skills Course*		
CISC1000	Information Technology Fundamentals and Practices	3
General Education Course		
GEGA1000	Macao and Chinese Civilization (Area of Global Awareness)	3
General Education Course		
1 course from area of Society & Behaviour		3
3 Free Elective Courses		9
Total Credits:		**34.5**

Year IV		Credits
Biomedical Stream		
Compulsory Major Courses		
HSCI4000	Final Year Project I	3
HSCI4001	Cancer Biology and Therapy	3
HSCI4002	Stem Cell Biology and Regenerative Medicine	3
HSCI4005	Final Year Project II	3
HSCI4006	Public Health	3
HSCI4007	Translational Medicine	3
2 Required Elective Courses selected from the following:		6
HSCI4003	Pharmacology and Chemical Biology	
HSCI4004	Drug Discovery and Development	
HSCI4008	Introduction to Pharmacy and Pharmaceutical Analysis	
HSCI4009	Drug Toxicology	
Pharmaceutical Stream		
Compulsory Major Courses		
HSCI4000	Final Year Project I	3
HSCI4003	Pharmacology and Chemical Biology	3
HSCI4004	Drug Discovery and Development	3
HSCI4005	Final Year Project II	3
HSCI4008	Introduction to Pharmacy and Pharmaceutical Analysis	3
HSCI4009	Drug Toxicology	3
2 Required Elective Courses selected from the following:		6
HSCI4001	Cancer Biology and Therapy	
HSCI4002	Stem Cell Biology and Regenerative Medicine	
HSCI4006	Public Health	
HSCI4007	Translational Medicine	
2 Free Elective Courses for both Biomedical Stream and Pharmaceutical Stream		6
Total Credits:		**30**

*Students who test out of some or all of the Languages and Skills course(s) are required to make up the credits by taking additional Free Elective(s). Please visit the REG's webpage (https://reg.umac.mo/current-students/1718model/lang_skills/) for more details about the test out criteria.

Course Description

Ph.D. PROGRAMME

HSCI8001 METHODOLOGIES IN MOLECULAR BIOLOGY AND BIOMEDICINE
This course introduces cutting-the-edge technologies in biological and biomedical sciences, especially those available at Faculty core facilities, such as bioinformatics tools, imaging technologies, etc. The course consists of two parts. The first part is provided by instructor(s) in the form of lectures on theories and principles of selected technologies, and the second part is offered in the form of workshops and hands-on trainings at different core facilities.
Pre-requisite: None

HSCI8002 FHS GRADUATE CORE COURSE
This course provides intensive training on basic generic skills of scientific communication, including information search, scientific writing (research proposal), and oral presentation. The course consists of two parts. The first part is provided by instructor(s) in the form of lectures and workshops, and the second part is student-oriented. Each student will write a formal research proposal on the topic of his/her interest (most likely the ongoing research of the student) and provide an oral presentation for defense in the class.
Pre-requisite: None

HSCI8003 RESEARCH ETHICS
This course provides students with an understanding of the need for research ethics and the responsibility of the researcher (the student); the most common types of academic dishonesty (such as fabrication and plagiarism); how to avoid committing acts of academic dishonesty (such as through using citations and references); and how the University deals with students who have been proven to have committed acts of academic dishonesty (The University's 'Rules on Handling Student Academic Dishonesty' will be outlined).
Pre-requisite: None

HSCI8101 CURRENT TOPICS IN CANCER BIOLOGY AND THERAPY
This course aims to introduce the most recent and advanced developments in the field of cancer biology and therapy. Multiple teachers may offer the course simultaneously. Students can choose the teacher, whereas teachers may set quota for the group/class. The course is offered flexibly in terms of availability, content, format, time, venue, and assessment.
Prerequisite: None

HSCI8102 CURRENT TOPICS IN IMMUNOLOGY AND INFECTIOUS DISEASES
This course aims to introduce the most recent and advanced developments in the field of immunology and infectious diseases. Multiple teachers may offer the course simultaneously. Students can choose the teacher, whereas teachers may set quota for the group/class. The course is offered flexibly in terms of availability, content, format, time, venue, and assessment.
Pre-requisite: None

HSCI8103 CURRENT TOPICS IN NEUROSCIENCE AND NEURODEGENERATIVE DISEASES
This course aims to introduce the most recent and advanced developments in the field of neuroscience and neurodegenerative diseases. Multiple teachers may offer the course simultaneously. Students can choose the teacher, whereas teachers may set quota for the group/class. The course is offered flexibly in terms of availability, content, format, time, venue, and assessment.
Pre-requisite: None

HSCI8104 CURRENT TOPICS IN MOLECULAR MEDICINE
This course aims to introduce the most recent and advanced developments in the field of molecular medicine. Multiple teachers may offer the course simultaneously. Students can choose the teacher, whereas teachers may set quota for the group/class. The course is offered flexibly in terms of availability, content, format, time, venue, and assessment.
Pre-requisite: None

HSCI8105 CURRENT TOPICS IN REPRODUCTION, DEVELOPMENT AND AGING
This course aims to introduce the most recent and advanced developments in the field of reproduction, development and aging. Multiple teachers may offer the course simultaneously. Students can choose the teacher, whereas teachers may set quota for the group/class. The course is offered flexibly in terms of availability, content, format, time, venue, and assessment.
Pre-requisite: None

HSCI8106 CURRENT TOPICS IN METABOLISM AND METABOLIC DISEASES
This course aims to introduce the most recent and advanced developments in the field of metabolism and metabolic diseases. Multiple teachers may offer the course simultaneously. Students can choose the teacher, whereas teachers may set quota for the group/class. The course is offered flexibly in terms of availability, content, format, time, venue, and assessment.
Pre-requisite: None

HSCI8107 CURRENT TOPICS IN CELL AND MOLECULAR BIOLOGY
This course aims to introduce the most recent and advanced developments in the field of cell and molecular biology. Multiple teachers may offer the course simultaneously. Students can choose the teacher, whereas teachers may set quota for the group/class. The course is offered flexibly in terms of availability, content, format, time, venue, and assessment.
Pre-requisite: None

HSCI8108 CURRENT TOPICS IN STEM CELL BIOLOGY AND REGENERATIVE MEDICINE
This course aims to introduce the most recent and advanced developments in the field of stem cell biology and regenerative medicine. Multiple teachers may offer the course simultaneously. Students can choose the teacher, whereas teachers may set quota for the group/class. The course is offered flexibly in terms of availability, content, format, time, venue, and assessment.
Pre-requisite: None

HSCI8109 CURRENT TOPICS IN BIOINFORMATICS
This course aims to introduce the most recent and advanced developments in the field of bioinformatics. Multiple teachers may offer the course simultaneously. Students can choose the teacher, whereas teachers may set quota for the group/class. The course is offered flexibly in terms of availability, content, format, time, venue, and assessment.
Pre-requisite: None

HSCI8110 CURRENT TOPICS IN BIOMEDICAL IMAGING
This course introduces radiation, dosimetry, x-ray imaging, computed tomography, optical tomography, photoacoustic tomography, multi-modality imaging modality, nuclear medicine, EEG, fNIRS, MRI (fMRI), ultrasound and imaging applications in clinical and pre-clinical diagnosis and therapy. It aims to provide a comprehensive introduction to all major aspects of standard medical imaging systems.
Pre-requisite: None

HSCI8111 CURRENT TOPICS IN BIOMEDICAL INSTRUMENTATION DESIGN
This module of the course is an overview of existing medical devices and discusses methods for development, evaluation, and approval of new medical devices. The course will cover both diagnostic and interventional devices, and cover clinical and pre-clinical testing issues, as well

as a discussion of FDA approval processes, funding start-ups, and cost effectiveness analysis. Students will work in teams to analyze requirements in the medical setting and come up with a plan for a new device, and analyze how best to develop it with a new start-up.
Pre-requisite: None

HSCI8112 CURRENT TOPICS IN DRUG DISCOVERY TECHNOLOGIES
This course aims to introduce the most recent and advanced technologies in the field of drug discovery. Particular emphases will be on lead generation and optimization where multidisciplinary and multifunctional efforts are essential to progress the candidate drug to the clinics. New technologies used in the fields of target selection/identification, hit identification, rational drug design, drug metabolism and pharmacokinetics, preclinical lead optimization, drug formulation and toxicity studies, will be introduced.
Pre-requisite: None

HSCI8113 CURRENT TOPICS IN EPIGENETICS
Epigenetics studies the heritable changes in phenotype that are independent of alterations in the DNA sequence itself. This course will examine the major epigenetic mechanisms. Particular attention will be paid to how the milestone discoveries in epigenetics were made. The course will also discuss the role of epigenetics in biological phenomena such as cellular reprogramming, X-inactivation, imprinting and the onset of human diseases.
Pre-requisite: None

HSCI8114 CURRENT TOPICS IN GENETICS, GENOMICS AND FUNCTIONAL GENOMICS
Genetics is the study of how biological information stored in the DNA of a genome is passed down from one generation to the next, while genomics and functional genomics are approaches for understanding genomic information. This course aims to provide students the basic knowledge of genetics, genomics and functional genomics and to familiarise students with the latest technological and methodological developments in these research fields.
Pre-requisite: None

HSCI8115 CURRENT TOPICS IN MENTAL HEALTH AND CLINICAL STUDY DESIGN
Mental health disorders are prevalent worldwide; each year around one quarter of the population suffers from one or more mental disorders. This course focuses on basic concepts of mental health, the method of mental state examination, introduction on measurement and assessment, clinical features of common mental problems. Commonly used clinical study methods will be also included.
Pre-requisite: None

HSCI8116 CURRENT TOPICS IN PROTEOMICS
This course focuses on cutting-edge proteomic approaches and technologies. The aim of the course is to provide each Ph.D. student with the fundamental knowledge and hands-on experience necessary for performing and analyzing proteomic experiments. The overall goal is to train researchers to identify new opportunities and applications for proteomic approaches in their biological research.
Pre-requisite: None

HSCI8117 CURRENT TOPICS IN NANOPROBES FOR BIOIMAGING
The course is about the current development of nanoparticles as contrast agents for biomedical imaging and sensing applications. Different contrast agents will be introduced including those for fluorescence imaging, magnetic resonance imaging, Photo acoustic imaging, etc. Preparation and surface functionalization of nanoparticles will be also introduced.
Pre-requisite: None

HSCI8999 DOCTORAL THESIS
This course spans six consecutive semesters. During the study period, students are required to perform independent research work under the supervision of the thesis supervisor. After successfully completing the qualifying examination and proposal assessment, a written thesis and an oral defence presenting the research findings with intellectual analysis are necessary for the assessment of the eligibility of graduation by the end of the study.
Pre-requisite: None

BACHELOR'S DEGREE PROGRAMME

HSCI1000 GENERAL CHEMISTRY
This course introduces the fundamental principles and concepts of chemistry to lay a foundation for future learning for students majoring in health sciences. The major areas covered in this course include atomic and molecular structure, chemical reactions and stoichiometry, energy and thermochemistry, chemical bonding, gases, chemical kinetics, chemical equilibrium, and introductory organic chemistry.
Pre-requisite: None

HSCI1001 GENERAL CHEMISTRY LABORATORY
This laboratory course supplements the lecture course General Chemistry and provides students with hands on learning experience on qualitative and quantitative experimental techniques for investigating the properties and reactions of chemical substances.
Pre-requisite: None

HSCI1002 INTRODUCTION TO BIOLOGICAL SCIENCES
Biology is the study of life. With the objective of introducing students to the fields of biological and biomedical sciences, this course covers the following fundamental aspects or principles of biological sciences: basic unis of life, genetic basis of life, evolution and biodiversity, development and function, and ecology and environment. Although all three domains or five kingdoms of life will be covered, the course will focus more on animals and humans.
Pre-requisite: None

HSCI1003 GENERAL AND CLINICAL BIOCHEMISTRY
This course introduces the molecular basis of biological processes through the logic of chemistry. Topics covered include the structure and function of biomolecules, biochemistry techniques, basic metabolic pathways, and a brief introduction to the biochemical bases of relevant disease states.
Pre-requisite: None

HSCI1004 BIOCHEMISTRY LABORATORY
This course aims to provide a hands-on opportunity for students to learn the basic experimental methods and instruments used in a biochemistry laboratory, and develop analytical and problem solving skills that will be required for the pursuit of their career in the health science area. Major topics covered include protein expression, concentration determination and gel electrophoresis, western blotting, chromatography, and enzyme kinetics. Students will also practice literature search and data presentation through the semester.
Pre-requisite: None

HSCI2000 CELL AND MOLECULAR BIOLOGY
This course aims to provide an introduction to the principles of modern cell and molecular biology, and build a foundation for students to initiate and develop the process of inquiry-based learning and discovery in biology and medical sciences. The course will discuss fundamental molecular

biology of the cell, current molecular genetic techniques, cell structure and function, and signal transduction pathways.
Pre-requisite: HSCI1002 Introduction to Biological Sciences

HSCI2001 CELL AND MOLECULAR BIOLOGY LABORATORY
This laboratory course applies concepts learned in Cell and Molecular Biology lecture to a molecular biology research project, with an aim to introduce students to in vitro techniques utilized in a modern biological research lab. While it is not possible to cover all the methods and technologies in a single semester, the fundamental skills taught in this course will provide a basis for understanding many more complex approaches. Topics covered include RNA isolation, agarose gel electrophoresis, PCR, restriction enzyme digestion, DNA cloning, bacterial transformation, plasmid DNA isolation, mammalian cell culture, DNA transfection, fluorescence microscopy, and sub-cellular fractionation.
Pre-requisites: HSCI1002 Introduction to Biological Sciences
HSCI2000 Cell and Molecular Biology (or concurrent enrolment)

HSCI2002 GENERAL AND CLINICAL MICROBIOLOGY
This course provides students with a broad-based foundation in the basic concepts of general and clinical microbiology. Topics covered include an overview of microbiology with basic information on bacteria, fungi, protozoa and viruses, a discussion of microbial physiology and genetics, and an introduction to microbial pathogenesis and the host response, providing a conceptual basis for understanding pathogenic microorganisms and the mechanisms by which they cause diseases in the human body. Successful completion of this course will prepare students for more advanced courses in related fields.
Pre-requisites: HSCI1002 Introduction to Biological Sciences
HSCI1003 General and Clinical Biochemistry

HSCI2003 MICROBIOLOGY LABORATORY
This course provides an opportunity for students to gain hands-on experience on basic microbiology methods and techniques. Topics covered include basic microscopy, aseptic technique, media preparation, bacterial growth and culture, staining methods, biochemical tests of microbes, effects of physical and chemical agents on bacteria, and eukaryotic organisms and viruses.
Pre-requisite: HSCI2002 General and Clinical Microbiology (or concurrent enrolment)

HSCI2004 GENETICS AND EPIGENETICS
This course introduces the basic principles of classical and molecular genetics and epigenetics, focusing on how biological information is stored, expressed, changed, and transmitted. Topics covered include inheritance, gene structure, expression and regulation, molecular genetic techniques, population and evolutionary genetics, followed by a discussion of the role of epigenetics in biological phenomena.
Pre-requisites: HSCI1000 General Chemistry
HSCI1002 Introduction to Biological Sciences

HSCI2005 DEVELOPMENT AND AGING
This lecture discusses animal development with focus on initiation and construction of an organism and the underlying molecular and genetic basis. Topics covered include an overview of developmental biology, the molecular mechanisms of development, cell commitment and early embryonic development, and the vertebrate development process. A final section will be devoted to a discussion of the aging process, including the evolutionary, biochemical, genetic and cellular mechanisms of aging, as well as age-related diseases.
Pre-requisites: HSCI1002 Introduction to Biological Sciences
HSCI2000 Cell and Molecular Biology

HSCI2006 PHYSIOLOGY AND PATHOPHYSIOLOGY
This course provides an introduction to the structure and function of the major physiological organ systems of the human body, how various body processes are integrated and regulated, and how perturbations in physiological regulatory mechanisms and anatomy result in pathophysiology. Common diseases and disorders of each system are covered, and emphasis is given on cardiovascular, pulmonary, hepatic, renal and reproductive systems.
Pre-requisites: HSCI1003 General and Clinical Biochemistry
HSCI2000 Cell and Molecular Biology

HSCI3000 NEUROSCIENCE AND NEURODEGENERATIVE DISEASES
This course aims to provide a systematic introduction to the mammalian nervous system. Topics covered include basic neuroanatomy, the electrophysiological properties of neural cells, sensory and motor systems, the structural and functional organization of the human brain, and an introduction to neural degenerative diseases.
Pre-requisite: HSCI2006 Physiology and Pathophysiology

HSCI3001 ENDORCRINOLOGY AND METABOLIC DISEASES
The course introduces the roles of hormones, the pathophysiologic process by which hormonal secretion is abnormal, and characteristics and treatments of various endocrine disorders to students. A number of metabolic diseases that pertain to defects in hormone production or signaling will be covered in the course. Main topics in the course include principles and practice of endocrinology, adrenal disorders, metabolic diseases, thyroid hormones and disorders, calcium homeostasis and metabolic bone disease, pituitary hormones and pituitary gland disorders, sex hormone disorders, and endocrine emergencies.
Pre-requisite: HSCI2006 Physiology and Pathophysiology

HSCI3002 IMMUNOLOGY AND INFECTIOUS DISEASES
This course provides a basic knowledge of the immune response and its involvement in health and disease, as well as an introduction to infectious disease, including the pathophysiology, clinical presentation and therapeutic management of common infectious diseases. Knowledge from this course will enable students to gain a broad foundation base and prepare them for advanced courses in the health care or medical research field.
Pre-requisites: HSCI2002 General and Clinical Microbiology
HSCI2004 Genetics and Epigenetics

HSCI3003 BIOSTATISTICS AND EXPERIMENTAL DESIGN
The course provides students with an understanding of basic concepts of data analysis and statistical inference in the medical and health sciences, with an emphasis on the application of statistical methods to the design and interpretation of biological experiments and comparative data. Specific topics include tools for describing central tendency and variability in data, methods for performing inference on population means and proportions via sample data, statistical hypothesis testing and its application to group comparisons, issues of power and sample size in study designs, and random sample and other study types.
Pre-requisite: None

HSCI3004 GENOMICS AND BIOINFORMATICS
This course introduces fundamental concepts and tools in genomics and bioinformatics to provide students with a foundation for doing innovative research. The course emphasizes on various types of functional genomic data available and current computational methods for interpreting and integrating the data to make inferences about cellular function. Topics covered include an introduction to genomics and bioinformatics, genomic sequencing, assembly and annotation, transcriptomics, proteomics, and application of genomic approaches.
Pre-requisite: HSCI2000 Cell and Molecular Biology

HSCI3005 GENETICS, GENOMICS AND BIOINFORMATICS LABORATORY
This laboratory course aims to provide students a hands-on experience through a series of laboratory experiments, designed to examine various genetics phenomenon in order to better understand fundamental genetics principles. In addition, students will carry out experiments and data analysis related to the fields of epigenetics, genomics and bioinformatics, such as DNA and protein sequence analysis, data mining from different types of research databases, standard Bioinformatics analysis of next generation sequencing data, etc. This course will equip students with the basic knowledge to solve biological questions using a genetics, genomics and bioinformatics approach.
Pre-requisites: HSCI2004 Genetics and Epigenetics
HSCI3004 Genomics and Bioinformatics (or concurrent enrolment)

HSCI4000 FINAL YEAR PROJECT I
The final year project is an essential part of the degree. In this course, students work independently on a research project under the supervision of an academic faculty member, culminating in a written research proposal and an oral presentation at the end of the first semester. The project supervisor guides the student through the process and provides support and advice on all aspects of the project work.
Pre-requisite: None

HSCI4001 CANCER BIOLOGY AND THERAPY
Cancer has a profound impact on our society and has been the driving force behind major research advances in medical sciences. This course provides a comprehensive overview of the biology, pathology and treatment of cancer. Specific topics covered include an overview of the field, molecular and genetic basis of cancer, cancer pathology, carcinogens, and current cancer therapies.
Pre-requisites: HSCI2000 Cell and Molecular Biology
HSCI2004 Genetics and Epigenetics

HSCI4002 STEM CELL BIOLOGY AND REGENERATIVE MEDICINE
This course covers a broad range of topics relevant to stem cell biology. This fast-moving field brings together many aspects of basic and applied biology and medicine, including development, regeneration/repair, and cancer. The course covers the following concepts and themes: pluripotency and reprogramming, pluripotent cell types, organ systems, stem cells and cancer, therapeutics and ethics. The lecture/discussion format gives students both a broad background and the opportunity to apply critical thinking skills to recent data in the field.
Pre-requisite: HSCI2005 Development and Aging

HSCI4003 PHARMACOLOGY AND CHEMICAL BIOLOGY
This course introduces principles of chemical biology and pharmacology with an emphasis on drug action in cell and organism levels. The course begins with an introduction of chemical biology; utilizing small molecules to understand biological functions and pathways, as a basic knowledge to study pharmacology. The course then introduces the pharmacology of major categories of medications. This course also lays the foundation for future learning for students pursuing a career in drug discovery & development, clinical practice, medical research, or pharmaceutical industry.
Pre-requisite: HSCI1003 General and Clinical Biochemistry

HSCI4004 DRUG DISCOVERY AND DEVELOPMENT
This course aims to provide students with an overview of the drug discovery and development process from the identification of novel drug targets to the introduction of new drugs into clinical practice. Topics covered include approaches to new drug discovery, drug design and synthesis, pharmacodynamics, pharmacokinetics, drug interaction, drug transportation, prodrug design and application, the drug development process, and drug design case studies.
Pre-requisites: HSCI1003 General and Clinical Biochemistry

HSCI4003 Pharmacology and Chemical Biology (or concurrent enrolment)

HSCI4005 FINAL YEAR PROJECT II
The final year project is an essential part of the degree. In this course, students work independently on a research project under the supervision of an academic faculty member, culminating in a final project report and an oral presentation at the end of the second semester. The project supervisor guides the student through the process and provides support and advice on all aspects of the project work.
Pre-requisite: HSCI4000 Final Year Project I

HSCI4006 PUBLIC HEALTH
This course intends to survey the broad field of public health and serves as an introduction to the major issues of health and health care in general as well as in local community. The course defines and describes public health issues, and identifies potential problems and their solutions.
Pre-requisite: None

HSCI4007 TRANSLATIONAL MEDICINE
The aim of translational medicine is to translate knowledge, mechanisms and techniques discovered by basic scientific research into new approaches for diagnosis and treatment of diseases. This course focuses on the principles and practices of translational medicine as they apply to the development of a new drug (small molecules and/or biologics), device, or diagnostic. Topics covered include a historical perspective of translational medicine, emerging concepts in biomarker discovery, innovative drug development, cell therapies, translational bioinformatics, IRB & ethical considerations in human subject research, and human clinical trials.
Pre-requisite: HSCI2000 Cell and Molecular Biology

HSCI4008 INTRODUCTION TO PHARMACY AND PHARMACEUTICAL ALANYSIS
This course introduces pharmacy practice and pharmaceutical analysis to the students. Topics covered include the pharmacy profession, the medication experience, medication dosage forms, pharmaceutical analysis techniques, pharmacopoeial methods of analysis, and quality control of pharmaceuticals. Knowledge from this course helps prepare students for careers in pharmacy and pharmaceutical industry.
Pre-requisite: HSCI1003 General and Clinical Biochemistry

HSCI4009 DRUG TOXICOLOGY
Pharmacological toxicology examines the mechanisms of action of medications and their potential to cause adverse or damaging effects upon the body. Assessment of these effects and characterization of their mechanistic basis is a critical area within drug discovery and development as well as clinical practice. This course provides an introduction to the basic principles of pharmacological toxicology. Topics covered include mechanisms of toxicity, toxicokinetics, factors affecting toxicity, toxicological testing, diagnosis and treatment, and substance abuse.
Pre-requisite: HSCI4003 Pharmacology and Chemical Biology