EXERCISE SCIENCE

Section 31.120

Faculty

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For the complete list of faculty members, please consult the Department website.

Location

Loyola Campus
Richard J. Renaud Science Complex, Room: SP 165
514-848-2424, ext. 3327

Department Objectives

The Department of Exercise Science is committed to teaching and research in the areas of exercise, health, and physical activity while emphasizing the fields of athletic therapy and clinical exercise physiology. The curriculum permits students to explore the biomechanical and physiological responses to physical activity of healthy individuals and persons with a variety of pathologies and disabilities. Lectures and laboratories are combined with supervised involvement in research, and community and professional activities. Students are provided with an education which is compatible with obtaining employment in the health and fitness field or continuing their studies in health-related professional or graduate schools.

The BSc Honours, Specialization, and Major programs in Exercise Science and the Bachelor of/Baccalaureate in Science in Athletic Therapy (BScAT) provide students with the opportunity to acquire essential knowledge and a strong foundation in the field of exercise science. Students are exposed to a concentrated series of courses that incorporate the application of biological sciences to exercise, physical activity, and health-related areas including athletic therapy and clinical exercise physiology.

The fundamental concepts associated with Clinical Exercise Physiology (CEP) include the adaptation of traditional exercise forms, assessment techniques, and training protocols which address the needs of individuals with a disease or functional disability (e.g. heart disease, diabetes, neurological disorders). Students entering the field of CEP acquire an appreciation of persons with a disability, their lifestyle, and their exercise possibilities. The form of exercise application ranges from adapted physical activities to competitive sports.

The BSc in Athletic Therapy (BScAT) is accredited by the Canadian Athletic Therapists Association (CATA) and is directed toward the preparation of students seeking to become a Certified Athletic Therapist in Canada (CAT[C]). A CAT(C) is devoted to the health care of physically active individuals. The scope of practice of the CATA includes prevention, immediate care, and reconditioning of musculoskeletal injuries. Some of the techniques used to accomplish prevention of injury are postural evaluation, conditioning, and providing prophylactic support. Immediate care and rehabilitation of musculoskeletal injury consist of injury assessment, first aid and emergency care, exercise and modality therapy, and preparing individuals for safe return to physical activity or athletic participation. Student members (certification candidates) of the CATA must fulfill the academic and practical requirements of a program accredited by the CATA in order to enter the CATA certification exam process. The Department of Exercise Science offers one of seven such programs in Canada.

While the major offers core applied-science, health, and fitness courses, the BSc Honours also introduces undergraduate students to research concepts and protocols. The BSc in Athletic Therapy (BScAT) and BSc Specialization in Exercise Science/Clinical Exercise Physiology offer courses providing a theoretical knowledge base in the respective areas of study.

Programs

Students are required to complete the appropriate profile for entry into the Exercise Science programs (see §31.002 — Programs and Admission Requirements — Profile). Students entering the major and specialization program should refer to §16.3.11 — Academic Performance, and §31.003.1 — WGPA Requirements. Students considering entry into the honours program should refer to §16.2.3 — Concentration Requirements.

Application Procedures

All newly admitted students enter the BSc Major in Exercise Science. Admission to the BSc Honours in Exercise Science, BSc in Athletic Therapy (BScAT) or BSc Specialization in Exercise Science/Clinical Exercise Physiology is by internal transfer only. Upon completion of a specified list of courses, any student may submit a request for an internal transfer.

Eligibility Requirements for Internal Transfer

To be eligible to transfer from the BSc Major into the BSc Honours program, the following courses must be completed with a minimum GPA of 3.30: EXCI 250, 252, 253, 254, 257 and CATA 262.

To be eligible to transfer from the BSc Major into the BSc in Athletic Therapy (BScAT) or the BSc Specialization in Exercise Science/Clinical Exercise Physiology, the following courses must be completed with a minimum GPA of 3.00: EXCI 210, 250, 252, 253, 254, 257; CATA 262 and 263. Due to the limited number of internship site placements in the BSc in Athletic Therapy (BScAT) and the Specialization in Exercise Science/Clinical Exercise Physiology, not all students with a minimum of 3.00 are guaranteed transfer.

NOTE: Those students who fail to complete all the required courses for transfer or fail to achieve at least a minimum GPA of 3.30 for the honours program or 3.00 for the specialization program or the BSc in Athletic Therapy (BScAT) in the first year of study will not be considered for transfer. These students will remain registered in the BSc Major in Exercise Science.

NOTE: Students enrolled in the BSc in Athletic Therapy (BScAT) or the BSc Specialization in Exercise Science/Clinical Exercise Physiology must maintain a cumulative GPA of not less than 3.00 calculated for courses required within their program. Any student who is unable to meet this GPA requirement will be removed from his/her program and placed in the BSc Major in Exercise Science.

Internship Eligibility Requirements

To be eligible to register for an internship, students must complete the following internship eligibility requirements specific to each internship course.

To be eligible to register for the Athletic Therapy Field Internship I (CATA 365[6]) the following prerequisite courses must be completed:
BIOL 201[3] or equivalent
CATA 262[3], 263[3]
CHEM 205[3], 206[3] or equivalent
EXCI 250[3], 252[3], 253[3], 254[3], 257[3]
MATH 203[3], 205[3] or equivalent
PHYS 204[3], 224[1] or equivalent

To be eligible for the Athletic Therapy Field Internship II (CATA 485[3]) the following prerequisite course must be completed:
CATA 365[6]

To be eligible to register for the Athletic Therapy Clinical Internship I (CATA 475[6]) the following prerequisite courses must be completed:
CATA 337[3], 339[3], 348[3], 365[6]
EXCI 351[3], 352[3], 355[3], 357[3], 358[3]
PHYS 205[3], 225[1] or equivalent

To be eligible to register for the Athletic Therapy Clinical Internship II (CATA 495[3]) the following prerequisite courses must be completed:
PHYS 206[3], 226[1] or equivalent
EXCI 445[3], 451[3]
CATA 437[3], 439[3], 475[6]

To be eligible to register for the Clinical Exercise Physiology Internship I (EXCI 383[3]) the following prerequisite courses must be completed:
BIOL 201[3] or equivalent
CATA 262[3]
CHEM 205[3], 206[3], or equivalent
EXCI 210[3], 250[3], 252[3], 253[3], 254[3], 257[3], 380[3]
MATH 203[3], 205[3] or equivalent
PHYS 204[3], 224[1] or equivalent

To be eligible to register for the Clinical Exercise Physiology Internship II (EXCI 483[3]) the following prerequisite courses must be completed:
EXCI 351[3], 352[3], 355[3], 357[3], 358[3], 383[3], 422[3] (previously or concurrently)
PHYS 205[3], 225[1] or equivalent

Students are responsible for satisfying their particular degree requirements.
The superscript indicates credit value.

60 BSc Honours in Exercise Science
Stage I
18 EXCI 250[3], 252[3], 253[3], 254[3], 257[3]; CATA 262[3]
Stage II
21 EXCI 322[3], 323[3], 351[3], 352[3], 355[3], 357[3], 358[3]
Stage III
18 EXCI 420[3], 424[3], 425[3], 426[6], 445[3]
3 Chosen from EXCI 440[3], 453[3], 455[3], 458[3]

NOTE: Students seeking admission to the honours program must apply to the Department Honours Committee normally following the completion of 24 program credits. Students must meet the University regulations concerning the honours degree (§16.2.3). For additional information concerning programs and courses, students should consult the Department.

96 BSc in Athletic Therapy (BScAT)
Stage I
24 CATA 262[3], 263[3]; EXCI 210[3], 250[3], 252[3], 253[3], 254[3], 257[3]
Stage II
30 CATA 337[3], 339[3], 348[3], 365[6]; EXCI 351[3], 352[3], 355[3], 357[3], 358[3]
Stage III
18 CATA 437[3], 439[3], 475[6]; EXCI 445[3], 451[3]
3 Chosen from EXCI 420[3], 422[3], 423[3], 440[3], 461[3]
Stage IV
15 CATA 441[3], 462[3], 485[3], 495[3]; EXCI 471[3]
6 Chosen from CATA 447[3]; EXCI 450[3], 455[3], 458[3], 492[3]; MANA 300[3]

66 BSc Specialization in Exercise Science/Clinical Exercise Physiology
Stage I
24 EXCI 210[3], 250[3], 252[3], 253[3], 254[3], 257[3]; CATA 262[3], 263[3]
Stage II
21 EXCI 351[3], 352[3], 355[3], 357[3], 358[3], 380[3], 383[3]
Stage III
18 EXCI 422[3], 423[3], 445[3], 450[3], 451[3], 483[3]
3 Chosen from EXCI 420[3], 440[3], 455[3], 458[3], 492[3]

42 BSc Major in Exercise Science
Stage I
18 EXCI 250[3], 252[3], 253[3], 254[3], 257[3]; CATA 262[3]
Stage II
15 EXCI 351[3], 352[3], 355[3], 357[3], 358[3]
Stage III
6 EXCI 420[3], 445[3]
3 Chosen from EXCI 440[3], 450[3], 453[3], 455[3], 458[3], 492[3]

Courses

Because of the renumbering of courses in the Department, students should see §200.1 for a list of equivalent courses.

CATA:

CATA 262 ***Emergency Care in Sport and Exercise*** (3 credits)
Prerequisite: EXCI 253 previously or concurrently.This course identifies common emergency situations in the athletic environment, and provides theoretical and practical components of management skills to safely deal with these situations. Specific signs and symptoms of basic emergency conditions are discussed. Planning of events to prepare for sport-related emergencies and administration of initial emergency techniques are included. Lectures and laboratory.
NOTE: The Corporation des thérapeutes du sport du Québec (CTSQ) accepts successful completion of this course as equivalent to a first aid course which is a partial requirement towards provincial recognition as a Level I Sport First Aider.

CATA 263 ***Principles of Athletic Therapy*** (3 credits)
Prerequisite: CATA 262. The course considers topics in athletic therapy from professional, preventive, and pathological perspectives. The course deals with injury classification, clinical flexibility, strength testing, cryotherapy, and sports dermatology. Preventive techniques such as pre-season physical examinations, protective equipment, hazard recognition, and taping techniques are also addressed. Acute and chronic pathologies associated with physical activity, as well as issues including sudden death and communicable diseases in athletics, and the adolescent athlete will be discussed. Lectures and laboratory.
NOTE: Students who have received credit for EXCI 263 or 335 may not take this course for credit.

CATA 337 ***Assessment of the Upper and Lower Extremities*** (3 credits)
Prerequisite: CATA 263; CATA 339 concurrently; enrolment in BScAT. This course examines normal function of the upper and lower extremities of the human body. Abnormal function and various pathologies of these structures are addressed in depth. Making use of principles based on applied anatomy and physiology, students learn about clinical assessment procedures and implementation of evaluation methods addressing orthopaedic dysfunction. Types of surgical procedures are discussed. Lectures and laboratory.
NOTE: Students who have received credit for CATA 338 may not take this course for credit.

CATA 339 ***Rehabilitation of the Upper and Lower Extremities*** (3 credits)
Prerequisite: CATA 337 previously or concurrently; enrolment in BScAT. This course examines concepts in the rehabilitation process including tissue healing, and introduces students to various exercise protocols and manual techniques specific to the upper and lower extremities. Students learn how to implement safe and effective rehabilitation protocols to address orthopaedic dysfunction of these areas. Patient education to facilitate rehabilitation, documentation treatment plans and treatment outcomes are addressed. Lectures and laboratory.
NOTE: Students who have received credit for CATA 338 may not take this course for credit.

CATA 348 ***Therapeutic Modalities in Sports Medicine*** (3 credits)
Prerequisite: CATA 337, 339; enrolment in BScAT. Students are introduced to the parameters of therapeutic modalities and their physiological effects. Various modalities such as heat, cold, ultrasound, muscle stimulation, interferential current and Transcutaneous Electrical Nerve Stimulation (T.E.N.S.) are examined. For each modality, topics include instrumentation, set-up, and practical application. Basic concepts of manual treatment approaches, such as mobilizations, myofascial release, traction, and massage, are introduced. Indications and contraindications and precautions for all treatments are presented. Lectures and laboratory.
NOTE: Students who have received credit for EXCI 348 or 448 may not take this course for credit.

CATA 365 ***Athletic Therapy Field Internship I*** (6 credits)
Prerequisite: CATA 263; enrolment in BScAT and permission of the Department. This course offers students the opportunity to work in an emergency or preventive setting with a sports team, although some clinical component may be introduced. Students must be certification candidates of the Canadian Athletic Therapists Association (CATA) and the Corporation des thérapeutes du sport du Québec (CTSQ). This course involves a commitment of 400 hours over two terms. Weekly seminars with agency supervisors are mandatory.
NOTE: Students who have received credit for CATA 390 may not take this course for credit.

CATA 437 ***Assessment of the Hip, Spine and Pelvis*** (3 credits)
Prerequisite: CATA 337, 339; enrolment in BScAT. This course examines normal function of the hip, spine, and pelvis of the human body. Abnormal function and various pathologies of these structures are addressed in depth. Making use of principles based on applied anatomy and physiology, students learn about clinical assessment procedures and implementation of evaluation methods addressing orthopaedic dysfunction. Surgical procedures are discussed. Lectures and laboratory.
NOTE: Students who have received credit for CATA 438 may not take this course for credit.

CATA 439 ***Rehabilitation of the Hip, Spine and Pelvis*** (3 credits)
Prerequisite: CATA 339, 437 previously or concurrently; enrolment in BScAT. This course examines concepts in rehabilitation, introducing the students to various exercise protocols and manual techniques specific to hip, spine, and pelvis. Students learn how to implement advanced, safe, and effective rehabilitation protocols to address orthopaedic dysfunction of these areas. Lectures and laboratory.
NOTE: Students who have received credit for CATA 438 may not take this course for credit.

CATA 441 ***Concepts in Manual Therapy*** (3 credits)
Prerequisite: Enrolment in BScAT and completion of 75 university credits. This course provides students with an understanding of the fundamental theory and practical basis for using various manual therapy techniques to keep athletes competition-ready, to help in their recovery from injury, and to improve their performance. The course explains various techniques in detail and describes the procedures involved in conducting effective treatment sessions. Muscle Energy, Active Release, Myofascial Release, and Sports Massage are some of the techniques discussed, demonstrated, and practised. Determining goals and organization of a treatment session, and the choice and application of techniques are also discussed. The goal of the course is to help athletic therapists determine the most appropriate manual therapy techniques for a variety of orthopaedic pathologies. Lectures and laboratory.

CATA 447 ***Special Topics in Athletic Therapy*** (3 credits)
Prerequisite: CATA 348; enrolment in BScAT. This course focuses on recent research outcomes and new issues in athletic therapy specific to prevention, assessment, and rehabilitation of athletic injuries. The course content varies within the domains of the Canadian Athletic Therapists Association depending upon the most current issues such as surgical techniques, new medications, advanced assessment and modality techniques, and issues related to professional development and the workplace environment. Information is presented from a variety of courses and disciplines to enhance the knowledge base received from core Athletic Therapy courses. Lectures only.

CATA 462 ***Advanced Emergency Care*** (3 credits)
Prerequisite: CATA 365; enrolment in BScAT. This course completes the preparation of Athletic Therapy students in the area of emergency care of sports-related injury. It identifies the less common and more complicated emergency situations experienced in the athletic therapy setting. Advanced theoretical and practical components are presented. This course develops the ability of the student to care for the athlete beyond the initial stages of emergency management and towards advanced life support. Lectures and laboratory.

CATA 475 ***Athletic Therapy Clinical Internship I*** (6 credits)
Prerequisite: CATA 348, 365; enrolment in BScAT and permission of the Department. Students must be certification candidates of the Canadian Athletic Therapists Association and the Corporation des thérapeutes du sport du Québec. The course offers a minimum 400-hour supervised work opportunity. Under the supervision of a Certified Athletic Therapist, students are shown basic administrative skills as seen in private rehabilitation clinics or within the Department of Exercise Science.
NOTE: Students who have received credit for CATA 480 may not take this course for credit.

CATA 485 ***Athletic Therapy Field Internship II*** (3 credits)
Prerequisite: CATA 475; enrolment in BScAT and fulfillment of internship eligibility requirements. This course offers students the opportunity to work in an emergency or preventive setting with a sports team, although some clinical component may be introduced. Students must be certification candidates of the Canadian Athletic Therapists Association (CATA) and the Corporation des thérapeutes du sport du Québec (CTSQ). This course involves a minimum commitment of 200 hours over one or two terms. Weekly seminars with agency supervisors are mandatory.
NOTE: Students who have received credit for CATA 390 may not take this course for credit.

CATA 495 ***Athletic Therapy Clinical Internship II*** (3 credits)
Prerequisite: CATA 475; enrolment in BScAT and fulfillment of the internship eligibility requirements. Students must be certification candidates of the CATA and the CTSQ. The course offers a supervised period of work in a rehabilitation or athletic therapy clinic, for a minimum of 200 hours including a weekly seminar.
NOTE: Students who have received credit for CATA 480 may not take this course for credit.

EXCI:

EXCI 202 ***The Body Human: Form and Function*** (3 credits)
This course provides insight into the manner in which common injuries and diseases impact on the anatomical structures and functional systems of the body. The various medical treatments and procedures available to maintain or restore the structural and functional integrity of the body are also addressed. Conditions of a cardiovascular, pulmonary, neuromuscular, metabolic and oncologic nature are discussed.
NOTE: Students who have received credit for this topic under an EXCI 298 or EXCZ 298 number may not take this course for credit.
NOTE: Exercise Science students may not take this course for credit.

EXCI 204 ***Food for Sport*** (3 credits)
The course introduces students to a basic understanding of how the digestive system functions, and then examines the role of diet on sport performance. Students learn about the impact of the major food stuffs (carbohydrates, fats, proteins, vitamins, minerals, water) on performance outcomes. The use of ergogenic aids commonly used to enhance sport performance are also discussed with respect to their effectiveness. Caloric balance, diet and body composition are also discussed relevant to specific sport requirements.
NOTE: Students who have received credit for this topic under an EXCI 298 number may not take this course for credit.
NOTE: Exercise Science students may not take this course for credit.

EXCI 206 ***The Science of Sport*** (3 credits)
The course introduces basic and practical knowledge of human movement in sports and physical activity. Anatomical and physiological knowledge pertinent to body movement is presented in simple and meaningful terms. Biomechanical concepts

and principles applied to body movement in different sports and physical activities are also addressed. Consideration is also given to nutritional aspects and injury prevention in sport and exercise.
NOTE: Students who have received credit for this topic under an EXCI 298 number may not take this course for credit.
NOTE: Exercise Science students may not take this course for credit.

EXCI 210 ***Introduction to Adapted and Therapeutic Physical Activity*** (3 credits)
Prerequisite: Enrolment in an Exercise Science program. This course differentiates between adapted and therapeutic approaches to physical activity with respect to their historical development, inherent principles, types of disabilities and disease conditions, demographics and epidemiological data. Lectures only.

EXCI 218 ***Physical Growth and Maturation*** (3 credits)
This course considers normal and abnormal growth and maturation patterns of the musculoskeletal, neural, hormonal, cardiovascular, and respiratory systems of the body. In addition, socialization and psychosocial development processes with relevance to an exercise or sports environment are examined. These patterns and processes are investigated from childhood through adolescence and adulthood. Lectures only.
NOTE: Exercise Science students may not take this course for credit.

EXCI 233 ***Current Issues in Personal and Community Health*** (3 credits)
This course presents an overview of factors influencing personal and community health. Students are exposed to prevalent physical and mental health issues from biological, psychological, and sociological points of view. Health-related consequences of alcohol abuse, drugs, birth control, sedentary lifestyle, eating disorders, and communicable diseases are among the topics considered. Lectures only.
NOTE: Exercise Science students may not take this course for credit.

EXCI 250 ***Research Methods*** (3 credits)
This course provides students with a general overview of investigative research and the nature of scientific inquiry. Students receive instruction in critical inquiry and appraisal, research design, research ethics, and the role research plays in the development of professional practice/skills. Finally, this course provides the necessary knowledge and practical experience to enable students to plan and run an experimental project, including an understanding of the process of data collection, analysis, interpretation, and presentation. Lectures only.

EXCI 251 ***Fundamentals of Health and Physical Activity*** (3 credits)
The basic and contemporary issues of health and physical activity are discussed. General topics regarding the benefits of physical activity are examined from anatomical and physiological perspectives. Upon completion, students are able to apply the principles of fitness and wellness to their own lives, to assess their current level of fitness and wellness, to create plans for changing their lifestyle to reach wellness, and to monitor their progress using the health-related components of physical fitness: body composition, cardiovascular endurance, muscular strength and endurance, and flexibility. Lectures only.
NOTE: Students who have received credit for EXCZ 251 may not take this course for credit.
NOTE: Exercise Science students may not take this course for credit.

EXCI 252 ***Introduction to Physical Activity, Health and Fitness*** (3 credits)
Prerequisite: Enrolment in an Exercise Science program. This course focuses on the fundamentals of fitness assessment and the design of individualized exercise programs compatible with the responsibilities of a health/fitness instructor. Topics of study include screening clients for fitness testing and physical activity participation; the selection of appropriate tests to assess the health-related components of physical fitness such as body composition, cardiovascular endurance, muscular strength, local muscular endurance, and flexibility; interpretation of test results; and the application of exercise principles in the design of safe and effective individualized exercise prescriptions of the apparently healthy client. Lectures and laboratory.
NOTE: Students who have received credit for EXCI 261 and 342 may not take this course for credit.

EXCI 253 ***Human Anatomy I: Musculoskeletal Anatomy*** (3 credits)
Prerequisite: Enrolment in an Exercise Science program. The major focus of this course covers the anatomy of the musculoskeletal system and accompanying (peripheral) circulatory and neurological systems. It also addresses introductory terminology and tissue differentiation. The structures are examined through approaches of surface anatomy, current and traditional media and/or cadaver examination. Lectures and laboratory.

EXCI 254 ***Human Anatomy II: Systemic Anatomy*** (3 credits)
Prerequisite: EXCI 253; enrolment in an Exercise Science program. The major focus of this course covers the anatomy of the central circulatory and central respiratory systems. It also addresses the anatomy of the brain and spinal column as well as the integumentary, digestive, and urogenital systems. The structures are examined through approaches of surface anatomy, current and traditional media and cadaver examination. Lectures and laboratory.

EXCI 257 ***Human Physiology I: The Neurological, Bio-energetic and Endocrine Systems*** (3 credits)
Prerequisite: EXCI 254 previously or concurrently. This course surveys the functional organization and integration of the major systems of the body. A strong focus is placed on the fundamental control and operation of the nervous system, the mechanics and energetics of skeletal muscle function, and the actions of hormones comprising the endocrine and reproductive systems. Lectures and laboratory.
NOTE: Students who have received credit for EXCI 353 may not take this course for credit.

EXCI 298 ***Selected Topics in Exercise Science*** (3 credits)

EXCI 299 ***Selected Topics in Exercise Science*** (6 credits)

Specific topics for these courses, and prerequisites relevant in each case, will be stated in the Undergraduate Class Schedule.

EXCI 322 ***Statistics for Exercise Science*** (3 credits)
Prerequisite: EXCI 250; enrolment in the honours program; or permission of the Department. This course builds on students' experience derived from EXCI 250 to advance their knowledge of the research process by providing details of statistical techniques and methods that are common in exercise science. Lectures only.

EXCI 323 ***Research Experience in Exercise Science*** (3 credits)
Prerequisite: EXCI 250; enrolment in the honours program. This course provides students with hands-on research experience. They learn a new technique, engage in data collection, and produce a literature review in an area related to the research of the supervising professor. Laboratory only.

EXCI 351 ***Introduction to the Biomechanics of Human Movement*** (3 credits)
Prerequisite: EXCI 253; PHYS 204, 224 or equivalent. The primary focus of this course concentrates on the mechanical principles of human movement. Fundamental principles of kinematics and kinetics are examined in a theoretical and practical context. Lectures and laboratory.

EXCI 352 ***Essentials of Exercise Testing and Training in Athletic Populations*** (3 credits)
Prerequisite: EXCI 252. This course utilizes the students' background knowledge of anatomy, physiology, biomechanics, exercise physiology, and exercise programming to design pre-season, in-season, and post-season conditioning programs for elite athletes in a variety of sports. Most importantly, this course focuses on the importance of applying scientific principles of training in the design of exercise programs for elite athletes. The importance of skill-related (i.e. speed, agility, and power) and health-related components (i.e. cardio-respiratory endurance, and muscle strength) of physical fitness relative to performance is emphasized in this course. Some of the topics covered include ergogenic aids, regulation of skeletal muscle mass, periodization, aerobic endurance and resistance exercise training, and plyometrics. Lectures and laboratory.
NOTE: Students who have received credit for EXCI 452 may not take this course for credit.

EXCI 355 ***Neural Control of Human Movement*** (3 credits)
Prerequisite: EXCI 254, 257. Following a brief review of the nervous system anatomy and the functional properties of the neuron, students are introduced to the basic principles of the neural control of human movement, including reference to the sensory systems (visual, auditory, vestibular, proprioceptive and kinesthetic). Select pathologies and disorders of the nervous system and their resulting neuromuscular deficits are presented, as well as neuro-rehabilitative techniques and strategies. Lectures only.

EXCI 357 ***Human Physiology II: The Cardiovascular and Respiratory Systems*** (3 credits)
Prerequisite: EXCI 257. This course deals with the structural, the fundamental mechanisms and the functional control of the cardiovascular and respiratory systems. A detailed analysis of the rhythmical control of the heart, cardiovascular hemodynamics, capillary and coronary circulations, control of arterial blood pressure, the regulation of heart rate, cardiac output, and the peripheral vasculature is discussed. With respect to respiratory physiology, selected topics including pulmonary mechanics, principles of gas exchange and diffusion, transport of oxygen and carbon dioxide in the blood, and the regulation of respiration are addressed. Lectures and laboratory.

EXCI 358 ***Physiology of Exercise*** (3 credits)
Prerequisite: EXCI 357. This course deals with the physiological adjustments and adaptations to physical activity. Special emphasis is placed on examining the functional capacity of the cardiovascular, respiratory, neuromuscular, and endocrine systems to acute exercise and the process of adaptation to exercise training. Lectures and laboratory.
NOTE: Students who have received credit for EXCI 456 may not take this course for credit.

EXCI 380 ***Adapted Physical Activity*** (3 credits)
Prerequisite: EXCI 210; enrolment in the Clinical Exercise Physiology Specialization. This course examines the pathology associated with selected physical impairments and disabilities including sensorial, neurological, and orthopaedic conditions. Appropriate adapted physical activities are presented together with contraindications to physical activity and the role of environmental factors. Students experience clinical environments through field-trip activities. Lectures only.

EXCI 383 ***Clinical Exercise Physiology Internship I*** (3 credits)
Prerequisite: Enrolment in the Clinical Exercise Physiology Specialization and fulfillment of internship eligibility requirements. This course offers students the opportunity to observe and participate in physical activity programming offered for special populations (i.e. persons with neurological and physical impairments) in a supervised setting. This course involves a commitment of 120 hours including a weekly seminar.

EXCI 398 ***Selected Topics in Exercise Science*** (3 credits)

EXCI 399 ***Selected Topics in Exercise Science*** (6 credits)

Specific topics for these courses, and prerequisites relevant in each case, will be stated in the Undergraduate Class Schedule.

EXCI 420 ***Physical Activity Epidemiology*** (3 credits)
Prerequisite: EXCI 358. This course surveys the health-related aspects of exercise, physical activity, and physical fitness from the perspective of epidemiology. Topics include an introduction to the epidemiological process, the relationship between physical activity and disease (e.g. cardiovascular disease, obesity, cancer, mental illness), the biological mechanisms for healthy adaptations to physical activity, the behavioural determinants of physical activity, and public policy implications of the current literature.
NOTE: Students who have received credit for this topic under an EXCI 498 number may not take this course for credit.

EXCI 422 ***Pathophysiology in Clinical Exercise Science I*** (3 credits)
Prerequisite: EXCI 252, 358 or equivalent; enrolment in the Clinical Exercise Physiology Specialization. This course reviews pathophysiology, medical intervention techniques, and medication profiles of the most common cardiovascular, respiratory, oncologic and metabolic diseases. Lectures only.

EXCI 423 ***Pathophysiology in Clinical Exercise Science II*** (3 credits)
Prerequisite: EXCI 252, 358 or equivalent; enrolment in the Clinical Exercise Physiology Specialization. This course reviews pathophysiology, medical intervention techniques, and medication profiles of the most common neuromuscular and orthopaedic diseases and disabilities. Lectures only.

EXCI 424 ***Honours Seminar I: Issues and Methods in Exercise Science*** (3 credits)
Prerequisite: EXCI 322, 323; enrolment in the honours program. Using a combination of guest speakers and student presentations, this seminar is geared to critically examining current issues and methods in exercise science. Its emphasis is on practical and methodological issues as they relate to selected topics from these areas. Examples of topics include ethical issues and new emerging theories in exercise science, and utility of a particular research technique or methodology. Lectures only.

EXCI 425 ***Honours Seminar II: Current Topics in Exercise Science*** (3 credits)
Prerequisite: EXCI 322, 323; enrolment in the honours program. Using a combination of guest speakers and student presentations, this seminar is geared to critically examining current topics in exercise science. Its emphasis is on the theoretical basis of issues as they relate to selected topics in the student's specific areas of research. Lectures only.

EXCI 426 ***Honours Thesis*** (6 credits)
Prerequisite: EXCI 322, 323; EXCI 424, 425 previously or concurrently; enrolment in the honours program. This course requires the student to propose and conduct a study and submit a thesis according to a recognized and approved scientific journal format. The work is supervised by a thesis chair selected by the student from within the Department.

EXCI 440 ***Current Developments in the Biochemistry of Exercise*** (3 credits)
Prerequisite: EXCI 358 or permission of the Department. This course offers an in-depth examination of the current topics and literature in biochemistry, cellular and molecular biology, and physiology as they relate to the adaptations associated with physical activity, exercise training, or disease. The course is designed to integrate knowledge from the disciplines of Exercise Science, Biochemistry, and Biology, to facilitate the synthesis and evaluation of new ideas, and to promote the effective oral and written communication of these ideas.
NOTE: Students who have received credit for this topic under an EXCI 498 number may not take this course for credit.

EXCI 445 ***Nutrition in Exercise and Sport*** (3 credits)
Prerequisite: EXCI 358. This course provides an overview of the anatomy and in-depth study of the physiology of the digestive system prior to examining the significance of carbohydrates, lipids, and proteins as essential nutritional requirements for physical activity and optimal performance. The importance of trace minerals and vitamins is also discussed. Specific issues such as the use of nutritional beverages, ergogenic aids, eating disorders, and nutritional concerns of athletes are some of the topics presented. Lectures only.

EXCI 450 ***Physical Fitness Assessment, Exercise Prescription and Rehabilitation in Special Populations*** (3 credits)
Prerequisite: EXCI 252, 358, 422, 423 previously or concurrently. This course focuses on the assessment of the health-related components of physical fitness in individuals with chronic degenerative diseases. These health-related components include cardiorespiratory endurance, muscular fitness, flexibility, and body composition. Furthermore, students learn how to design safe and effective exercise programs through proper exercise prescription for these same individuals. Cancer, musculoskeletal disorders, and cardiovascular, pulmonary, and metabolic diseases are samples of the degenerative diseases that are examined in this course. Lectures and laboratory.

EXCI 451 ***Clinical Biomechanics*** (3 credits)
Prerequisite: EXCI 351, 355 previously or concurrently. This course addresses biomechanical aspects of the most common structural and neurological abnormalities of the spine resulting in pathological gait. It also addresses the mechanics of tissue and joint injury of the head, neck, torso, and extremities. Lectures only.

EXCI 453 ***Stress, Health and Disease*** (3 credits)
Prerequisite: EXCI 355, 357 or permission of the Department. This course is an introduction to the role stress plays in health and disease. Topics dealt with in this seminar-based course include defining and measuring stress, the relationship between stress and disease (e.g. cardiovascular disease, asthma, cancer, infectious illness), the pathophysiology of stress, and current issues and controversies in behavioural medicine.
NOTE: Students who have received credit for EXCI 320 or for this topic under an EXCI 398 number may not take this course for credit.

EXCI 455 ***Physical Activity, Health and Aging*** (3 credits)
Prerequisite: EXCI 358. This course addresses the health status, physical fitness, exercise patterns, and effectiveness of exercise prescription for the well elderly and those exhibiting symptoms of chronic diseases which commonly accompany the aging process. Lectures and laboratory.

EXCI 458 ***Pediatric Exercise Science*** (3 credits)
Prerequisite: EXCI 351, 358. This course introduces students to the anatomical, physiological, and psychosocial issues related to exercise and physical activity in children. Topics include influence on growth and health, injury potential, endurance exercise, weight training, youth in sport, competitive and collaborative play, stress in childhood, and the strategies for improving exercise habits of children. Lectures only.

EXCI 461 ***Pharmacology for Sport and Exercise*** (3 credits)
Prerequisite: EXCI 358. This course provides the latest information on over-the-counter and prescription medications commonly used in sport. It offers a sound review of pharmacology and pharmokinetic principles and explores the latest practice implications for certified athletic therapists and exercise specialists. The course includes indications, contraindictions, and side effects of common therapeutic medications used in sport. Class discussions also cover natural products and the effects of their interactions with prescription and non-prescription pharmaceuticals. Lectures only.

EXCI 471 ***Pain Management Strategies*** (3 credits)
Prerequisite: EXCI 358. This course relates theory and research to the practical experiences of client/athletic-practitioner interactions, relationships, and interventions. It addresses pain management principles as they relate to illness, injury, and rehabilitation. Lectures only.

EXCI 483 ***Clinical Exercise Physiology Internship II*** (3 credits)
Prerequisite: Enrolment in the Clinical Exercise Physiology Specialization and fulfillment of internship eligibility requirements. The course offers a supervised period of work as activity leader/exercise specialist in a hospital or rehabilitation centre assisting in performing physiological evaluations, designing exercise programs, and animating physical activities. The course involves a commitment of 120 hours including a weekly seminar.

EXCI 492 ***Independent Study in Exercise Science*** (3 credits)
Prerequisite: Completion of 60 credits in the BScAT or the Exercise Science Major or the Specialization in Exercise Science/Clinical Exercise Physiology and written permission of the Department Chair. This course provides an opportunity to conduct a small-scale scientific research project under the supervision of a faculty member from the Department. In consultation with a faculty member, the student selects a topic, formulates a research methodology, collects data, analyzes the results, and writes a formal research report.
NOTE: Students who have received credit for EXCI 491 may not take this course for credit.

EXCI 498 ***Advanced Topics in Exercise Science*** (3 credits)

EXCI 499 ***Advanced Topics in Exercise Science*** (6 credits)

Specific topics for these courses, and prerequisites relevant in each case, will be stated in the Undergraduate Class Schedule.
