

University of Waterloo
SENATE UNDERGRADUATE COUNCIL
Notice of Meeting

DATE: Tuesday 6 October 2020
TIME: 12:00 noon – 2:00 p.m.
PLACE: Teams – See meeting invitation or contact the secretary

Open Session

Item	Action
1. Declarations of Conflict of Interest - Excerpt from Senate Bylaw 1*.....	Information
2. Approval of the 15 September 2020 Minutes* and Business Arising.....	UGC
3. Curricular Items for Approval & Information	
a. AHS*.....	4, 5 SEN-R; rest UGC
b. Arts*.....	UGC
c. Engineering*.....	4, 5 SEN-R; 7 SEN-C, rest UGC
d. Environment*.....	9 SEN-R; rest UGC
e. Mathematics*.....	4, 6 SEN-R; 7 SEN-C; rest UGC
f. Science*.....	UGC
g. Software Engineering*.....	UGC
4. Registrar’s Office:	
a. Preferred Name Guideline*.....	SEN-C
b. Academic Calendar Dates*.....	SEN-R
5. Academic Program Reviews	
a. Academic Program Reviews - Status.....	Information
b. Handling of Final Assessment Reports & Two-Year Progress Reports*	Information
c. Two-Year Report – Applied Math, C&O, Computational Math, Pure Math* (Reviewer: K.Acheson; Guest: TBD).....	UGC
6. Strategic Plan Implementation.....	Discussion
7. Other Business.....	
8. Next Meeting: Tuesday 6 October 2020, 12:00 to 2:00 p.m. via Teams	

*material attached/to be distributed**

“SEN-consent” to be recommended to Senate for approval (consent agenda)

“SEN-regular” to be recommended to Senate for approval (regular agenda)

“UGC” to be approved on behalf of Senate & sent to Senate for information

28 September 2020

Rebecca Wickens
Associate University Secretary

Excerpt from Senate Bylaw 1

8. Declarations of conflict of interest

8.01	At the beginning of each meeting of Senate or any of Senate’s committees or councils, the chair will call for members to declare any conflicts of interest with regard to any agenda item. For agenda items to be discussed in closed session, the chair will call for declarations of conflict of interest at the beginning of the closed portion of the meeting. Members may nonetheless declare conflicts at any time during a meeting.
8.02	A member shall be considered to have an actual, perceived or potential conflict of interest, when the opportunity exists for the member to use confidential information gained as a member of Senate, or any of Senate’s committees or councils, for the personal profit or advantage of any person, or use the authority, knowledge or influence of the Senate, or a committee or council thereof, to further her/his personal, familial or corporate interests or the interests of an employee of the university with whom the member has a marital, familial or sexual relationship.
8.03	Members who declare conflicts of interest shall not enter into debate nor vote upon the specified item upon which they have declared a conflict of interest. The chair will determine whether it is appropriate for said member to remove themselves from the meeting for the duration of debate on the specified item(s).
8.04	Where Senate or a committee or council of Senate is of the opinion that a conflict of interest exists that has not been declared, the body may declare by a resolution carried by two-thirds of its members present at the meeting that a conflict of interest exists and a member thus found to be in conflict shall not enter into debate on the specified item upon which they have declared a conflict of interest. The chair will determine whether it is appropriate for said member to remove themselves from the meeting for the duration of debate on the specified item(s).

University of Waterloo
SENATE UNDERGRADUATE COUNCIL
Minutes of the 15 September 2020 Meeting
[in agenda order]

Present: Katherine Acheson, Veronica Austen, Monica Barra, Harleen Bhandal, Rachel Bruce, Benoit Charbonneau, Victoria Chu, Martin Cooke, Daniel Davison, Vivian Dayeh, David DeVidi (chair), Leeann Ferries, Brendon Larson, Amanda Morin, Cathy Newell Kelly, Jeremy Pittman, Francis Poulin, Reginald Somera, Megan Town, Cristina Vanin, Chris Vigna, Rebecca Wickens (secretary), Richard Wikkerink

Resources: Blair Clarence, Jennifer Coghlin, Danielle Jeanneault, Amanda McKenzie, Alyssa Voigt

Guests: Melissa Holst, Monica Leoni, Julia Roberts, Jean Richardson, Jeff Wilson

Organization of Meeting: David DeVidi took the chair, and Rebecca Wickens acted as secretary. The secretary advised that a quorum was present. The agenda was approved without formal motion. The chair welcomed new members of council.

1. DECLARATIONS OF CONFLICTS OF INTEREST

No conflicts of interest were declared.

2. APPROVAL OF THE 9 JUNE 2020 MINUTES AND BUSINESS ARISING

The minutes were approved without formal motion. There was no business arising from the minutes.

3. CURRICULAR ITEMS FOR APPROVAL & INFORMATION

Arts. Acheson spoke to proposed new courses, noting minor amendments to address questions received before the meeting. Members discussed the rationale for replacing a list of approved courses with department consent for MEDVL 491. Following discussion, there was a motion to approve the new courses on behalf of Senate, subject to the noted amendments. Acheson and Charbonneau. Carried.

Acheson noted that changes to FINE 383 are being withdrawn and will be brought back in October, and an antirequisite is being added to HIST 230 and PSCI 257. Members discussed the administration of repeatable courses at the 400-level. Following discussion, there was a motion to approve the course reactivation and course changes on behalf of Senate, subject to the noted amendments. Acheson and Larson. Carried.

Following an overview of the course inactivations and related changes, there was a motion to approve those items on behalf of Senate. Acheson and Ferries. Carried.

Acheson spoke to the new academic plans, noting: the popularity of creative writing courses with non-English majors and the availability of instructors; the review of Italian studies and proposed diploma; and the rationale and structure of the proposed indigenous entrepreneurship minor and diploma. There was a motion to recommend that Senate approve the new plans as proposed. Acheson and Austen. Carried.

Acheson took members through the major and minor modifications, including plan inactivations. Charbonneau commented favourably on the proposed changes to the digital art specialization, which is taught with computer science. There was a motion to recommend that Senate approve the major modifications and plan inactivations, and to approve the minor modifications on behalf of Senate. Acheson and Poulin. Carried.

Science. Following an overview of the changes to existing courses, there was a motion to approve the changes on behalf of Senate. Barra and Acheson. Carried. Barra spoke to the rationale for inactivating SCI 10, following which there was a motion to approve the inactivation on behalf of Senate. Barra and Charbonneau. Carried. Following an overview of the minor modifications, there was a motion to approve the modifications on behalf of Senate. Barra and Dayeh. Carried. Members heard that Honours Geochemistry has had low enrollment for several years and its inactivation is supported by the departments involved. There was a motion to recommend that Senate approve the

inactivation of this plan. Barra and Dayeh. Carried. Barra took members through the proposed changes to the regulations regarding grades and academic standings for the Faculty of Science, noting a change of terminology with respect to the Doctor of Pharmacy program and the addition of certain standings to the section. There was a motion to recommend that Senate approve the revised regulation. Barra and Cooke. Carried.

4. STUDENT SUCCESS OFFICE

Global Experience Certificate. The chair noted the addition of certain courses approved over the last year, as well as a terminology update. There was a motion to approve the changes on behalf of Senate. Town and Newell Kelly. Carried.

5. ACADEMIC PROGRAM REVIEWS

Items a and b were received for information.

Final Assessment Report – History. Chu provided feedback on the report and process. Voigt drew members' attention to written feedback from Matthew Gerrits. Discussion included: questions about the number of courses offered by and instructors located at the AFIW institutions, and how those numbers were calculated; the external reviewers' confusion about the role of the AFIW; the extent of consultation with AFIW representatives; initiatives undertaken to promote the co-op stream; opportunities to clarify the reporting templates and documentation. Following discussion, there was a motion to approve the report on behalf of Senate. Ferris and Acheson. Carried with one abstention and one against.

Final Assessment Report – Studies in Islam. Council's reviewers provided their feedback on the report. In response to questions, members heard: implementation dates for recommendations have been met; enrollments are good for a language program. Following discussion, there was a motion to approve the report on behalf of Senate. Acheson and Larson. Carried.

Final Assessment Report – Science and Business. Council's reviewers provided comments on the report, the process for reviews more generally, and opportunities for improvement. Following discussion, there was a motion to approve the report on behalf of Senate. Barra and Charbonneau. Carried.

Two-Year Report – Fine Arts. Discussion included: the importance of the department's programming to a well-rounded university education and support for moving the recommendations forward; questions around the timelines and plans for addressing open recommendations. Following discussion, there was a motion to approve the report on behalf of Senate. Larson and Acheson. Carried.

6. OTHER BUSINESS.

The chair provided an update on the Undergraduate Communication Outcomes Initiative, indicating that the framework will come to SUC and Senate for consideration. The chair also updated members on the advancement of strategic plan items related to teaching and learning, consultations to date and plans to bring items for discussion to Council.

7. NEXT MEETING

The next meeting is 6 October 2020, 12:00 noon – 2:00 p.m. via Teams.

28 September 2020

Rebecca Wickens
Associate University Secretary

FACULTY OF APPLIED HEALTH SCIENCES REPORT (June 19 & July 27, 2020)

to

SENATE UNDERGRADUATE COUNCIL (October 6, 2020)

**Undergraduate Calendar changes for Applied Health Sciences
for inclusion in the 2021/2022 and 2022/2023 Undergraduate Calendar**

1. NEW COURSES – Undergraduate Catalog Report 10, 21 (22-SEP-2020)
AHS
HLTH
KIN
2. COURSE CHANGES
HLTH
KIN
REC
3. COURSE INACTIVATIONS
HLTH
KIN
REC
4. NEW ACADEMIC PLANS/PROGRAMS
 - 4.1. Addictions, Mental Health, and Policy Minor
5. ACADEMIC PLANS (MAJOR MODIFICATIONS)
 - 5.1. Bachelor of Science, Honours Health Studies (effective September 1, 2022)
 - 5.2. Bachelor of Science, Kinesiology (effective September 1, 2022)
6. ACADEMIC PLANS (MINOR MODIFICATIONS)
 - 6.1. Medical Physiology Minor
 - 6.2. Honours Recreation and Leisure Studies
 - 6.3. General Recreation and Leisure Studies
 - 6.4. Honours Recreation and Sport Business
 - 6.5. Honours Therapeutic Recreation
 - 6.6. Honours Tourism Development
 - 6.7. Bachelor of Science, Honours Health Studies
 - 6.8. Bachelor of Public Health, Honours
 - 6.9. Pre-Clinical Specialization
 - 6.10. Gerontology Minor
 - 6.11. Aging Studies Option

Legend

Bold = new text being added

Strikeout = text being removed

NEW COURSES (for approval)

Dean of Applied Health Sciences

Effective 01-SEP-2021

AHS 395 (2.50) LEC Study Abroad

Study abroad under exchange agreements supported by the University. Discussion and approval of options with your advisor is required. Credit for specific courses will be evaluated following receipt of an official transcript and supporting course outline documentation. The approved study agreement will be recorded on the student record.

Rationale : To add a new course. The Registrar's Office has requested that the Faculty of Applied Health Sciences consolidate the unit specific international exchange courses into one unified AHS international exchange course. The purpose of having one faculty-level international exchange course is to facilitate and improve enrolment processes. As a result, HLTH 405, KIN 372, and REC 375 will be inactivated. Department Consent Required.

Public Health and Health Systems - School of

Effective 01-SEP-2021

HLTH 392 (0.50) LEC Mental Health Systems and Policy

This course will explore concepts of mental health, mental illness, and substance use from a societal perspective. This will include an exploration of risks and protective factors at the individual and social levels. An overview of the addictions and mental health care systems will also be discussed, with particular emphasis on the role of public and private policy.

Requisites : Prereq: HLTH 245/GERON 245 or HLTH 260/GSJ 260 or Addictions, Mental Health, and Policy Minor students; Level at least 3A

Rationale : To add a new course. This course has been a popular offer as a HLTH 373 (Contemporary Issues in Health 3) special topics course taught by a School of Public Health and Health Systems' faculty member whose research focuses on improving health systems for people with mental health conditions. This course will add to the number of restricted elective options for the health systems and policy core content cluster requirement in the Health Studies academic plan, and will be required for a new proposed Addictions, Mental Health, and Policy Minor.

Kinesiology

Effective 01-SEP-2021

KIN 464 (0.50) LEC Psychology of Injury and Rehabilitation

This course will examine the psychological theories and models related to injuries (in sport, work/labour, and clinical populations) and the ensuing rehabilitation of the injuries. Emphasis will be placed on the psychological antecedents to injury and factors related to the psychological experience and treatment of injured individuals and individuals in transition from injury to returning to play or returning to the workforce. The course will also discuss the importance of communication in the injury management process (e.g., with physicians, specialists, coaches, supervisors, managers) and identifying symptoms to refer individuals to professional psychological services.

Requisites :

Prereq: KIN 354

Rationale :

To add a new course. This course will provide students with an introduction to the psychological perspective of injury and pain in a variety of populations. With many of our students being interested in rehabilitation and volunteering with varsity athletics as athletic trainers it would be beneficial for them to be equipped with a foundational knowledge of the psychological impacts of injury. Additionally, this knowledge will be valuable outside of the university context when they move on to other professional service occupations (e.g., chiropractic, occupational therapy, and physiotherapy). There are several Kinesiology programs across the Province that have a similar psychology of injury course and thus KIN 464 will fill a major gap in our upper year curriculum. Lastly, KIN 464 would be a strong candidate to be added as an elective to the Rehabilitation Sciences Specialization and Ergonomics and Injury Prevention Minor in future.

COURSE CHANGES (for approval)

Public Health and Health Systems - School of

Current Catalog Information

HLTH 230 (0.50) LAB, LEC Introduction to Health Informatics

Health informatics is the multidisciplinary field that aims to optimize the collection, storage, organization, retrieval, analysis, and communication of health data, information, and knowledge. Fueled by recent advances in information technology, informatics increasingly plays a vital role in many areas of health. This introductory course gives an overview of health informatics by discussing modern informatics issues and state-of-the-art applications in various sub-fields within health informatics including bioinformatics, medical informatics, e-Health, public health informatics, and prototyping solutions using open-access data. [Note: Formerly HLTH 330]

No Special Consent Required

Requisites :

Prereq: Level at least 2A School of Public Health and Health Systems or

Level at least 2A Mathematics Health Informatics Option students. Antireq: HLTH 330

Effective 01-SEP-2021

Requisite Change :

Prereq: Level at least 2A. Antireq: HLTH 330

Rationale :

To revise the prerequisites. The change in prerequisites will make the course more broadly accessible to students outside of the School of Public Health and Health Systems. The Mathematics Health Informatics Option is no longer in the Calendar so it has been removed from the prerequisites. The two main instructors for the course have approved this prerequisite change.

Current Catalog Information

HLTH 245 (0.50) LEC Canadian Health Systems

This course examines Canadian health systems by considering organizational principles, health resources, service utilization, health care planning, and health promotion strategies. There is a focus on societal and political issues which affect the health of the society through the delivery system.

No Special Consent Required

Requisites :

Prereq: Level at least 1B; Applied Health Sciences students or Statistics for Health students
GERON 245

Cross-listed as:

Effective 01-SEP-2021

Requisite Change :

Prereq: Level at least 1B

Rationale :

To revise the prerequisites. The change in prerequisites to HLTH 245 will make the course more broadly accessible to students outside of the School of Public Health and Health Systems. The statistics for health program is no longer in the Calendar. The two main instructors for the course have approved this prerequisite change. The prerequisites for GERON 245 are not being revised.

Current Catalog Information

HLTH 260 (0.50) LEC Social Determinants of Health

Enormous inequalities in health persist both within and between countries. These inequalities can be seen across various axes including gender, ethnicity, and access to material resources. As such, those relatively deprived/underprivileged have substantially poorer health than those better off. The course will demonstrate the extent of inequalities in health, and it will explore current theories explaining how inequalities arise, focusing on behavioural/cultural, psychosocial, and structural/material explanations. The course will also investigate the role of various approaches to economic and social policy in creating or reducing inequalities.

No Special Consent Required

Requisites :

Prereq: HLTH 101, 102 or Level at least 2B Applied Health Sciences students or Honours Social Development Studies Social Policy Specialization students
GSJ 260

Cross-listed as:

Effective 01-SEP-2021

Requisite Change :

Prereq: AHS 107 or SOC 101 or Level at least 2B Social Policy and Social

Rationale : Action Specialization students
 To revise the prerequisites. The addition of SOC 101 as an option for fulfilling the prerequisite will make HLTH 260 more accessible to students outside of Applied Health Sciences. SOC 101 used to be a required prerequisite for HLTH 260 before it was replaced by AHS 107 as an introductory sociology course for students in the Faculty of Applied Health Sciences. Since all Applied Health Sciences students take AHS 107 in first year, the prerequisite of 'Level at least 2B Applied Health Sciences students' has been removed and replaced with AHS 107. Since HLTH 260 will be a required course in the new Addictions, Mental Health, and Policy Minor, the addition of SOC 101 as one of the prerequisite options will also make it easier for students outside of AHS to adopt the Minor (since SOC 101 is a common course taken in many different programs). Permission to include SOC 101 as one of the prerequisite options for HLTH 260 was provided by the Department of Sociology and Legal Studies. HLTH 260 is an elective in the Social Policy and Social Action Specialization for students majoring in social development studies. The Specialization has been renamed in the Calendar so the prerequisites have been updated to reflect the new name. The prerequisites have not been added to GSJ 260 cross-listing since students in the Gender and Social Justice program do not require the prerequisites.

Current Catalog Information

HLTH 290 (0.50) LAB, LEC An Introduction to Health Neuroscience

The primary objective of the course will be to explore the dynamic and bidirectional relationship that develops between the brain and physical health over the life span. By investigating the interaction of individual biological factors (e.g., genetic, epigenetic, and life history traits) and social context (e.g., poverty, socioeconomic position), we would hope to understand how the brain acts as both a target and mediator of processes that influence a person's health and vulnerability to disease. Topics such as developmental programming, gene-environment interactions, resilience, and stress physiology will be considered.

No Special Consent Required

Requisites : Prereq: BIOL 130, PSYCH 101

Effective 01-SEP-2021

Requisite Change : Prereq: AHS 150 or BIOL 130; PSYCH 101

Rationale : To revise the prerequisites. The addition of AHS 150 as an alternative to BIOL 130 in the prerequisites will make the course more accessible to students outside of Bachelor of Science programs, such as students in the Bachelor of Public Health, Honours Therapeutic Recreation, and students from programs in the Faculty of Arts. This prerequisite change will also make the course more accessible to students enrolling in the new Addictions, Mental Health, and Policy Minor. AHS 150 (Foundations of Human Anatomy and Physiology) is designed for students without 4U Biology and little formal knowledge of the human body and has enough biology/physiology content to provide sufficient background (along with PSYCH 101) for HLTH 290. Permission to add AHS 150 to the prerequisite has been granted by the

unit/instructor in charge of the course.

Current Catalog Information

HLTH 460 (0.50) LEC Social Neuroscience II: Mental Health

This course examines the joint contribution of social processes and neurobiology to the risk for and development of mental health conditions in the modern world. Topics include the social neurobiology of affective disorders (i.e., anxiety/depression), post-traumatic stress disorder, eating disorders, addictions, and suicide.

No Special Consent Required

Effective 01-SEP-2021

Subject/Catalog Nbr Change:

HLTH 358

Title Change:

Social Neuroscience I: Mental Health and Addiction

Description Change:

This course examines the joint contribution of social processes and neurobiology to the risk for and development of mental health conditions in the modern world. Topics may include the social neurobiology of affective disorders (e.g., anxiety, depression, post-traumatic stress disorder), eating disorders, addictions, and suicide.

Requisite Change :

Prereq: PSYCH 101 and (STAT 202, BIOL 361) or (KIN 232, KIN 354) or (PSYCH 291, PSYCH 292, PSYCH 261) or (HLTH 204; HLTH 205 or HLTH 333) or (AHS 150, REC 371) or Addictions, Mental Health, and Policy Minor students; Level at least 3A. Antireq: HLTH 460

Rationale :

To revise the course level/number, title, description, and requisites. The new course number reflects that the course will now become a 3rd year offering, as the content and course requirements are more appropriate to be at a 3rd-year level. Since most students taking both Social Neuroscience courses and will take HLTH 358 before HLTH 458, the course should be re-numbered "Social Neuroscience 1" to reflect the expected/typical sequencing. The addition of the word 'Addiction' in the title reflects that this is a major topic in the course. HLTH 260 was removed from the HLTH prerequisites as this course is not necessary background. The addition of HLTH 205 to the HLTH prerequisites allows students to use either this course or HLTH 333 as an option for fulfilling the prerequisite research methods course. The addition of (AHS 150, REC 371) will make the course more accessible to students in the Honours Therapeutic Recreation program and ensure that these students have the proper background for the neuroscience and research methods content. Permission to add the REC course was granted by the Department of Recreation and Leisure Studies. The addition of 'Addictions, Mental Health, and Policy Minor students' to the prerequisites makes the course more accessible for students in the Minor. The addition of the antirequisite of HLTH 460 is to prevent students who already took this course from enrolling in HLTH 358 since there would be too much overlap in content.

Current Catalog Information

HLTH 280 (0.50) LEC Applied Public Health Ethics

This course explores ethical issues in health sciences, emphasizing population and public health. The course begins by considering canonical ethical theories and

frameworks for applying these theories to population health. Specific topics in population health, including the conflict between public health and individual autonomy, the just distribution of health resources, and responsibility for health outcomes will then be discussed. The overall objective of the course is to provide students with tools to discuss and assess ethical arguments and to form their own views on issues within population health.

No Special Consent Required

Cross-listed as: GSJ 280

Effective 01-SEP-2021

Subject/Catalog Nbr Change: HLTH 380

Requisite Change : Prereq: Level at least 2A. Antireq: HLTH 280/GSJ 280

Rationale : To revise the course level/number and add an antirequisite (both offerings) and add a prerequisite (GSJ offering only). The new course number reflects that the course will now become a third year offering, as the content and level of critical thinking required are more appropriate to be at a third-year level rather than second-year level. The addition of the antirequisite of HLTH 280/GSJ 280 is to prevent students who already took this course from enrolling since there would be too much overlap in content. The addition of the prerequisite to GSJ 380 is to bring it in line with the HLTH 380 offering and is in keeping with a third-year course. The Faculties of Applied Health Sciences and Arts are submitting these changes for approval concurrently to the October 06, 2020, Senate Undergraduate Council meeting.

Current Catalog Information

HLTH 410 (0.50) LEC Health Policy

Health care policy exists at federal, provincial, local and institutional levels, and shapes every aspect of the Canadian Health Care System. Its ongoing development, implementation and outcomes are shaped by ideology and empirical evidence through the definition of health issues, setting of priorities for action, and the policy instruments chosen for implementation. This course will introduce students to health policy in Canada and provide them with an understanding of what policy is, how it is developed, who is involved with its production, implementation, and evaluation. Students will learn to critically analyse real world examples of Canadian health policy.

No Special Consent Required

Requisites : Prereq: HLTH 245, 260; Level at least 4A School of Public Health and Health Systems or Honours Social Development Studies Social Policy Specialization students

Effective 01-SEP-2021

Requisite Change : Prereq: HLTH 245 or Social Policy and Social Action Specialization students; Level at least 4A

Rationale : To revise the prerequisites. The change in prerequisites will make the course more broadly accessible to students outside the School of Public Health and Health Systems. Although HLTH 245 (Canadian Health Systems) course is necessary to prepare students for the content in HLTH 410, HLTH

260 (Social Determinants of Health) is not necessary. HLTH 410 is an elective in the Social Policy and Social Action Specialization for students majoring in Social Development Studies. The Specialization has been renamed in the Calendar so the prerequisite has been updated to reflect the new name.

Current Catalog Information

HLTH 421 (0.50) SEM Nutritional Aspects of Chronic Disease

Nutrition is integral to the etiology, prevention and treatment of chronic diseases. This course examines nutritional aspects of key chronic diseases affecting the Canadian population. There will be an opportunity for students to explore, in depth, specific conditions and aspects of nutritional assessment or intervention that interest them. Case topics span the lifecycle and such conditions as obesity, eating disorders, diabetes, dyslipidemia, cardiovascular disease and some cancers. As well, students present seminars on a topic of their choice.

No Special Consent Required

Requisites : Prereq: HLTH 355 or KIN 346; Level at least 4A School of Public Health and Health Systems students

Effective 01-SEP-2021

Requisite Change :

Prereq: HLTH 355 or (KIN 146, KIN 217, BIOL 273); Level at least 4A

Rationale :

To revise the prerequisites. The change in prerequisites will make the course more broadly accessible to students outside of the Health Studies program. The course instructor has confirmed that the change from KIN 346 to KIN 146, BIOL 273, and KIN 217 reflects that students do not require the advanced kinesiology nutrition course and that the introductory course will suffice as long as students also have biochemistry and physiology. This change also makes the course more accessible to students in the Human Nutrition Minor. Permission to add the BIOL and KIN courses to the prerequisites has been granted by the respective units.

Current Catalog Information

HLTH 449 (0.50) SEM Alcohol and Drug Use and Abuse in Contemporary Society

This course will provide an overview of alcohol and drug use and abuse in contemporary society. The student will develop an understanding of how alcohol and other drug problems become defined as social problems and how these definitions influence subsequent intervention strategies. Students will explore the social, political, economic and biological determinants of the use and abuse of alcohol and drugs, and then critically examine real-world policy issues related to prevention, control and cessation of use.

No Special Consent Required

Requisites : Prereq: Level at least 4A School of Public Health and Health Systems students

Effective 01-SEP-2021

Requisite Change :

Prereq: Level at least 4A School of Public Health and Health Systems students or Addictions, Mental Health, and Policy Minor students

Rationale :

To revise the prerequisites. HLTH 449 is an elective course in a proposed

new School of Public Health and Health Systems' Addictions, Mental Health, and Policy Minor. Addition of the Minor to the prerequisites will make this course accessible to students in this new Minor.

Current Catalog Information

HLTH 458 (0.50) LEC Social Neuroscience I: Physical Health

This is an in-depth course intended for the intensive study of psychological, neuroscientific and social processes that together set the stage for the development of chronic illnesses in the modern world. Topics include exercise neuroscience, health-related decision processes, and neural responses to health risk communications in the media.

No Special Consent Required

Requisites : Prereq: PSYCH 101 and (STAT 202, BIOL 361) or (KIN 232, KIN 354) or (PSYCH 291, PSYCH 292, PSYCH 261) or (HLTH 204, HLTH 260, HLTH 333) KIN 458

Cross-listed as:

Effective 01-SEP-2021

Title Change: Social Neuroscience 2: Lifestyle and Chronic Illness

Requisite Change : Prereq: PSYCH 101 and (STAT 202, BIOL 361) or (KIN 232, KIN 354) or (PSYCH 291, PSYCH 292, PSYCH 261) or (HLTH 204; HLTH 205 or HLTH 333) or (AHS 150, REC 371) or Addictions, Mental Health, and Policy Minor students; Level at least 3A

Rationale : To revise the title and requisites. The change in the new course title reflects that HLTH 458/KIN 458 will usually be taken after HLTH 358 (formerly 460) for those students who take both courses, making the "Social Neuroscience 2" designation more sensible. HLTH 260 was removed from the prerequisites as this course is not necessary background. The addition of HLTH 205 to the prerequisites allows students to use either this course or HLTH 333 as a prerequisite research methods course. The addition of (AHS 150, REC 371) will make the course more accessible to students in the Honours Therapeutic Recreation program and ensure that these students have the proper background for the neuroscience and research methods content. Permission to add the REC course was granted by the Department of Recreation and Leisure Studies. The addition of 'Addictions, Mental Health, and Policy Minor students' to the prerequisites makes the course more accessible for students in the Minor.

Current Catalog Information

HLTH 461 (0.50) LAB Experimental Methods in Psychoneuroimmunology

Psychoneuroimmunology (PNI) is a broad and rapidly developing discipline that is well positioned to help us better understand many of the physiological processes underlying health. By examining interactions among the brain, endocrine, and immune systems, PNI-related research is able to elucidate many chronic health problems, especially those related to the effects of stress. As a laboratory course, the primary objective of the class will be to provide students with a broad conceptual and practical understanding of how to design, conduct, and interpret experiments that seek to answer questions related to the biological embedding of stress. To this end,

students will receive instruction in a variety of areas, including: experimental design, molecular techniques to assess protein-level changes, statistical analysis, and the preparation of a scientific manuscript.

Department Consent Required

Requisites : Prereq: Level at least 4A Health Studies students

Effective 01-SEP-2021

Title Change:

Experimental Methods in Behavioural Neuroscience

Description Change:

As a senior laboratory course, the primary objective will be to provide students with a broad conceptual and practical understanding of how to design, conduct, and interpret animal-based experiments that seek to answer neuroscience-themed questions with relevance for public health. To this end, students will receive instruction upon, and gain direct experience in, a variety of areas; for example, animal ethics and husbandry, experimental design, behavioural techniques to assess learning and memory, molecular techniques to assess protein-level changes, statistical analysis, and the preparation of a scientific manuscript.

Consent Change:

No Special Consent Required

Requisite Change :

Prereq: BIOL 273 or PSYCH 261; one of HLTH 205, HLTH 333, BIOL 361, KIN 232, PSYCH 291; Level at least 4A

Rationale :

To revise the title, course description, consent, and prerequisites. The new title and course description more accurately reflect the current course content which is not specific to psychoneuroimmunology. The change in prerequisites will make the course more broadly accessible to students outside of the health studies program, such as students from kinesiology, psychology, and the Faculty of Science. Permission to add the BIOL, PSYCH and KIN courses as prerequisites has been granted by the respective units.

Current Catalog Information

HLTH 465 (0.50) SEM Epigenetics and Health

This course provides an in-depth examination into how genes, environment, and epigenetics interact over the lifespan to increase risks for complex diseases and disorders. Students will explore how environmental exposures such as diet, drugs, psychosocial stress, and environmental toxicants can become biologically-embedded via stable epigenetic changes that affect long-term gene expression. Underlying molecular mechanisms for epigenetic modifications, such as DNA methylation, histone modification, and the role of non-coding RNAs will also be covered.

No Special Consent Required

Requisites : Prereq: Level at least 4A Health Studies students

Effective 01-SEP-2021

Requisite Change :

Prereq: BIOL 239, 273; one of HLTH 205, HLTH 333, BIOL 361, KIN 232; Level at least 4A

Rationale :

To revise the requisites. The change in prerequisites will make the course more broadly accessible to students outside of the Health Studies program, such as students from Kinesiology and the Faculty of Science. Permission to add the BIOL and KIN courses as prerequisites has been granted by the respective units.

Current Catalog Information

HLTH 471 (0.50) SEM Psychopharmacology

The primary objective of the course will be to provide a basic understanding of how drugs can alter the function of neural cells and how these changes can affect mood, cognition, and behaviour. Key topics to be discussed include: a) biological principles of pharmacology, b) general structure and function of the nervous system, c) major neurotransmitter systems of the brain, d) mechanisms of drug action on neurotransmission, and e) pharmacotherapy for mental health illness.

Department Consent Required

Requisites : Prereq: Level at least 4A Health Studies students

Effective 01-SEP-2021

Requisite Change : Prereq: BIOL 273 or PSYCH 261; Level at least 4A

Rationale : To revise the requisites. The change in prerequisites will make the course more broadly accessible to students outside of the Health Studies program, such as students from Kinesiology, Psychology, and the Faculty of Science. Permission to add the BIOL and PSYCH courses as prerequisites has been granted by the respective units.

Kinesiology

Current Catalog Information

KIN 217 (0.50) LEC Human Biochemistry

An elementary course in human biochemistry including the metabolism and function of proteins, carbohydrates, lipids, enzymatic function, energy metabolism, and introductory genetics. Emphasis is placed on clinical and medical applications.

No Special Consent Required

Requisites : Prereq: CHEM 120 or 121; Kinesiology, Health Studies or Honours Science students only

Effective 01-SEP-2021

Component Change: LEC, TST

Rationale : To add a component. A TST component is being added to KIN 217. KIN 217 is a 400+ student class and is held in Hagey Hall. This lecture hall is not conducive for exam writing, which is problematic for students and for proctors trying to help students. To better serve our students we request a TST component to be scheduled during the scheduling process.

Current Catalog Information

KIN 301 (0.50) LAB, LEC Human Anatomy of the Central Nervous System

Functionally-oriented anatomy of the brain, spinal cord, cranial nerves and the tissues they innervate using predissected cadavers. This course complements other behavioural neuroscience courses including KIN 242, 357, 415, 416, 456, and PSYCH 261, 307, 396.

No Special Consent Required

Requisites : Prereq: KIN 100, KIN 100L or BIOL 201/301

Effective 01-SEP-2021

Description Change: Functionally-oriented anatomy of the brain, spinal cord, cranial nerves and the tissues they innervate using predissected cadavers. Major functional systems, including somatosensory and motor pathways, special sense pathways and integrative systems of the brain, will be examined through an understanding of anatomical connectivity.

Rationale : To revise the course description. The course description is being changed to provide more information regarding the topics covered in the course. This will benefit students when searching for elective courses in which to enrol.

Current Catalog Information

KIN 408 (0.50) LEC Cardiovascular Physiology and Pathophysiology

This course will provide an advanced understanding of heart and blood vessel physiology in normal health, and in cardiovascular disease conditions including hypertension, heart failure, atherosclerosis, and diabetes. This will include examination of mechanisms underlying lifestyle and medical/ pharmacological management of these conditions from both prevention and treatment perspectives. The influence of physical activity on heart and blood vessel physiology and pathophysiology will be emphasized. Contemporary research elucidating cellular and molecular mechanisms controlling heart and blood vessel function in health and disease will be discussed.

No Special Consent Required

Effective 01-SEP-2021

Subject/Catalog Nbr Change: KIN 308

Title Change: Cardiovascular and Pulmonary Physiology

Description Change: This course will provide an advanced understanding of heart, lung, blood vessels, and airway physiology. Examples of pathology and exercise will be used to reinforce basic physiological function. Pathologies discussed may include hypertension, heart failure, chronic obstructive pulmonary disease, and asthma. Contemporary research that spans from cell to organ to the integrated system level will be used to introduce lecture material.

Requisite Change : Prereq: BIOL 273; Level at least 3A. Antireq: KIN 408

Rationale : To revise the course level/number, title, description, and add an antirequisite. The new course number reflects that the course will now become a 3rd year offering. The change is meant to encourage students to take the course in their 3rd year as students would benefit taking the course prior to our 4th year electives. It was decided that the title and calendar description needed revision to more accurately reflect the course content. Pulmonary physiology is not in the current description. However, it is impossible to discuss cardiovascular physiology without discussing pulmonary physiology as the two are intimately integrated and influence each other. Integration of cardiovascular and pulmonary physiology is how the course is being delivered and we feel that changing the description will provide a transparent description for students. KIN 408 will be added

to the course as an antirequisite.

Current Catalog Information

KIN 312 (0.50) LEC Introduction to Movement Disorders

An introduction to selected movement disorders and their implications for physical activity. The movement disorders examined include those which accompany neuromuscular and perceptual-motor impairment, mental retardation, cardio-vascular and respiratory disease.

No Special Consent Required

Requisites : Prereq: BIOL 273. Antireq: KIN 242

Effective 01-SEP-2021

Title Change: Introduction to Neurological Disorders

Description Change: An introduction to selected neurological disorders and their implications for physical activity. The neurological disorders examined include those which accompany neuromuscular and perceptual-motor impairment, intellectual disability, cardio-vascular and respiratory disease.

Rationale : To revise the title and course description. Neurological disorders is a more inclusive term than movement disorders and better reflects the broad range of disorders covered in the course. For example, stroke, traumatic brain injury, spinal cord injury, which are included within the course, would be considered neurological disorders but are not typically classified as movement disorders. As such, the change in title and description better reflects the disorders included in the course, using terminology as would appear in clinical textbooks and research.

Current Catalog Information

KIN 456 (0.50) LEC Cognitive Dysfunction and Motor Skill

An examination of issues related to understanding the cerebral organization of motor skill. Discussion of how certain movement disorders are a reflection of disturbances at different stages in the sequence of information processing.

No Special Consent Required

Effective 01-SEP-2021

Subject/Catalog Nbr Change: KIN 359

Title Change: Cognition, Cognitive Dysfunction, and Movement

Description Change: This course provides a comprehensive introduction to neuropsychology, with emphasis on the implication for movement and discussion of how neurological disorders reflect disturbances at different stages in the sequence of information processing.

Requisite Change : Prereq: KIN 255 or PSYCH 306. Antireq: PSYCH 307, KIN 456

Rationale : To revise the course level/number, title, description and requisites. The changes to course description will clearly communicate the emphasis on neuropsychology, how cognitive-motor function contributes to movement and how neuropsychological abnormalities contribute to abnormal movement. The change to the title and course number better communicate the level of the course and its status as prerequisite to KIN 457 which focuses upon application and assessment of cognitive-motor function in the clinical

setting. KIN 356 (Information Processing in Human Perceptual Motor Performance) is no longer an appropriate prerequisite given recently approved changes to the curriculum. KIN 255 (Fundamentals of Neuroscience) has been identified as a suitable prerequisite that provides an introduction to the principles of the nervous system control of movement, including cognition. Finally, the addition of PSYCH 307 as an exclusion reflects the overlap of certain elements (e.g., neuropsychology of attention, working memory) despite the emphasis on movement in the current course.

Current Catalog Information

KIN 415 (0.50) LAB, LEC Clinical Neurophysiology: Fundamentals for Rehabilitation of Human Movement

This course explores current clinical neurophysiological concepts important for the control of human movement as well as current techniques used in clinical neurophysiology. Emphasis is placed on the neurophysiology underlying human movement pathologies and the application of this understanding to rehabilitation following injury to the central nervous system.

No Special Consent Required

Requisites :

Prereq: BIOL 273 or PSYCH 261; Level at least 3A

Effective 01-SEP-2021

Title Change:

Clinical Neurophysiology

Description Change:

This course explores current clinical neurophysiological concepts important for the control of human movement as well as current techniques used in clinical neurophysiology. Emphasis is placed on the origin of bioelectrical activity underlying human movement and their use in the diagnosis of movement pathology following injury to the central nervous system.

Rationale :

To revise the title and course description. The change in the title better reflects course content and will resolve confusion for students. This course is focused on the neurophysiology of human movement, the techniques used to study neurophysiology and their application to understanding/diagnosing human movement pathologies. Past inclusion of 'Fundamentals for Rehabilitation of Human Movement' in the title has caused confusion for students, many of whom expect an emphasis on the core principles of interventions to restore movement ability. Such core principles are addressed elsewhere in the curriculum.

Current Catalog Information

KIN 458 (0.50) LEC Social Neuroscience I: Physical Health

This is an in-depth course intended for the intensive study of psychological, neuroscientific and social processes that together set the stage for the development of chronic illnesses in the modern world. Topics include exercise neuroscience, health-related decision processes, and neural responses to health risk communications in the media.

No Special Consent Required

Requisites :

Prereq: PSYCH 101 and (STAT 202, BIOL 361) or (KIN 232, KIN 354) or (PSYCH

Cross-listed as: 291, PSYCH 292, PSYCH 261) or (HLTH 204, HLTH 260, HLTH 333)
HLTH 458

Effective 01-SEP-2021

Title Change: Social Neuroscience 2: Lifestyle and Chronic Illness

Requisite Change : Prereq: PSYCH 101 and (STAT 202, BIOL 361) or (KIN 232, KIN 354) or (PSYCH 291, PSYCH 292, PSYCH 261) or (HLTH 204; HLTH 205 or HLTH 333) or (AHS 150, REC 371) or Addictions, Mental Health, and Policy Minor students; Level at least 3A

Rationale : To revise the title and requisites. The change in the new course title reflects that HLTH 458/KIN 458 will usually be taken after HLTH 358 (formerly 460) for those students who take both courses, making the "Social Neuroscience 2" designation more sensible. HLTH 260 was removed from the prerequisites as this course is not necessary background. The addition of HLTH 205 to the prerequisites allows students to use either this course or HLTH 333 as a prerequisite research methods course. The addition of (AHS 150, REC 371) will make the course more accessible to students in the Honours Therapeutic Recreation program and ensure that these students have the proper background for the neuroscience and research methods content. Permission to add the REC course was granted by the Department of Recreation and Leisure Studies. The addition of 'Addictions, Mental Health, and Policy Minor students' to the prerequisites makes the course more accessible for students in the Minor.

Current Catalog Information

KIN 457 (0.50) LAB, LEC Cognitive, Perceptual and Motor Assessment

This course is designed to provide the student with an introduction to the principles underlying the assessment of cognitive, perceptual and motor functions. Measurement issues associated with test development and use, factors involved in the administration and interpretation of test results, and methods of report writing will be examined. Under the supervision of a Registered Psychologist, the student will learn to administer a number of test instruments used in the assessment of cognitive, perceptual and motor functions. Assessments will be done on normal, healthy volunteers recruited from the university community.

Instructor Consent Required

Effective 01-SEP-2021

Subject/Catalog Nbr Change: KIN 459

Title Change: Cognitive, Emotional and Motor Assessment

Description Change: This course is designed to provide the student with an introduction to the principles underlying the assessment of cognitive, emotional and motor functions. Measurement issues associated with test development and use, factors involved in the administration and interpretation of test results, and methods of report writing will be examined. Students will learn to administer a number of test instruments used in the assessment of cognitive, emotional and motor functions.

Consent Change: No Special Consent Required

Requisite Change : Prereq: KIN 359. Antireq: KIN 457

Rationale : To revise the course number, title, description, consent, and requisites. This course is focused on the neuropsychological, clinical and functional assessment of cognition, affect and movement. The change in course number will resolve confusion for students as this course is intended to follow KIN 456, which has been proposed to shift to KIN 359. The change in course title and description better acknowledge the curricular emphasis on the critical role that emotion plays in cognition and the importance of evaluating emotion in order to properly assess cognitive impairment. The change to the course description also removes the specification that this course will be carried out under the supervision of a registered psychologist. Instructor consent is being removed as there is a suitable prerequisite which would then make enrolling in the course easier for students and reduces work for undergraduate advisors.

Current Catalog Information

KIN 493 (0.50) PRA, TUT Clinical Kinesiology: Movement Assessment Practicum

Practical experience in movement assessment of persons from various special populations such as the normal elderly and those with neurological, degenerative or developmental disorders. Motor functions involving gait, posture and balance or upper limb movements will typically be examined in these assessments.

Instructor Consent Required

Requisites : Prereq: KIN 242, 416, 422, 456; Grade Point Average at least 75%

Effective 01-SEP-2021

Requisite Change : Prereq: KIN 242/312, 359, 416, 422; Cumulative overall average at least 75%

Rationale : To revise the prerequisites. The course prerequisite is being revised to reflect the change in the numbering of KIN 456 to KIN 359.

Recreation & Leisure Studies

Current Catalog Information

REC 203 (0.50) LEC Sociology of Sport

This course examines sport in modern societies and the distinctive features of Canadian sport. Attention is directed to the relationship between sport and other institutions, including the economy and political system. Contemporary issues, including racial and gender inequality and controversies over violence and drugs are also considered.

No Special Consent Required

Requisites : Prereq: SOC 101/101R or 120R

Cross-listed as: SOC 210

Effective 01-SEP-2021

Requisite Change : Prereq: AHS 107 or SOC 101/101R

Rationale : To revise the prerequisites for REC 203. The Department of Recreation and Leisure studies has proposed to remove SOC 101 as a required course from all Recreation programs. As such, AHS 107 is being added as a prerequisite to REC 203 (cross-listed with SOC 210), Sociology of Sport, in order for

all students within the Department of Recreation and Leisure studies to enrol. This change will also allow other students from the Faculty of Applied Health Sciences to access REC 203. AHS 107 is not being added as a prerequisite to SOC 210 as AHS 107 is specific to AHS students only. SOC 120R was removed as the course was inactivated effective September 2014. The Department of Sociology and Legal Studies has been made aware of this change.

Current Catalog Information

(0.00)

Effective 01-SEP-2021

Subject/Catalog Nbr Change: REC 206
Unit Change: (0.50)
Component Change: LEC
Title Change: Philosophy of Sport
Description Change: This course uses the tools of philosophy to ask important questions about sport, such as: What is sport? What is the value of sport for participants or fans? Are violent sports unethical? Should performance enhancing drugs be banned? What is luck, and how is it different from skill?
Consent Change: No Special Consent Required
New Cross Listing : PHIL 206
Rationale : To add cross-listing. REC 206 is to be cross-listed course with PHIL 206, Philosophy of Sport, offered by the Faculty of Arts. Students in the Department of Recreation and Leisure Studies benefit from exploring ethical issues in sport from diverse perspectives and this course offers a unique philosophical perspective, taught by a member of the Department of Philosophy. The course complements existing courses in Recreation and Leisure Studies and provides students with philosophical ways of critically reflecting on sport in society. This course is about ethical and conceptual issues that arise in sports. In accordance with Faculty of Arts cross-listing guidelines, this course has significant shared content with Recreation and Leisure Studies. Recreation and Leisure Studies students are one of the intended audiences for the course. The Faculties of Arts and Applied Health Sciences are submitting these changes for approval concurrently to the October 06, 2020, Senate Undergraduate Council meeting.

COURSE INACTIVATIONS (for approval)

Public Health and Health Systems - School of

Effective 01-SEP-2021
HLTH 405 (2.50)

International Exchange

Rationale : To inactivate the course. The Registrar's Office has requested that the Faculty of Applied Health Sciences consolidate the unit specific international exchange courses into one unified AHS international exchange course, AHS 395. The purpose of having one faculty-level international exchange course is to facilitate and improve enrolment processes.

Kinesiology

Effective 01-SEP-2021
KIN 372 (2.50)
Rationale :

International Exchange

To inactivate the course. The Registrar's Office has requested that the Faculty of Applied Health Sciences consolidate the unit specific international exchange courses into one unified AHS international exchange course, AHS 395. The purpose of having one faculty-level international exchange course is to facilitate and improve enrolment processes.

Effective 01-SEP-2021
KIN 405 (0.50)
Rationale :

Exercise Management

To inactivate the course. KIN 405 was a 4th year elective that was replaced by KIN 204 and KIN 204L, which are required courses in the Kinesiology program. Since KIN 204 and KIN 204L were adopted, KIN 405 has not been offered and can be inactivated.

Effective 01-SEP-2021
KIN 451 (0.50)
Rationale :

Social Aspects of Injury in Work and Sport

To inactivate the course. This course is no longer offered by the Department of Kinesiology and should be inactivated.

Recreation & Leisure Studies

Effective 01-SEP-2021
REC 375 (2.50)
Rationale :

International Exchange

To inactivate the course. The Registrar's Office has requested that the Faculty of Applied Health Sciences consolidate the unit specific international exchange courses into one unified AHS international exchange course, AHS 395. The purpose of having one faculty-level international exchange course is to facilitate and improve enrolment processes.

End of Report

4. NEW ACADEMIC PLANS/PROGRAMS

4.1. Addictions, Mental Health, and Policy Minor

Effective September 1, 2021

Background and Rationale:

To add an Addictions, Mental Health, and Policy Minor to the undergraduate program offerings of the School of Public Health and Health Systems. There is no minor on addictions, mental health, and policy offered at the University of Waterloo. The addition of this minor also addresses one of the recommendations from the 2017 Presidential Advisory Committee on Student Mental Health report, which encourages development of curriculum focused on mental health. The School of Public Health and Health Systems is well-suited to cover the multi-disciplinary aspects of addictions and mental health given our diverse training backgrounds, research, and course offerings, touching on: biology, neuroscience, sociology, epidemiology, health systems, policy, public health, and psychology. Permission to include the ARTS, PSYCH, BIOL, KIN, REC, SDS, SOC, SOCWK, and STAT courses has been granted by the departments/units in charge of the courses.

Calendar text:

Addiction and mental health issues are major public health concerns that require a multidisciplinary approach to understand and address challenges. This undergraduate minor will be of interest to students who want to understand the challenges of addictions and mental health and to advocate for their own and for the mental health of others.

The minor will ensure coverage of the neuroscience, biology, socio-behavioral, health system, and policy aspects of mental health and addictions. All participants in the minor will be required to take courses from each of these core content areas:

- Neuroscience and Biology
- Psychosocial and Policy
- Mental Health Literacy
- Methods and Statistics

Admission Requirements:

The Addictions, Mental Health, and Policy minor is open to all University of Waterloo students. Unless a higher minimum average is required in the undergraduate calendar for a specific course, an overall minimum average of 67% will be required for courses presented for the Minor. Students must be in level at least 2A to declare the Minor.

Requirements: 5.0 units from the following will be required:

- A. Mental Health Literacy (0.5 units)
AHS 105
- B. Neuroscience and Biology (1.0 unit)
HLTH 290
HLTH 358
- C. Psychosocial and Policy (1.5 units)
HLTH 260/GSJ 260
HLTH 392
PSYCH 257/PSYCH 257R
- D. Electives (1.0 unit) from the following list:
Neuroscience/Biology
HLTH 458/KIN 458
HTLH 461
HLTH 465
HLTH 471
BIOL 476
PSYCH 335
Psychosocial
HLTH 427
HLTH 448
HLTH 449
HLTH 479
PSYCH 317
PSYCH 451

REC 251
SOC 249/LS 226
SOCWK 365R
Policy

HLTH 410
SDS 312R/SWREN 312R

Thesis, Independent Study, or Seminar Courses

HLTH 373, HLTH 432A, HLTH 432B, HLTH 472, HLTH 473, KIN 431, KIN 432, KIN 472, KIN 433, PSYCH 483, PSYCH 484, PSYCH 499A/B/C (all three PSYCH honours thesis courses must be completed), REC 455, REC 471A, REC 471B, REC 472, SDS 450R, SDS 499A, SDS 499B, SOC 498, SOC 499A, SOC 499B

E. Research Methods Course (0.5 unit) from the following list:

HLTH 205, HLTH 333, BIOL 361, PSYCH 291, REC 373, SDS 251R, SOC 221

F. Statistics Course (0.5 unit) from the following list:

HLTH 204, KIN 232, ARTS 280, PSYCH 292, REC 371, SDS 250R, SOC 280, STAT 202, STAT 221, STAT 231

Notes:

1. It is recommended that students take HLTH 290 before the other neuroscience and biology courses.
2. The thesis, independent study, or seminar courses must be a topic on the neuroscience, biology, psychosocial, or policy aspects of addictions or mental health that is approved by the School of Public Health and Health Systems associate director, undergraduate studies.

5. ACADEMIC PLANS (MAJOR MODIFICATIONS)

5.1. Bachelor of Science, Honours Health Studies

Effective September 1, 2022

Background and Rationale:

To revise the name of the Bachelor of Science, Health Studies degree to Bachelor of Science, Health Sciences, which better reflects the curriculum. Current students in Health Studies will not automatically be changed into the Health Sciences plan; they will still graduate from Health Studies. However, as is custom, current students can choose to switch to the Health Sciences plan after September 1, 2022 but they will be required to follow the 2022-2023 plan requirements.

Similar to other Health Sciences programs in Ontario (see **ATTACHMENT A – Health Studies and Health Sciences comparator programs**), the Bachelor of Science, Health Studies is an interdisciplinary degree program that combines courses from the following three thematic areas: Public & Population Health Sciences, Health Research Methods & Data Sciences, and Life Sciences & Human Biohealth, as detailed below:

- **Public & Population Health Sciences:** All of the comparator programs have a mixture of courses on Determinants of Health (Psycho-social, environmental, physical/biological, ecological, socio-political, etc.), Canadian/Global Health Systems, Health Promotion/Communication, Health Policy, Health Ethics, and Health issues across the lifespan. For the Health Studies program, these courses are: HLTH 101 (Intro to Health, HLTH 102 (Intro to Health 2), HLTH 201 (Aging and Health), HLTH 260 (Social Determinants of Health), HLTH 245 (Canadian Health Systems), HLTH 280 (Applied Public Health Ethics), HLTH 370 (Ecological Determinants of Health), HLTH 480 (Competencies in Health capstone), one course in the Social-Behavioural Sciences cluster, and one course in the Health Systems and Policy cluster.
- **Health Research Methods & Data Sciences:** All of the comparator programs have courses on Health Research Methods, Epidemiology, and Statistics/Data Sciences. For the Health Studies program, these courses are: HLTH 204 (Quantitative approaches to Health Sciences with lab), HLTH 205 (Introduction to Health Research – 2021 Calendar), HLTH 230 (Health Informatics with Lab), HLTH 335 (Intro to Statistical Analytics in Health with SAS lab), HLTH 333 (Principles of Epidemiology with lab) and one additional Methods/Application course (Qualitative Methods, Experimental Methods, Program Planning and Evaluation, etc.).
- **Life Sciences & Human Biohealth:** All of the comparator programs have required courses in Biology, Chemistry, Physiology, and Human Biohealth. For the Health Studies program, these courses are: BIOL 130/BIOL 130L (Intro Cell Bio & Cell Bio Lab), CHEM 120/CHEM 120L (Physical and Chemical Properties of Matter; Chemical Reaction Laboratory 1), CHEM 123/123L (Chemical Reactions, Equilibria, and Kinetics; Chemical Reaction Laboratory 2), BIOL 273 (Principles of Human Physiology 1), BIOL 373 (Principles of Human Physiology 2 – 2021 Calendar), KIN 217 (Human Biochemistry), BIOL 239 (Genetics), HLTH 310 (Development, Aging, and Health), HLTH 340 (Environmental Toxicology and Public Health) or 341 (Principles of Pathobiology), and one additional Biohealth course.

Similar to the comparator Health Sciences programs, the Bachelor of Science, Health Studies program prepares students for further education in clinical health professions (Medicine, Nursing, Occupational Therapy, Physician Assistant, Speech-language Pathology, etc.) or graduate programs in Health Sciences, Epidemiology & Biostatistics, Public Health, Health Administration, etc. The Bachelor of Science, Health Studies program has similar admissions requirements to other Health Sciences programs, including Grade 12 Math, English, Biology, and Chemistry. The comparator programs also have options for specializations or minors for students who wish to take additional biology, chemistry, math, physics, and other courses as required for some clinical health profession programs (such as the Pre-clinical Specialization in Health Studies).

The name Health Studies does not appropriately reflect the curriculum and future career options, thus creating confusion for prospective high school students interested in Health Sciences programs. In addition, there are Health Studies programs in Ontario that are more similar to our Bachelor of Public Health degree (BPH), which all require Grade 12 English but not Biology or Chemistry. These programs include: The Honours Bachelor of Arts (Humanities, Social Sciences) in Health Studies at the University of Toronto, St. George campus; the Honours Bachelor of Arts (Social Sciences & Humanities) in Health Studies – Health Policy at the University of Toronto, Scarborough campus, and the Bachelor of Arts Honours degree in Health Studies at Queens University.

The Bachelor of Science, Health Studies program has also been revised in the last year to include more laboratory courses as well as lab components within HLTH courses. The additional labs bring the curriculum more in line with other health sciences programs that have higher BIU weightings from the province, hence higher funding. We are in the process of applying to the province to be evaluated for a higher BIU weighting. The name Health Studies (which is more associated with Arts rather than Sciences programs) will make it more difficult to make a strong case for the higher BIU valuation.

In conclusion, changing the name of the Bachelor of Science, Health Studies degree to Bachelor of Science, Health Sciences will more accurately reflect the actual curriculum, admissions requirements, and future career options and lessen confusion for prospective high school students. In addition, the name change will strengthen our case to receive higher BIU valuation and funding from the Province, which would allow us to create even more capacity in experiential learning and labs.

5.2. Bachelor of Science, Kinesiology Effective September 1, 2022

Background and Rationale:

To revise admission requirements. The proposed changes to our admission requirements are viewed to be less restrictive for prospective students while still reflecting the requirements to prepare students for success in our program. Importantly, the proposed changes will bring our admission requirements more in-line with similar Bachelor of Science, Kinesiology programs in Canada. As a result, these changes should result in increased applications to our program and the calculated admission average of applicants.

Required courses:

- ~~Advanced Functions 4U – a minimum final grade of 70 is required~~
- ~~Chemistry 4U – a minimum final grade of 70 is required~~
- Any English 4U - a minimum final grade of 70 is required

~~One~~ Two of the following:

- Biology 4U - a minimum final grade of 70 is required
- Physics 4U - a minimum final grade of 70 is required
- **Chemistry 4U - a minimum final grade of 70 is required**

One of the following:

- **Advanced Functions 4U - a minimum final grade of 70 is required**
- **Calculus and Vectors 4U - a minimum final grade of 70 is required**

6. ACADEMIC PLANS (MINOR MODIFICATIONS)

6.1. Medical Physiology Minor

Effective September 1, 2021

Background and Rationale:

To reflect the renumbering of KIN 408 to KIN 308 the Medical Physiology Minor needs to be modified as KIN 408 is a required course for the minor. In addition, BIOL 354 and KIN 312 are suitable electives for the Medical Physiology Minor and are being added to the list of electives. This is a joint Minor between the departments of Biology and Kinesiology. Accordingly, the Department of Biology has been notified of the changes and a parallel change to their Calendar text is being submitted to Senate Undergraduate on October 6, 2020.

Calendar Text:

The Medical Physiology Minor is a joint minor between the departments of Biology and Kinesiology. The departments of Biology and Kinesiology have complementary strengths within medical sciences fields. The Minor is designed to provide additional elective courses to prepare University of Waterloo students for health professional school and/or other biomedical graduate programs/careers.

Requirements

1. Students must be in an honours or three- or four-year general program at Waterloo.
2. Courses obtained on a Letter of Permission or in transfer credit must be equivalent to courses listed in the course requirements.
3. Successful completion of 5.0 units, with an overall average of 60%, from the requirements listed below.

Required courses (2.5 units):

BIOL 239

BIOL 373

KIN 404

~~KIN 408~~ **KIN 308**

PHIL 226 or PHIL 319J

Elective courses (2.5 units):

Select 1.0 unit from:

KIN 301

KIN 310/HLTH 310

KIN 312

KIN 343

KIN 356

KIN 406

KIN 407

KIN 416

KIN 429

Select 1.0 unit from:

BIOL 341

BIOL 354

BIOL 355

BIOL 376

BIOL 444

BIOL 473

BIOL 476

Select 0.5 unit from:

PSYCH 207

PSYCH 261

PSYCH 307

PSYCH 335

Notes

1. Students in the Medical Physiology Minor are expected to have already taken BIOL 130, BIOL 273, and PSYCH 101, which are prerequisites for one or more of the listed required courses.
2. It is recommended that students who are interested in entering a health profession should take additional physical sciences courses (e.g., CHEM 120, CHEM 123, CHEM 266, CHEM 267, PHYS 111, PHYS 112), which would be beneficial for preparation to write standardized admission examinations (e.g., MCAT, OAT).
3. Admission requirements vary greatly among professional schools. It is therefore imperative that students consult schools directly when choosing courses to satisfy admissions requirements.

6.2. Honours Recreation and Leisure Studies

Effective September 1, 2021

Background and Rationale:

SOC 101 is being removed from the list of required courses across the Department of Recreation and Leisure Studies academic plans. The changes to the program requirements are the result of student feedback and ongoing curricula reviews. Students in Recreation and Leisure Studies programs are already exposed to foundational sociological theories and concepts within a recreation and leisure studies context in three required courses including AHS 107 (Sociology of Activity, Health, and Well-being; the AHS Communication Requirement), REC 100 (Introduction to the Study of Recreation and Leisure), and REC 201 (Leisure and Social Justice). The Department of Kinesiology and the School of Public Health and Health Systems removed SOC 101 effective 2016, following the activation of AHS 107 (effective 2016). The Department of Sociology and Legal Studies has been notified of this upcoming change and the corresponding rationale.

Calendar Text:

1. Recreation courses (~~40.0~~ 10.5 units):

- Required recreation courses (4.0 units): REC 100, REC 101, REC 120, REC 201, REC 371, REC 373, REC 405, REC 420
- Recreation elective courses (~~6.0~~ 6.5 units):
Students must complete additional recreation electives to meet the required minimum of ~~40.0~~ 10.5 recreation units.
 - Note that MU353, Inclusive Arts for Children (1.0 unit) (see Wilfrid Laurier University Calendar), is accepted as a University of Waterloo recreation elective.
 - All cross-listed courses with REC are counted as recreation electives and are included in the major average.

2. Courses outside the Department of Recreation and Leisure Studies (~~40.0~~ 9.5 units):

- Required courses (~~4.5~~ 1.0 units): AHS 107, PSYCH 101, ~~SOC 101~~
- Restricted elective courses (2.0 units):
Students must complete a total of four courses from the following 12 subject categories. To fulfil this requirement, students may only choose one course per subject category.
 - An English course: ENGL
 - A fine or performing arts course: FINE, MUSIC, THPERF
 - A humanities course: CLAS, HIST, HUMSC, INDG, MEDVL, PHIL, RS, SPCOM, VCULT
 - A social science course other than psychology or sociology: ANTH, ECON, GSJ, LS, PACS, PSCI, SDS, SMF, SOCWK, STV
 - A psychology course: PSYCH (other than PSYCH 101/PSYCH 101R)
 - A sociology course: SOC (~~other than SOC 101/SOC 101R~~)
 - A language course from the Faculty of Arts (other than ENGL or EMLS)
 - A course from the Faculty of Applied Health Sciences (other than REC): AHS, GERON, HLTH, KIN
 - A course from the Faculty of Environment: ENBUS, ENVS, ERS, GEOG, INDEV, INTEG, PLAN
 - A course offered by the School of Computer Science: CS
 - A course offered by the Faculty of Mathematics: ACTSC, AMATH, CO, COMM, MATBUS, MATH, MTHEL, PMATH, STAT
 - A course offered by the Faculty of Science: BIOL, CHEM, EARTH, MNS, PHYS, SCI

6.3. General Recreation and Leisure Studies

Effective September 1, 2021

Background and Rationale:

SOC 101 is being removed from the list of required courses across the Department of Recreation and Leisure Studies academic plans. The changes to the program requirements are the result of student feedback and ongoing curricula reviews. Students in Recreation and Leisure Studies programs are already exposed to foundational sociological theories and concepts within a recreation and leisure studies context in three required courses including AHS 107 (Sociology of Activity, Health, and Well-being; the AHS Communication Requirement), REC 100 (Introduction to the Study of Recreation and Leisure), and REC 201 (Leisure and Social Justice). The Department of Kinesiology and the School of Public Health and Health Systems removed SOC 101 effective 2016, following the activation of AHS 107 (effective 2016). The Department of Sociology and Legal Studies has been notified of this upcoming change and the corresponding rationale.

Calendar Text:

1. Recreation courses (~~40.0~~ 10.5 units):

- Required recreation courses (4.0 units): REC 100, REC 101, REC 120, REC 201, REC 371, REC 373, REC 405, REC 420
- Recreation elective courses (~~6.0~~ 6.5 units):
Students must complete additional recreation electives to meet the required minimum of ~~40.0~~ 10.5 recreation units.
 - Note that MU353, Inclusive Arts for Children (1.0 unit) (see Wilfrid Laurier University Calendar), is accepted as a University of Waterloo recreation elective.
 - All cross-listed courses with REC are counted as recreation electives and are included in the major average.

2. Courses outside the Department of Recreation and Leisure Studies (~~10.0~~ **9.5** units):

- Required courses (~~1.5~~ **1.0** units): AHS 107, PSYCH 101, ~~SOC 101~~
- Restricted elective courses (2.0 units):
Students must complete a total of four courses from the following 12 subject categories. To fulfil this requirement, students may only choose one course per subject category.
 - An English course: ENGL
 - A fine or performing arts course: FINE, MUSIC, THPERF
 - A humanities course: CLAS, HIST, HUMSC, INDG, MEDVL, PHIL, RS, SPCOM, VCULT
 - A social science course other than psychology or sociology: ANTH, ECON, GSJ, LS, PACS, PSCI, SDS, SMF, SOCWK, STV
 - A psychology course: PSYCH (other than PSYCH 101/PSYCH 101R)
 - A sociology course: ~~SOC (other than SOC 101/SOC 101R)~~
 - A language course from the Faculty of Arts (other than ENGL or EMLS)
 - A course from the Faculty of Applied Health Sciences (other than REC): AHS, GERON, HLTH, KIN
 - A course from the Faculty of Environment: ENBUS, ENV5, ERS, GEOG, INDEV, INTEG, PLAN
 - A course offered by the School of Computer Science: CS
 - A course offered by the Faculty of Mathematics: ACTSC, AMATH, CO, COMM, MATBUS, MATH, MTHEL, PMATH, STAT
 - A course offered by the Faculty of Science: BIOL, CHEM, EARTH, MNS, PHYS, SCI

6.4. Honours Recreation and Sport Business

Effective September 1, 2021

Background and Rationale:

SOC 101 is being removed from the list of required courses across all of the Department of Recreation and Leisure Studies academic plans. Honours Recreation and Sport Business - required recreation courses are being increased by 0.5. The content of SOC 101 is now incorporated in other required courses including AHS 107 (Sociology of Activity, Health, and Well-being; AHS Communication Requirement), REC 100 (Introduction to the Study of Recreation and Leisure), and REC 201 (Leisure and Social Justice). These courses better service our students due to the focus on sociological theories within a recreation and leisure studies context. The Department of Sociology and Legal Studies has been informed regarding this change. REC 206 is being added to the Recreation and Sport Business elective courses list as it is a new REC course being cross-listed with PHIL 206 (see motion 1.4., New Courses).

Calendar Text:

1. Recreation courses (~~10.0~~ **10.5** units):

- Required recreation courses (6.5 units): REC 100, REC 101, REC 120, REC 201, REC 213, REC 215, REC 219, REC 313, REC 371, REC 373, REC 405, REC 413, REC 420
- Recreation elective courses (~~3.5~~ **4.0** units):
Students must complete additional recreation electives to meet the required minimum of ~~10.0~~ **10.5** recreation units.
 - Note that MU353, Inclusive Arts for Children (1.0 unit) (see Wilfrid Laurier University Calendar), is accepted as a University of Waterloo recreation elective.
 - All cross-listed courses with REC are counted as recreation electives and are included in the major average.

2. Courses outside the Department of Recreation and Leisure Studies (~~10.0~~ **9.5** units):

- Required courses (~~4.5~~ **4.0** units):
AHS 107
AFM 123
AFM 131 or BUS 111W (see Laurier calendar)
BET 100
BUS 352W (see Laurier calendar) or MGMT 244
BUS 288W (see Laurier calendar) or PSYCH 238 or MSCI 211
HRM 200
PSYCH 101
~~SOC 101~~
- Recreation and Sport Business elective courses (2.5 units):
Recreation and Sport Business electives have been categorized into the following focus areas. Students may opt to choose courses from any of the areas, or concentrate on one area. The focus area does not appear on your transcript or degree. It is only a guideline for selecting your elective courses. Some courses may have prerequisite courses that the student will need to complete.

Select 2.5 units from the following lists:

Communications

- ENGL 210F
- ENGL 295
- SPCOM 100 or BUS 208W (see Laurier calendar)
- SPCOM 101
- SPCOM 223
- SPCOM 225
- SPCOM 226
- SPCOM 228
- SPCOM 324

Entrepreneurship and Events

- BET 300
- GSJ 207
- MGMT 220
- REC 218
- SPCOM 433
- REC 319
- REC 419

Finance

- AFM 231 or BUS 231W (see Laurier calendar)
- BUS 311W (see Laurier calendar)
- ECON 101
- ECON 102
- ECON 254

Government and Policy

- PSCI 100
- PSCI 231
- PSCI 252
- PSCI 260
- PSCI 283
- PSCI 331
- PSCI 334

Human Resources

- HRM 301
- HRM 303
- HRM 305
- HRM 307

Note that these courses may require declaration of the minor.

Leadership/Group Dynamics

- PACS 202
- SPCOM 227
- SPCOM 432

Marketing

- BUS 121W (see Laurier calendar)
- BUS 362W (see Laurier calendar)
- BUS 412W (see Laurier calendar)
- BUS 432W (see Laurier calendar)
- BUS 452W (see Laurier calendar)
- BUS 462W (see Laurier calendar)
- BUS 472W (see Laurier calendar)
- BUS 482W (see Laurier calendar)

Occupational/Culture

- REC 206/PHIL 206
- PHIL 215
- SOC 241

Practicum

- REC 312

- Free elective courses: 3.0 units

3. Total number of units to complete is 20.0

6.5. Honours Therapeutic Recreation

Effective September 1, 2021

Background and Rationale:

SOC 101 is being removed from the list of required courses across all of the Department of Recreation and Leisure Studies academic plans. Honours Therapeutic Recreation - required recreation courses are being increased by 0.5. The content of SOC 101 is now incorporated in other required courses including AHS 107 (Sociology of Activity, Health, and Well-being; AHS Communication Requirement), REC 100 (Introduction to the Study of Recreation and Leisure), and REC 201 (Leisure and Social Justice). These courses better service our students due to the focus on sociological theories within a recreation and leisure studies context. The Department of Sociology and Legal Studies has been informed regarding this change.

Calendar Text:

1. Recreation courses (~~10.0~~ **10.5** units):
 - Required courses (8.5 units): REC 100, REC 101, REC 120, REC 151, REC 201, REC 251, REC 252, REC 253, REC 351, REC 357, REC 371, REC 373, REC 405, REC 420, REC 450 (1.0), REC 455
 - Recreation elective courses: (~~1.5~~ **2.0** units)
 - Students must complete additional recreation electives to meet the required minimum of ~~10.0~~ **10.5** recreation units
 - Note that MU353, Inclusive Arts for Children (1.0 unit) (see Wilfrid Laurier University Calendar), is accepted as a University of Waterloo recreation elective.
 - All cross-listed courses with REC are counted as recreation electives and are included in the major average.
2. Courses outside the Department of Recreation and Leisure Studies: (~~10.0~~ **9.5** units)
 - Required courses (~~2.5~~ **2.0** units): AHS 107, AHS 150, HLTH 245, PSYCH 101, ~~SOC 101~~

6.6. Honours Tourism Development

Effective September 1, 2021

Background and Rationale:

SOC 101 is being removed from the list of required courses across all of the Department of Recreation and Leisure Studies academic plans. Honours Tourism Development required recreation courses are being increased by 0.5. The content of SOC 101 is now incorporated in other required courses including AHS 107 (Sociology of Activity, Health, and Well-being; AHS Communication Requirement), REC 100 (Introduction to the Study of Recreation and Leisure), and REC 201 (Leisure and Social Justice). These courses better service our students due to the focus on sociological theories within a recreation and leisure studies context. The Department of Sociology and Legal Studies has been informed regarding this change.

Calendar Text:

1. Recreation courses (~~10.0~~ **10.5** units):
 - Required recreation courses (6.5 units): REC 100, REC 101, REC 120, REC 201, REC 219, REC 230, REC 280, REC 371, REC 373, REC 380, REC 405, REC 420, REC 480
 - Recreation elective courses (~~3.5~~ **4.0** units):
 - Students must complete additional recreation electives to meet the required minimum of ~~10.0~~ **10.5** recreation units.
 - Note that MU353, Inclusive Arts for Children (1.0 unit) (see Wilfrid Laurier University Calendar), is accepted as a University of Waterloo recreation elective.
 - All cross-listed courses with REC are counted as recreation electives and are included in the major average.
2. Courses outside the Department of Recreation and Leisure Studies (~~10.0~~ **9.5** units):
 - Required courses (~~1.5~~ **1.0** units): AHS 107, PSYCH 101, ~~SOC 101~~
 - Tourism Development elective courses (5.0 units):
 - Select from the following list:
 - ANTH 348
 - ENGL 108D
 - ENGL 208M
 - ENGL 295
 - ENV5 195
 - ERS 253
 - ERS 372
 - ERS 404/PSCI 432
 - GEOG 233
 - GEOG 319/PLAN 320
 - GEOG 323/REC 383
 - GEOG 426
 - GEOG 432/HLTH 420/PLAN 432
 - HRM 200

- INDEV 100
 - INTST 101
 - INDG 272
 - MGMT 220
 - PLAN 100
 - PSCI 252
 - PSCI 350
 - PSCI 389
 - PSCI 404
 - REC 215
 - REC 218
 - REC 312
 - REC 319
 - REC 356
 - REC 419
 - REC 422
 - REC 425/PLAN 414
 - REC 433/ENVS 433 (1.0)
3. Free elective courses: 3.5 units.
 4. Total number of units to complete degree is 20.0.

6.7. Bachelor of Science, Honours Health Studies

Effective September 1, 2021

Background and Rationale:

To revise the Health Studies degree requirements.

- HLTH 202 (Principles of Public and Population Health) was removed as a requirement since the BSc students are introduced to these principles in HLTH 101 and 102 and the more in-depth public health course is more appropriate as a requirement for students in the BPH (Bachelor of Public Health) program only.
- HLTH 205 is a new Introduction to Health Research course for the Fall 2021 calendar. The addition of HLTH 205 as required provides a foundational course for all students before they take more specialized methods courses (Epidemiology, Qualitative Methods, Experimental Methods) in 3rd and 4th year.
- The numbering for HLTH 280 (Applied Public Health Ethics) has been changed to HLTH 380 since the course will be revised to a 3rd-year level for the Fall 2021 calendar.
- For the Biohealth core content cluster, students will be required to take 1 of the 3rd year courses (HLTH 340: Environmental Toxicology and Public Health or HLTH 341: Principles of Pathobiology) as these courses are considered more foundational to human biohealth, whereas the other choices are more specialized.
- HLTH 475 is a new course on Measuring Food & Nutrition Exposures & Outcomes and is appropriate to include as a choice for the methods/application cluster.
- HLTH 392 is a new course on Mental Health Systems and Policy and is appropriate to include as a choice in the health systems and policy core content cluster.
- The addition of a HLTH 472 independent study in both the health systems and policy and the social behavioural sciences core content clusters provides more options.
- HLTH 450 is a new course on Gender, Sex, and Health and is appropriate to include as a choice in the social behavioural sciences core content cluster.
- HLTH 449 is a course on Alcohol and Drug Use and Abuse in contemporary society and is appropriate to include as a choice in the social behavioural sciences core content cluster.
- HLTH 290 (Introduction to Health Neuroscience) and HLTH 358 (Social Neuroscience 1: Mental Health and Addiction) contain significant human biology content and hence are appropriate to include on the list of options for the Biohealth core content cluster.
- BIOL 373 (Principles of Human Physiology 2) is being added as a requirement so that all Health Studies students will have sufficient knowledge of the function of all of the physiological systems of the body. Permission to add BIOL 373 as a requirement has been granted by the Biology department.
- Since all students are required to take AHS 107 as their communication requirement, and students have several HLTH courses with written tutorial assignments and presentations (HLTH 101, 102, 202), as well as lab reports in their BIOL and CHEM lab courses, it was decided that the restricted English elective is not necessary. The Department of English Language and Literature has been informed of this change.

Legend

* Must be approved by the School of Public Health and Health Systems associate director, undergraduate studies.

** Cannot be used for both the methods/application cluster and core content clusters.

*** Cannot be used for both the required health studies courses and the biohealth core content cluster

In order to receive the Bachelor of Science, Honours Health Studies degree, the student must successfully complete 20.0 units of which at least 10.0 total units are at or above the 200-level and including the following requirements

In order to receive the Bachelor of Science, Honours Health Studies degree, the student must successfully complete 20.0 units of which at least 10.0 total units are at or above the 200-level and including the following requirements:

1. Required health studies courses (~~6.25~~ **6.75** units):
HLTH 101, HLTH 102, HLTH 201, ~~HLTH 202~~, HLTH 204, **HLTH 205**, HLTH 230, HLTH 245, HLTH 260, HLTH ~~2380~~,
HLTH 310, HLTH 333, **HLTH 340 or HLTH 341**, HLTH 370, HLTH 480 (0.25 unit)
2. Required applied health sciences course (0.5 unit):
AHS 107
3. Required statistics course (0.5 unit):
One of: HLTH 335, STAT 316
4. Methods/application cluster (0.5 unit):
One of: HLTH 303, HLTH 344, HLTH 433, HLTH 435, HLTH 442, HLTH 443, HLTH 451, HLTH 453, HLTH 458**, **HLTH 475**
5. Core content clusters (~~2.0~~ **1.5** units):
~~One of~~ **One course in the area of Health Systems and Policy: HLTH 392**, HLTH 401, HLTH 410, HLTH 412, HLTH 373*,
HLTH 472*, or HLTH 473* with an approved topic in health systems and policy
~~One of~~ **One course in the area of Social Behavioural Sciences: HLTH 301**, HLTH 304, HLTH 305, HLTH 320, HLTH 352,
HLTH 448, **HLTH 449, HLTH 450**, HLTH 373*, **HLTH 472***, or HLTH 473* with an approved topic in social behavioural
sciences
~~Two of~~ **One course in the area of Biohealth: HLTH 290**, HLTH 340***, HLTH 341***, **HLTH 358**, HLTH 407, HLTH 421,
HLTH 458**, HLTH 461, HLTH 465, HLTH 471, HLTH 373*, HLTH 472*, or HLTH 473* with an approved topic in biohealth
6. Required courses from other departments (~~4.25~~ **4.75** units):
BIOL 130/BIOL 130L, BIOL 239, BIOL 273, **BIOL 373**
CHEM 120/CHEM 120L, CHEM 123/CHEM 123L
KIN 217
PSYCH 101
7. ~~Restricted elective course (0.5 unit):~~
~~One of: ENGL 109 or ENGL 140R (recommended for Year One) or any ENGL 210 (recommended for Year Two)~~
8. Free elective courses: 5.5 units

6.8. Bachelor of Public Health, Honours

Effective September 1, 2021

Background and Rationale:

To revise the Bachelor of Public Health degree requirements.

- HLTH 205 is a new Introduction to Health Research course for the Fall 2021 calendar. The addition of HLTH 205 as required provides a foundational course for all students before they take more specialized methods courses (Epidemiology, Qualitative Methods, Experimental Methods) courses in 3rd and 4th year.
- The numbering for HLTH 280 (Applied Public Health Ethics) has been changed to HLTH 380 since the course will be revised to a 3rd-year level for the Fall 2021 calendar.
- HLTH 475 is a new course on Measuring Food & Nutrition Exposures & Outcomes and is appropriate to include as a choice for the methods/application cluster.
- Under item 4, the phrase “minimum 0.5 unit per cluster” is redundant since students must choose 1 course from each of the 2 core content clusters and hence would already be taking a minimum of 0.5 unit per cluster.
- HLTH 392 is a new course on Mental Health Systems and Policy and is appropriate to include as a choice in the health systems and policy core content cluster.
- HLTH 449 is a course on Alcohol and Drug Use and Abuse in contemporary society and is appropriate to include as a choice in the social behavioural sciences core content cluster.
- HLTH 450 is a new course on Gender, Sex, and Health and is appropriate to include as a choice in the social behavioural sciences core content cluster.
- The addition of a HLTH 472 independent study to both the health systems and policy and the social behavioural sciences core content clusters provides more options to fulfill these requirements.
- HLTH 474, Health Apprenticeship, is appropriate to include as a choice for a capstone course.

In order to receive the Honours Bachelor of Public Health degree the student must successfully complete 20.0 units of which at least 10.0 total units are at or above 200-level and including the following requirements:

1. Required health courses (~~7.0~~ **7.5** units):
HLTH 101, HLTH 102, HLTH 103, HLTH 201, HLTH 202, HLTH 204, **HLTH 205**, HLTH 230, HLTH 245, HLTH 260, HLTH ~~2380~~, HLTH 320, HLTH 333, HLTH 355, HLTH 370
2. Required applied health sciences courses (1.0 unit):
AHS 107
AHS 150
3. Methods/application cluster (1.0 unit):
Two of: HLTH 303, HLTH 344, HLTH 433, HLTH 435, HLTH 442, HLTH 443, HLTH 451, HLTH 453, HLTH 458, **HLTH 475**, HLTH 335 or STAT 316
4. Core content clusters (~~minimum 0.5 unit per cluster~~; total 1.5 units):
One course in the area of Health Systems and Policy: **HLTH 392**, HLTH 401, HLTH 410, HLTH 412, HLTH 373*, **HLTH 472***, or HLTH 473* with an approved topic in health systems and policy
One course in the area of Social Behavioural Sciences: HLTH 301, HLTH 304, HLTH 305, HLTH 352, HLTH 448, **HLTH 449**, **HLTH 450**, HLTH 373*, **HLTH 472***, or HLTH 473* with an approved topic in social behavioural sciences
One additional course from any Core Content Clusters lists in the areas of health systems and policy or social behavioural sciences.
5. One additional HLTH course at the 300- or 400-level (0.5 unit).
6. Capstone course (0.5 unit):
One of: HLTH 481, HLTH 472*, HLTH 432A/HLTH 432B, **HLTH 474**, or any fourth-year seminar course (cannot double count)
7. Required course from another department (0.5 unit):
PSYCH 101
8. Restricted elective courses (1.5 units):
One of: ENGL 109 or ENGL 140R (recommended for Year One) or any ENGL 210 (recommended for Year Two)
One of: ANTH, ECON, PSCI, PSYCH, SDS, SMF, SOC
One of: CLAS, ENGL, HIST, MEDVL, PACS, PHIL, RS
9. Free elective courses: ~~6.5~~ **6.0** units

6.9. Pre-Clinical Specialization

Effective September 1, 2021

Background and Rationale

To revise the requirements for the Pre-Clinical Specialization. The Specialization is being restricted to the Bachelor of Science, Health Studies students as the Bachelor of Public Health students would not have the proper science prerequisites to take most of the courses in the electives list and the specialization is more appropriate for a Bachelor of Science degree. The description has been updated to list other examples of clinical health professions for which students can choose prerequisite courses from the electives list. Since all Health Studies students are now required to take HLTH 310, CHEM 123, and CHEM 123L and will be required to take HLTH 340/341 and BIOL 373 starting in September 2021, these courses should no longer be included in the Pre-Clinical Specialization. HLTH 475 (Measuring Food & Nutrition Exposures & Outcomes) is a new course and is appropriate to include in the list of fourth-year Research Methods courses. The addition of all of the specific fourth-year seminar courses makes it transparent which courses students may choose to fulfill this requirement. Upon review of current biology and chemistry course offerings, other courses were deemed appropriate to include in the list of elective choices, including some that are required for certain clinical health profession programs. The inclusion of the additional BIOL and CHEM courses was approved by the respective departments. Upon consultation with the Associate Chair, Undergraduate Studies in the Department of Kinesiology, it was decided that certain KIN courses should be removed from the specialization since these courses are mainly restricted to KIN students. Other appropriate KIN courses to include in the specialization were added. The addition of the notes provides more clarification and transparency for students who enrol in the Specialization and plan to apply to clinical health profession programs.

Calendar Text:

~~This plan is open to students in the School of Public Health and Health Systems. The Pre-Clinical Specialization program~~ combines the Bachelor of Science, Honours Health Studies ~~or the Bachelor of Public Health, Honours,~~ degree requirements with a specified grouping of health, chemistry, mathematics, physics, biology, and kinesiology elective courses.

This Specialization is intended to provide suitable preparation for entry into clinical health professional schools such as medicine, nursing, **optometry, pharmacy**, physiotherapy, etc. or to advanced graduate training in biohealth **sciences**. However, students must consult the admission requirements of specific professional schools when choosing from the electives.

Admission to the Specialization requires at least good standing with a minimum cumulative average of 75% and a minimum major average of 75%. Students may declare only one specialization.

In order to graduate with this Specialization, the following requirements must be met:

1. A cumulative overall average of 75% and cumulative major average of 75%.
2. Declare this Specialization by the beginning of 3A academic term.
3. Successful completion of 21.0 units, including all requirements of the Bachelor of Science, Honours Health Studies degree. ~~of the Bachelor of Public Health, Honours degree.~~
4. Successful completion of ~~4.5~~ **1.0** units from the following list:
 - ~~○ (0.5 unit) one of HLTH 310, HLTH 340, or HLTH 341~~
 - (0.5 unit) fourth-year **Health (HLTH)** research methods course: HLTH 432A, HLTH 432B, HLTH 433, HLTH 435, HLTH 442, HLTH 443, HLTH 451, HLTH 453, HLTH 458, HLTH 461, **HLTH 475**, or a **fourth-year health (HLTH) research methods course approved by the associate director, undergraduate studies specifically to meet this requirement**
 - (0.5 unit) fourth-year **Health (HLTH)** seminar course: **HLTH 421, HLTH 427, HLTH 430, HLTH 448, HLTH 449, HLTH 450, HLTH 465, HLTH 471, HLTH 479, HLTH 481**, or a **fourth-year HLTH seminar course approved by the associate director, undergraduate studies specifically to meet this requirement**
5. Successful completion of 3.5 total units from the following list:
BIOL 201, BIOL 211, BIOL 240, BIOL 240L, BIOL 241, BIOL 302, BIOL 303, BIOL 308, BIOL 309, BIOL 331, BIOL 341, BIOL 354, BIOL 355, ~~BIOL 373~~, BIOL 373L, BIOL 376, BIOL 441, BIOL 442, BIOL 444, BIOL 449, BIOL 455, BIOL 469, BIOL 472, BIOL 473
~~CHEM 123, CHEM 123L, CHEM 237, CHEM 237L, CHEM 266, CHEM 266L, CHEM 267, CHEM 267L~~
KIN 100/KIN 100L, ~~KIN 121/KIN 121L, KIN 202/KIN 202L, KIN 221/KIN 221L~~, KIN 301, **KIN 308**, KIN 312, KIN 340, KIN 341, KIN 404, **KIN 406**, HLTH 407/KIN 407
MATH 127, MATH 128
PHYS 111, PHYS 111L, PHYS 112, PHYS 112L

Notes

1. **Students are expected to have already taken BIOL 130, BIOL 239, BIOL 273, CHEM 120, CHEM 120L, CHEM 123, and CHEM 123L, which are prerequisites for several of the listed courses.**
2. **Students must complete one additional unit beyond the 20 units required for their Health Studies degree and should plan carefully, in consultation with an academic advisor, for when they will fit in the extra courses.**
3. **Admission requirements vary greatly among clinical professional schools. It is therefore imperative that students consult schools directly when choosing courses to satisfy admissions requirements.**
4. **Although the minimum average for the specialization is 75%, students should note that higher averages are normally needed to be admitted into many health professional or graduate programs.**

6.10. Gerontology Minor

Effective date September 1, 2021

Background and Rationale:

To revise the Gerontology Minor. Senate Undergraduate Council has approved harmonized text for residency requirements and as a result the School of Public Health and Health Systems is removing related faculty-specific text. For the minor, this means that students will be allowed up to 50% of the courses presented for the minor to be obtained on Letter of Permission or transfer credit, as long as these courses are equivalent to the courses listed in the minor. The numbering for HLTH 280 (Applied Public Health Ethics) has been changed to HLTH 380 since the course will be revised to a 3rd-year level for the Fall 2021 calendar, thus HLTH 380 was added to the list of restricted elective choices. Listing specific statistics courses makes the choices more transparent for students to know whether they can use a statistics course they have already taken as one of the electives. Permission to include the PSYCH, SOC, REC, KIN, SDS, STAT, and ARTS courses has been granted by each unit in charge of the courses. PHIL 321J is a new course on the Philosophy of Palliative care that is appropriate to include as an elective choice for the minor. Permission to include the course has been granted by St. Jerome's University. RS 266 is a Religious Studies course on Death and Dying that is appropriate to include as an elective choice for the minor. Permission to include the course has been granted by the Religious Studies department.

Calendar Text:

The Gerontology Minor is open to University of Waterloo students who wish to obtain some specialization in gerontology.

Degree Requirements for the Minor

- ~~1. Students must be in an honours or four-year general program at the University of Waterloo.~~
2. An overall minimum average of 67% is required for courses presented for the Minor.

~~3. Normally, a maximum of two courses (1.0 unit) obtained on Letter of Permission or in transfer credit may be applied toward fulfillment of the Gerontology Minor course requirements. These courses must be equivalent to courses listed in the course requirements as assessed by the school/department offering the replaced course. Courses obtained on a Letter of Permission or in transfer credit must be equivalent to courses listed in the course requirements as assessed by the school/department offering the replaced course.~~

4. Successful completion of 5.0 units from the following requirements:

- Required courses (1.0 unit):
GERON 201/HLTH 201 (it is recommended that students begin their studies with GERON 201/HLTH 201)
GERON 400/HLTH 400
- Restricted elective courses (4.0 units):
GERON 218/HLTH 218/PSYCH 218
GERON 245/HLTH 245
GERON 310/HLTH 310/KIN 310
GERON 320/HLTH 320
GERON 352/HLTH 352/KIN 352/REC 362/SOC 352
GERON 355/BIOL 355
GERON 401A, GERON 401B
HLTH 253/SOC 253
~~HLTH 280~~ **HLTH 380**
HLTH 407/KIN 407
HLTH 420/GEOG 432/PLAN 432
HLTH 427
HLTH 430
HLTH 451
HLTH 473 (course topic must be approved by the associate director, undergraduate studies)
KIN 342
KIN 343
KIN 406
KIN 418
KIN 422
KIN 429
KIN 456
PHIL 226
PHIL 319J
PHIL 321J
PSYCH 398
REC 361
RS 266
SOC 248
SOCWK 240R
SDS 367R

~~An approved course in statistics (a list of approved courses is available from the School of Public Health and Health Systems Undergraduate Office).~~

A Statistics Course (0.5 unit) from the following list: HLTH 204, ARTS 280, KIN 232, PSYCH 292, REC 371, SOC 280, SDS 250R, STAT 202, STAT 221, STAT 231

6.11. Aging Studies Option

Effective date September 1, 2021

Background and Rationale:

To revise the Aging Studies option. In order to be consistent with the Gerontology Minor, which does allow Letter of Permission and transfer credit courses, we have decided to allow the same for the Aging Studies Option. This means that students will be allowed up to 50% of the courses presented for the option to be obtained on Letter of Permission or transfer credit, as long as these courses are equivalent to the courses listed in the option. The numbering for HLTH 280 (Applied Public Health Ethics) has been changed to HLTH 380 since the course will be revised to a 3rd-year level for the Fall 2021 calendar, thus HLTH 380 was added to the list of restricted elective choices. Listing specific statistics courses makes the choices more transparent for students to know whether they can use a statistics course they have already taken as one of the electives. Permission to include the PSYCH, SOC, REC, KIN, SDS, STAT, and ARTS courses has been granted by each unit in charge of the courses. PHIL 321J is a new course on the Philosophy of Palliative care that is appropriate to include as an elective choice for the option. Permission to include the course has been granted by St. Jerome's University. RS 266 is a Religious Studies course on Death and Dying that is appropriate to include as an elective choice for the minor. Permission to include the course has been granted by the Religious Studies department.

Calendar Text:

The Aging Studies Option is open to Applied Health Sciences students who wish to obtain some interdisciplinary knowledge in issues related to aging, but do not wish to complete the Gerontology Minor.

Degree Requirements for the Option

1. A minimum overall average of 67% is required for the courses presented for the option.
2. ~~Normally all courses must be taken at University of Waterloo; there is no allowance for transfer of credit from other institutions.~~ **Courses obtained on a Letter of Permission or in transfer credit must be equivalent to courses listed in the course requirements as assessed by the school/department offering the replaced course.**
3. Successful completion of 3.0 units from the following requirements:
 - o Required courses (0.5 unit):
GERON 201/HLTH 201 (it is recommended that students begin their studies with GERON 201/HLTH 201)
 - o Restricted elective courses (2.5 units):
GERON 218/HLTH 218/PSYCH 218
GERON 245/HLTH 245
GERON 310/HLTH 310/KIN 310
GERON 320/HLTH 320
GERON 352/HLTH 352/KIN 352/REC 362/SOC 352
GERON 355/BIOL 355
GERON 401A,GERON 401B
HLTH 253/SOC 253
~~HLTH 280~~ **HLTH 380**
HLTH 407/KIN 407
HLTH 420/GEOG 432/PLAN 432
HLTH 427
HLTH 430
HLTH 451
HLTH 473 (course topic must be approved by the associate director, undergraduate studies)
KIN 342
KIN 343
KIN 406
KIN 418
KIN 422
KIN 429
KIN 456
PHIL 226
PHIL 319J
PHIL 321J
PSYCH 398
REC 361
RS 266
SOC 248
SOCWK 240R
SDS 367R
~~An approved course in statistics (a list of approved courses is available from the School of Public Health and Health Systems Undergraduate Office).~~
A Statistics Course (0.5 unit) from the following list: HLTH 204, ARTS 280, KIN 232, PSYCH 292, REC 371, SOC 280, SDS 250R, STAT 202, STAT 221, STAT 231

PROGRAM INFORMATION	University of Waterloo	McMaster University	Western University	University of Ottawa	Wilfrid Laurier University	Carleton University
Program Name	Health Studies - Reflects 2021 curriculum (assuming motions are approved)	Health Sciences	Health Sciences	Health Sciences	Health Sciences	Health Sciences (with Concentration)
Faculty	Applied Health Sciences Health	Health Sciences	Health Sciences	Health Sciences	Science	Science
Department	School of Public Health and Health Systems	Health Sciences	School of Health Studies	Interdisciplinary School of Health Sciences	Health Sciences	Health Sciences (with Concentration)
Level	Undergraduate	Undergraduate	Undergraduate	Undergraduate	Undergraduate	Undergraduate
Degree Type	Bachelor of Science (BSc)	Bachelor of Health Sciences (BHSc)	Bachelor of Health Sciences (BHSc)	Bachelor of Health Sciences (BHSc)	Bachelor of Science (BSc)	BSc Honours Health Sciences
Program Length	Regular: 4 yrs; Co-op: 5 yrs	4 years	4 years	4 years	4 years	4 years
First Year Courses	AHS 107 – Sociology of Activity, Health, and Well-being (incl tutorial) HLTH 101 – Introduction to Health 1 (incl tutorial) BIOL 130, 130L - Intro Cell Bio & Cell Bio Lab CHEM 120, 120L - Physical and Chemical Properties of Matter: Chemical Reaction Laboratory 1 HLTH 102 – Introduction to Health 2 (incl tutorial) PSYCH 101 – Introductory Psychology CHEM 123, 123L – Chemical Reactions, Equilibria, and Kinetics; Chemical Reaction Laboratory 2 BIOL 239 – Genetics (incl tutorial, sequenced into 1st year in 2021) 1 elective	• Health Sciences 1E06 A/B – Inquiry (2 terms - selected health issues) • Health Sciences 1G02 – Interdisciplinary Problem Solving in Health (Similar to HLTH 101, 102, 202) • Health Sciences 1106A/B – Cellular and Molecular Biology (2 terms) • Chemistry 1A03 – Introductory Chemistry I (incl lab) • Chemistry 1AA3 – Introductory Chemistry II (incl lab) • Health Sciences 1X01 A/B – Praxis Pathways 1 (Skills in information literacy, critical analysis, collaboration, leadership, self-care, and wellness). Part of longitudinal praxis pathways curriculum) • Three electives	• Health Sciences 1001A/B: Personal Determinants of Health • Health Sciences 1002A/B: Social Determinants of Health • Biology 1201A/B or 1001A/B: General Biology 1 (incl lab) • Biology 1202A/B or 1002A/B: General Biology 2 (incl lab) • 2 additional 1000 level courses • 4 electives	• ANP1105 Human Anatomy and Physiology I • CHM1311 Principles of Chemistry 1 • ENG1100 Workshop in Essay Writing • HSS1101 Determinants of Health • PSY1101 Introduction to Psychology: Foundations • ANP1106 Human Anatomy and Physiology II • BIO1140 Introduction to Cell Biology • HSS1100 Microbiology and Immunology • SOC1101 Principles of Sociology • 1 elective	HE100 – Health Issues 1 HE101 – Health Issues 2 BI110 – Unifying Life Processes (incl biweekly tutorial) BI111 – Biological Diversity and Evolution (incl biweekly tutorial) CH110 – Fundamentals of Chemistry 1 (incl lab) CH111 – Fundamentals of Chemistry 2 (incl lab) PS101 – Introduction to Psychology 1 PS102 – Introduction to Psychology 2 MA100 – Introductory Calculus for the Natural Sciences (incl lab) MA101 – Calculus I for the Natural Sciences (incl lab)	HLTH 1000 - Fundamentals of Health HLTH 1002 - Health Science Communication BIOL 1103 - Foundations of Biology I BIOL 1104 - Foundations of Biology II CHEM 1001 - General Chemistry I CHEM 1002 - General Chemistry II MATH 1007 - Elementary Calculus I 1. 1.0 credit from: - ECON 1001 - Introduction to Microeconomics - ECON 1002 - Introduction to Macroeconomics - PSYC 1001 - Introduction to Psychology I - PSYC 1002 - Introduction to Psychology II - 0.5 credit from: - PHIL 1550 - Introduction to Ethics and Social Issues - PHIL 2408 - Bioethics
Second Year Courses	HLTH 201 - Aging and Health HLTH 204 - Quantitative Approaches to Health Science (incl Stats Lab) HLTH 205 (2021 calendar) - Introduction to Health Research KIN 217 - Human Biochemistry One Elective HLTH 245 – Canadian Health Systems (sequenced to 2nd year in 2021) HLTH 230 - Health Informatics (incl Lab) HLTH 260 - Social Determinants of Health BIOL 273 - Principles of Human Physio 1 (neurophysio & PNS, muscle, cardiovascular system, blood, immune, respiratory system) One elective	HTHSCI 2E03 - Inquiry II: Biochemistry HTHSCI 2F03 - Human Physiology and Anatomy I (incl lab) HTHSCI 2FF3 - Human Physiology and Anatomy II (incl lab) HTHSCI 2G03 - Statistics & Epidemiology 1 (tutorial) HTHSCI 2GG3 - Statistics & Epidemiology 2 (tutorial) HTHSCI 2K03 - Cell Biology (tutorial) HTHSCI 2X03 A/B - Praxis Pathways 2 3 electives	Health Sciences 2250A/B, Health Promotion Health Sciences 2300A/B, Functional Human Gross Anatomy (incl lab) Health Sciences 2610F/G, Introduction to Ethics and Health Health Sciences 2700A/B, Health Issues in Childhood and Adolescence Health Sciences 2711A/B, Health Issues in Aging Health Sciences 2801A/B, Research Methods in Health Sciences (incl lab) 4.0 courses from: Health Sciences at the 2010-level or above	HSS 2102 Communication and Health HSS 2305 Molecular Mechanisms of Disease HSS 2381 Quantitative Methods in Health Sciences: Continuous Variables PHI 2396 Bioethics HSS 2321 Sociopolitical and Economic Perspectives in Health HSS 2382 Quantitative Methods in Health Sciences: Categorical Variables 2 Science courses 2 optional HSS courses	HE201 – Research Methods for Health Sciences HN210/KP221 – Functional Human Anatomy (incl lab) HN220/KP222 – Human Physiology (incl lab) CH202 – Organic Chemistry 1 (incl lab) CH203 – Organic Chemistry 2 (incl lab) ST231 – Statistical Methods for Life and Health Sciences (incl lab) BI236 – Cell and Molecular Biology CH250 – Introductory Biochemistry (incl lab) PS263 - BioPsychology At most 1.0 elective credits (Refer to Notes 1, 2 and 3)	- HLTH 2001 - Health Research Methods and Skills - HLTH 2002 - Molecular and Cellular Pathology - HLTH 2003 - Social Determinants of Health - 1.0 credit in: - STAT 2507 - Introduction to Statistical Modeling I - STAT 2509 - Introduction to Statistical Modeling II - 1.0 credit in: - BIOL 2104 - Introductory Genetics - BIOL 2200 - Cellular Biochemistry - 0.5 credit in approved 2000-level concentration electives
Third Year Courses	HLTH 333 - Principles of Epidemiology (incl lab) HLTH 380 - Applied Public Health Ethics (3rd year course in 2021 calendar) HLTH 341 (Principles of Pathobiology) OR HLTH 340 (Environmental Toxicology and Public Health) 2 electives HLTH 370 Ecological Determinants of Health STAT 316 Or HLTH 335 Statistics Course with Lab (SAS) HLTH 310 Development, Aging, & Health (Physiology of human development course) BIOL 373 (2021 calendar) – Principles of Human Physio 2 (central nervous system, the sense organs, the digestive system, the endocrine system, the reproductive system, and the excretory system.) 1 elective 3 Electives year 3 (total of 11 free electives plus need total of 4 restricted electives: 1 BioHealth, 1 Methods, 1 Social Behavioural Sciences, 1 Health Systems and Policy BioHealth courses include: Principles of Pathobiology; Environmental Toxicology and Public Health; Epigenetics and Health; Coronary Artery Disease Prevention and Rehabilitation; Nutritional Aspects of Chronic Disease; Social Neuroscience 1: Mental Health and Addiction; Social Neuroscience 2: Lifestyle and Chronic Illness; Experimental Methods in Behavioural Neuroscience; Psychopharmacology; Special Topics Courses - (examples: Medical Parasitology; Neuroscience,	HTHSCI 3E03 - Inquiry III: Advanced Inquiry in Health Sciences (Health across lifespan - Similar to HLTH 320, 310, 201) HTHSCI 3G03 - Critical Appraisal of the Medical Literature HTHSCI 3GG3 - Health Systems and Health Policy 3-6 units HTHSCI 3H03 A/B - Inquiry Project (An opportunity to explore one or more specialized areas of Health Sciences in preparation for Level IV Senior Project/Thesis.) HTHSCI 3X00 A/B - Praxis Pathways 3 Electives (5-8 depending on how many units for Inquiry Project)	Health Sciences 3400A/B, Health Policy Health Sciences 3801A/B, Measurement and Analysis in Health Sciences (incl lab) a maximum of 12.0 credits (at the 1000-level or higher) from amongst Health Sciences, Rehabilitation Sciences, or Communication Sciences and Disorders courses, may be taken in any Specialization or Honors Specialization degree or module in the School of Health Studies. Rest Free Electives	HSS 3101 Health Research: Quantitative and Qualitative Approaches HSS 3103 Experience of Illness, Impairment and Disability HSS 3305 Pathophysiology of Health Problems (similar to HLTH 341) HSS 3106 Pharmacology: Mechanisms and Compliance HSS 3110 Epidemiology HSS 3303 Environment and Health (Similar to HLTH 370: Ecological Determinants of Health and HLTH 340: Environmental Toxicology and Public Health) 2 optional HSS courses 2 electives	Year 3: (5.0 credits) HE300/KP434 - Epidemiology HE301 – Social Determinants of Health HE302 – Foundations of the Canadian Health Care System 3.5 elective credits (Refer to Notes 1, 2 and 3; must be approved by the Health Sciences Co-ordinator or designate)	- HLTH 3101 - Global Health - HLTH 3201 - Epidemiology - HLTH 3302 - Immunity and Immune-Related Disorders - HLTH 3404 - Psychosocial and Biological Interactions in Health - 0.5 credit (1 course) from: - HLTH 3901 - Emerging Issues in Biomedical Science - HLTH 3902 - Emerging Issues in Global Health - HLTH 3903 - Emerging Issues in Environment and Health - HLTH 3904 - Emerging Issues in Health Throughout the Lifespan - HLTH 3905 - Emerging Issues in Disabilities & Chronic Illness OR - 0.5 credit in HLTH elective at the 3000 level or above - 4.0 credits in concentration electives at the 3000 level or above

Fourth Year Courses	<p>HLTH 480 - Competencies in Health course (0.25 unit Capstone - Satisfy CEPH requirement)</p> <p>9 Electives year 4 (total of 11 free electives plus need total of 4 restricted electives: 1 BioHealth, 1 Methods, 1 Social Behavioural Sciences, 1 Health Systems and Policy)</p> <p>- Methods courses include: Program Planning and Evaluation; Qualitative Methods; Experimental Methods; Epidemiology of Non-Communicable Diseases; Epidemiology of Communicable Diseases; Several 4th year Health Informatics Courses; Neuroscience courses with a lab component</p> <p>- Health Systems and Policy Courses Include: Health Policy; Global Health; Comparative Health Systems; Mental Health Systems and Policy</p> <p>- Social Behavioural Sciences courses include: Psychosocial Perspectives on Lifespan Development and Health; Applied Health Promotion: Theory and Practice; Health Communication; Community Development and Engagement in Public Health; Sociology of Aging; Advanced Social Determinants of Health; Gender, Sex, and Health, etc</p>	<p>6-15 units of a 4th Year Thesis, Senior Project, Senior Project in Engaging the City (community-based participatory research), Thesis in Engaging the City</p> <p>HTHSCI 4XP3 A/B - Praxis Pathways 4</p> <p>12-21 units</p> <p>Electives (4-7 depending on how many units for thesis)</p>	<p>1.0 course from: Health Sciences at the 4000-level.</p> <p>a maximum of 12.0 credits (at the 1000-level or higher) from amongst Health Sciences, Rehabilitation Sciences, or Communication Sciences and Disorders courses, may be taken in any Specialization or Honors Specialization degree or module in the School of Health Studies.</p> <p>Rest Free Electives</p>	<p>HSS 4101 Development and Evaluation of Health Programs (Similar to HLTH 303 Program Planning and Evaluation Course)</p> <p>HSS 4102 Developmental Origins of Health and Disease (similar to HLTH 310)</p> <p>1 optional HSS course</p> <p>7 electives</p>	<p>HE400 – Multidisciplinary Seminar on Critical Health Issues</p> <p>1.5 restricted elective credits selected from: HE330 Human Nutrition and Health, HE401 Case Based Problem Solving in the Health Sciences, HE410 Aging and Health, HE411 Critical Perspectives in Public Health, HE430 (Advanced Nutrition and Chronic Disease), HE431 (Pathophysiology), HE432 (Biomedical Virology), HE433 (Biochemical Basis of Disease), HE434 (Immunology), HE435 (Exercise Is Medicine), HE440 (Special Topics), HE450 (Directed Studies), HE490* (Thesis – 2 terms);</p> <p>3.0 elective credits (Refer to Notes 1, 2 and 3; must be approved by the Health Sciences Co-ordinator or designate)</p>	<p>- 1.0 credit (1 course) from:</p> <ul style="list-style-type: none"> - HLTH 4907 - Capstone Course – Group Research Project - HLTH 4909 - Capstone Course – Field Placement and Research Project - HLTH 4910 - Honours Individual Research Thesis <p>OR</p> <ul style="list-style-type: none"> - 1.0 credit in: HLTH 4906 - Capstone course - Research Essay
Source	http://ugradcalendar.uwaterloo.ca/page/AHS-Honours-Health-Studies-2	https://academiccalendars.romcmaster.ca/preview_program.php?catoid=38&pooid=20624&returnto=8071	http://www.westerncalendar.uwo.ca/Modules.cfm?ModuleID=21161&SelectedCalendar=Live&ArchivelD=	http://catalogue.uottawa.ca/en/undergrad/honours-bachelor-health-sciences/#text	https://academic-calendar.wlu.ca/program.php?cal=1&d=1912&p=4109&s=897&y=77	https://calendar.carleton.ca/undergrad/undergradprograms/healthsciences/#Health_Sciences_with_Concentration_BHSc_Honours
Required BIOL, CHEM, Human BioHealth Courses	<p>BIOL 130, BIOL 130L, CHEM 120, CHEM 120L, CHEM 123, 123L, BIOL 273, BIOL 373, KIN 217, BIOL 239, HLTH 310, HLTH 340 or 341</p> <p>1 additional BioHealth course</p> <p>= 4 BIO (w 1 lab), 2 CHEM (w 2 labs), 1 KIN, 3 HLTH = 10 total</p> <p>BIOL 130, BIOL 130L, CHEM 120, CHEM 120L, CHEM 123, 123L, BIOL 273, BIOL 373, KIN 217, BIOL 239, HLTH 310, HLTH 340 or 341</p> <p>1 additional BioHealth course</p> <p>= 4 BIO (w 1 lab), 2 CHEM (w 2 labs), 1 KIN, 3 Bio-HLTH = 10 total lecture courses + 3 lab courses (2 Chem, 1 Bio)</p>	<p>Cellular and Molecular Biology (2 terms), Intro Chemistry I & II (labs included), Human Physio & Anatomy I & II (2nd year, incl labs), 2nd Year Cell Bio (Inquiry), HLTHSCI 2E03 Inquiry II (Biochemistry), HLTHSCI3E03 (sometimes Biohealth depending on topic)</p> <p>= 3 BIO/CellBio, 2 CHEM (w 2 labs), 2 physio/anatomy (w 2 labs), 1 BIOCHEM, 1 HLTHSCI Inquiry</p> <p>= 9 total including labs incorporated into 4 of the courses</p>	<p>Biology 1201A/B or 1001A/B: General Biology 1 (incl lab)</p> <p>Biology 1202A/B or 1002A/B: General Biology 2 (incl lab)</p> <p>Health Sciences 2300A/B, Functional Human Gross Anatomy (incl lab)</p> <p>= 2 BIO (w 2 labs), 1 anatomy (with lab)</p> <p>= 3 total incl labs incorporated into the courses</p> <p>If students do Health Sciences with Biology Specialization they would take 4 CHEM courses and 9 additional BIO courses</p>	<ul style="list-style-type: none"> • ANP1105 Human Anatomy and Physiology I • CHM1311 Principles of Chemistry 1 (incl lab) • ANP1106 Human Anatomy and Physiology II • BIO1140 Introduction to Cell Biology (incl lab) • HSS1100 Microbiology and Immunology HSS 2305 Molecular Mechanisms of Disease (similar to HLTH 341) HSS 3106 Pharmacology: Mechanisms and Compliance HSS 3303 Environment and Health (Similar to HLTH 370: Ecological Determinants of Health and HLTH 340: Environmental Toxicology and Public Health) HSS 4102 Developmental Origins of Health and Disease (similar to HLTH 310) <p>= 10 total including labs incorporated into 2 of the courses (Chem, Cell Bio)</p>	<p>BI110 – Unifying Life Processes (incl biweekly tutorial)</p> <p>BI111 – Biological Diversity and Evolution (incl biweekly tutorial)</p> <p>CH110 – Fundamentals of Chemistry 1 (incl lab)</p> <p>CH111 – Fundamentals of Chemistry 2 (incl lab)</p> <p>HN210 - Functional Human Anatomy (lab)</p> <p>HN220/KP222 – Human Physiology (incl lab)</p> <p>CH202 – Organic Chemistry 1 (incl lab)</p> <p>CH203 – Organic Chemistry 2 (incl lab)</p> <p>BI236 – Cell and Molecular Biology</p> <p>CH250 – Introductory Biochemistry (incl lab)</p> <p>3 BIO, 5 CHEM (5 labs), 1 PHYSIO (lab), 1 ANATOMY (lab)</p> <p>= 10 total incl labs incorporated into 7 of the courses</p>	<p>8 total - 4 Biology (BIO 1&2, Intro Genetics, Cellular Biochem), 2 Chemistry, 2 HLTH (Molecular and Cellular Pathology, Immunity and Immune-related disorders)</p>
Customization (minors, specializations, etc.)	<p>Gerontology Minor</p> <p>Aging Studies Option</p> <p>Health Informatics Option</p> <p>Pre-clinical Specialization</p> <p>Health Research Specialization</p>	<p>Biomedical Sciences Specialization</p> <p>Child Health Specialization</p> <p>Global Health Specialization</p>	<p>Health and Aging Specialization</p> <p>Health Promotion Specialization</p> <p>Health Sciences with Biology Specialization</p> <p>Rehabilitation Sciences Specialization (and a Major)</p>	<p>Population and Public Health Option</p> <p>Technologies and Innovation in Healthcare Option</p> <p>Integrative Health Biosciences Option</p>	<p>Management Option</p> <p>Biology Minor</p> <p>Chemistry Minor</p> <p>Psychology Minor</p>	<p>Concentrations:</p> <ul style="list-style-type: none"> - Biomedical Sciences - Health Throughout the Lifespan - Disability and Chronic Illness - Global Health - Environment and Health (Double concentration is an option as well)
Interesting Opportunities	<p>Accelerated master's degree</p> <p>Joint honours degree (Health Studies and Psychology)</p>	<p>Collaboration and Peer Tutoring course - three units (1 course) taken over four year span, encouraging formal and informal life-long learning community</p>	<p>Combine your degree with Honors Business Administration (HBA) from the Ivey Business School (5 Years)</p>	<p>Available in French</p>	<p>Management Option provides fundamental training in key areas of business such as the theories and process of management, marketing, finance, accounting, organizational behaviour, microeconomics and macroeconomics.</p>	<p>Students can take advantage of unique summer research internships, the co-curricular volunteer program, and international alternative break opportunities.</p> <p>Degree planning guides are provided online.</p>
Website	https://uwaterloo.ca/public-health-and-health-systems/future-undergraduates/programs/health-studies	https://bhsc.mcmaster.ca/	http://www.uwo.ca/fhs/shs/	https://health.uottawa.ca/	https://www.wlu.ca/programs/science/undergraduate/health-sciences-bsc/index.html	https://carleton.ca/healthsciences/health-sciences/undergraduate/
ADMISSIONS						
Required Entrance Grade	Regular - Low 80s Co-op - Mid 80s Minimum 70% in required courses	Minimum of 90% required for consideration	Mid to high 80s	Low 80s	Admission range of mid 80s	Cut-off Range: 85-88%
Required High School Courses	<p>ENG4U</p> <p>One of: MHF4U, MCV4U, MDM4U</p> <p>SBI4U</p> <p>SCH4U</p>	<p>ENG4U</p> <p>One of: MHF4U, MCV4U, MDM4U</p> <p>SBI4U</p> <p>SCH4U</p> <p>One non-math; non-science; non-technology 4U/M credit</p>	<p>Grade 12U English (ENG4U)</p> <p>Grade 12U Biology (SBI4U)</p> <p>One of:</p> <ul style="list-style-type: none"> - Grade 12U Advanced Functions - Grade 12U Calculus and Vectors - Grade 12U Math of Data Management 	<ul style="list-style-type: none"> • English 4U or Français 4U • Biology 4U • Chemistry 4U • One of the following: <ul style="list-style-type: none"> o Advanced Functions 4U o Calculus and Vectors 4U o Physics 4U 	<p>Advanced Functions at 60%</p> <p>Biology at 60%</p> <p>Chemistry at 60%</p> <p>English at 60%</p>	<p>Ontario Secondary School Diploma</p> <p>Minimum of six 4U or M courses including:</p> <ul style="list-style-type: none"> - Advanced Functions - Two of Biology, Chemistry, Earth and Space Sciences, or Physics (no grades below 60%)
Additional Admission Requirements		Level 1 Supplementary Application required, admission is by selection	Students considering Honours Specialization in Health Sciences with Biology will also need Chemistry SCH4U			Calculus and Vectors is strongly recommended 4U English is recommended
How to Apply	Directly to program via OUAC	Directly to program via OUAC		Directly to program via OUAC	Directly to program via OUAC	Apply through OUAC

EXPERIENTIAL LEARNING/CO-OP						
Co-op Offered?	Yes	No	No (for Science, not Health Science)	No (according to OJAC)	Yes (apply at the end of first year)	No
Length of Work Terms	4 months (minimum 12 weeks)	N/A	N/A	n/a	10 weeks	NA
Number of Work Terms	4, with option of 5	N/A	N/A	n/a	2 (usually in the summers following their second and third years.)	NA
Paid Co-op?	Yes	N/A	N/A	n/a	Yes	NA
Co-op Fees	\$709	N/A	N/A	n/a	\$348.16	NA
Alternatives to Co-op (for example, internship course)	EDGE certificate for Regular stream	Ample opportunities for projects in health research, community engagement, peer tutoring, and more.	Community engaged learning courses,	Nothing listed	Co-curricular record - volunteer work, campus clubs, leadership programs, student exchanges	Students can take advantage of unique summer research internships, the co-curricular volunteer program, and international alternative break opportunities. Experiential learning activities incorporated in courses.
Main Message Presented to Future Students	Focus on preventing illness, not simply treating people once they get sick. At Waterloo, you'll learn how to promote healthy lifestyles, improve health care systems, and bring together the science and the social aspects of health. You'll graduate with the skills to tackle global health epidemics, transform public health policy, and pave the way for new medical breakthroughs.	Health Sciences is the only program in Ontario that draws on the full range of departments within health sciences, including clinical departments of medicine, pathology and molecular medicine, psychiatry and behavioural neurosciences, clinical epidemiology and biostatistics.	Undergraduate students in the School of Health Studies develop an appreciation for emerging global health issues and are inspired to think strategically about innovative solutions.	Students will build on a foundation in biomedical sciences to integrate social and environmental health determinants in the study of health communication, disability and illness issues, pharmacology and nutrition. Significant training in health research methodologies is provided through courses in statistics, quantitative and qualitative approaches to research, epidemiology and health program development and evaluation.	Laurier's Health Sciences degree is designed for students who are primarily interested in pursuing postgraduate opportunities in health-related fields, such as medicine, dentistry, pharmacy, physiotherapy, public health, and epidemiology	Carleton's Bachelor of Health Sciences (BHSc) is a unique interdisciplinary program designed to provide students with the knowledge and skills required to succeed at professional schools and in the rapidly changing worlds of healthcare and health research.
CAREERS/FURTHER EDUCATION						
Does the Program Prepare Students for Further Education?	Yes	Yes	Yes	Yes	Yes	Yes
Suggested Professional/Graduate Programs	While the full range of further education depends on your individual interests, these are common areas where graduates pursued a master's, PhD, or other professional program. Medicine Nursing Pharmacy Speech language pathology Law Epidemiology Public health Health informatics	Graduates from this program have many options: Apply to a professional school (i.e. Medicine, Dentistry, Rehabilitation Sciences) Apply to graduate school to pursue research in the basic sciences, clinical research, MBA or MHA programs. Obtain employment in the health care field (i.e. community or government agencies, insurance or pharmaceutical industries) They have a list of links to a variety of postgraduate options: https://bhsc.mcmaster.ca/current-students/post-grad/ They also have a chart of various "next steps" for their graduates and the number who have gone on for each step. Medicine is the winner by far with 987 (the next highest is Graduate Studies: 211)	Some graduates of the School of Health Studies pursue research- or course-based graduate degrees in areas such as: Health Promotion Health and Aging International Development Health and Information Science Health Ethics Biostatistics Many graduates of the School of Health Studies pursue professional degrees in areas such as: Education Medicine Law Physical/Occupational Therapy Speech-Language Pathology/Audiology Dentistry	students will be well-prepared to undertake MSc programs in interdisciplinary health sciences or epidemiology, or work in health promotion or biomedical research. Graduates may choose to pursue careers in public or private health agencies, non-governmental health organizations or in community health programs. Graduates may also go on to further studies in medicine, rehabilitation studies, dentistry or pharmacy. Our interdisciplinary focus enhances the quality and maturity of future clinicians and health professionals.	https://students.wlu.ca/programs/science/health-sciences/careers.html Sample Further Education Programs within the First Year After Graduation Doctor: Medicine, Chiropractic, Dentistry, Optometry, Pharmacy, Naturopathic Medicine. Master's degree: Public Health, Health Informatics, Psychology, Physiotherapy, Occupational Therapy, Epidemiology. Bachelor's degree: Nursing, Radiation Therapy, Education. College program: Paramedicine, Respiratory Therapy, Pharmacy Technician.	carleton.ca/healthsciences/ Master of Science in Health: Science, Technology and Policy Master of Science: Health Sciences PhD: Health Sciences The BHSc program offers an interdisciplinary foundation in health science that can prepare you for postgraduate education in biomedical research and professional fields like medicine, dentistry, or veterinary medicine, as well as for careers in health-related fields like public health, global and environmental health law and policy, and health services and community healthcare.
Promoted Future Careers	Your Health Studies degree lays the foundation for a career in health professions such as medicine, physiotherapy, dentistry, and occupational health. Or, go on to pursue an accelerated master's degree in our School of Public Health and Health Systems. Recent graduates Family Physician - London Lambeth Medical Clinic Health Promotion Specialist - Region of Peel Tobacco Cessation Specialist - Canadian Cancer Society Epidemiologist - University Health Network Clinical Research Coordinator - The Centre for Dermatology Policy Analyst - Employment & Social Development Canada Speech Language Pathologist - Peel District School Board	All the listed "careers" involve further education (Medicine, Law, Veterinary, Physiotherapy, etc.)	http://www.uwo.ca/fhs/shs/students/after_grad/careers.html Site provides a list of sample careers in these areas: Government Private Sector Medical Careers Alternative Therapy	Public or private health agencies Non-governmental health organizations Community health programs Health policy researchers and consultant Social and community service worker Occupational health officer / inspector	Sample Jobs within the First Year After Graduation lab technician pharmaceutical representative quality assurance technician research assistant	Business, Dentistry, Disability and chronic illness, Environment and health, Health, Health and safety officer, Health community worker, Health program evaluator, Health project manager/administrator, Health promotional coordinator, Health researcher or policy analysis, Healthcare and regulatory systems, Indigenous health, Infectious diseases and pandemics, Law, Lifespan studies, Medicine, Midwifery, Naturopathy, Nursing, Occupational therapy, Optometry, Paramedic, Pharmaceutical industry, Physiotherapy, Social work, Teaching
MARKETING CONTENT						

<p>Key Messages (ex. Selling features, statistics, etc)</p>	<p>Graduate success (graduate statistics, sample jobs/programs), Co-op, flexibility and academic options, experiential learning</p>	<p>Inquiry-based learning, four year program (option to graduate after 3 years), small class sizes, full teaching hospital on campus, Health Sciences library, anatomy labs - use of cadavers for the study of the structure of the human body</p>	<p>Academic counsellor names and contact information is a left-side item that is available on every School of Health Studies page.</p>	<p>The Undergraduate Research Opportunity program (UROP) allows you to contribute hours to a research project conducted by a professor of your choice in second or third year.</p> <p>State-of-the-art labs and facilities, Hands-on clinical experience from as early as second year of your bachelor's to boost your work profile.</p> <p>Employment rate (93.2%-96.6%) exceeding provincial average</p> <p>Largest bilingual university in the world</p>	<p>The Department of Health Sciences at Laurier is designed for students interested in pursuing postgraduate opportunities in health-related fields.</p> <p>Students will approach the study of health through a combination of fundamental courses in biology, chemistry, psychology and math, as well as applied social sciences health courses. Exposure to health care practitioners and applied researchers will lend relevance and scope to the academic curriculum.</p> <p>Site offers a year-to-year experience guide and checklists https://students.wlu.ca/programs/science/health-sciences/experience-guide.html</p>	<p>The emphasis on interdisciplinarity will provide you with the breadth of knowledge and experience that medical schools and employers look for (e.g. science, global and international studies, journalism and evidence-based practices and policy, architecture and the built environment)</p> <p>Located in nation's capital - numerous organizations, agencies, research institutes and hospitals in the region that provide a knowledge base unique to Ottawa</p> <p>Hands-on approach - laboratories, workshops and seminars beginning in first year; fourth year capstone experience</p>
<p>Student Life Content (ex. Clubs, activities, volunteering, etc)</p>	<p>Student society, Living-Learning Community, athletics (varsity or intramural), international exchange</p>	<p>Lounge, peer tutoring, BHSc fashion show, BHSc musical, McMaster clubs</p>	<p>Community service learning, international experiences, volunteering (to gain experience), Health Studies Students' Association and other clubs</p>	<p>Mentorship, student associations, Sport Services (athletics); jobs on campus</p>	<p>Health Sciences Students' Association, Faculty of Science Students' Association, National Health Sciences Students' Association</p> <p>The admissions site give lots of information about co-curricular record, clubs, Students' Union (and on-campus events), Homecoming/"Go Hawks Go", Residence Council, social scene</p>	<p>Volunteer opportunities to gain experience, co-curricular record</p>

FACULTY OF ARTS – UNDERGRADUATE AFFAIRS GROUP

*Curricular items approved by
Arts Undergraduate Affairs Group: May 28, 2020
Arts Faculty Council: June 16, 2020*

**REPORT TO SENATE UNDERGRADUATE COUNCIL
October 06, 2020**

1. **COURSE CHANGES** [for approval] – Arts courses cross-listed with courses in other faculties
ENGL (ERS - ENV)
FINE (CS - MATH)
GSJ (HLTH - AHS)
PHIL (REC - AHS)
SOC (REC – AHS)

2. **ACADEMIC PLAN CHANGES – MINOR MODIFICATIONS** [for approval]
Cultural Identities Minor
Three-Year General English – Literature and Rhetoric

:mt

COURSE CHANGES (for approval)

English Language & Literature

Current Catalog Information

ENGL 248 (0.50) LEC Literature for an Ailing Planet

Can the humanities change how cultures relate to environments and the natural world?
This course surveys environmental thought in works of literature and in popular culture.

No Special Consent Required

Effective 01-SEP-2021

New Cross Listing :

ERS 288

Rationale :

To add cross-listing. The content and methodology of this course will diversify ERS students' learning experiences by offering them ways of thinking about environmental issues through perspectives found in literary and rhetorical studies. This new cross-listing has been approved by both the Department of English and Literature and School of Environmental, Resources, and Sustainability.

Fine Arts

Current Catalog Information

FINE 383 (0.50) STU Computational Digital Art Studio

An upper-level studio course to create computational projects that function as art works and aesthetic experiences. Students will work in interdisciplinary teams to combine computer science principles with fine art technical and conceptual skills.

[Offered: W]

No Special Consent Required

Requisites :

Prereq: FINE 229, FINE 257, CS 105, CS 106; one of CS 100, CS 200, CS 230;
Level at least 3A

Cross-listed as:

CS 383

Effective 01-SEP-2021

Description Change:

An upper-level studio course to create computational projects that function as art works and aesthetic experiences. Students will work in an interdisciplinary environment to combine computer science principles with fine art technical and conceptual skills. [Offered: W]

Requisite Change :

Prereq: CS 105, CS 106; One of FINE 228, FINE 229, FINE 247; FINE 257 or VCULT 200; one of CS 100, 200, 230; Level at least 3A

Rationale :

To change description and prerequisites (both offerings). The change to the description highlights the way the course is taught, rather than a teamwork component that is not a focus of the course as it has been delivered. The changes to prerequisites is to add alternative courses that still enable

students to be comparably prepared. As is often the case with cross-listed courses, prerequisites differ slightly for the respective FINE 383 and CS 383 student audiences.

Philosophy

Current Catalog Information

GSJ 260 (0.50) LEC Social Determinants of Health

Enormous inequalities in health persist both within and between countries. These inequalities can be seen across various axes including gender, ethnicity, and access to material resources. As such, those relatively deprived/underprivileged have substantially poorer health than those better off. The course will demonstrate the extent of inequalities in health, and it will explore current theories explaining how inequalities arise, focusing on behavioural/cultural, psychosocial, and structural/material explanations. The course will also investigate the role of various approaches to economic and social policy in creating or reducing inequalities.

No Special Consent Required

Cross-listed as: HLTH 260

Effective 01-SEP-2021

Rationale :

To revise the prerequisites. The addition of SOC 101 as an option for fulfilling the prerequisite will make HLTH 260 more accessible to students outside of Applied Health Sciences. SOC 101 used to be a required prerequisite for HLTH 260 before it was replaced by AHS 107 as an introductory sociology course for students in the Faculty of Applied Health Sciences. Since all Applied Health Sciences students take AHS 107 in first year, the prerequisite of 'Level at least 2B Applied Health Sciences students' has been removed and replaced with AHS 107. Since HLTH 260 will be a required course in the new Addictions, Mental Health, and Policy Minor, the addition of SOC 101 as one of the prerequisite options will also make it easier for students outside of AHS to adopt the Minor (since SOC 101 is a common course taken in many different programs). Permission to include SOC 101 as one of the prerequisite options for HLTH 260 was provided by the Department of Sociology and Legal Studies. HLTH 260 is an elective in the Social Policy and Social Action Specialization for students majoring in social development studies. The Specialization has been renamed in the Calendar so the prerequisites have been updated to reflect the new name. The prerequisites have not been added to GSJ 260 cross-listing since students in the Gender and Social Justice program do not require the prerequisites.

Current Catalog Information

GSJ 280 (0.50) LEC Applied Public Health Ethics

This course explores ethical issues in health sciences, emphasizing population and public health. The course begins by considering canonical ethical theories and frameworks for applying these theories to population health. Specific topics in

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population health, including the conflict between public health and individual autonomy, the just distribution of health resources, and responsibility for health outcomes will then be discussed. The overall objective of the course is to provide students with tools to discuss and assess ethical arguments and to form their own views on issues within population health.

No Special Consent Required

Cross-listed as: HLTH 280

Effective 01-SEP-2021

Subject/Catalog Nbr Change:

GSJ 380

Requisite Change :

Prereq: Level at least 2A. Antireq: GSJ 280/HLTH 280

Rationale :

To revise the course level/number and add an antirequisite (both offerings) and add a prerequisite (GSJ offering only). The new course number reflects that the course will now become a third year offering, as the content and level of critical thinking required are more appropriate to be at a third-year level rather than second-year level. The addition of the antirequisite of HLTH 280/GSJ 280 is to prevent students who already took this course from enrolling since there would be too much overlap in content. The addition of the prerequisite to GSJ 380 is to bring it in line with the HLTH 380 offering and is in keeping with a third-year course. The Faculties of Applied Health Sciences and Arts are submitting these changes for approval concurrently to the October 06, 2020, Senate Undergraduate Council meeting.

Current Catalog Information

PHIL 206 (0.50) LEC

Philosophy of Sport

This course uses the tools of philosophy to ask important questions about sport, such as: What is sport? What is the value of sport for participants or fans? Are violent sports unethical? Should performance enhancing drugs be banned? What is luck, and how is it different from skill?

No Special Consent Required

Effective 01-SEP-2021

New Cross Listing :

REC 206

Rationale :

To add cross-listing. REC 206 is to be cross-listed course with PHIL 206, Philosophy of Sport, offered by the Faculty of Arts. Students in the Department of Recreation and Leisure Studies benefit from exploring ethical issues in sport from diverse perspectives and this course offers a unique philosophical perspective, taught by a member of the Department of Philosophy. The course complements existing courses in Recreation and Leisure Studies and provides students with philosophical ways of critically reflecting on sport in society. This course is about ethical and conceptual issues that arise in sports. In accordance with Faculty of Arts cross-listing guidelines, this course has significant shared content with Recreation and Leisure Studies. Recreation and Leisure Studies students are one of the intended audiences for the course. The Faculties of Arts and Applied Health Sciences are submitting these changes for approval concurrently to the October 06, 2020, Senate Undergraduate Council meeting.

Sociology and Legal Studies

Current Catalog Information

SOC 210 (0.50) LEC Sociology of Sport

This course examines sport in modern societies and the distinctive features of Canadian sport. Attention is directed to the relationship between sport and other institutions, including the economy and political system. Contemporary issues, including racial and gender inequality and controversies over violence and drugs are also considered.

No Special Consent Required

Requisites : Prereq: SOC 101/101R or 120R
Cross-listed as: REC 203

Effective 01-SEP-2021

Rationale :

To revise the prerequisites for REC 203. The Department of Recreation and Leisure studies has proposed to remove SOC 101 as a required course from all Recreation programs. As such, AHS 107 is being added as a prerequisite to REC 203 (cross-listed with SOC 210), Sociology of Sport, in order for all students within the Department of Recreation and Leisure studies to enrol. This change will also allow other students from the Faculty of Applied Health Sciences to access REC 203. AHS 107 is not being added as a prerequisite to SOC 210 as AHS 107 is specific to AHS students only. SOC 120R was removed as the course was inactivated effective September 2014. The Department of Sociology and Legal Studies has been made aware of this change.

End of Report

2. ACADEMIC PLAN CHANGES – MINOR MODIFICATIONS [for approval]

Effective date: 01 September 2021

2.1. Cultural Identities Minor

Rationale: To update the list of language and culture subject codes in the Cultural Identities minor. These subject codes (ARABIC and MOHAWK) were newer language additions created in the last few years, and should have been added to the list of language and culture subjects in the CI minor requirements.

Change:

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- two courses from any of the following language and culture subjects: **ARABIC**, ASL, CI, CHINA, CROAT, DUTCH, EASIA, FR, GER, GRK, ITAL, ITALST, JAPAN, JS, KOREA, LAT, **MOHAWK**, PORT, REES, RUSS, SI, SPAN
-

2.2. Three-Year General English – Literature and Rhetoric

Rationale: In the September 2020 SUC submission, two course additions (ENGL 425, 471) were accidentally omitted from the Literature category of this plan, so the update reflects the correction needed.

Change:

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- Literature: two of ENGL 305A, ENGL 305B, ENGL 308, ENGL 310A, ENGL 310B, ENGL 310C, ENGL 313, ENGL 315, ENGL 316, ENGL 318, ENGL 322, ENGL 324, ENGL 325, ENGL 330A, ENGL 330B, ENGL 342, ENGL 343, ENGL 344, ENGL 345, ENGL 346, ENGL 346R, ENGL 347, ENGL 348, ENGL 350A, ENGL 350B, ENGL 361, ENGL 362/THPERF 386, ENGL 363/THPERF 387, ENGL 364, ENGL 367, ENGL 410/GSJ 410, ENGL 411, ENGL 412, **ENGL 425**, ENGL 430A, ENGL 430B, ENGL 451A, ENGL 451B, ENGL 460A, ENGL 460B, ENGL 460C, ENGL 460D, ENGL 463/GSJ 463, **ENGL 471**, ENGL 484, ENGL 485, ENGL 486

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September 22, 2020

TO: Rebecca Wickens, Associate University Secretary, Secretariat

FROM: Dan Davison, Associate Dean, Undergraduate Studies, Faculty of Engineering

SUBJECT: Items for Approval at October 6, 2020 Senate Undergraduate Council

ALL CURRICULUM CHANGES ARE EFFECTIVE SEPTEMBER 2021 UNLESS OTHERWISE NOTED.

1. New Courses

- 1.1 Electrical and Computer Engineering
- 1.2 Biomedical Engineering
- 1.3 Mechanical and Mechatronics Engineering
- 1.4 Management Sciences
- 1.5 Society, Technology & Values Centre
- 1.6 Systems Design Engineering

2. Course Changes

- 2.1 Conrad School of Entrepreneurship & Business
- 2.2 Electrical and Computer Engineering
- 2.3 Biomedical Engineering
- 2.4 Mechanical and Mechatronics Engineering
- 2.5 Management Sciences
- 2.6 Systems Design Engineering

3. Course Inactivations

- 3.1 Conrad School of Entrepreneurship & Business
- 3.2 Management Sciences

4. New Academic Plans

- 4.1. Computing Option
- 4.2. Computer Engineering Option

5. Academic Plans (Major Modifications)

- 5.1. Software Engineering Option

6. Academic Plans (Minor Modifications)

6.1. Systems Design Engineering

6.1.1. Biomedical Engineering

6.2. Electrical and Computer Engineering

6.2.1. Electrical Engineering and Computer Engineering

6.3. Management Sciences

6.3.1. Management Engineering

6.3.2. Management Sciences Option

6.4. Mechanical and Mechatronics Engineering

6.4.1. Mechatronics Engineering

6.5. Complementary Studies Electives

6.6. Options

6.6.1. Artificial Intelligence Option

6.6.2. Biomechanics Option

6.6.3. Entrepreneurship Option

6.6.4. Life Sciences Option

6.6.5. Mechatronics Option

6.6.6. Science, Technology, and Values Option

6.6.7. Statistics Option

7. Academic Regulations

7.1. Options, Specializations and Electives for Engineering Students

NEW COURSES (for approval)

Electrical & Computer Engineering

Effective 01-SEP-2021

ECE 457C (0.50) LEC, PRJ, TUT Reinforcement Learning
Introduction to reinforcement learning (RL) theory and algorithms for learning decision-making policies in situations with uncertainty and limited information. Topics include Markov decision processes, classic exact/approximate RL algorithms such as value/policy iteration, Q-learning, State-action-reward-state-action (SARSA), Temporal Difference (TD) methods, policy gradients, actor-critic, and Deep RL such as Deep Q-Learning (DQN), Asynchronous Advantage Actor Critic (A3C), and Deep Deterministic Policy Gradient (DDPG). [Offered: S, first offered Spring 2022]

Requisites : Prereq: One of ECE 203, MTE 201, STAT 206, SYDE 212. Antireq: ECE 493 Quantum Information Processing Devices

Rationale : This course has run as a special topics course (ECE 493 topic 22 Quantum Information Processing Devices) for the past two years and it has been received well by students and enrolment has been strong.

Dean of Engineering

Effective 01-SEP-2021

BME 581 (0.50) LEC, TUT Ultrasound in Medicine and Biology
Ultrasound physics, scanning modes, data acquisition schemes, transducer basics, wave-matter interactions; biomedical applications of ultrasound including imaging, flow measurements, microscopy, therapy, drug delivery. [Offered: F]

Requisites : Prereq: One of BME 386, PHYS 395, 396. Antireq: BME 487 Biomedical Signals-Ultrasound in Medicine and Biology

Rationale : Ultrasound is an important biomedical signal modality and there is no other course at the University of Waterloo with this content. This course has been offered as a special topics course, BME 487, and had strong enrolment. (Special Topics in Biomedical Signals - Ultrasound in Medicine and Biology).

Mechanical and Mechatronics Engineering

Effective 01-SEP-2021

MTE 321 (0.50) LEC, TUT Design and Dynamics of Machines
Principles of the geometry and motion in linkages and mechanisms. Computer-aided kinematic and kinetic analysis of mechanisms. Synthesis of mechanisms. Static failure and yield criteria in ductile and brittle materials. Fatigue failure criteria due to fluctuating stresses. Shaft design under static and fluctuating loads. Shaft

components, including shoulders, keys and keyways. Deflections in shafts. [Offered: W, S]

Requisites : Prereq: MTE 203, 210, SYDE 182; Level at least 3A Mechatronics Engineering.
Antireq: ME 321

Rationale : This new course replaces ME 321 (3A core in the mechatronics plan) with MTE 321. The offering of ME 321 to mechatronics students has always differed from the offering to mechanical students. Further course revisions were made to the mechatronics offering to eliminate overlapping material with a subsequent course (MTE 322 - only taken by mechatronics students). Consequently, the material differs enough from ME 321 to warrant a new course number and description. A student survey supports the calendar change (students indicated material overlap in ME 321 and MTE 322). The proposed calendar description reflects the material taught in winter and spring 2020.

Management Sciences

Effective 01-SEP-2021

MSCI 302 (0.50) LAB, LEC Engineering Design Methods

This course provides a survey of engineering design theories, methods, and tools as they pertain to need finding, problem formulation, and solution generation and evaluation. Students learn about different approaches to design project and team management and communication, as well as the relationship between design and environmental, social, and economic sustainability. Students gain experience in the entire design cycle by working on a number of small design problems throughout the term. Students form teams and work on a term-long project centred on need finding and problem formulation. This activity is expected to result in a project topic that can be further developed in the capstone design series of courses (MSCI 401/402).
[Offered: F, first offered Fall 2023]

Requisites : Prereq: Level at least 3B Management Engineering

Rationale : This new course allows us to improve our curriculum and enhance the capstone project sequence. Management engineering students in 3B will gain a better foundation in engineering design and establish stronger projects and teams for their fourth year design projects. In the current curriculum, student and instructor feedback have identified that instruction on capstone prior to 4A would help. Currently, MSCI 401 has evolved to include lectures that the students find helpful and want more of, but 401 is supposed to be a project oriented course and unfortunately, this material comes too late to help many students. With the creation of MSCI 302, we can move the MSCI 401 lecture material and add additional material about engineering design methods before MSCI 401 to improve the capstone design experience. In addition, a lot of time is currently spent on 401 on forming teams, finding advisors, and finding a suitable topic. With the creation of 302, this "project setup" work can occur in 302 so that all students are

able to start 401 with a project and team in hand and are ready to begin the design process.

Effective 01-SEP-2022

MSCI 546 (0.50) LEC, TUT Advanced Machine Learning

This course provides a deeper understanding of machine learning (ML) techniques by utilizing students' prior background in ML and operations research to understand the drivers of ML methodologies rather than using black-box processes. The course first reviews supervised and unsupervised learning methods, and then dives deeper into their assumptions, mathematical models, and underlying algorithms to help students systematically develop and enhance ML processes. Using the same approach, the course covers more advanced topics in ML, such as neural networks and reinforcement learning. Application areas within this course may include, but are not limited to healthcare, energy, sports, transportation, and manufacturing. [Offered: W, first offered Winter 2023]

Requisites :

Prereq: MSCI 332, 446. Antireq: MSCI 445

Rationale :

This new course is a replacement for MSCI 445 (Telecommunications). Machine learning is an area of great interest to our students, of which, many are being hired as data scientists. This course allows our students to go beyond the introductory material in MSCI 446 and to study the connection between machine learning models and optimization, which is a core area of our department. Many of our students have had to seek out machine learning and artificial intelligence courses in other departments, but they are often prevented from taking those courses because of scheduling conflicts or issues with prerequisites.

Society, Technology & Values Centre

Effective 01-SEP-2021

STV 208 (0.50) LEC Artificial Intelligence and Society: Impact, Ethics, and Equity

The objective of this course is to introduce students to ethical and social concerns relating to Artificial Intelligence (AI). These concerns include historical determinism, governance, utopianism, biopower, human rights, robo-ethics, justice, accountability, and fairness. An overview will be provided on these issues as they arise in areas like art, commerce, education, finance, journalism, law, healthcare, transportation, warfare, and work. [Note: This course is not technical. No background in AI is necessary or assumed. First offered Winter 2022]

Rationale :

Artificial Intelligence (AI) presents significant ethical and social challenges and concerns. As AI plays an ever-greater role in people's lives and in academic programs, a systematic consideration of these challenges and concerns, along with responses to them, becomes a pressing matter. The proposed course provides students with an overview of these issues in light of current scholarship and helps them to meet intelligently their professional responsibilities where AI is concerned.

Systems Design Engineering

Effective 01-JAN-2021

SYDE 599 (0.50) LEC, TUT Special Topics in Systems Design Engineering

This course deals with selected topics at the undergraduate level in environmental and societal systems, mechatronics and physical systems, or human factors and ergonomics. [Note: For a current list of offerings, see the associate chair of undergraduate studies. Offered: F,W]

Requisites : Prereq: Level at least 3A Engineering students
Rationale : Special topics courses will provide flexibility in offering new technical electives to students, and help us to reduce over subscription in other technical electives that has resulted from the transition to remote teaching. The various technical electives may change from year to year depending on availability of teaching faculty and students' interest in technical electives.

COURSE CHANGES (for approval)

Conrad Business, Entrepreneurship & Technology Ctr

Current Catalog Information

BET 210 (0.50) LEC Business Technology and Infrastructure

Modern organizations increasingly rely on a technological infrastructure that informs what can be accomplished, the prospects for long-term growth, and its overall competitiveness. In this course, students will learn about technologies such as enterprise resource management and platform management, understand how to plan for new technologies, evaluate existing systems, and obtain third party industry certifications on some in-demand business applications. [Offered: S]

No Special Consent Required

Effective 01-SEP-2021

Description Change: Modern organizations increasingly rely on a technological infrastructure that informs what can be accomplished, the prospects for long-term growth, and its overall competitiveness. In this course, students will learn about technologies such as enterprise resource management and platform management, understand how to plan for new technologies, evaluate existing systems, and obtain third party industry certifications on some in-demand business applications. [Offered: F,W,S]

Rationale : The addition of a fall and winter term of offering for this course due to significant increase in enrolment.

Current Catalog Information

BET 420 (0.50) LEC Entrepreneurship for Social Impact

This course explores how innovative approaches can address social problems, create organizations that make positive change, have significant social impact, and be sustainable and economically viable. Topics include the principles of social entrepreneurship, design thinking applied to identifying significant problems, innovative solutions for social impact, and identifying opportunities for social change. Students develop skills and tools for refining and implementing their ideas as well as measuring the success and value of mission-driven organizations. Through case studies, lectures, and workshops, students also develop skills in strategic thinking with a socially conscious business mindset to create high-impact ventures.

[Offered: F]

No Special Consent Required

Effective 01-SEP-2021

Description Change:

This course explores how innovative approaches can address social problems, create organizations that make positive change, have significant social impact, and be sustainable and economically viable. Topics include the principles of social entrepreneurship, design thinking applied to identifying significant problems, innovative solutions for social impact, and identifying opportunities for social change. Students develop skills and tools for refining and implementing their ideas as well as measuring the success and value of mission-driven organizations. Through case studies, lectures, and workshops, students also develop skills in strategic thinking with a socially conscious business mindset to create high-impact ventures. [Offered: F,S]

Rationale :

The addition of a spring term offering for this course due to significant increase in enrolment.

Current Catalog Information

BET 430 (0.50) LEC Sales Fundamentals

The one thing every new venture needs whether small or large, not-for-profit or for-profit, startup or part of an already mature business, is sales. This course is designed to help create and grow a successful business venture through personal marketing and sales efforts. Coursework examines key sales technologies, networking techniques, the use of marketing in sales, the sales process, and assessing the value of a particular sale from both the perspective of customer impact and the financial/strategic impact on the organization. [Offered: F]

No Special Consent Required

Effective 01-SEP-2021

Description Change:

The one thing every new venture needs whether small or large, not-for-profit or for-profit, startup or part of an already mature business, is sales. This course is designed to help create and grow a successful business venture through personal marketing and sales efforts. Coursework examines key sales technologies, networking techniques, the use of marketing in sales, the sales process, and assessing the value of a particular sale from both the perspective of customer impact and the

Rationale : financial/strategic impact on the organization. [Offered: F,W]
The addition of a winter term offering for this course due to significant increase in enrolment.

Current Catalog Information

BET 450 (0.50) LEC Leadership

Leaders make things happen. Leaders make things possible. This course explores the relevant concepts, theories, and skills needed to lead successfully in any environment, from new ventures to change management in large corporations, government, and not-for-profits. Course topics include leadership and followership, group and team dynamics, change management, interpersonal dynamics, and supporting leadership skills such as self-awareness, conflict management, and communications.

Course topics will be enriched through a critical study of leadership exemplars in popular media. [Offered: W]

No Special Consent Required

Requisites :

Antireq: MSCI 411, SPCOM 204, 227

Effective 01-SEP-2021

Description Change:

Leaders make things happen. Leaders make things possible. This course explores the relevant concepts, theories, and skills needed to lead successfully in any environment, from new ventures to change management in large corporations, government, and not-for-profits. Course topics include leadership and followership, group and team dynamics, change management, interpersonal dynamics, and supporting leadership skills such as self-awareness, conflict management, and communications. Course topics will be enriched through a critical study of leadership exemplars in popular media. [Offered: F,W]

Rationale : The addition of a fall term offering for this course due to significant increase in enrolment.

Current Catalog Information

BET 460 (0.50) LEC Business Negotiations

We negotiate every day with potential employers, coworkers, merchants, service providers, customers, and suppliers. Negotiation is the art and science of securing agreements between two or more independent parties. It is a craft that must hold co-operation and competition in creative tension, and even the most experienced negotiators often fall prey to common biases and errors in judgment. This course is highly experiential; therefore, students will practice, reflect, analyze, and practice again. [Offered: W]

No Special Consent Required

Effective 01-SEP-2021

Description Change:

We negotiate every day with potential employers, coworkers, merchants, service providers, customers, and suppliers. Negotiation is the art and science of securing agreements between two or more independent parties. It is a craft that must hold co-operation and competition in creative tension, and even the most experienced negotiators often fall prey to common biases and errors in judgment. This course is highly experiential; therefore,

students will practice, reflect, analyze, and practice again. [Offered:
F,W]
Rationale : The addition of a fall term offering for this course due to significant
increase in enrolment.

Current Catalog Information

BET 470 (0.50) LEC Family Business

This course explores the business practices needed to manage, run, and work for family-owned ventures. The focus will be on those issues unique to family-businesses such as the interaction between family, management, and ownership. Family-controlled businesses are also characterized by challenges that put their continuity in serious jeopardy; and leadership and succession crises are the norm. Topics include, but are not limited to, the strengths and weaknesses of family businesses, managing family-business conflict, succession planning, professionalization, communication, new opportunity development, and strategic planning. [Offered: W]

No Special Consent Required

Effective 01-SEP-2021

Description Change: This course explores the business practices needed to manage, run, and work for family-owned ventures. The focus will be on those issues unique to family-businesses such as the interaction between family, management, and ownership. Family-controlled businesses are also characterized by challenges that put their continuity in serious jeopardy; and leadership and succession crises are the norm. Topics include, but are not limited to, the strengths and weaknesses of family businesses, managing family-business conflict, succession planning, professionalization, communication, new opportunity development, and strategic planning. [Note: Course offered when resources permit.]

Rationale : The term offered is removed due to variable resources to teach this course, and general lack of student interest. This course will be taught when there is sufficient demand.

Current Catalog Information

BET 580 (0.50) LEC Consulting

This course is useful for anyone considering working as a consultant, either for a consulting firm, as an independent entrepreneurial consultant, or as an internal consultant to large organizations. Some of the competencies skilled consultants have include understanding business needs from a holistic perspective, developing innovative ideas, expert people skills, influence, and change management. Course topics may also include key stages in the consulting process, issue diagnosis, managing difficult clients, consulting frameworks, analytical approaches to solving complex problems, engagement management, building a consulting toolset, change management processes, negotiation, and advanced presentation techniques. We will also cover aspects of the business of consulting. [Offered: F]

No Special Consent Required

Requisites : Prereq: Level at least 3A

Effective 01-SEP-2021

Description Change: This course is useful for anyone considering working as a consultant, either for a consulting firm, as an independent entrepreneurial consultant, or as an internal consultant to large organizations. Some of the competencies skilled consultants have include understanding business needs from a holistic perspective, developing innovative ideas, expert people skills, influence, and change management. Course topics may also include key stages in the consulting process, issue diagnosis, managing difficult clients, consulting frameworks, analytical approaches to solving complex problems, engagement management, building a consulting toolset, change management processes, negotiation, and advanced presentation techniques. We will also cover aspects of the business of consulting. [Offered: F,W]

Rationale : The addition of a winter term of offering for this course due to significant increase in enrolment.

Electrical & Computer Engineering

Current Catalog Information

ECE 240 (0.50) LAB, LEC, TUT Electronic Circuits 1

Introduction to electronic signal processing; operational amplifier circuits; diode device and circuits; MOS (metal-oxide semiconductor) and bipolar amplifier biasing networks; load-line analysis; diode, MOS and bipolar small-signal equivalent circuits; single-stage small-signal MOS and bipolar amplifiers; transistor switches.

[Offered: F, W]

No Special Consent Required

Requisites : Prereq: ECE 106, 140, MATH 119; Level at least 2A Computer Engineering or Electrical Engineering. Coreq: (ECE 205 or MATH 211)

Effective 01-SEP-2021

Description Change: Introduction to electronic signal processing; second-order circuits; operational amplifier circuits; diode device and circuits; metal-oxide-semiconductor (MOS) biasing networks; load-line analysis; diode and MOS small-signal equivalent circuits; single-stage small-signal MOS amplifiers; complementary metal-oxide-semiconductor (CMOS) logic circuits. [Offered: F, W]

Requisite Change : Prereq: ECE 106, 140, MATH 119; Level at least 2A Computer Engineering or Electrical Engineering or Software Engineering. Coreq: (ECE 205 or MATH 211 or MATH 213)

Rationale : Computer engineering students no longer take ECE 340 so we are shifting topics around between ECE 240 and ECE 340 to teach the basics to both Electrical and Computer students in ECE 240. The prerequisites have been updated to allow Software engineering students to take the course without the need for a course override.

Current Catalog Information

ECE 309 (0.50) LEC, TST, TUT Introduction to Thermodynamics and Heat Transfer
Macroscopic approach to energy analysis. Energy transfer as work and heat, and the

First Law of thermodynamics. Properties and states of simple substances. Control-mass and control-volume analysis. The essence of entropy, and the Second Law of thermodynamics. The Carnot cycle and its implications for practical cyclic devices. Introduction to heat transfer by conduction, convection, and radiation. Basic formulation and solution of steady and transient problems. Issues relevant to the cooling of electrical devices. [Offered: W,S]

No Special Consent Required

Requisites :

Prereq: MTE 202, 203; Level at least 3A Mechatronics Engineering. Antireq: ME 250, SYDE 381
MTE 309

Cross-listed as:

Effective 01-SEP-2021

Rationale :

This course (MTE 309) requires suitable preparation and background in order for students to be successful. There currently is nothing blocking students from any level or any program from enrolling into the course. The addition of prerequisites and antirequisites are intended to allow only students with proper preparation to enrol. Note: there is no requisite change to ECE 309.

Current Catalog Information

ECE 327 (0.50) LAB, LEC, TST, TUT Digital Hardware Systems

Design and modelling of digital hardware systems using a hardware description language. Development process. Impact of implementation technologies. Performance analysis and optimization. Functional verification. Timing analysis. Power analysis and optimization. Faults and testability. Reliability and fault tolerance.[Offered: W, S]

No Special Consent Required

Requisites :

Prereq: (ECE 222 or MTE 241); (ECE 224 or MTE 325); (ECE 124 or MTE 262 or SE 141); Level at least 3A Computer Engineering or Electrical Engineering or Mechatronics Engineering or Software Engineering or Computer Science/Digital Hdw Op

Effective 01-SEP-2021

Requisite Change :

Prereq: (ECE 222 or MTE 241); (ECE 124 or MTE 262) or (SYDE 192 and SYDE 192L); Level at least 3A Computer Engineering or Electrical Engineering or Mechatronics Engineering or Software Engineering or Systems Design Engineering or Computer Science/Digital Hdw Op

Rationale :

Updating prerequisites to allow Software engineering and Systems Design engineering students to take ECE 327 without overrides.

Current Catalog Information

ECE 340 (0.50) LAB, LEC, TUT Electronic Circuits 2

Electronic circuits and their limitations, including differential pairs, biasing, the cascode configuration and active loads. Differential and multistage amplifiers. Feedback, stability and compensation. Complementary metal-oxide semiconductor (CMOS) logic circuits. [Offered: W, S]

No Special Consent Required

Requisites :

Prereq: Level at least 3A Computer Engineering or Electrical Engineering.

Effective 01-SEP-2021

Description Change:

Antireq: ECE 242

Electronic circuits and their limitations including, metal-oxide-semiconductor (MOS) and bipolar junction transistor (BJT) differential pairs, biasing, the cascode configuration and active loads. Differential and multistage amplifiers. Feedback, stability, and compensation. [Offered: W, S]

Rationale :

Computer engineering students no longer take ECE 340 and therefore would not learn about CMOS logic gate design and analysis at the transistor level. To address this, we propose to teach CMOS digital logic in ECE 240 instead of BJTs and BJT circuit/amplifier analysis for two reasons; (1) analysis of BJT circuits is less important for CE students, and (2), there is not enough time in ECE 240 to teach BJTs and CMOS digital logic. The analysis of BJT circuits would now be taught only in ECE 340 and CMOS digital logic would be removed from ECE 340 to make time for this.

Current Catalog Information

ECE 417 (0.50) LEC, PRJ, TUT Image Processing

This course introduces the basic theories and methodologies of digital image processing. Topics include intensity transformations for image enhancement, two-dimensional discrete Fourier transform, spatial and frequency domain linear image filtering, nonlinear image filtering, binary image processing, edge detection, image segmentation, and digital video processing basics. [Offered: S]

No Special Consent Required

Requisites :

Prereq: (Level at least 4A Computer Engineering or Electrical Engineering) or (ECE 207; Level at least 4A Software Engineering). Antireq: SYDE 575

Effective 01-SEP-2021

Requisite Change :

Prereq: Level at least 4A Computer Engineering or Electrical Engineering or Software Engineering. Antireq: SYDE 575

Rationale :

Updating prerequisites to allow Software Engineering students to take this course without overrides.

Dean of Engineering

Current Catalog Information

BME 281 (0.50) LEC, TUT Mechanics of Deformable Solids

Introduction to mechanical response of materials and stress-strain relationship. Behaviour of prismatic members in tension, compression, shear, bending, and torsion. Shear-force and bending-moment diagrams. Introduction to instability. Mechanical properties of biological tissues, and viscoelastic models. Applications to bone, cartilage, and biomedical implants. [Offered: F]

No Special Consent Required

Requisites :

Prereq: Level at least 2A Biomedical Engineering. Antireq: CIVE 204, ME 219, SYDE 286

Effective 01-SEP-2021

Component Change:

LEC, TUT

Rationale : The tutorial component contact hours have been reduced from 2 to 1 hour to reflect historical and current teaching practice.

Current Catalog Information

BME 355 (0.50) LEC, TUT Anatomical Systems Modelling

Introduction to systems theory as a general modeling method, and applied to the skeletal, neuromuscular, central nervous, cardiovascular, and respiratory systems of the human body. Time-domain simulations, sensitivity analyses, and parameter identification, with the latter driven by experimental measurements of system performance. [Offered: W]

No Special Consent Required

Requisites : Prereq: Level at least 3A Biomedical Engineering

Effective 01-SEP-2021

Title Change: Physiological Systems Modelling

Rationale : The course title is revised to accurately reflect the course content. The term anatomy refers to structure, while physiology refers to functions and mechanisms.

Current Catalog Information

BME 411 (0.50) LEC, TUT Optimization and Numerical Methods

Interpolation and curve fitting, root-finding methods, local and global optimization methods, constrained optimization, multiobjective and multidisciplinary design optimization for biomedical applications such as implanted chips and therapeutic regimens. [Offered: F]

No Special Consent Required

Requisites : Prereq: Level at least 4A Biomedical Engineering. Antireq: SYDE 411

Effective 01-SEP-2021

Description Change: Interpolation and curve fitting, root-finding methods, local and global optimization methods, constrained optimization, multiobjective and multidisciplinary design optimization for biomedical applications. [Offered: F]

Rationale : The course description is revised to remove specific application examples that may not be covered in a given year.

Current Catalog Information

BME 487 (0.50) LEC, TUT Special Topics in Biomedical Signals

This course deals with selected topics at the undergraduate level in medical imaging and diagnostics, biosignals, and neuroscience. [Note: each year at least one elective course will be offered in this theme area. For a current list of offerings, see the director for biomedical engineering. Offered: F, W]

Department Consent Required

Effective 01-SEP-2021

Subject/Catalog Nbr Change: BME 587

Description Change: This course deals with selected topics at the undergraduate level in medical imaging and diagnostics, biosignals, and neuroscience. [Offered: F,

Rationale : W]
This course is renumbered to allow masters' students to enrol. The note regarding the offering each year is removed. This wording was originally introduced to ensure that there were always technical electives in each of the topic areas. However, there are now a number of courses in biomechanics, and there is a proposed course in biomedical signals. The special topics courses often have low enrolment, so it is not practical under the new budget model to commit to offering each special topic course every year.

Current Catalog Information

BME 488 (0.50) LEC, TUT Special Topics in Biomechanics

This course deals with selected topics at the undergraduate level in biofluid mechanics, tissue mechanics, sports engineering, and rehabilitation engineering. [Note: each year at least one elective course will be offered in this theme area. For a current list of offerings, see the director for biomedical engineering. Offered: F, W]

Department Consent Required

Effective 01-SEP-2021

Subject/Catalog Nbr Change: BME 588

Description Change: This course deals with selected topics at the undergraduate level in biofluid mechanics, tissue mechanics, sports engineering, and rehabilitation engineering. [Offered: F, W]

Rationale : This course is renumbered to allow masters' students to enrol. The note regarding the offering each year is removed. This wording was originally introduced to ensure that there were always technical electives in each of the topic areas. However, there are now a number of courses in biomechanics, and there is a proposed course in biomedical signals. The special topics courses often have low enrolment, so it is not practical under the new budget model to commit to offering each special topic course every year.

Current Catalog Information

BME 489 (0.50) LEC, TUT Special Topics in Biomedical Devices

This course deals with selected topics at the undergraduate level in assistive devices, implants, prostheses, orthoses, biomedical technologies, therapeutics, and biocompatibility. [Note: each year at least one elective course will be offered in this theme area. For a current list of offerings, see the director for biomedical engineering. Offered: F, W]

Department Consent Required

Effective 01-SEP-2021

Subject/Catalog Nbr Change: BME 589

Description Change: This course deals with selected topics at the undergraduate level in assistive devices, implants, prostheses, orthoses, biomedical technologies, therapeutics, and biocompatibility. [Offered: F, W]

Rationale : This course is renumbered to allow masters' students to enrol. The note

regarding the offering each year is removed. This wording was originally introduced to ensure that there were always technical electives in each of the topic areas. However, there are now a number of courses in biomechanics, and there is a proposed course in biomedical signals. The special topics courses often have low enrolment, so it is not practical under the new budget model to commit to offering each special topic course every year.

Mechanical and Mechatronics Engineering

Current Catalog Information

MTE 309 (0.50) LEC, TST, TUT Introduction to Thermodynamics and Heat Transfer

Macroscopic approach to energy analysis. Energy transfer as work and heat, and the First Law of thermodynamics. Properties and states of simple substances. Control-mass and control-volume analysis. The essence of entropy, and the Second Law of thermodynamics. The Carnot cycle and its implications for practical cyclic devices. Introduction to heat transfer by conduction, convection, and radiation. Basic formulation and solution of steady and transient problems. Issues relevant to the cooling of electrical devices. [Offered: W,S]

No Special Consent Required

Cross-listed as: ECE 309

Effective 01-SEP-2021

Requisite Change : Prereq: MTE 202, 203; Level at least 3A Mechatronics Engineering. Antireq: SYDE 381

Rationale : This course (MTE 309) requires suitable preparation and background in order for students to be successful. There currently is nothing blocking students from any level or any program from enrolling into the course. The addition of prerequisites and antirequisites are intended to allow only students with proper preparation to enrol. Note: there is no requisite change to ECE 309.

Current Catalog Information

MTE 322 (0.50) LAB, LEC, TUT Electromechanical Machine Design

Design of mechanical motion transmission systems: gearing, couplings, belts and lead-screws; Sensing and measurement of mechanical motion, sensor selection; Electromechanical actuator selection and specification; PLCs and sequential controller design, digital I/O; Case studies. [Offered: F,W]

No Special Consent Required

Requisites : Prereq: ME 321, MTE 220, 262, 320; Level at least 3B Mechatronics Engineering

Effective 01-SEP-2021

Description Change: Integrated design of mechanical motion transmission systems: gearing, couplings, bearings, power screws, fasteners and their integration; sensing and measurement of mechanical motion; specification and selection of motors and electromechanical actuators; analysis and design of controllers for motion transmission systems; case studies. [Offered: F,W]

Requisite Change : Prereq: MTE 220, 262, 320, 321; Level at least 3B Mechatronics Engineering.
Antireq: ME 321

Rationale : The revised description better reflects the material currently taught, and to reduce overlap with a prerequisite course (ME 321/MTE 321). Students benefit from a more accurate description of what topics will be covered. The prerequisites are updated to indicate that MTE 321 replaces ME 321.

Current Catalog Information

MTE 325 (0.50) LAB, LEC, TUT Microprocessor Systems and Interfacing for Mechatronics Engineering
Synchronization and data flow; interfacing to sensors and actuators; microprocessor system architecture, parallel, serial, and analog interfacing; buses; direct memory access (DMA); interfacing considerations. [Note: Not open to students in Computer Engineering or Electrical Engineering. Offered: W, S]
No Special Consent Required

Effective 01-SEP-2021

Description Change: Synchronization and data flow; interfacing to sensors and actuators; microprocessor system architecture, parallel, serial, and analog interfacing; buses; direct memory access (DMA); interfacing considerations. [Offered: W, S]

Requisite Change : Prereq: ME 262 or MTE 262; Level at least 3A Mechatronics Engineering

Rationale : This course requires suitable preparation and background in order for students to be successful. There currently is nothing blocking students from any level or any program from enrolling into the course. The addition of prerequisites are intended to allow only students with proper preparation to enrol. With the proper prerequisites added, there is no longer a need for the note that prevents Computer and Electrical Engineering students from taking the course.

Management Sciences

Current Catalog Information

MSCI 211 (0.50) LEC Organizational Behaviour
Introduction to the concepts of learning, person perception, attitudes, and motivation in an organization. Consideration of communication, roles, norms, and decision making within a group. Discussion of power, control, leadership, and management in light of the above concepts. [Offered: F, W, S]
No Special Consent Required

Requisites : Antireq: AFM 280, BUS 288W, PSYCH 238/338, SCBUS 225

Effective 01-SEP-2021

Requisite Change : Prereq: Not open to Accounting and Financial Management students. Antireq: AFM 280, BUS 288W, PSYCH 238/338, SCBUS 225

Rationale : Prerequisite Not open to AFM students added as requested by Darren Charters AFM, to prevent AFM students from enrolling in MSCI 211 before they are required to take AFM 280.

Current Catalog Information

MSCI 251 (0.50) LAB, LEC, TUT Probability and Statistics 1

A first of a two-course sequence that introduces fundamental concepts in probability and statistics. It covers probability concepts, random variables, graphical display of distributions and data, discrete and continuous probability distributions, sampling, estimation, confidence intervals, experimental design, hypothesis testing, and simple linear regression and correlation. Students learn how to graphically explore data, conduct, and analyze a two-treatment experiment, and model data with linear regression, and interpret its fit. Students learn to use statistical computing software (e.g., R) to perform data analyses. Emphasis is placed on gaining experience with data collected from student-conducted experiments. [Offered: F]

No Special Consent Required

Requisites :

Prereq: Level at least 2A Management Engineering. Antireq: AE 224, BME 213, CHE 220, CIVE 224, ECE 316, ECON 221, ENVE 224, ME 202, MTE 201, NE 215, STAT 231, SYDE 212

Effective 01-SEP-2021

Requisite Change :

Prereq: Level at least 2A Management Engineering. Antireq: AE 224, BME 213, CHE 220, CIVE 224, ECE 306, 316, ECON 221, ENVE 224, ME 202, MTE 201, NE 215, STAT 231, SYDE 212

Rationale :

The antirequisites have been updated to include ECE 306 which is replacing ECE 316.

Current Catalog Information

MSCI 263 (0.50) LEC, TUT Managerial Economics

This course introduces students to key concepts in microeconomics, with an emphasis on applications to managerial decision-making. Topics include: basic analysis of supply and demand, demand functions and the theory of consumer behaviour, production and costs, market equilibrium, competition between industry participants, and pricing strategies of firms under different market structures. [Offered: S]

No Special Consent Required

Requisites :

Prereq: Level at least 2A Management Engineering or MSCI Option. Antireq: ECON 101, 201

Effective 01-SEP-2021

Requisite Change :

Antireq: ECON 101, 201

Rationale :

The prerequisite of Level at least 2A MGTE or MSCI option is being removed to allow for easier enrolment access.

Current Catalog Information

MSCI 331 (0.50) LEC, TUT Introduction to Optimization

This first course in optimization uses a quantitative approach to problem solving involving, mathematical modelling and formulations, solution methods, and output analysis. Students are introduced to a variety of practical problem formulations in Management and Engineering, a number of solution methods, including, but not limited to linear optimization, network models, project management, and decision analysis.

Students are also involved in a group project, where they go through conceptual and operational model design, analytical solution, output analysis, and recommendation.

[Offered: F, W, S]

No Special Consent Required

Requisites : Prereq: Not open to students in the Faculty of Mathematics except for Software Engineering. Antireq: BME 411, CIVE 332, CO 250, ENVE 320/335, SYDE 411

Effective 01-SEP-2021

Requisite Change : Prereq: Not open to students in the Faculty of Mathematics except for Software Engineering. Antireq: BME 411, CHE 521, CIVE 332, CO 250, ENVE 320, 335, SYDE 411

Rationale : The antirequisites are being updated to include CHE 521. After reviewing the syllabus, CHE 521 appears to cover almost the same material as MSCI 331.

Current Catalog Information

MSCI 332 (0.50) LEC, TUT Deterministic Optimization Models and Methods

This course builds on the material presented in MSCI 331, and explores more advanced optimization techniques and applications. Methods, such as integer optimization, dynamic programming, and heuristics are introduced, and used to design solution alternatives for applications from management engineering. This may include network and process design in logistics, transportation, telecommunications, and healthcare.

[Offered: F]

No Special Consent Required

Requisites : Prereq: One of BME 411, CIVE 332, CO 250, ENVE 320/335, MSCI 331, or SYDE 411; Level at least 3B Management Engineering or MSCI Option.

Effective 01-SEP-2021

Requisite Change : Prereq: One of BME 411, CHE 521, CIVE 332, CO 250, ENVE 320, 335, MSCI 331, SYDE 411

Rationale : The prerequisites are updated to allow access to students who have completed CHE 521 and/or have not declared the MSCI Option yet.

Current Catalog Information

MSCI 334 (0.50) LAB, LEC, TUT Operations Planning and Inventory Control

This course exposes students to production planning and inventory control approaches in industrial and service systems. Production planning topics cover capacity and resources planning, production scheduling, manufacturing resource planning, Just-In-Time and lean manufacturing. Inventory control topics cover lot sizing policies, deterministic and stochastic inventory policies. The course involves a design project of a production and/or inventory system. [Offered: W]

No Special Consent Required

Requisites : Prereq: MSCI 131; One of CHE 220, CIVE 224, ECE 316, ENVE 224, ME 202, MSCI 252 or 253, MTE 201, STAT 206, 231, 241, or SYDE 212. Antireq: MSCI 432

Effective 01-SEP-2021

Requisite Change : Prereq: MSCI 131; One of CHE 220, CIVE 224, ECE 306, 316, ENVE 224, ME 202, MSCI 252, 253, MTE 201, STAT 206, 231, 241, SYDE 212. Antireq: MSCI 432

Rationale : The prerequisites have been updated to include ECE 306 which is replacing ECE 316.

Current Catalog Information

MSCI 391 (0.13) PRJ Work-term Report

A work-term report presents in detail a technical project, activity, or analysis engaged by the student normally during the preceding work term, related to management engineering. The report is evaluated on the basis of written communication skills and technical proficiency in the subject matter as demonstrated by the report. Reports are due on the 10th day of lectures for the academic term in which the report is required. Any resubmissions granted are due by the "Lectures End" date. [Offered: W]

No Special Consent Required

Requisites : Prereq: Level at least 3A Management Engineering. Antireq: WKRPT 200, 201

Effective 01-SEP-2021

Description Change: A work-term report is a written report that provides an opportunity for students to effectively communicate, document, and reflect on engineering experience gained during a preceding work term. In the report, students draw connections between the theoretical aspects of engineering taught in the classroom and the practical applications of that theory in the workplace. Reports are due on the 10th day of lectures for the academic term in which the report is required. [Offered: W]

Rationale : The course description is updated to reflect current work report requirements.

Current Catalog Information

MSCI 392 (0.13) PRJ Work-term Report

A work-term report presents in detail a technical project, activity, or analysis engaged by the student normally during the preceding work term, related to management engineering. The report is evaluated on the basis of written communication skills and technical proficiency in the subject matter as demonstrated by the report. Reports are due on the 10th day of lectures for the academic term in which the report is required. Any resubmissions granted are due by the "Lectures End" date. [Offered: F]

No Special Consent Required

Requisites : Prereq: Level at least 3B Management Engineering. Antireq: WKRPT 300, 301

Effective 01-SEP-2021

Description Change: A work-term report is a written report that provides an opportunity for students to effectively communicate, document, and reflect on engineering experience gained during a preceding work term. In the report, students draw connections between the theoretical aspects of engineering taught in the classroom and the practical applications of that theory in the workplace. Reports are due on the 10th day of lectures for the academic term in which the report is required. [Offered: F]

Rationale : The course description is updated to reflect current work report requirements.

Current Catalog Information

MSCI 401 (0.50) LEC, PRJ Management Engineering Design Project 1

This is the first course of a two course sequence to provide students with an opportunity to engage in a significant design experience based on the engineering knowledge and skills gained in previous courses and on cooperative work terms. The instructor will review and extend concepts of project management studied in earlier courses, and students will apply these project management skills. Teams of students will formulate a design problem and submit a preliminary project proposal, make oral presentations for preliminary and interim design reviews, and submit a written interim report describing the proposed design solution. [Offered S]

No Special Consent Required

Requisites : Prereq: Level at least 4A Management Engineering

Effective 01-SEP-2021

Description Change: Teams formed in MSCI 302 conduct concept generation and detailed design iterations on the design problem formulated in MSCI 302, or on a new customer-defined problem. Project progress is communicated and evaluated in periodic design reviews. Teams establish and maintain suitable project control and team processes. [Offered S]

Requisite Change : Prereq: MSCI 302; Level at least 4A Management Engineering

Rationale : The course description and prerequisites are updated based on MSCI 401 being the second course in a three-course capstone design sequence.

Current Catalog Information

MSCI 402 (0.50) LEC, PRJ Management Engineering Design Project 2

This is the second course of a two course sequence to provide students with an opportunity to engage in a significant design experience based on the engineering knowledge and skills gained in previous courses and on cooperative work terms. Each student team is required to complete the detailed design for the project defined in MSCI 401, submit a final written report, and make an oral presentation describing their design solution. [Offered: W]

No Special Consent Required

Requisites : Prereq: MSCI 401; Level at least 4B Management Engineering

Effective 01-SEP-2021

Description Change: Student teams continue working on the design project begun in MSCI 302 and MSCI 401. They complete design iterations, plan and perform verification and validation of the solution, and deliver a final implementation of the design. Project progress and final design are communicated and evaluated in periodic design reviews and at a public symposium. Teams maintain suitable project control and team processes. [Offered: W]

Rationale : The course description is updated based on MSCI 402 being the third course in a three-course capstone design sequence.

Current Catalog Information

MSCI 422 (0.50) LEC Economic Impact of Technological Change and Entrepreneurship

This course is designed to analyze the impact of technological change and entrepreneurship at a firm and societal level, primarily in terms of the economic antecedents and consequences of new technology. The scope of the course ranges from the study of the determination of productivity and its effect on economic growth to the determination of innovative activity and performance. Prereq: (One of AE 392, BME 364, CIVE 392, ECON 101, ENVE 392, GEOE 392, MSCI 261, SYDE 262) and (One of AE 224, BME 213, CHE 220, CIVE 224, ECE 316, ECON 221, ENVE 224, ENVS 278, MSCI 251 or 252, ME 202, MTE 201, NE 215, PSCI 314, PSYCH 292, REC 371, SDS 250R, SOC 280, STAT 202, 206, 211, 221, 231, 241, SYDE 212) and level at least 3A. [Offered: F]

No Special Consent Required

Requisites :

See course description for prerequisite details.

Effective 01-SEP-2021

Description Change:

This course is designed to analyze the impact of technological change and entrepreneurship at a firm and societal level, primarily in terms of the economic antecedents and consequences of new technology. The scope of the course ranges from the study of the determination of productivity and its effect on economic growth to the determination of innovative activity and performance. Prereq: (One of AE 392, BME 364, CIVE 392, ECON 101, ENVE 392, GEOE 392, MSCI 261, SYDE 262) and (One of AE 224, BME 213, CHE 220, CIVE 224, ECE 306, 316, ECON 221, ENVE 224, ENVS 278, MSCI 251, 252, ME 202, MTE 201, NE 215, PSCI 314, PSYCH 292, REC 371, SDS 250R, SOC 280, STAT 202, 206, 211, 221, 231, 241, SYDE 212). [Offered: F]

Rationale :

The prerequisites are updated to include ECE 306 which is replacing ECE 316. Level at least 3A is removed, as the level is not relevant, but the courses are.

Current Catalog Information

MSCI 431 (0.50) LEC, TUT Stochastic Models and Methods

Introduction to operations research models and methods for problems with random, stochastic and probabilistic components. Topics include birth and death processes, branching processes, waiting line models, and Markov decision processes. Applications include the design, modelling, and analysis of service and manufacturing systems, with emphasis on important functions such as queueing, inventory, reliability, equipment replacement, and maintenance. [Offered: W]

No Special Consent Required

Requisites :

Prereq: (One of BME 411, CIVE 332, CO 250, ENVE 335, MSCI 331 or SYDE 411) and (One of AE 224, BME 213, CHE 220, CIVE 224, ECE 316, ENVE 224, MSCI 251, 252, ME 202, MTE 201, NE 215, STAT 206, 211, 231, 241, SYDE 212); Not open to Math students except SE

Effective 01-SEP-2021

Requisite Change :

Prereq: (One of BME 411, CHE 521, CIVE 332, CO 250, ENVE 335, MSCI 331, SYDE 411) and (One of AE 224, BME 213, CHE 220, CIVE 224, ECE 306, 316, ENVE 224, MSCI 251, 252, ME 202, MTE 201, NE 215, STAT 206, 211, 231, 241, SYDE 212); Not open to Math students except Software Engineering

Rationale :

The prerequisites are updated to include CHE 521 (MSCI 331 equivalent), and

ECE 306 which is replacing ECE 316.

Current Catalog Information

MSCI 432 (0.50) LEC, TUT Production and Service Operations Management

Introduction to management, planning, and control decisions in manufacturing and service settings using quantitative approaches. Topic areas include production, inventory, distribution, quality control, facilities layout, and process design.

Students are exposed to a number of examples and case studies, and work on a project that involves analysis and discussion of improved designs. [Offered: F, W]

No Special Consent Required

Requisites : Prereq: (One of AE 224, BME 213, CHE 220, CIVE 224, ECE 316, ENVE 224, ME 202, MTE 201, NE 215, STAT 206, 211, 231, 241, SYDE 212); Not open to Management Engineering students. Antireq: MSCI 334

Effective 01-SEP-2021

Requisite Change : Prereq: (One of AE 224, BME 213, CHE 220, CIVE 224, ECE 306, 316, ENVE 224, ME 202, MTE 201, NE 215, STAT 206, 211, 231, 241, SYDE 212); Not open to Management Engineering students. Antireq: MSCI 334

Rationale : The prerequisites are updated to include ECE 306 which is replacing ECE 316.

Current Catalog Information

MSCI 436 (0.50) LEC, TUT Decision Support Systems

This course provides an introduction to analysis, design and implementation of decision support systems for engineering and business applications. Operations research modelling techniques and software are integrated with database systems and computer interfaces to create systems that aid managerial decision-making. This course also discusses challenges in designing and implementing decision support systems based on models drawn from Operations Research. [Offered: S]

No Special Consent Required

Requisites : Prereq: MSCI 332, 343; Level at least 4A Management Engineering

Effective 02-MAY-2022

Requisite Change : Prereq: MSCI 332; One of CS 348, MSCI 245; One of CS 247, MSCI 342, SYDE 322; One of CS 449, MSCI 343, SYDE 348, 548

Rationale : The prerequisites are being amended to allow access for students who have completed an antirequisite to MSCI 343, and to make clear the full set of prerequisites without relying on the prerequisite chain in MSCI courses. MSCI 342 or SYDE 322 are also necessary.

Please note this is an amendment to the June 20, 2017 SUC (effective May 2022) change which was previously approved.

Current Catalog Information

MSCI 442 (0.50) LEC Impact of Information Systems on Organizations and Society

This course is designed to familiarize the student with issues related to the impact of computer-based technologies on individual jobs, organizations, and broader societal level. Particular emphasis will be placed on critical examination of various

issues including privacy, security, ethical concern and professional responsibilities. [Offered: W]

No Special Consent Required

Requisites :

Prereq: Level at least 3A Engineering

Effective 01-SEP-2021

Description Change:

This course is designed to familiarize the student with issues related to the impact of computer-based technologies on individual jobs, organizations, and broader societal level. Particular emphasis will be placed on critical examination of various issues including privacy, security, ethical concern and professional responsibilities. [Offered: W, S]

Rationale :

The course description is updated to include a spring term offering. The prerequisite is removed to allow easier enrolment access.

Current Catalog Information

MSCI 445 (0.50) LAB, LEC, TUT Telecommunication Systems: from protocols to applications

An introduction to design, use, and analysis of computer networks and telecommunication systems with a focus on technological issues arising in the rapidly developing field of telecommunications and information technology. The emphasis is on what engineers need to know about telecommunication to make sound business decisions and utilize networks in software applications. The material is taught using a top-down approach. Topics include: systems, security, applications, evolution of the field, performance, and technology. [Offered: W, S, last spring offering in 2021 to 4A Management Engineering students]

No Special Consent Required

Requisites :

Prereq: One of CS 240, ECE 250, MSCI 240, MTE 140, or SYDE 223

Effective 01-SEP-2021

Description Change:

An introduction to design, use, and analysis of computer networks and telecommunication systems with a focus on technological issues arising in the rapidly developing field of telecommunications and information technology. The emphasis is on what engineers need to know about telecommunication to make sound business decisions and utilize networks in software applications. The material is taught using a top-down approach. Topics include systems, security, applications, evolution of the field, performance, and technology. [Offered: W]

Rationale :

The term of offering changes to winter only beginning with the 2021-2022 Calendar.

(sarecord: please note there is another row effective September 1, 2022 to inactivate this course)

Current Catalog Information

MSCI 446 (0.50) LEC, TUT Data Mining

This course covers algorithmic and statistical foundations of data mining: extracting previously unknown and useful information from data. Topics include exploratory data analysis, data cleaning, data transformations, association rule mining, and both supervised and unsupervised learning. Methods typically covered include, but are not

limited to: the Apriori algorithm, Bayesian inference, decision trees, linear and logistic regression, nearest-neighbor classification, and k-means clustering.

[Offered: W]

No Special Consent Required

Requisites :

Prereq: One of BME 411, CIVE 332, CO 250, ENVE 320/335, MSCI 331, or SYDE 411; Level at least 3A; (One of CS 348, ECE 356, MSCI 245) and (One of CHE 220, CIVE 224, ECE 316, ENVE 224, MSCI 252 or 253, ME 202, MTE 201, NE 215, STAT 206, 231, 241, SYDE 212)

Effective 01-SEP-2021

Title Change:

Introduction to Machine Learning

Description Change:

This course provides an introduction to machine learning, including supervised and unsupervised learning. Emphasis is placed on proper procedures for the training and testing of models. Topics covered may include data cleaning and transformation, overfitting and generalization, n-fold cross validation, regression, decision trees, neural networks, rule finding, and clustering. Students learn to apply machine learning methods to Management Engineering problems using common tools such as R and Python.
[Offered: W]

Requisite Change :

Prereq: (One of CS 240, ECE 250, MSCI 240, MTE 140, SYDE 223) and (One of BME 213, CHE 220, CIVE 224, ECE 306, 316, ENVE 224, MSCI 252, 253, ME 202, MTE 201, NE 215, STAT 206, 231, 241, SYDE 212); Level at least 3A

Rationale :

The prerequisites are updated adding MSCI 240 (equivalent to this group of courses), BME 213 (MSCI 252 equivalent) and ECE 306 (replacing ECE 316), and removing the prerequisites for database and optimization courses to help with enrolment access. The course title and description are revised to reflect the course content.

Current Catalog Information

MSCI 452 (0.50) LEC, TUT Decision Making Under Uncertainty

This course deals with normative, descriptive, and prescriptive theories of decision making under uncertainty. It begins with analytical models such as decision trees, Bayes Theorem and Bayesian revision, value of information, basic utility theory and multi-attribute decision making. The course continues with an examination of how these theories can fail to predict actual decision making behaviour. This course applies the concepts of decision-making to managerial and consumer behaviour as well as behaviour in negotiations. [Offered: S]

No Special Consent Required

Requisites :

Prereq: One of AE 224, BME 213, CHE 220, CIVE 224, ECE 316, ENVE 224, MSCI 251 or 252, ME 202, MTE 201, NE 215, STAT 206, 211, 231, 241, SYDE 212

Effective 01-SEP-2021

Description Change:

This course deals with normative, descriptive, and prescriptive theories and models of decision making under uncertainty. The course focuses on concepts such as, risk measures, Bayes theorem, and basic and multi-attribute utility theories. The course uses these concepts to build analytical decision-making models considering the randomness and/or risk-attitude of the decision-makers. Various forms of decision analysis

techniques will be covered and typically include, expected utility maximization, the value of information analysis, one/two-way sensitivity analysis, and sequential Bayesian inference. Practical uses and limitations of the models and techniques will be illustrated. [Offered: S]
Requisite Change : Prereq: One of AE 224, BME 213, CHE 220, CIVE 224, ECE 306, 316, ENVE 224, MSCI 251, 252, ME 202, MTE 201, NE 215, STAT 206, 211, 231, 241, SYDE 212
Rationale : The course description is revised to better reflect course content. The prerequisites have been updated to include ECE 306, which is replacing ECE 316.

Current Catalog Information

MSCI 491 (0.13) PRJ Work-term Report

A work-term report presents in detail a technical project, activity, or analysis engaged by the student normally during the preceding work term, related to management engineering. The report is evaluated on the basis of written communication skills and technical proficiency in the subject matter as demonstrated by the report. Reports are due on the 10th day of lectures for the academic term in which the report is required. Any resubmissions granted are due by the "Lectures End" date. [Offered: S]

No Special Consent Required

Requisites :

Prereq: Level at least 4A Management Engineering. Antireq: WKRPT 400, 401

Effective 01-SEP-2021

Description Change:

A work-term report is a written report that provides an opportunity for students to effectively communicate, document, and reflect on engineering experience gained during a preceding work term. In the report, students draw connections between the theoretical aspects of engineering taught in the classroom and the practical applications of that theory in the workplace. Reports are due on the 10th day of lectures for the academic term in which the report is required. [Offered: S]

Rationale :

The course description is updated to reflect current work report requirements.

Current Catalog Information

MSCI 541 (0.50) LEC, TUT Search Engines

This course provides an opportunity for students to learn the engineering behind search engines and how to optimize search engines to provide higher quality user experiences. This course focuses on text retrieval and web search. Topics include design and construction of retrieval systems, retrieval models, and evaluation of search engines. [Offered: F, W, first offered Fall 2021, offered Winter until 2020]

No Special Consent Required

Requisites :

Prereq: (One of BME 122, CS 240, ECE 250, MSCI 240, MTE 140, SYDE 223) and (One of AE 224, BME 213, CHE 220, CIVE 224, ECE 316, ENVE 224, MSCI 251 or 252, ME 202, MTE 201, NE 215, STAT 206, 231, 241, SYDE 212)

Effective 01-SEP-2021

Description Change:

This course provides an opportunity for students to learn the engineering behind search engines and how to optimize search engines to provide higher quality user experiences. This course focuses on text retrieval and web

search. Topics include design and construction of retrieval systems, retrieval models, and evaluation of search engines. [Offered: F]
Requisite Change : Prereq: (One of BME 122, CS 240, ECE 250, MSCI 240, MTE 140, SYDE 223) and (One of AE 224, BME 213, CHE 220, CIVE 224, ECE 306, 316, ENVE 224, MSCI 251, 252, ME 202, MTE 201, NE 215, STAT 206, 231, 241, SYDE 212)
Rationale : The term of offering is cleaned up for the 2021-2022 Calendar, showing only the fall offering. The prerequisites are updated to include ECE 306 which is replacing ECE 316.

Current Catalog Information

MSCI 543 (0.50) LEC, TUT Analytics and User Experience

This course provides students with an in-depth understanding of methods for evaluating the user experience on a large scale. Students will learn how to design user experiments that involve the collection and analysis of large quantities of data online, apply useful metrics for evaluating the user experience, and use this analysis to inform their designs of software and technology. [Offered: S, first offered Spring 2022]

No Special Consent Required

Requisites : Prereq: MSCI 253, 343

Effective 01-SEP-2021

Requisite Change : Prereq: (One of MSCI 253, SYDE 212); (One of MSCI 343, SYDE 348, 548)
Rationale : The prerequisites are updated to include SYDE 212 and SYDE 348/548 in order to allow access to systems design engineering students.

Current Catalog Information

MSCI 551 (0.50) LEC, TUT Quality Management and Control

The course focuses on the analysis, evaluation, and improvement of quality based on statistical tools. Topics include process capability analysis, statistical process control, experimental design and the Taguchi method, and acceptance sampling. The emphasis is on the assessment of quality and the design of alternate processes and/or quality assessment schemes to improve quality. [Offered: F]

No Special Consent Required

Requisites : Prereq: One of AE 224, BME 213, CHE 220, CIVE 224, ECE 316, ENVE 224, MSCI 251 or 252, ME 202, MTE 201, NE 215, STAT 206, 231, 241, SYDE 212

Effective 02-SEP-2021

Requisite Change : Prereq: One of AE 224, BME 213, CHE 220, CIVE 224, ECE 306, 316, ENVE 224, MSCI 251, 252, ME 202, MTE 201, NE 215, STAT 206, 231, 241, SYDE 212
Rationale : The prerequisites are updated to include ECE 306 which is replacing ECE 316.

Please note that this is another amendment to the June 19, 2018 SUC (effective September 2021) change which has been previously approved.

Current Catalog Information

MSCI 555 (0.50) LEC, TUT Scheduling: Theory and Practice

Scheduling is the sequencing of tasks to scarce resources. By exploring scheduling

problems found in industry, this course will discuss scheduling framework and notation as well as algorithmic, heuristic, and mathematical programming solution approaches. Students will be introduced to the theoretical background in these areas, but the emphasis will be placed on modeling and solving scheduling problems in practice. Students will apply these concepts in design activities in assignments and a course project. [Offered: W]

No Special Consent Required

Requisites :

Prereq: One of BME 411, CIVE 332, CO 250, ENVE 320/335, MSCI 331, or SYDE 411. Antireq: CO 454

Effective 01-SEP-2021

Requisite Change :

Prereq: One of BME 411, CHE 521, CIVE 332, CO 250, ENVE 320, 335, MSCI 331, SYDE 411. Antireq: CO 454

Rationale :

The prerequisites are updated adding CHE 521 (MSCI 331 equivalent).

Systems Design Engineering

Current Catalog Information

SYDE 111 (0.50) LEC, TST, TUT Fundamental Engineering Math 1

Functions: trigonometric, exponential, log, inverse functions. Differential calculus:

limits, continuity, derivatives, differentials, applications. Sequences and series:

convergence, power series, Taylor expansions. Simple numerical methods. [Offered: F]

No Special Consent Required

Requisites :

Prereq: 1A Systems Design Engineering or 1A Biomedical Engineering.

Antireq: MATH 116, 117, 127, 137, 147

Effective 01-SEP-2021

Component Change:

LEC, TUT

Title Change:

Calculus 1

Description Change:

Differential calculus: limits, continuity, derivatives, differentials, applications. Sequences and series: convergence, power series, Taylor expansions. Simple numerical methods. Introduction to integration, indefinite and definite integral, techniques of integration. [Offered: F]

Rationale :

This course is only offered to Systems Design and Biomedical Engineering students. Suite of SYDE-BME 1A, 1B, and 2A mathematics courses have been realigned to reinforce engineering fundamentals.

Current Catalog Information

SYDE 112 (0.50) LEC, TUT Fundamental Engineering Math 2

Integration: Indefinite and definite integral; techniques of integration; improper integrals, numerical methods, applications. Vector differential calculus: Partial,

total, and directional derivative; Gradient divergence and curl; Jacobian.

Applications. [Offered: W, S]

No Special Consent Required

Requisites :

Prereq: 1B Systems Design Engineering or 1B Biomedical Engineering.

Antireq: MATH 118, 119, 128, 138, 148

Effective 01-SEP-2021

Title Change:

Calculus 2

Description Change: Integration: improper integrals and applications. Multi-variable calculus: partial, total, and directional derivative, gradient divergence, double and triple integrals, Jacobian, solution techniques, applications. [Offered: W, S]

Rationale : This course is only offered to Systems Design and Biomedical Engineering students. Suite of SYDE-BME 1A, 1B, and 2A mathematics courses have been realigned to reinforce engineering fundamentals.

Current Catalog Information

SYDE 113 (0.25) LEC, TUT Matrices and Linear Systems

Geometry and algebra: root-finding, vectors, coordinate systems, lines and planes, conic sections, complex numbers. Introduction to numerical computation. Floating point arithmetic, accuracy and sources of error. Matrix algebra, inverses. Analytical and numerical techniques for systems of linear equations. [Offered: F]

No Special Consent Required

Requisites : Prereq: 1A Systems Design Engineering or 1A Biomedical Engineering

Effective 01-SEP-2021

Title Change: Elementary Engineering Mathematics

Description Change: Functions: trigonometric, exponential, log, inverse functions. Mathematical notation and proof techniques. Metric spaces. Geometry and algebra: root-finding, vectors, coordinate systems, lines and planes, conic sections, complex numbers. Introduction to numerical computation: binary and floating point numbers and arithmetic, accuracy and sources of error. [Offered: F]

Rationale : This course is only offered to Systems Design and Biomedical Engineering students. Suite of SYDE-BME 1A, 1B, and 2A mathematics courses have been realigned to reinforce engineering fundamentals.

Current Catalog Information

SYDE 114 (0.25) LEC, TUT Numerical and Applied Calculus

Matrices and linear systems: determinants, eigenvalues and eigenvectors, LU decomposition, conditioning, numerical methods. First order ordinary differential equations: analytical techniques, applications, elementary numerical methods, convergence. [Offered: W, S]

No Special Consent Required

Requisites : Prereq: 1B Systems Design Engineering or 1B Biomedical Engineering

Effective 01-SEP-2021

Title Change: Matrices and Linear Systems

Description Change: Matrix algebra, inverses, solution of linear systems, determinants, eigenvalues and eigenvectors, lower-upper (LU) factorization. Numerical methods: sensitivity, condition number. [Offered: W, S]

Rationale : This course is only offered to Systems Design and Biomedical Engineering students. Suite of SYDE-BME 1A, 1B, and 2A mathematics courses have been realigned to reinforce engineering fundamentals.

Current Catalog Information

SYDE 211 (0.50) LEC, TUT Advanced Engineering Math 1

Vector calculus: double and triple integrals, line and surface integrals, fundamental theorems, applications. Difference methods: root-finding, finite and divided differences, numerical differentiation, interpolation. Second order linear ordinary differential equations and systems. Applications in vibration. [Offered: F,W]

No Special Consent Required

Requisites : Prereq: 2A Systems Designs Engineering or 2A Biomedical Engineering

Effective 01-SEP-2021

Title Change: Calculus 3

Description Change: Vector differential calculus: divergence and curl, line and surface integrals, fundamental theorems, applications. First order ordinary differential equations: analytical techniques and applications. Second order linear ordinary differential equations: systems of equations and applications. Numerical methods for solving ordinary differential equations (ODEs). [Offered: F,W]

Rationale : This course is only offered to Systems Design and Biomedical Engineering students. Suite of SYDE-BME 1A, 1B, and 2A mathematics courses have been realigned to reinforce engineering fundamentals.

Current Catalog Information

SYDE 522 (0.50) LEC, TUT Machine Intelligence

The objective of this course is to introduce students to current intelligent system concepts. An overview of different learning schemes will be provided, including decision tree, bayesian, inductive, analytical and rule-based learning. The main focus of this course will be on neural nets, genetic algorithms and reinforcement learning. [Offered: W]

No Special Consent Required

Requisites : Prereq: One of BME 122, CS 240, ECE 250, MSCI 240, MTE 140, SYDE 223 and Biomedical Engineering or SYDE or level at least 4A Management Engineering or Mechatronics Engineering or Mechatronics Option or Computer Engineering Option. Antireq: ECE 457A

Effective 01-SEP-2021

Title Change: Foundations of Artificial Intelligence

Description Change: The objective of this course is to introduce students to fundamental concepts of Artificial Intelligence. An overview of different learning schemes will be provided, including supervised and unsupervised algorithms. The focus of this course will be on dimensionality reduction, clustering, classification, deep and shallow artificial neural networks, and reinforcement learning. Ethical aspects of artificial intelligence will be discussed. [Offered: W]

Requisite Change : Prereq: One of BME 122, CS 240, ECE 250, MSCI 240, MTE 140, SYDE 223 and Biomedical Engineering or SYDE or level at least 4A Management Engineering or Mechatronics Engineering or Mechatronics Option or Computer Engineering

Rationale : Option. Antireq: CS 480, 486, ECE 457A, 457B
The course has evolved since the existing description was written, reflecting ongoing developments in the field. The new description better reflects the course content. The antirequisites are updated; both ECE 457A and B combined cover topics in SYDE 522, as well as CS 480. CS 486 is listed as an antirequisite for ECE 457A and 457B.

Current Catalog Information

SYDE 584 (0.50) LEC, TUT Biological and Human Systems

In this course, students will become familiar with the physiology and anatomical structures of the human body. The structure, functions, and properties of the major biological systems (musculoskeletal, nervous, and cardiovascular) will be presented in relation to modeling biological systems and the design of biomedical devices (imaging, assistive, and diagnostic). Various aspects of pathology and how they influence measurements will also be introduced. [Offered: W]

No Special Consent Required

Requisites : Prereq: (Level at least 3B Engineering) or (Level at least 3B Honours Life Physics (Biophysics specialization)). Antireq: BIOL 273, BME 284

Effective 01-SEP-2021

Title Change:

Physiological Systems and Biomedical Design

Description Change:

In this course, students will become familiar with the physiology and anatomical structures of the human body. The structure, functions, and properties of major physiological systems (e.g., musculoskeletal, nervous, cardiovascular, and respiratory) will be presented in relation to modelling physiological systems and the design of biomedical devices (imaging, assistive, and diagnostic). Various aspects of pathology and how they influence measurements will also be introduced. [Offered: W]

Rationale :

This course has evolved since the existing description was written, reflecting ongoing developments in the field. Title change reinforces the design component already included in the course description.

COURSE INACTIVATIONS (for approval)

Conrad Business, Entrepreneurship & Technology Ctr

Effective 01-SEP-2021

BET 410A (0.25)

Capstone Entrepreneurship Planning and Execution Part 1

Rationale :

This course is inactivated due to consistent lack of enrolment.

Effective 01-SEP-2021

BET 410B (0.25)

Capstone Entrepreneurship Planning and Execution Part 2

Rationale :

This course is inactivated due to consistent lack of enrolment.

Management Sciences

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Effective 01-SEP-2021
MSCI 421 (0.50)
Rationale :

Strategic Management of Technology
This course is being inactivated due to declining enrolment.

Effective 01-SEP-2021
MSCI 423 (0.50)
Rationale :

Managing New Product and Process Innovation
This course is being inactivated due to declining enrolment.

Effective 01-SEP-2022
MSCI 445 (0.50)
Rationale :

Telecommunication Systems: from protocols to applications
This course is inactivated to make room in the curriculum for a new elective.

Effective 01-SEP-2021
MSCI 599 (0.50)
Rationale :

Special Topics in Management Engineering Design
This course is being inactivated as it is redundant. We have an existing topics course MSCI 598, and we only need to distinguish between non-technical and technical electives in the special topics courses.

End of Report

4. New Academic Plans

4.1. Computing Option

Effective Date: September 1, 2021

Rationale: A package of Options is designed to be a comprehensive and integrated approach to computing for students in the Faculty of Engineering (outside of Computer Engineering and Software Engineering). This package includes: the revised SE Option, the re-introduced Computer Engineering Option, and the new Computing Option. These Options are designed with a degree of overlap, so that students can switch their emphasis or have a fallback position without having to disregard all of their prior work. These Options are designed to recognize all of the computing courses taught in the Faculty of Engineering, so they are truly attainable by all students in the Faculty.

While the revised SE Option (further on in this agenda) and the re-introduced CE Option (next on the agenda) are now practically attainable to students across FOE in the sense that the revised definitions recognize computing/software courses taught across FOE, the amount of additional work on top of their core degree might be onerous for students in some programs. The amount of computing/software courses in the core curriculum varies significantly across the FOE, from none in Architecture to 6 courses in Mechatronics or Management. But for a student in Architecture, attaining the SE or CE Option would require 10 courses on top of their core degree, which is practically unattainable (10 courses because they do not have the two prerequisites in their core curriculum, plus the 8 courses required for the options). The situation is similar, but not so extreme, for students in Civil, Environmental, Geological, Chemical, Mechanical, and so on.

This new **Computing Option** is intended to primarily serve students in these programs that have relatively little software/computing in their core curriculum. This Option plays a role similar to the Computing Minor offered by the Cheriton School of Computer Science. The SCS Computing Minor is not practical for these Engineering students because it does not recognize the computing courses taught in Engineering. This new Computing Option explicitly includes all of the CS courses that count towards the SCS Computing Minor, and informs the Engineering students of this so that they can consider if the SCS Computing Minor is a good choice for them. For example, the SCS Computing Minor might make sense for Architecture students, since they have almost no computing in their curriculum.

This new Computing Option also serves as a fallback position for students in programs such as SYDE, Biomedical, Nano, Mechatronics, or Management, that have a medium amount of software/computing in their core curriculum. If one of these students starts pursuing the SE Option or CE Option, but decides to change direction, they can switch to this Computing Option to get some recognition for the work they have done.

In many other respects the design of this Computing Option mirrors the design of the revised SE Option and CE Option (elsewhere in this agenda), and the rationale for specific design choices is the same. Having these three Options designed with similar structure gives students flexibility to build a foundation in computing/software and to select a specific area of focus that aligns with their interests.

The Computing Option is available to all students in the Faculty of Engineering (including Architecture), except students in Computer Engineering or Software Engineering. It requires six courses:

- At least one introductory programming course
- At least one data structures and algorithms course
- At least two topics courses
- Two additional courses selected from any list below

The courses chosen to satisfy this Option must satisfy four additional constraints:

- They must satisfy Canadian Engineering Accreditation Board (CEAB) requirements.
- They must be approved by the option co-ordinator.
- Three of the courses must be considered elective (that is, not core requirements) in the student's academic plan. For the purposes of this Option, a course that a student could choose to graduate without will be considered elective.
- The student must have earned a 75% average in the selected courses in order to have earned the Option.

Students may not declare this Option until they have completed both an introductory programming course and a data structures and algorithms course. Students must have an average of 75% in these two courses in order to declare this Option.

The lists below are intended to be the same as the [Computer Engineering Option](#) and [Software Engineering Option](#). These lists are also intended to include courses that are normally part of the [Computing Minor](#) offered by the Cheriton School of Computer Science. Other courses from Computer Science may be used towards this Option with permission of the option co-ordinator. Students may declare at most one of the Computing Option, Computer Engineering Option, or Software Engineering Option. Students may change which of the three Options they declare by contacting the option co-ordinator(s).

Introductory Programming

Course	Title
AE 121	Computational Methods
BME 121	Digital Computation
CS 115	Introduction to Computer Science 1
CS 116	Introduction to Computer Science 2
CS 135	Designing Functional Programs
CS 145	Designing Functional Programs (Advanced Level)
CHE 120	Computer Literacy and Programming for Chemical Engineers
CIVE 121	Computational Methods
ECE 150	Fundamentals of Programming
ENVE 121	Computational Methods
GEOE 121	Computational Methods
ME 101	Introduction to Mechanical Engineering Practice 2
MSCI 121	Introduction to Computer Programming
MTE 121	Digital Computation

[NE 111](#) Introduction to Programming for Engineers

[SYDE 121](#) Digital Computation

Data Structures and Algorithms

Course	Title
BME 122	Data Structures and Algorithms
CS 136	Elementary Algorithm Design and Data Abstraction
CS 146	Elementary Algorithm Design and Data Abstraction (Advanced Level)
CS 231	Algorithmic Problem Solving
CS 234	Data Types and Structures
ECE 250	Algorithms and Data Structures
ECE 406	Algorithm Design and Analysis
MSCI 240	Algorithms and Data Structures
MTE 140	Algorithms and Data Structures
SYDE 223	Data Structures and Algorithms

Topics

The following list of topics are organized into specific areas for readability.

Logic

Course	Title
CS 245	Logic and Computation
ECE 208	Discrete Mathematics and Logic 2
SE 212	Logic and Computation

Databases

Course	Title
CS 338	Computer Applications in Business: Databases
ECE 356	Database Systems
MSCI 245	Databases and Software Design

Operating Systems

Course	Title
ECE 350	Real-Time Operating Systems
MTE 241	Introduction to Computer Structures & Real-Time Systems
SE 350	Operating Systems

Computing Systems

Course	Title
ECE 252	Systems Programming and Concurrency

ECE 351	Compilers
ECE 454	Distributed Computing
ECE 455	Embedded Software
ECE 459	Programming for Performance

Networks

Course	Title
ECE 358	Computer Networks
MSCI 445	Telecommunication Systems: from protocols to applications

Digital Hardware

Course	Title
BME 393	Digital Systems
CS 230	Introduction to Computers and Computer Systems
ECE 124	Digital Circuits and Systems
ECE 222	Digital Computers
ECE 224	Embedded Microprocessor Systems
ECE 320	Computer Architecture
ECE 327	Digital Hardware Systems
ECE 423	Embedded Computer Systems
ME 262	Introduction to Microprocessors and Digital Logic
MTE 262	Introduction to Microprocessors and Digital Logic
MTE 325	Microprocessor Systems and Interfacing for Mechatronics Engineering
SYDE 192	Digital Systems

Software Engineering

Course	Title
CS 445/ECE 451	Software Requirements Specification and Analysis
CS 446/ECE 452	Software Design and Architectures
CS 447/ECE 453	Software Testing, Quality Assurance and Maintenance
MSCI 342	Principles of Software Engineering
SE 463	Software Requirements Specification and Analysis
SE 464	Software Design and Architectures
SE 465	Software Testing and Quality Assurance

Human-Computer Interaction

Course	Title
MSCI 343	Human-Computer Interaction
MSCI 541	Search Engines
MSCI 543	Analytics and User Experience
SYDE 542	Interface Design

SYDE 543	Cognitive Ergonomics
SYDE 548	User Centred Design Methods

Security and Privacy

Course	Title
ECE 409	Cryptography and System Security
ECE 458	Computer Security

Pattern Analysis and Machine Intelligence

Course	Title
ECE 417	Image Processing
ECE 457A	Cooperative and Adaptive Algorithms
ECE 457B	Fundamentals of Computational Intelligence
ECE 457C	Reinforcement Learning
MSCI 436	Decision Support Systems
MSCI 446	Introduction to Machine Learning
MSCI 546	Advanced Machine Learning
SYDE 522	Foundations of Artificial Intelligence
SYDE 552	Computational Neuroscience
SYDE 556	Simulating Neurobiological Systems
SYDE 572	Introduction to Pattern Recognition
SYDE 575	Image Processing

Numerical Methods

Course	Title
BME 411	Optimization and Numerical Methods
CHE 322	Numerical Methods for Process Analysis and Design
CIVE 422	Finite Element Analysis
EARTH 456	Numerical Methods in Hydrogeology
ECE 204	Numerical Methods
ECE 204A and ECE 204B	Numerical Methods 1 and Numerical Methods 2
ENVE 225	Environmental Modelling
ME 559	Finite Element Methods
ME 566	Computational Fluid Dynamics for Engineering Design
MTE 204	Numerical Methods
NE 336	Micro and Nanosystem Computer-aided Design
SYDE 411	Optimization and Numerical Methods

Special topics courses as approved by the [option co-ordinator](#).

4.2 Computer Engineering Option

Effective Date: September 1, 2021

Rationale: A package of Options is designed to be a comprehensive and integrated approach to computing for students in the Faculty of Engineering (outside of Computer Engineering and Software Engineering). This package includes: the revised SE Option, the re-introduced Computer Engineering Option, and the new Computing Option. These Options are designed with a degree of overlap, so that students can switch their emphasis or have a fallback position without having to disregard all of their prior work. These Options are designed to recognize all of the computing courses taught in the Faculty of Engineering, so they are truly attainable by all students in the Faculty.

This change re-introduces the **Computer Engineering Option** that existed from 1982 until 2019. That old CE Option was defined to be available to SYDE students only, and the definition was also significantly out of date. That old CE Option was removed from the calendar to make room for this revision.

The design of this CE Option mirrors the design of the revised SE Option, and the rationale for many aspects is the same. What differs is that instead of requiring the three core SE courses, this CE Option requires two upper year ECE courses in digital hardware or embedded computing. In order to meet prerequisites for these courses students will need to take some lower/middle-year courses in digital hardware, so a certain proportion of the remaining 7 technical courses in this CE Option will be derived from this upper year goal. This CE Option is designed to recognize lower/middle year digital hardware courses taught across the Faculty of Engineering.

Computer Engineering Option

CLEAN CALENDAR COPY

The Computer Engineering Option is available to all students in the Faculty of Engineering (including Architecture), except students in Computer Engineering. It requires a total of eight courses:

- Two of:

Course	Title
ECE 320	Computer Architecture
ECE 327	Digital Hardware Systems
ECE 423	Embedded Computer Systems
ECE 455	Embedded Software

- Five additional courses from the topics list below, one of which may be substituted with a course from the data structures and algorithms list.
- One course from List A [Complementary Studies Requirements for Engineering Students](#) that considers application of computing technology, or an alternative approved by the option co-ordinator.

The courses chosen to satisfy this Option must satisfy four additional constraints:

- They must satisfy Canadian Engineering Accreditation Board (CEAB) requirements.
- They must be approved by the option co-ordinator.
- Five of the courses must be considered elective (that is, not core requirements) in the student's academic plan. For the purposes of this Option, a course that a student could choose to graduate without will be considered elective.
- The student must have earned a 75% average in the selected courses in order to have earned the Option.

Students pursuing this Option are recommended to select courses in the areas of logic, digital hardware, operating systems, computing systems, databases, networks, and security and privacy.

Students may not declare this Option until they have completed both an introductory programming course and a data structures and algorithms course. Students must have an average of 75% in these two courses in order to declare this Option.

The lists below are intended to be the same as for the [Computing Option](#) and the [Software Engineering Option](#). These lists are also intended to include courses that are normally part of the [Computing Minor](#) offered by the Cheriton School of Computer Science. Other courses from Computer Science may be used towards this Option with permission of the option co-ordinator. Students may declare at most one of the Computing Option, Computer Engineering Option, or Software Engineering Option. Students may change which of the three Options they declare by contacting the option co-ordinator(s).

Introductory Programming

Course	Title
AE 121	Computational Methods
BME 121	Digital Computation
CHE 120	Computer Literacy and Programming for Chemical Engineers
CIVE 121	Computational Methods
CS 115	Introduction to Computer Science 1
CS 116	Introduction to Computer Science 2
CS 135	Designing Functional Programs
CS 145	Designing Functional Programs (Advanced Level)
ECE 150	Fundamentals of Programming
ENVE 121	Computational Methods
GEOE 121	Computational Methods
ME 101	Introduction to Mechanical Engineering Practice 2
MSCI 121	Introduction to Computer Programming
MTE 121	Digital Computation
NE 111	Introduction to Programming for Engineers
SYDE 121	Digital Computation

Data Structures and Algorithms

Course	Title
BME 122	Data Structures and Algorithms

CS 136	Elementary Algorithm Design and Data Abstraction
CS 146	Elementary Algorithm Design and Data Abstraction (Advanced Level)
CS 231	Algorithmic Problem Solving
CS 234	Data Types and Structures
ECE 250	Algorithms and Data Structures
ECE 406	Algorithm Design and Analysis
MSCI 240	Algorithms and Data Structures
MTE 140	Algorithms and Data Structures
SYDE 223	Data Structures and Algorithms

Topics

The following list of topics are organized into specific areas for readability.

Logic

Course	Title
CS 245	Logic and Computation
ECE 208	Discrete Mathematics and Logic 2
SE 212	Logic and Computation

Databases

Course	Title
CS 338	Computer Applications in Business: Databases
ECE 356	Database Systems
MSCI 245	Databases and Software Design

Operating Systems

Course	Title
ECE 350	Real-Time Operating Systems
MTE 241	Introduction to Computer Structures & Real-Time Systems
SE 350	Operating Systems

Computing Systems

Course	Title
ECE 252	Systems Programming and Concurrency
ECE 351	Compilers
ECE 454	Distributed Computing
ECE 455	Embedded Software
ECE 459	Programming for Performance

Networks

Course	Title
ECE 358	Computer Networks
MSCI 445	Telecommunication Systems: from protocols to applications
Digital Hardware	
Course	Title
BME 393	Digital Systems
CS 230	Introduction to Computers and Computer Systems
ECE 124	Digital Circuits and Systems
ECE 222	Digital Computers
ECE 224	Embedded Microprocessor Systems
ECE 320	Computer Architecture
ECE 327	Digital Hardware Systems
ECE 423	Embedded Computer Systems
ME 262	Introduction to Microprocessors and Digital Logic
MTE 262	Introduction to Microprocessors and Digital Logic
MTE 325	Microprocessor Systems and Interfacing for Mechatronics Engineering
SYDE 192	Digital Systems
Software Engineering	
Course	Title
CS 445/ECE 451	Software Requirements Specification and Analysis
CS 446/ECE 452	Software Design and Architectures
CS 447/ECE 453	Software Testing, Quality Assurance and Maintenance
MSCI 342	Principles of Software Engineering
SE 463	Software Requirements Specification and Analysis
SE 464	Software Design and Architectures
SE 465	Software Testing and Quality Assurance
Human-Computer Interaction	
Course	Title
MSCI 343	Human-Computer Interaction
MSCI 541	Search Engines
MSCI 543	Analytics and User Experience
SYDE 542	Interface Design
SYDE 543	Cognitive Ergonomics
SYDE 548	User Centred Design Methods
Security and Privacy	

Course	Title
ECE 409	Cryptography and System Security
ECE 458	Computer Security

Pattern Analysis and Machine Intelligence

Course	Title
ECE 417	Image Processing
ECE 457A	Cooperative and Adaptive Algorithms
ECE 457B	Fundamentals of Computational Intelligence
ECE 457C	Reinforcement Learning
MSCI 436	Decision Support Systems
MSCI 446	Introduction to Machine Learning
MSCI 546	Advanced Machine Learning
SYDE 522	Foundations of Artificial Intelligence
SYDE 552	Computational Neuroscience
SYDE 556	Simulating Neurobiological Systems
SYDE 572	Introduction to Pattern Recognition
SYDE 575	Image Processing

Numerical Methods

Course	Title
BME 411	Optimization and Numerical Methods
CHE 322	Numerical Methods for Process Analysis and Design
CIVE 422	Finite Element Analysis
EARTH 456	Numerical Methods in Hydrogeology
ECE 204	Numerical Methods
ECE 204A and ECE 204B	Numerical Methods 1 and Numerical Methods 2
ENVE 225	Environmental Modelling
ME 559	Finite Element Methods
ME 566	Computational Fluid Dynamics for Engineering Design
MTE 204	Numerical Methods
NE 336	Micro and Nanosystem Computer-aided Design
SYDE 411	Optimization and Numerical Methods

Special topics courses as approved by the [option co-ordinator](#).

5. Academic Plans (Major Modifications)

5.1 Software Engineering Option

Effective Date: September 1, 2021

Rationale: A package of Options is designed to be a comprehensive and integrated approach to computing for students in the Faculty of Engineering (outside of Computer Engineering and Software Engineering). This package includes: the revised SE Option, the re-introduced Computer Engineering Option, and the new Computing Option (both found earlier in this agenda). These Options are designed with a degree of overlap, so that students can switch their emphasis or have a fallback position without having to disregard all of their prior work. These Options are designed to recognize all of the computing courses taught in the Faculty of Engineering, so they are truly attainable by all students in the Faculty.

The Software Engineering Option was out of date, both in details and in design. This Option was introduced in 1996, and it was originally intended to be applicable to only ECE students. Today, most of the interest in this Option comes from students outside ECE, who are frustrated because it is practically impossible for them to attain the Option. For example, the current Option definition does not adequately recognize the software courses in the core curriculum of Mechatronics, Systems Design, Biomedical, Management, and so on. These courses are often anti-requisite to the ECE courses that are listed in the current Option definition. This revision recognizes all software courses across the FOE appropriately, which means that all students will have an opportunity to pursue this Option. Rationale for some specific aspects of the revisions follows:

8 course workload and 3 electives. The current SE Option definition requires 17 courses for Engineering students. The current definition of the SE Option for BCS students nominally requires only 8 elective courses, but substantively requires 15 if one counts the prerequisites to those 8 (but those prerequisites are also mandatory part of the BCS degree).

The requirement for at least three electives in addition to the three core SE courses makes this definition similar to the definition for BCS students, which requires 8 electives. Bringing the number of required electives down to 6 from 8 reflects the reality that Engineering students have fewer elective slots than do BCS students. A BCS student can earn the SE Option without overloading.

Most of the Engineering programs that have students who are expected to pursue this Option teach at least 3 software/computing related electives to their students, and those courses are included on the lists that count towards this Option. Hence, most students completing this Option would need only 3 three courses from ECE/CS (the three core SE courses), and could get the other three required electives from their home program.

Inclusion of FOE Software/Computing Courses. This revision lists almost every software/computing related course in FOE in order to make this Option practically attainable to every student in FOE. The revision requires the three core SE courses (Requirements, Design, Testing) that have always been the essence of SE at UW. Beyond that, it recognizes that there can be some natural variety in the 6 additional technical courses required for the Option, according to the student's main degree plan.

Inclusion of CS Courses. CS Director Undergraduate Kate Larson suggested that it would be appropriate for this Option to explicitly include all courses that are ordinarily part of the Computing Minor offered by CS, because these are explicitly open to students outside CS. Larson also recommended keeping CS245 in the Option for historical reasons. Additionally, within FOE Architecture had explicitly requested that CS courses be included because their students do not have computing courses within their core curriculum.

75% Average. The default position for Options in FOE is that they require a 60% average in the Option courses. This Option has a higher requirement in order to make it accessible across the FOE. There are 11 introductory programming courses in the FOE, as well as 5 data structures courses. There is significant variety in these introductory foundations. But Engineering students generally do not have any individual choice in their introductory courses. The current definition of the Option requires the ECE introductory courses, which are rigorous but logistically impossible for most FOE students to enroll in. This 75% average requirement ensures that students will have an adequate preparation to continue in the Option. This is not an onerous barrier: 75% is close to the median average in FOE.

The ECE Undergraduate Studies Committee feels strongly about this 75% requirement. If they are going to adjust the prerequisites for their course to have more students from outside ECE taking them, they want those students to be properly prepared.

Numerical Methods. Numerical methods were not historically included in the SE Option, and are not part of the core SE degree program. Nevertheless, numerical methods are a central part of the role that computing plays in most traditional engineering disciplines, and FOPS felt strongly that these courses should be included.

Linkage Elective: Professional responsibility is an important part of Engineering, and the SE Option has always recognized this by requiring linkage electives. The current SE Option for Engineering students requires 4 linkage electives, whereas the definition for BCS students requires only 1 linkage elective. This revision includes just one linkage elective, aligning with the definition of the SE Option/Specialization for BCS students. The list of permissible linkage electives has been updated.

The Software Engineering Option is available to all students in the Faculty of Engineering (including Architecture), except students in Software Engineering.

This Option is offered jointly by the Faculty of Engineering and the David R. Cheriton School of Computer Science in the Faculty of Mathematics. Given that the Option involves two faculties, it has slightly different realizations in those faculties.

For students in the Faculty of Engineering, this Option requires a total of eight courses.

- Three required courses:

Course	Title
CS 445/ECE 451 or SE 463	Software Requirements Specification and Analysis
CS 446/ECE 452 or SE 464	Software Design and Architectures
CS 447/ECE 453 or SE 465	Software Testing, Quality Assurance and Maintenance
	Software Testing and Quality Assurance

- Four additional courses from the topics list below, one of which may be substituted with a course from the data structures and algorithms list.
- One course from List A [Complementary Studies Electives for Engineering Students](#) that considers application of computing technology, or an alternative approved by the option co-ordinator.

The courses chosen to satisfy this option must satisfy four additional constraints:

- They must satisfy Canadian Engineering Accreditation Board (CEAB) requirements.
- They must be approved by the option co-ordinator.
- Five of the courses must be considered elective (that is, not core requirements) in the student's academic plan. For the purposes of this Option, a course that a student could choose to graduate without will be considered elective.
- The student must have earned a 75% average in the selected courses in order to have earned the Option.

Students pursuing this Option are recommended to select courses in the areas of logic, operating systems, computing systems, databases, networks, human-computer interaction, and security and privacy.

Students may not declare this Option until they have completed both an introductory programming course and a data structures and algorithms course. Students must have an average of 75% in these two courses in order to declare this Option.

The lists below are intended to be the same as for the [Computing Option](#) and the [Computer Engineering Option](#). These lists are also intended to include courses that are normally part of the [Computing Minor](#) offered by the Cheriton School of Computer Science. Other courses from Computer Science may be used towards this Option with permission of the option co-ordinator. Students may declare at most one of the Computing Option, Computer Engineering Option, or Software Engineering Option. Students may change which of the three Options they declare by contacting the option co-ordinator(s).

Introductory Programming

Course	Title
AE 121	Computational Methods
BME 121	Digital Computation
CHE 120	Computer Literacy and Programming for Chemical Engineers
CIVE 121	Computational Methods
CS 115	Introduction to Computer Science 1
CS 116	Introduction to Computer Science 2
CS 135	Designing Functional Programs
CS 145	Designing Functional Programs (Advanced Level)
ECE 150	Fundamentals of Programming
ENVE 121	Computational Methods
GEOE 121	Computational Methods
ME 101	Introduction to Mechanical Engineering Practice 2
MSCI 121	Introduction to Computer Programming
MTE 121	Digital Computation
NE 111	Introduction to Programming for Engineers
SYDE 121	Digital Computation

Data Structures and Algorithms

Course	Title
BME 122	Data Structures and Algorithms
CS 136	Elementary Algorithm Design and Data Abstraction
CS 146	Elementary Algorithm Design and Data Abstraction (Advanced Level)
CS 231	Algorithmic Problem Solving
CS 234	Data Types and Structures
ECE 250	Algorithms and Data Structures
ECE 406	Algorithm Design and Analysis
MSCI 240	Algorithms and Data Structures
MTE 140	Algorithms and Data Structures
SYDE 223	Data Structures and Algorithms

Topics

The following list of topics are organized into specific areas for readability.

Logic

Course	Title
CS 245	Logic and Computation
ECE 208	Discrete Mathematics and Logic 2
SE 212	Logic and Computation

Databases

Course	Title
CS 338	Computer Applications in Business: Databases
ECE 356	Database Systems
MSCI 245	Databases and Software Design
Operating Systems	
Course	Title
ECE 350	Real-Time Operating Systems
MTE 241	Introduction to Computer Structures & Real-Time Systems
SE 350	Operating Systems
Computing Systems	
Course	Title
ECE 252	Systems Programming and Concurrency
ECE 351	Compilers
ECE 454	Distributed Computing
ECE 455	Embedded Software
ECE 459	Programming for Performance
Networks	
Course	Title
ECE 358	Computer Networks
MSCI 445	Telecommunication Systems: from protocols to applications
Digital Hardware	
Course	Title
BME 393	Digital Systems
CS 230	Introduction to Computers and Computer Systems
ECE 124	Digital Circuits and Systems
ECE 222	Digital Computers
ECE 224	Embedded Microprocessor Systems
ECE 320	Computer Architecture
ECE 327	Digital Hardware Systems
ECE 423	Embedded Computer Systems
ME 262	Introduction to Microprocessors and Digital Logic
MTE 262	Introduction to Microprocessors and Digital Logic
MTE 325	Microprocessor Systems and Interfacing for Mechatronics Engineering
SYDE 192	Digital Systems
Software Engineering	

Course	Title
CS 445/ECE 451	Software Requirements Specification and Analysis
CS 446/ECE 452	Software Design and Architectures
CS 447/ECE 453	Software Testing, Quality Assurance and Maintenance
MSCI 342	Principles of Software Engineering
SE 463	Software Requirements Specification and Analysis
SE 464	Software Design and Architectures
SE 465	Software Testing and Quality Assurance

Human-Computer Interaction

Course	Title
MSCI 343	Human-Computer Interaction
MSCI 541	Search Engines
MSCI 543	Analytics and User Experience
SYDE 542	Interface Design
SYDE 543	Cognitive Ergonomics
SYDE 548	User Centred Design Methods

Security and Privacy

Course	Title
ECE 409	Cryptography and System Security
ECE 458	Computer Security

Pattern Analysis and Machine Intelligence

Course	Title
ECE 417	Image Processing
ECE 457A	Cooperative and Adaptive Algorithms
ECE 457B	Fundamentals of Computational Intelligence
ECE 457C	Reinforcement Learning
MSCI 436	Decision Support Systems
MSCI 446	Introduction to Machine Learning
MSCI 546	Advanced Machine Learning
SYDE 522	Foundations of Artificial Intelligence
SYDE 552	Computational Neuroscience
SYDE 556	Simulating Neurobiological Systems
SYDE 572	Introduction to Pattern Recognition
SYDE 575	Image Processing

Numerical Methods

Course	Title
BME 411	Optimization and Numerical Methods
CHE 322	Numerical Methods for Process Analysis and Design
CIVE 422	Finite Element Analysis
EARTH 456	Numerical Methods in Hydrogeology
ECE 204	Numerical Methods
ECE 204A and ECE 204B	Numerical Methods 1 and Numerical Methods 2
ENVE 225	Environmental Modelling
ME 559	Finite Element Methods
ME 566	Computational Fluid Dynamics for Engineering Design
MTE 204	Numerical Methods
NE 336	Micro and Nanosystem Computer-aided Design
SYDE 411	Optimization and Numerical Methods

Special topics courses as approved by the [option co-ordinator](#).

6. Academic Plans (Minor Modifications)

6.1 Systems Design

6.1.1 Biomedical Engineering

Effective Date: September 1, 2021

Rationale: A number of technical electives with biomedical engineering content do not have BME course numbers (e.g. SYDE 544, Biomedical Measurement and Signal Processing; CHE 561, Biomaterials and Biomedical Design). This could make the range of biomedical electives seem artificially low, and potentially discourage prospective students from the program, if they learn about the program through the calendar. We would like to add a link to a live list of TEs. This will provide a more accurate indication of biomedical elective courses. It is the intention of BME to move all of the technical electives into the calendar in the next calendar cycle.

Biomedical Engineering

MARKED UP CALENDAR COPY

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Technical Studies Electives (TEs)

Each student in Biomedical Engineering must complete at least six approved technical electives to meet graduation requirements. Students may arrange the sequencing of the technical elective courses to suit their plan (and any course prerequisites).

The Department of Systems Design Engineering offers a wide variety of technical elective courses in the third and fourth year. Biomedical Engineering students are encouraged to design their own elective package to develop expertise in their particular interest area. Approved technical elective courses are available from [the Department of Systems Design Engineering \(SYDE and BME TEs\)](#), from other Engineering departments, and from a wide list of technical courses in the Faculties of Science and Mathematics. [There are a variety of technical electives with biomedical content, but students can also take technical electives on other topics.](#) Students may choose to take their technical electives from a more restricted list to receive the Neural Engineering Specialization or the Sports Engineering Specialization. Only courses from Engineering and Computer Science will contribute towards CEAB hours in the categories of "Engineering Science" and "Engineering Design."

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6.2 Electrical and Computer Engineering

6.2.1 Electrical Engineering & Computer Engineering

Effective Date: September 1, 2021

Rationale: Add the newly created ECE 457C – Reinforcement Learning to the Technical Electives list for both the Electrical Engineering and Computer Engineering plans. Reinforcement learning is an important aspect of machine learning. It addresses the problem of using machine learning to learn control policies. It is not covered in the other ECE Artificial Intelligence courses. It will also provide another course that students can use to attain the AI option.

Technical Electives List

The following TE courses are normally offered for the spring (4A) term. The list is subject to change from year to year.

Course	Title	Cls	Tut	Lab
ECE 414	Communication Systems 2	3	1	0
ECE 417	Image Processing	3	1	1.25
ECE 433	Fabrication Technologies for Micro and Nano Devices	3	1	1.25
ECE 444	Integrated Analog Electronics	3	1	1.25
ECE 445	Integrated Digital Electronics	3	1	1.25
ECE 452	Software Design and Architectures	3	1	1.25
ECE 454	Distributed Computing	3	1	1.25
ECE 455	Embedded Software	3	1	1.25
ECE 457A	Cooperative and Adaptive Algorithms	3	1	0
ECE 457C	Reinforcement Learning	3	1	1.25
ECE 458	Computer Security	3	1	1.25
ECE 462	Electrical Distribution Systems	3	1	1.25
ECE 463	Design & Applications of Power Electronic Converters	3	1	1.25
ECE 475	Radio-Wave Systems	3	1	1.25
ECE 481	Digital Control Systems	3	1	1.25
ECE 486	Robot Dynamics and Control	3	1	1.25
ECE 493	Special Topics in Electrical and Computer Engineering (see note 7)	3	1	0

6.3 Management Sciences

6.3.1 Management Engineering

Effective Date: September 1, 2021

Students following the 2020/2021 Calendar requirements are being given the opportunity to take advantage of these modifications. The changes do not affect the 1A or 1B curriculum, so the transition from the 2020/2021 Calendar requirements to the 2021/2022 requirements can be done seamlessly, with the first impact occurring in 2A (Fall 2021).

Rationale: To reduce the load on students such that 2A and 2B terms will only have 5 courses instead of the current 6 courses. These changes introduce electives starting in 2A, which help students who need a reduced load term. CEAB AUs are improved. These changes also:

1. improve students' choice of natural science content,
2. provide more engineering design in the 3B term by creating a new course (MSCI 302 – Engineering Design Methods) that improves capstone course sequence,
3. allow us to offer a technical elective (MSCI 546 – Advanced Machine Learning) in 4B more suited to the Management Engineering program, and
4. strengthen students' technical writing with PD 11.

Management Sciences has consulted with MME who have agreed to dropping ME 219, 235, and 250. Approvals from the Associate Chairs in the Faculty of Science for adding all the courses to the NatSci elective list have been obtained. WatPD has approved adding PD 11 as a required PD that MSCI will block enroll students into. MATH has been informed about the inactivation of the MSCI courses that they had listed.

Summary of Changes:

- Overall load reduced from 43 courses to 41.
- First year is unchanged.
- 2A: Reduction from six to five courses. Natural science elective slot added. MSCI 211 moved to 3A and ME 235 removed.
- 2B: Reduction from six to five courses. Natural science elective slot added. ME 219 and ME 250 removed.
- 3A: MSCI 311 moved to 4B. New TE course, MSCI 546 (Advanced Machine Learning), replaces inactivated MSCI 445 (Telecommunications).
- 3B: Add MSCI 302 (Engineering Design Methods) as core, reducing elective slots from 2 to 1 in 3B. MSCI 302 extends Capstone to 3 terms.
- 4A: No changes.
- 4B: MSCI 311 replaces an elective slot, reducing elective slots from 4 to 3.
- Required number of electives unchanged at 9 courses, but two free electives replaced by 2 natural science elective courses from a pre-approved list.
- Replace the List I (TE) and List II (non-TE) Electives with one list of Technical Electives (TE).

- Require students to take PD 11 (Processes for Technical Report Writing), replacing one PD elective.

Proposal for creation of 3B Design Course and Updating of MSCI 401/402 Course Outlines

Current state: Two-term capstone design course (MSCI 401/402) sequence in 4A and 4B term.

MSCI 401	<ul style="list-style-type: none"> Form teams, find a project topic, find an advisor Perform a need analysis and formulate a problem, generate design alternatives and propose a chosen design Participate in lectures/workshop on design methods, project management, teamwork, engineering impact (5 weeks) Participate in two formal design reviews and two progress update meetings
MSCI 402	<ul style="list-style-type: none"> Continue working on chosen design, perform design verification and validation (e.g., testing) Complete implementation and handover to client (when applicable) Participate in lecture/workshop on design verification and validation (1 week) Participate in one formal design review, three progress update meetings, and symposium

Problems

- For many teams, a lot of MSCI 401 is spent on forming teams, finding advisors, and finding a suitable topic. Often, after spending time analyzing a problem, students find it to not be a suitable design project and have to start from scratch, sometimes as late as end of MSCI 401. Students have consistently provided feedback that they wish they could form teams and pick topics in 3B. They really feel the pressure at the beginning of 4A. On the one hand, they are expected to carefully find a good problem and form a team to match it; on the other hand, they cannot spend too long on it (they need to start designing something).
- Students like the lectures/workshops on engineering design methods in MSCI 401/402 and want more of them (including more guest lectures), but they find attending them to be an additional burden, especially in MSCI 401, when they are already stressed finding and defining a project topic. Also, for many, those lectures come too late – they need that information **before** beginning the project.

Proposed Solution: Create a new design course in the 3B term, extending the capstone course sequence to three courses.

- Students will begin team formation and topic selection in the 3B course.
- All lecture content from 401/402 will be moved to the 3B course.

MSCI 302	<ul style="list-style-type: none"> Lectures/workshops on design methods, and tools as they pertain to need finding, problem formulation, solution generation and evaluation, and design verification/validation; design project and team management; design impact on social/economic/environmental sustainability Students form teams, begin their capstone sequence by conducting need finding, analysis, and problem formulation
MSCI 401	<ul style="list-style-type: none"> Continue the project begun in MSCI 302, or begin a new customer-defined project Concept generation and begin detail design iterations Design reviews and progress update meetings
MSCI 402	<ul style="list-style-type: none"> Continue design iterations; design verification and validation, handover Design reviews, progress update meetings, and symposium

Current and proposed course outlines

	MSCI 302 – Engineering Design Methods	MSCI 401 – Management Engineering Design Project 1	MSCI 402 – Management Engineering Design Project 2
Current	N/A	<p>LEC, PRJ 0.50</p> <p>This is the first course of a two course sequence to provide students with an opportunity to engage in a significant design experience based on the engineering knowledge and skills gained in previous courses and on cooperative work terms. The instructor will review and extend concepts of project management studied in earlier courses, and students will apply these project management skills. Teams of students will formulate a design problem and submit a preliminary project proposal, make oral presentations for preliminary and interim design reviews, and submit a written interim report describing the proposed design solution.</p>	<p>LEC, PRJ 0.50</p> <p>This is the second course of a two course sequence to provide students with an opportunity to engage in a significant design experience based on the engineering knowledge and skills gained in previous courses and on cooperative work terms. Each student team is required to complete the detailed design for the project defined in MSCI 401, submit a final written report, and make an oral presentation describing their design solution.</p>
Proposed	<p>LEC, LAB 0.50</p> <p>This course provides a survey of engineering design theories, methods, and tools as they pertain to need finding, problem formulation, and solution generation and evaluation. Students learn about different approaches to design project and team management and communication, as well as the relationship between design and environmental, social, and economic sustainability. Students gain experience in the entire design cycle by working on a number of small design problems throughout the term. Students form teams and work on a term-long project centered on need finding and problem formulation. This activity is expected to result in a project topic that can be further developed in the capstone design series of courses (MSCI 401/402).</p>	<p>PRJ 0.50</p> <p>Teams formed in MSCI 302 conduct concept generation and detailed design iterations on the design problem formulated in MSCI 302, or on a new customer-defined problem. Project progress is communicated and evaluated in periodic design reviews. Teams establish and maintain suitable project control and team processes.</p>	<p>PRJ 0.50</p> <p>Student teams continue working on the design project begun in MSCI 302 and MSCI 401. They complete design iterations, plan and perform verification and validation of the solution, and deliver a final implementation of the design. Project progress and final design are communicated and evaluated in periodic design reviews and at a public symposium. Teams maintain suitable project control and team processes.</p>

Program	3A	3B	4A	4B
Architectural		AE 325 Project 1 Studio	AE 400 Project 2 Studio	AE 425 Project 3 Studio
		Two-term capstone design project in groups		Individual design project
Biomedical/ Systems Design	BME 361 Biomed. Eng. Design SYDE 361 Syst. Design Methods 1: Needs Analysis and Prototyping	BME 362 Biomed. Eng. Design Workshop 1 SYDE 362 Syst. Design Methods 2: Testing, Verification, and Validation	BME 461 Biomed. Eng. Design Workshop 2 SYDE 461 Syst. Design Capstone Project 1	BME 462 Biomed. Eng. Design Workshop 3 SYDE 462 Syst. Design Capstone Project 2
	Each course includes a term design project in groups. The courses cover non-overlapping design-related topics		Two-term capstone design project in groups	
Chemical		CHE 383 Chem. Eng. Design Workshop Half-credit course on design process. Beginning of capstone design project	CHE 482 Group Design Project	CHE 482 Group Design Project and Symposium
		Two-term capstone design project in groups		
Civil/ Enviro./ Geological			CIVE 400 Civil Eng. Design Project 1 ENVE 400 Enviro. Eng. Design Project 1 GEOE 400 Geo. Eng. Design Project 1	CIVE 401 Civil Eng. Design Project 2 ENVE 401 Enviro Eng. Design Project 2 GEOE 401 Geo. Eng. Design Project 2
		Two-term capstone design project in groups		
Computer/ Electrical			ECE 498A Eng. Design Project 1	ECE 498B Eng. Design Project 2
		Two-term capstone design project in groups		
Mechanical/ Mechatronics		ME 380 Mech. Eng. Design Workshop MTE 380 Mechatr. Eng. Design Workshop	ME 481 Mech. Eng. Design Project 1 MTE 481 Mechatr. Eng. Design Project	ME 482 Mech. Eng. Design Project 2 MTE 482 Mechatr. Eng. Project
		Design methods and design project management. Term-long design project		
Nanotech.		NE 307 Introduction to Nanosystems Design	NE 408 Nanosystems Design Project	NE 409 Nanosystems Design Project and Symposium
		Design methods and design project management. Beginning of capstone design project		
Software		SE 390 Design Project Planning	SE 490 Design Project 1	SE 491 Design Project 2
		Design methods and design project management. Beginning of capstone design project		

Sequences of design courses in other programs

Academic Curriculum

The Management Engineering curriculum consists of 342 core and nine elective courses for a total of 431 courses. The term by term academic component is as follows:

Legend

Cls=number of class hours per week, Tut=number of tutorial hours per week, Lab=number of lab hours per week. **F=Fall, W=Winter, and S=Spring**

Term	Course and Title	Cls	Tut	Lab
1A Fall	CHE 102 Chemistry for Engineers	3	2	0
	MSCI 100 Management Engineering Concepts	3	2	3
	MATH 115 Linear Algebra for Engineering	3	2	0
	MATH 116 Calculus 1 for Engineering	3	2	0
	PHYS 115 Mechanics	3	2	0
1B Winter	MSCI 100B Seminar	1	0	0
	ENGL 192/SPCOM 192 Communication in the Engineering Profession	3	0	0
	GENE 123 Electrical Circuits and Instrumentation	3	1	1.5
	MSCI 121 Introduction to Computer Programming	3	2	0
	MSCI 131 Work Design and Facilities Planning	3	1	1.5
	MATH 118 Calculus 2 for Engineering	3	2	0
2A Fall	PHYS 125 Physics for Engineers	3	2	0
	MSCI 200A Seminar	1	0	0
	MSCI 211 Organizational Behaviour	3	0	0
	MSCI 240 Algorithms and Data Structures	3	1	0
	MSCI 251 Probability and Statistics 1	3	1	1.5
	MSCI 261 Engineering Economics: Financial Management for Engineers	3	1	0
	MSCI 271 Advanced Calculus and Numerical Methods	3	2	0
	ME 235 Materials Science and Engineering	3	1	3
Natural Science Elective (see Note 4)				
2B Spring	MSCI 200B Seminar	1	0	0
	MSCI 245 Databases and Software Design	3	1	1.5
	MSCI 253 Probability and Statistics 2	3	1	1.5

	MSCI 263 Managerial Economics	3	1	0
	MSCI 331 Introduction to Optimization	3	1	0
	ME 219 Mechanics of Deformable Solids 1	3	1	0
	ME 250 Thermodynamics 1	3	1	0
	Natural Science Elective (see Note 4)			
3A Winter	MSCI 300A Seminar	1	0	0
	MSCI 311 Organizational Design and Technology	3	0	0
	MSCI 211 Organizational Behaviour	3	0	0
	MSCI 334 Operations Planning and Inventory Control	3	1	1.5
	MSCI 342 Principles of Software Engineering	3	0	3
	MSCI 431 Stochastic Models and Methods	3	1	0
	Elective			
	MSCI 391 Work-term Report			
3B Fall	MSCI 300B Seminar	1	0	0
	MSCI 302 Engineering Design Methods	3	0	1
	MSCI 332 Deterministic Optimization Models and Methods	3	1	0
	MSCI 333 Simulation Analysis and Design	3	1	1.5
	MSCI 343 Human-Computer Interaction	3	1	1.5
	Two Electives Elective			
	MSCI 392 Work-term Report			
4A Spring	MSCI 400A Seminar	1	0	0
	MSCI 401 Management Engineering Design Project 1	3	0	0
	MSCI 434 Supply Chain Management	3	1	1.5
	MSCI 436 Decision Support Systems	3	1	0
	Two Electives			
	MSCI 491 Work-term Report			
4B Winter	MSCI 400B Seminar	1	0	0
	MSCI 311 Organizational Design and Technology	3	0	0
	MSCI 402 Management Engineering Design Project 2	3	0	0
	Four Three Electives			

Elective Courses

List I: Six Technical Electives ~~Courses~~ with Large Engineering Science ~~or~~ and Design Content

Department Term	Course	Title
Management Sciences <u>W</u>	MSCI 433	Applications of Management Engineering
<u>W</u>	MSCI 435	Advanced Optimization Techniques
	MSCI 445	Telecommunication Systems: from protocols to applications
<u>W</u>	MSCI 446	Data Mining Introduction to Machine Learning
<u>S</u>	MSCI 452	Decision Making Under Uncertainty
<u>S</u>	MSCI 531	Stochastic Processes and Decision Making
<u>F</u>	MSCI 541	Search Engines
<u>S</u>	MSCI 543	Analytics and User Experience
<u>W</u>	MSCI 546	Advanced Machine Learning
<u>F</u>	MSCI 551	Quality Management and Control
<u>W</u>	MSCI 555	Scheduling: Theory and Practice
<u>F,W,S</u>	MSCI 598	Special Topics in Management Engineering
	MSCI 599	Special Topics in Management Engineering Design
Chemical Engineering	CHE 211	Fluid Mechanics
	CHE 572	Air Pollution Control
	CHE 574	Industrial Wastewater Pollution Control
Civil Engineering	CIVE 230	Engineering and Sustainable Development
	CIVE 343	Traffic Simulation Modelling and Applications
	CIVE 375	Environmental Engineering Principles
	CIVE 440	Transit Planning and Operations
Electrical and Computer Engineering	ECE 361	Power Systems and Components
	ECE 467	Power Systems Analysis, Operations and Markets
Mechanical Engineering	ME 212	Dynamics
	ME 220	Mechanics of Deformable Solids 2
	ME 262	Introduction to Microprocessors and Digital Logic
	ME 269	Electromechanical Devices and Power Processing
	ME 340	Manufacturing Processes
	ME 351	Fluid Mechanics 1
	ME 353	Heat Transfer 1
	ME 354	Thermodynamics 2
	ME 362	Fluid Mechanics 2
	ME 435	Industrial Metallurgy
	ME 456	Heat Transfer 2

	ME 459	Energy Conversion
	ME 533	Non-metallic and Composite Materials
	ME 559	Finite Element Methods
	ME 566	Computational Fluid Dynamics for Engineering Design
Mechatronics Engineering	MTE 241	Introduction to Computer Structures & Real-Time Systems
Statistics	STAT 435	Statistical Methods for Process Improvements
	STAT 443	Forecasting
Systems Design Engineering	SYDE 522	Machine Intelligence
	SYDE 531	Design Optimization Under Probabilistic Uncertainty
	SYDE 542	Interface Design

List II: Other Elective Courses-

Course	Title
MSCI 411	Leadership and Influence
MSCI 421	Strategic Management of Technology
MSCI 422	Economic Impact of Technological Change and Entrepreneurship (<i>CSE List A, Impact</i>)
MSCI 423	Managing New Product and Process Innovation
MSCI 442	Impact of Information Systems on Organizations and Society (<i>CSE List A, Impact</i>)
MSCI 454	Technical Entrepreneurship
MSCI 597	Complementary Studies Topics in Management Sciences
MSCI 598	Special Topics in Management Engineering

Natural Science Electives

Two courses from this list of natural science courses:

- [BIOL 110, BIOL 120, BIOL 130, BIOL 150, BIOL 165, BIOL 211, BIOL 239, BIOL 240, BIOL 273](#)
- [CHE 161](#)
- [CHEM 262](#)
- [EARTH 121, EARTH 122, EARTH 123, EARTH 221](#)
- [ENVS 200](#)
- [PHYS 124, PHYS 175, PHYS 233, PHYS 275](#)
- [PSYCH 261](#)
- [SCI 238, SCI 250](#)

Notes

1. [MSCI 401/MSCI 402](#) may be replaced by [GENE 403/GENE 404](#).

2. Some of the ~~List I~~ [elective](#) courses have prerequisites that are not met by core courses in Management Engineering; see their course descriptions in this Calendar before planning elective choices.
 3. Course schedules may vary from term to term; check course schedules before planning elective choices.
 4. ~~Students are encouraged to take List II electives as free electives to extend their knowledge of management engineering. However, free electives may be used to deepen a concentration in any area of engineering or to pursue an interest outside of engineering. Free electives may be selected from any academic unit at the University.~~
- 4. If a student cannot find a natural science elective for this term, they may take another course towards their degree requirements with the permission of their academic advisor. Taking another course does not reduce the requirement of two natural science electives.**

Rules Restricting Choice of the Nine Elective Courses

RULE 1. ~~At least s~~ Six of the nine electives must be from ~~List I~~ [the list of approved technical electives](#). Students can count other Engineering courses towards [this List I requirement](#) (subject to associate chair approval).

RULE 2. ~~At least o~~ One of the nine electives must be from List A of the [Complementary Studies Requirements for Engineering Students](#), i.e., a course on the impact of technology on society.

RULE 3. Two of the nine electives must be from the list of approval natural science electives. Students can count other Natural Science courses towards this requirement subject to associate chair approval.

Complementary Studies Component

All engineering students are required to take Complementary Studies courses, as described in [Complementary Studies Requirements for Engineering Students](#). Most of these requirements are satisfied in the core curriculum, namely, [ENGL 192](#) or [SPCOM 192](#), [MSCI 211](#), [MSCI 261](#), [MSCI 263](#), [MSCI 311](#), together with satisfactory evaluations on three work-term reports. The requirement for studies on the impact of technology on society is met by [RULE 2](#), ~~above~~.

Professional Development (PD) Courses

Professional development courses are required as described in the BSc and BSE Specific Degree Requirements section on [Work Terms](#). Management Engineering students are also required to take [PD 11 Processes for Technical Report Writing and PD 22 Professionalism and Ethics in Engineering Practice](#). ~~This~~ These courses ~~replaces one two~~ of the PD electives such that for Management Engineering students, [PD 11 and PD 22](#) ~~is an~~ are additional core PD courses, and the number of PD electives required is reduced by ~~one two~~. Management Engineering students are automatically enrolled in the required core PD courses, [PD 11](#) and [PD 22](#), but must enrol in the elective PD courses using the normal Quest enrolment process.

Options and Minors

Several faculty designated options are available to Engineering students. These are listed and described elsewhere in this section of the Calendar. If a student satisfies the option requirements (usually seven or eight courses), the appropriate designation will be shown on the student's transcript. The course requirements for some options can be partially met by taking Management Engineering electives, but students may have to take extra courses to complete the requirements.

The Management Sciences Option will not be awarded to any Management Engineering student.

Minors are sequences of courses that are arranged in conjunction with another academic unit and lead to an appropriate designation on the transcript and diploma. Approval from both Management Sciences and the other academic unit is required. Usually a student must take extra courses to complete a minor. See the discussion in this section of the Calendar under the heading [Options, Specializations and Electives for Engineering Students](#).

Term-by-Term Structure

The Management Engineering plan follows the eight-stream schedule (i.e., beginning with terms 1A and 1B in the fall and winter terms, followed by alternating work and academic terms). In accordance with Faculty rules, in order to complete their degree, students must have at least five work terms, and they must submit three work-term reports, in academic terms following three work terms.

6.3.2 Management Sciences Option

Effective Date: September 1, 2021

Students following the 2020/2021 Calendar requirements are being given the opportunity to take advantage of these modifications. The changes do not affect the 1A or 1B curriculum, so the transition from the 2020/2021 Calendar requirements to the 2021/2022 requirements can be done seamlessly, with the first impact occurring in 2A (Fall 2021).

Rationale: The Management Sciences Option will now have two required courses and four electives rather than three required courses and three electives. These changes make the MSCI Option more available to students in programs that do not require MSCI 261 (Engineering Economics) or an equivalent. The overall number of courses required remains unchanged, but now Engineering Economics is an elective choice rather than a requirement.

Management Sciences Option

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The Management Sciences Option (MSCI Option) prepares students for decision-making roles in business and technology management. The Option complements an engineer's technical training with a well-rounded education in management sciences, including studies of economics, organizational behaviour and design, decision analysis and operations research, production and service operations, information systems design, innovation, and technology strategy. Courses develop a conceptual understanding of management and organizational processes, practical skills to analyze and solve decision problems and implement business solutions, and an awareness of the impact of technology and innovation on organizations and society.

Legend

Code	Description
F	Fall term
W	Winter term
S	Spring term
A,B,C,D	These courses count toward Complementary Studies Requirements : A- Impact, B- Engineering Economics, C- Humanities and Social Sciences, D- Other.

†

These courses may count towards technical elective (or technical breadth elective) requirements. Engineering students should consult the undergraduate advisor in their home department for specific rules that apply to their plan.

The MSCI Option consists of six courses, including ~~three~~ two required courses (or their equivalents) and ~~three~~ four elective courses (or equivalents). In order to gain a management science perspective during their option, students are required to have at least three of the six courses taught by the Department of Management Sciences. The ~~three~~ two required MSCI Option courses and equivalents are:

Course	Title and Notes
MSCI 211^C	Organizational Behaviour (F,W,S) - may be replaced by PSYCH 238
or MSCI 311^C	Organizational Design and Technology (F,W)
MSCI 261^B	Engineering Economics: Financial Management for Engineers (F,W,S) - may be replaced by AE 392, BME 364, CIVE 392, ENVE 392, GEOE 392, or SYDE 262
MSCI 331[†]	Introduction to Optimization (F,W,S) - may be replaced by BME 411 , CHE 521 , CIVE 332 , CO 250 , ENVE 335 , or SYDE 411

Plus ~~three~~ four of the following elective courses or equivalents:

Course	Title and Notes
MSCI 211^C	Organizational Behaviour (F,W,S) - may be replaced by PSYCH 238
MSCI 261^B	Engineering Economics: Financial Management for Engineers (F,W,S) - may be replaced by AE 392, BME 364, CIVE 392, ENVE 392, GEOE 392, or SYDE 262
MSCI 263^C	Managerial Economics (S) - may be replaced by ECON 201
MSCI 311^C	Organizational Design and Technology (F,W)
MSCI 332[†]	Deterministic Optimization Models and Methods (F)
MSCI 411^C	Leadership and Influence (S) - may be replaced by BET 450
MSCI 421^D	Strategic Management of Technology (S)
MSCI 422^A	Economic Impact of Technological Change and Entrepreneurship (F)
MSCI 423[‡]	Managing New Product and Process Innovation (W)
MSCI 431[†]	Stochastic Models and Methods (W) - may be replaced by CS 457 or SYDE 531
MSCI 432[†]	Production and Service Operations Management (F,W)
MSCI 433[†]	Applications of Management Engineering (W)

MSCI 435 [†]	Advanced Optimization Techniques (W)
MSCI 442 ^A	Impact of Information Systems on Organizations and Society (W)
MSCI 444 [†]	Information Systems Analysis and Design (W) - may be replaced by CS 430 or CS 490
MSCI 445[‡]	Telecommunication Systems: from protocols to applications (W beginning 2021)
MSCI 446 [†]	Data Mining (F until 2020, W beginning 2021) [Note: new title effective winter 2021] Introduction to Machine Learning (W)
MSCI 452 [†]	Decision Making Under Uncertainty (S)
MSCI 454 ^D	Technical Entrepreneurship (W)
MSCI 531 [†]	Stochastic Processes and Decision Making (S)
MSCI 541 [†]	Search Engines (F) (W until 2020, F beginning 2021)
MSCI 543 [†]	Analytics and User Experience (S beginning 2022)
MSCI 546 [†]	Advanced Machine Learning (W beginning 2023)
MSCI 551 [†]	Quality Management and Control (F) (S until 2021, F beginning 2021)
MSCI 555 [†]	Scheduling: Theory and Practice (W)
MSCI 597	Complementary Studies Topics in Management Sciences
MSCI 598 [†]	Special Topics in Management Engineering
MSCI 599[‡]	Special Topics in Management Engineering Design
CIVE 596	Construction Engineering (S)
ECON 371	Business Finance 1 (F,W,S)
HRM 200 ^C	Basic Human Resources Management (F,W,S)
SYDE 531	Design Optimization Under Probabilistic Uncertainty (W)
SYDE 533	Conflict Resolution (F)

Requirements

- At least three of the six courses must be MSCI courses from the Department of Management Sciences.
- A maximum of one course from outside the approved list may be counted toward the Option, subject to written approval of the [MSCI option co-ordinator](#) and the associate chair of undergraduate studies in the student's home department. The student must complete a [Course Substitution Request form](#) to obtain course approval.
- Students may take both [MSCI 211](#) and [MSCI 311](#), in which case, one will count toward the required courses and the other toward the elective courses.

- For the designation of Management Sciences Option to be shown on the transcript, the student must achieve a minimum overall cumulative average of 60% in the six courses.

Students have a wide degree of flexibility in course selection within the MSCI Option. For students who wish to focus on a particular theme within Management Sciences, the Department suggests the following selection of courses beyond the required set:

Theme	Courses
Operations Research	Two or more of MSCI 332 , MSCI 431 , MSCI 432 , MSCI 433 , MSCI 435 , MSCI 452 , MSCI 531 , MSCI 555
Information Systems	Two or more of MSCI 442 , MSCI 444 , MSCI 445 , MSCI 446 , MSCI 541 , MSCI 543 , MSCI 546
Management of Technology	Two or more of MSCI 311 , MSCI 411 , MSCI 421 , MSCI 422 , MSCI 423 , MSCI 454

Note

Refer to the University of Waterloo's official [Schedule of Classes](#) for confirmation of actual course offerings each term.

For further information about the MSCI Option, contact the [MSCI option co-ordinator](#) in the Management Sciences Department.

6.4 Mechanical and Mechatronics Engineering

6.4.1 Mechatronics Engineering

Effective Date: September 1, 2021

Rationale: Replace ME 321 (part of the core 3A MTE program) with newly created course, MTE 321. MTE 321 requires the same number of hours that ME 321 did: 3 (Cls), 1 (Tut), 0 (Lab).

The offering of ME 321 to MTE students has always differed from the offering to ME students. Revisions were made to the MTE offering to eliminate overlapping material with a subsequent course (MTE 322 - only taken by MTE students). Better alignment of course material with subsequent courses. Should improve student experience. A student survey supports the calendar change (students indicated material overlap in ME 321 and MTE 322). The course is jointly offered by ME and SYDE. Contributions to the calendar description were made by both the ME instructor and SYDE instructor.

6.5 Complementary Studies Electives

Effective Date: September 1, 2021

Rationale: Add the following courses to the CSE electives lists. Inclusion of these courses will provide students with additional choice in fulfilling List A, C and D requirements.

List A	List C	List D
PACS 315	BET 460	AHS 100
STV 208	BET 580	AHS 105

With the addition of PACS 315 and STV 208, Engineering students will be able to select from 27 courses on **List A**. The proposal to include PACS 315 on List A was initiated by Conrad Grebel University College.

List C consists of a very large number of courses from the humanities and social sciences. For the purposes of **List C**, literature and civilization courses offered by the

language departments are also considered suitable. These BET courses are considered by Engineering to be suitable for List C.

With the addition of AHS 100 and AHS 105, Engineering students will be able to select from a list of 49 courses on **List D**. The Faculty of Applied Health Sciences has approved the addition of these courses to List D.

6.6 Options

6.6.1 Artificial Intelligence Option

Effective Date: September 1, 2021

Rationale: Replace CHE 420 (inactivated) with CHE 341, *Introduction to Process Control*, essentially the same course, re-numbered.

The AI Option is available for students in all undergraduate engineering plans at the University of Waterloo. The requirements for option completion are:

-
-
-

One of

[BME 356](#) Control Systems

~~[CHE 420 Introduction to Process Control](#)~~ [CHE 341 Introduction to Process Control](#)

[ECE 380](#) Analog Control Systems

[MTE 360](#) Automatic Control Systems

[SE 380](#) Introduction to Feedback Control

[SYDE 352](#) Introduction to Control Systems

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-
-

6.6.2 Biomechanics Option

Effective Date: September 1, 2021

Rationale: Replace CHE 420 (inactivated) with CHE 341, *Introduction to Process Control* in List C – Techniques of Biomechanics, essentially the same course, re-numbered.

Add BME 551 to List D – Kinesiology. List D currently includes several biomechanics courses from the Department of Kinesiology. BME 551 covers similar content (largely rigid-body dynamic models of human movement) but with a more mathematical emphasis.

List C - Techniques of Biomechanics:

Course	Title
CHE 420 CHE 341	Introduction to Process Control (F,S) Introduction to Process Control (F,W)

Course	Title
CIVE 306	Mechanics of Solids 3 (F)
CIVE 422	Finite Element Analysis (W)
ECE 380	Analog Control Systems (W,S)
ECE 486	Robot Dynamics and Control (S)
ME 322	Mechanical Design 1 (F,W)
ME 360	Introduction to Control Systems (F,W)
ME 423	Mechanical Design 2 (F,S)
ME 547	Robot Manipulators: Kinematics, Dynamics, Control (W)
ME 555	Computer-Aided Design (W)
ME 559	Finite Element Methods (F,S)
ME 566	Computational Fluid Dynamics for Engineering Design (F,S)
MTE 360	Automatic Control Systems (F,W)
PHYS 395	Biophysics of Therapeutic Methods (W)
SYDE 352	Introduction to Control Systems (W)
SYDE 543	Cognitive Ergonomics (F)
SYDE 544	Biomedical Measurement and Signal Processing (W)
SYDE 553	Advanced Dynamics (F)
SYDE 572	Introduction to Pattern Recognition (W)
SYDE 575	Image Processing (F)

List D - Kinesiology:

Course	Title
BME 551	Biomechanics of Human Movement (W)
KIN 221 and KIN 221L	Advanced Biomechanics of Human Movement/Advanced Biomechanics of Human Movement Lab (W,S)
KIN 255 and KIN 255L	Fundamentals of Neuroscience/Fundamentals of Neuroscience Lab (F)
KIN 312	Introduction to Movement Disorders (F)
KIN 340	Muskuloskeletal Injuries in Work and Sport (F)
KIN 356	Information Processing in Human Perceptual-Motor Performance (W) Sensory Systems Neuroscience
KIN 416	Neuromuscular Integration (F)
KIN 420*	Occupational Biomechanics (W)
KIN 422	Human Gait, Posture, and Balance: Pathological and Aging Considerations (F)
KIN 425	Biomechanical Modelling of Human Movement (F)
KIN 472	Directed Study in Special Topics (F,W,S)

6.6.3 Entrepreneurship Option

Effective Date: September 1, 2021

Rationale: Modify the plan for the Option in Entrepreneurship so that the capstone design project no longer requires BET 410A and 410B. Instead, Conrad proposes substituting other experiences related to commercialization of the capstone including competing in the Norman Esch Award, the Hult Prize, or the Concept \$5K Grants.

The purpose of the milestone is to have students go beyond learning the theory of entrepreneurship and applying what they have learned in a real-world context. The original purpose of the BET 1/4-courses - 410A/B - was twofold: first, to add depth to the FYDP for students who otherwise might not have some way of getting that hands-on experience; and, second, to give engineering students the ability to take enough courses to obtain their Option in what are already crowded program schedules.

As we have added courses, included more courses on the CSE lists, and provide more course sections per year, we saw a significant decline in students taking 410a/b and, instead, taking Conrad 1/2-credit courses. Numbers had dropped below 5 students per semester; clearly, the original reason for having these courses was no longer as useful to students. At the same time, we added the Hult prize competitions and others have arisen. Note that Conrad provides significant mentoring for students in all these competitions (as does Concept for the \$5k competition) and these give students the kinds of experiences that Conrad faculty believe grounds the program in practice. In other words, the competitions give students useful opportunities to apply their learning (for example, there is an extensive process of developing a commercialization plan in the Norman Esch competition, run by Conrad).

For these reasons, we believe it is appropriate to change the Option as noted.

Entrepreneurship Option

Overview

This Option is designed for engineering students with a passion for entrepreneurship, whether that means starting a business, working in a start-up environment, or creating something new within an existing organization. It provides students with the business skills required to move ideas from concept to commercial and social success.

The Option is built upon an approach to entrepreneurial education that recognizes the need to couple academic and experiential learning to develop an individual's capabilities. This is achieved through a combination of venture

development or capstone project with academic content tailored to the different stages of development for new ventures.

Option Objectives

Successful students in the Entrepreneurship Option will:

- be able to find and identify significant problems worth solving
- be able to create and grow new entrepreneurial businesses
- understand the strategy and process of commercializing new technologies
- develop core business skills useful for early stage ventures
- be able to manage the introduction and growth of new business opportunities within existing organizations

Course Requirement

The Option requires students to complete six courses. Three of those courses are required, and three are electives.

Required Courses

- [BET 100](#) (~~List C Complementary Studies Elective~~)
- [BET 320](#) (~~List C Complementary Studies Elective~~)
- [BET 340](#) (~~List C Complementary Studies Elective~~)

Electives

~~Choose three courses from this list:~~

- Any other [BET courses](#)
- Any **Up to two** technical courses in an area related to the milestone requirement, as approved by the [option co-ordinator](#)
- ~~• At most one List B Complementary Studies Elective~~
- ~~• BET 410A and BET 410B courses, but only if taken concurrently with any of the capstone project courses: [CHE 482/CHE 483](#) or [CIVE 400/CIVE 401](#) or [ECE 498A/ECE 498B](#) or [ENVE 400/ENVE 401](#) or [GENE 403/GENE 404](#) or [GEOE 400/GEOE 401](#) or [MSCI 401/MSCI 402](#) or [ME 481/ME 482](#) or [MTE 481/MTE 482](#) or [NE 408/NE 409](#) or [SE 490/SE 491](#) or [SYDE 461/SYDE 462](#).~~

Entrepreneurial Milestone Requirement

Students can demonstrate entrepreneurial experience **through one of:** ~~either by earning credit for an Enterprise Co-op (E Co-op) term, or by completing a capstone design project. Students choosing the capstone design milestone must take [BET 410A](#) and [BET 410B](#).~~

- **Earning credit for an Enterprise Co-op (E Co-op) term**

- Through a capstone design project. Students choosing the capstone design project must participate in the Esch Awards competition, the Hult Prize competition, Concept Grants, Velocity Fund Finals, or an equivalent as approved by the option co-ordinator
- Developing a new entrepreneurial venture that is not part of the capstone design project for at least a 12-month period, as approved by the option co-ordinator
- Working for an entrepreneurial venture, including during a co-op term, that is not part of the capstone design project, as approved by the option co-ordinator

6.6.4 Life Sciences Option

Effective Date: September 1, 2021

Rationale: Add BME 186 to the required courses for the Life Sciences Option, Themes 2, 3 and 4. Themes 2, 3, and 4 of the Life Sciences Option each currently require one of CHEM 123 or CHE 102 or NE 121. BME 186 is a similar introductory chemistry course.

6.6.5 Mechatronics Option

Effective Date: September 1, 2021

Rationale: Add MTE 544 to Table 3 in the Robotics and Automation group. MTE544: Autonomous Mobile Robots deals with Robots and their Automation. MME feels that this course would be a good fit for the Mechatronics Option as a Technical Elective in the Automation and Robotics category.

Table 3. Level 3 Courses (Electives) for the Mechatronics Option

Students must take one course from each of the Group Topics given here.

Group Topic	Courses
Actuators and Sensors	ECE 463 , ME 561
Computer Systems/Software	ECE 250 , ECE 254 , ECE 356 , (ECE 454 or ECE 455), ECE 458 , ECE 459 , SYDE 322 , SYDE 572 , SYDE 575 , or MTE 140
Control Systems	ECE 481 , ECE 484 , MTE 460
Robotics and Automation	ECE 457A , ECE 457B , ECE 486 , ME 547 , MTE 544 , SYDE 522

Group Topic	Courses
Mechanical Systems	ME 322 , ME 524 , SYDE 553

6.6.6 Science, Technology, and Values Option

Effective Date: September 1, 2021

Rationale: Add STV 208 to the Requirement A List of the STV Option for Engineering Students and to the STV Option for Non-Engineering Students. Students must select two List A Requirements and maintain a two course average of 70%. With the addition of STV 208, there are now five courses available from which to select.

- [STV 100](#) Society, Technology and Values: Introduction
- [STV 202](#) Design and Society
- [STV 205](#) Cybernetics and Society
- [STV 208 Artificial Intelligence and Society: Impact, Ethics, and Equity](#)
- [STV 210](#) The Computing Society [cross-listed with [HIST 212](#)]

Artificial Intelligence (AI) presents significant ethical and social challenges and concerns. As AI plays an ever greater role in people’s lives and in academic programs, a systematic consideration of these challenges and concerns, along with responses to them, becomes a pressing matter. The addition of this course provides students with an overview of these issues in light of current scholarship and helps them to meet intelligently their professional responsibilities where AI is concerned.

6.6.7 Statistics Option

Effective Date: September 1, 2021

Rationale: Replace CHE 420 (inactivated) with CHE 341, *Introduction to Process Control*, essentially the same course, re-numbered. The Statistics Option consists of four required courses and a choice of three additional courses from a list of 21, including CHE 341.

7. Academic Regulations

7.1. Options, Specializations and Electives for Engineering Students

Effective Date: September 1, 2021

Rationale: The text in #3 is modified to acknowledge stricter grade requirements in some options or specializations.

Options, Specializations and Electives for Engineering Students **MARKED UP CALENDAR COPY**

1. The Bachelor of Applied Science (BASc) and Bachelor of Software Engineering (BSE) consist of two course groupings:
 - Compulsory core courses within the plan, and
 - Elective courses.
 - Complementary Studies Electives: Complementary Studies elective courses must be chosen from subjects that complement and provide breadth to the engineering curriculum. This Complementary Studies requirement gives students some breadth of studies related to their role as educated professionals in society. (See [Complementary Studies Requirements](#) section and plan section for more information.
 - Technical Electives: Technical elective courses are usually chosen from engineering department courses which will give some depth in the student's discipline. (See Engineering plan descriptions for listings of suggested elective course groupings of this type.) Students with special interests may, with the approval of their department associate chair (or academic advisor) structure individual elective course groupings.
2. The Faculty of Engineering recognizes both options and specializations within the BASc and BSE degrees. For students that meet an option or a specialization requirement, the credential is recognized on both the diploma and the transcript. Options are intended to recognize a field of study outside of the basic degree while specializations are intended to recognize success in a concentration within the electives available within the degree specification. Descriptions of the options are provided in [BASc and BSE Specific Degree Requirements](#) and descriptions of the specializations are within the specific plan descriptions. The options and option co-ordinators are listed on the [designated options and co-ordinators](#) web page. The option co-ordinator can assist in the organization and selection of courses for the option. Students are encouraged to use a [Plan Modification Form](#) and are required to declare an option or specialization for it to be recognized as part of their degree and to appear on the diploma.
3. For an option or specialization to appear on the transcript, a student must achieve an average of at least 60% in the option or specialization courses and at least 50% in each course. [Stricter grade requirements may be imposed for certain options or specializations.](#)
4. Because options can require students to take extra courses, a student's academic standing must be such that the extra load will not lead to a high risk of failure, and permission of the department associate

chair must be obtained. Details follow later in this section. BSE students should refer to the section on [Software Engineering](#), for options that are open to them.

5. Although Engineering does not offer minors to students enrolled in Engineering, many departments of other faculties do. Engineering students who choose a minor must take extra courses chosen from lists prepared by the department offering the minor. Courses in a minor may be used to satisfy some of the technical electives or complementary studies electives.
6. In addition, students may take advantage of other opportunities including the [Interdisciplinary Alternatives for Engineering Students](#), the [Accelerated Master's Program](#), and a [concurrent Bachelor of Arts \(BA\) degree](#). A concurrent BA degree will require extra courses as well as agreement by both Faculties of Arts and Engineering; interested students should consult their undergraduate advisor.

Senate Undergrad Council
Faculty of Environment
October 6, 2020

Approval agenda:

1. New courses (attachment 1)
2. Course Changes (attachment 1)
3. Geography and Environment Management (attachment 2)
 - a. Economy and Society Specialization
 - b. Climate Change and Environment Specialization
 - c. Geomatics Specialization
4. Knowledge Integration, Breadth Requirements (attachment 3)
5. School of Planning, Decision Support and Geographic Information Systems Specialization and Diploma of Excellence in Geographic Information Systems (attachment 4)
6. School of Planning, Urban Design Planning Specialization (attachment 5)
7. Environmental Assessment Diploma (attachment 6)
8. Urban Studies Minor (attachment 7)
9. 2+2 agreement: Shandong University and Geography and Environmental Management, Economy and Society Specialization (attachment 8)

Information agenda:

10. Changes made to 2020/21 calendar not requiring SUC approval
 - a. GEOG 411 prereq changed to “Level at least 3A” effective Spring 2020
11. UCR requirements for GEM, AVIA, GEOM curriculum (attachment 9)
12. COVID-19 academic exceptions (attachment 10)

NEW COURSES (for approval)

Geography & Environmental Management

Effective 01-SEP-2021

GEOG 219 (0.50) LEC How Pandemics Change the World

Pandemics have decimated human populations, transformed societies and altered the course of human history. This interdisciplinary course examines these tumultuous events from antiquity to the 21st century to help us understand our lived experience of COVID-19, including its causes, differential geographic impacts, social inequities, and the process of building societal resilience.

Course Attributes:

Only offered Online

Rationale :

The COVID-19 pandemic has had unprecedented social and economic impacts around the world and will continue to influence virtually all dimensions of society for years to come. While pandemics/infectious disease outbreaks are discussed in courses in GEM (introduction to human geography, hazards), there is no pandemic focused course offered at Waterloo. Indeed, a scan of Geography Departments across Canada (and US, Europe) revealed no similar course, so this would be a novel development within Canadian Geography / Environment programs. The course would contribute to our global change curriculum in the Climate Change and Environment specialization and would have broad relevance and appeal across the Faculty of Environment. [Only offered online]

Effective 01-SEP-2021

GEOG 403 (0.50) DIS, LEC Eutrophication: From Process to Water-Quality Management

Eutrophication, caused by excess nutrients (phosphorus and nitrogen) entering water bodies, results in nuisances such as harmful algal blooms, and is a major global threat to water quality and water security. This course will explore eutrophication drivers and impacts on freshwater quality, from watershed to global scales; sources and biogeochemical cycling of nutrients along the land-river-lake continuum; ecological responses and nutrient water-quality standards and criteria; the benefits and challenges of sustainable nutrient stewardship; and application of this knowledge in water-quality management.

Requisites :

Prereq: One of GEOG 201, GEOG 205 or GEOG 209

Rationale :

This new 'Eutrophication' course examines how multiple pressures influence the quality of our water resources, and considers the benefits of integrated watershed management. The course explores how eutrophication and water quality interact with a range of environmental issues, including agricultural and wastewater management, hydrology, fluvial processes, ecosystem services, the sustainable use of water and nutrient resources, and climate change and adaptation. The course is suitable for upper-level

undergraduates in Physical Geography, and Environmental Science, including within the Water Science Specialization.

Effective 01-SEP-2021

GEOG 484 (0.50) LAB, LEC, TUT Machine Learning in Geospatial Science

An in-depth study of current machine learning algorithms and their applications in geospatial science, with a focus on earth observation data processing and analysis. Topics include k-nearest neighbour, decision trees, support vector machines, ensemble learning, and some deep neural networks (e.g., CNN, U-Net). Machine learning algorithms implemented using Python will be applied for semantic segmentation, land use and land cover classification, and building and road detection using aerial and satellite images.

Requisites : Prereq: GEOG 316, GEOG 371. Antireq: GEOG 474 W2020 001; CS 480
Rationale : Machine learning is a set of techniques that allow machines to learn from data and experience, rather than requiring humans to specify the desired behavior by hand. Over the past two decades, machine learning techniques have become increasingly central in both the geospatial science and geomatics technology industry. This course provides a broad introduction to some of the most commonly used machine learning and deep learning algorithms and hand-on excises in earth observation data processing tasks to be implemented via Python coding by students. CS and ECE have both been consulted. Kate Larson asked for the CS antireq to be added.

Knowledge Integration

Effective 01-SEP-2021

INTEG 410 (0.50) DIS, LEC, PRJ, SEM Interdisciplinary Collaboration

"Interdisciplinary collaboration" is a popular term these days, but what does it mean, exactly, and what makes it successful? In this course, we will examine the nature of interdisciplinarity (such as differences between multi-, inter-, and transdisciplinarity), barriers to collaborating across disciplinary boundaries, and strategies for facilitating more effective collaborations. The course will be taught using collaborative learning techniques that allow students to shape the direction of the course and to work with the instructor to co-create assignments.

Requisites : Prereq: Level at least 2A Knowledge Integration or Level at least 3A.
Antireq: INTEG 475 W19 001
Rationale : This course has already been taught three times as a special topics elective course (INTEG 475, W13, W14, and W19). Based on the reception of the course, we plan to continue to offer it in the future (roughly every two years). The course has started to draw more students from outside KI and we would like to make this a permanent course so that we can request that it be added to appropriate elective course lists across campus.

Planning - School of

Effective 01-JAN-2021

PLAN 211 (0.50) STU Design Studio Foundations

A studio-based course that explores, through problem solving, the built form's connections to its physical-natural setting and its socio-cultural and economic contexts. Individual and group projects, and studio critiques and reviews will underscore visual communication skills through qualitative and quantitative visual analyses, design drawings (e.g., site plans, cross sections, elevations, axonometric projections, and perspective drawings), and constructed and computer models. This course normally includes a field component. [Note: Field trip fee will not exceed \$25+HST. Estimated material cost to student will not exceed \$150+HST.]

Requisites :

Prereq: PLAN 210.

Rationale :

This new course replaces the studio component formerly associated with PLAN 210 to provide a studio-based learning opportunity to students with interest and aptitude in urban design. This course will contribute to the required courses for the urban design specialization (see attachment 5 of the ENV agenda). Effective date of January 1, 2021 has been approved by Jennifer Coghlin. Instructor consent required.

COURSE CHANGES (for approval)

Environment, Resources & Sustainability, School of

Current Catalog Information

ERS 315 (0.50) LEC, TUT Environmental and Sustainability Assessment II

Continuing from concepts developed in ERS 215, this course places more emphasis on case studies and projects by students. The course provides a synthesis of ecological, physical, economic, socio-cultural and institutional concerns, as well as experience in the use of impact assessment methodologies and approaches, as a key element in achieving more informed and responsible decision making.

No Special Consent Required

Requisites :

Prereq: ERS 215 and ENVS 200

Effective 01-SEP-2021

Title Change:

Environmental and Sustainability Assessment 2

Requisite Change :

Prereq: ERS 215; ENVS 200 or International Development student

Rationale :

This course is a core course for INDEV students. ENVS 200 is no longer taken by these students; therefore, the prereq needs to be changed to allow course selection and enrolment. Change from roman numeral to numeric in course title is editorial.

Geography & Environmental Management

Current Catalog Information

GEOG 311 (0.50) LEC, TUT Local Development in a Global Context

The course examines the ability of local communities to influence their development trajectory. The roles and potential for collaboration among public, private, and third sector partners are explored. Social, environmental, and economic goals are interconnected within a sustainable development framework.

No Special Consent Required

Requisites : Prereq: GEOG 202 or GEOG 203 or Level at least 2B Faculty of Environment students only.

Effective 01-SEP-2021

Title Change: Money, Economy, and the State

Description Change: This lecture and discussion course covers topics of key importance to understanding the economy today including economic development, the 2007/2008 sub-prime mortgage crisis, debt and finance, deindustrialization, the role of work and unions, and economic justice.

Requisite Change : Prereq: GEOG 202 or GEOG 203 or Level at least 3A.

Rationale : This course is being changed to bring it in line with the new focus for the Economy and Society specialization, to better match how the course has been taught in recent offerings, and to account for personnel changes in the department. As the Specialization is being recast to be less narrowly focused, the goal is to broaden the remit to make it more appealing to a wider range of students, and to allow more people to teach it. Students with a wide range of backgrounds who are interested in the subject matter can be expected to succeed in this course.

Current Catalog Information

GEOG 411 (0.50) LEC, SEM Entrepreneurship and Startup Economies

A lecture, reading, and discussion-based class that explores the spatial, social, cultural, and economic dimensions of entrepreneurship and startup economies to explore their relationship to: (1) entrepreneurial forms of work in the global economy, (2) entrepreneurship as a gendered phenomenon, (3) regional startup economies (in particular in the San Francisco and Kitchener-Waterloo contexts), and (4) the relationship between startup economies and gentrification.

No Special Consent Required

Requisites : Prereq: Level at least 3A; Geography and Environmental Management, Geomatics, Geography and Aviation, Environment and Business, or Planning students only. Antireq: GEOG 474 001 F17, GEOG 474 001 S18

Effective 01-SEP-2021

Title Change: The Digital Economy

Description Change: A lecture, reading, and discussion-based class that explores the impacts of new technologies including digital and social media on the economy. Content will cover contemporary issues about digital media and the economy that include social media economies (e.g., Twitter and Facebook), the sharing economy, cryptocurrency, influencer and streamer economies, and global work

Requisite Change : platform's like Amazon's Mechanical Turk.
Prereq: GEOG 202 or GEOG 203 or Level at least 3A.
Antireq: GEOG 474 001 F17, GEOG 474 001 S18

Rationale : This course is being changed to bring it in line with the new focus for economy and society, to broaden the content, to better match how the course has been taught in recent offerings, and make it easier for other faculty to teach. The content will remain broadly similar, but with a focus on the digital rather than on entrepreneurship. Students with a wide range of backgrounds who are interested in the subject matter can be expected to succeed in this course.

Planning - School of

Current Catalog Information

PLAN 210 (0.50) LEC, STU Urban Planning Design and the Environment

A problem-based exploration of urban and regional design in the physical-natural, built, social-cultural environment. Individual and group projects, studio consultation and critiques explore traditional and contemporary approaches using sketches, constructed and computer models, and verbal analysis. This course normally includes a field component. [Note: Field trip fee will not exceed \$25+HST. Estimated material cost to student will not exceed \$150+HST.]

No Special Consent Required

Requisites :

Prereq: PLAN 110; Level at least 2A Planning students

Effective 01-SEP-2021

Component Change:

LEC

Title Change:

Community Design Fundamentals for Planners

Description Change:

This course explores the role of design in shaping human settlements. Students will study fundamental concepts related to urban and regional form and structure as well as the principles of design. The course will examine the impacts of design and place-making on human well-being through problem-based explorations of built form vis-à-vis transit and movement, sustainability and resilience, social institutions (including heritage), physical infrastructure, social justice, and economic development. Students will demonstrate design literacy through the creation of a sketchbook and a portfolio.

Rationale :

PLAN 211 is a new course replacing the studio component formerly associated with this course, PLAN 210. PLAN 210 has been redesigned to be a prereq for the new PLAN 211 course.

Current Catalog Information

PLAN 309 (0.50) STU Site Planning and Design Studio

A design studio that focuses on design planning for individual sites and small scale developments. Projects integrate critical features: terrain, natural and cultural context, microclimate, infrastructure, and adjacent land uses. Studio seminars, consultation and critiques explore theory and practice in observation, awareness, comprehension, and idea development. [Note: Studio fee of \$15+HST may be charged.]

No Special Consent Required

Requisites : Prereq: PLAN 210

Effective 01-SEP-2021

Requisite Change : Prereq: PLAN 211

Rationale : The studio component is being removed from PLAN 210 and a new studio course is being proposed, PLAN 211.

Current Catalog Information

PLAN 313 (1.00) LEC, STU Community Design Studio

A design studio on planning design at the community scale that is sensitive to the natural, built, and cultural context. Field study projects of area development or redevelopment projects are used to examine traditional and contemporary theory and practice. Studio seminars, presentations and critiques explore the definition, management and mapping of physical structures, visual and environmental resources. Included is consideration of the special problems of planning development within a scenic landscape. This course normally includes a field component. [Note: Studio fee: \$15+HST may be charged. Field trip fee will not exceed \$50+HST. Supply and printing cost will not exceed \$150+HST.]

No Special Consent Required

Requisites : Prereq: PLAN 210, 309

Effective 01-SEP-2021

Requisite Change : Prereq: PLAN 309

Rationale : Removal of PLAN 210 as a prereq due to course sequencing changes to the urban design stream.

Environment, Enterprise & Development - School of

Current Catalog Information

ENBUS 202 (0.50) LEC Environmental Management Systems

The examination and evaluation of Environmental Management Systems such as ISO 14001. Alternate EMS systems will be compared and reviewed to identify their respective strengths and weaknesses. Case studies will be used to illustrate the ideas presented.

No Special Consent Required

Requisites : Prereq: ENBUS 102; Environment and Business students only

Effective 01-SEP-2021

Requisite Change : Prereq: ENBUS 102; Accounting and Financial Management or Environment and Business students only

Rationale : Changing the prerequisite enables Arts Faculty AFM students (~5-10 per cohort) to pursue the newly created Sustainability Specialization.

Current Catalog Information

ENBUS 407 (0.50) LEC Corporate Sustainability Accounting and Reporting

The course focuses on the environmental reporting mechanisms required of businesses in North America and overseas. The course will also evaluate best practices with

reporting performance in different business sectors.

No Special Consent Required

Requisites :

Prereq: ENBUS 202, 204

Effective 01-SEP-2021

Requisite Change :

Prereq: Level at least 3A; Accounting and Financial Management or Environment and Business students only

Rationale :

Changing the prerequisite enables Arts Faculty AFM students (~5-10 per cohort) to pursue the newly created Sustainability Specialization. For courses in which a prerequisite course was removed (i.e., ENBUS 407, 408), the instructor of record was consulted to ensure that the prerequisite could be removed without negatively affecting a student's preparedness to effectively participate in the course.

Current Catalog Information

ENBUS 408 (0.50) LEC

Best Practices in Regulations

Well-crafted environmental regulations, smart regulations, can not only protect the environment but also enhance business competitiveness. This course will discuss issues with regard to smart regulations from the viewpoint of various stakeholders: for example, governments, businesses, and customers.

No Special Consent Required

Requisites :

Prereq: ENVS 201

Effective 01-SEP-2021

Requisite Change :

Prereq: Level at least 3A

Rationale :

Changing the prerequisite enables Arts Faculty AFM students (~5-10 per cohort) to pursue the newly created Sustainability Specialization and opens the course to all students. For courses in which a prerequisite course was removed (i.e., ENBUS 407, 408), the instructor of record was consulted to ensure that the prerequisite could be removed without negatively affecting a student's preparedness to effectively participate in the course.

Current Catalog Information

ENBUS 410 (0.50) LEC

Engaging Stakeholders

Business practices need to reflect responsibility not just to shareholders, customers and staff, but also towards the local community. This course discusses what this means for management, and the strategies and practices that are needed to express this responsibility successfully.

No Special Consent Required

Requisites :

Prereq: Level at least 4A Environment and Business

Effective 01-SEP-2021

Requisite Change :

Prereq: Level at least 3A; Accounting and Financial Management or Environment and Business students only

Rationale :

Changing the prerequisite enables Arts Faculty AFM students (~5-10 per cohort) to pursue the newly created Sustainability Specialization.

End of Report

COURSE CHANGES (for approval)

English Language & Literature

Current Catalog Information

ENGL 248 (0.50) LEC Literature for an Ailing Planet

Can the humanities change how cultures relate to environments and the natural world?
This course surveys environmental thought in works of literature and in popular culture.

No Special Consent Required

Effective 01-SEP-2021

New Cross Listing :

ERS 288

Rationale :

To add cross-listing. The content and methodology of this course will diversify ERS students' learning experiences by offering them ways of thinking about environmental issues through perspectives found in literary and rhetorical studies. This new cross-listing has been approved by both the Department of English and Literature and School of Environmental, Resources, and Sustainability.

Environment, Resources & Sustainability, School of

Current Catalog Information

(0.00)

Effective 01-SEP-2021

New Cross Listing :

ENGL 248

Rationale :

To add cross-listing. The content and methodology of this course will diversify ERS students' learning experiences by offering them ways of thinking about environmental issues through perspectives found in literary and rhetorical studies. This new cross-listing has been approved by both the Department of English and Literature and School of Environmental, Resources, and Sustainability.

End of Report

To: Senate Undergrad Council
From: Faculty of Environment
Date: October 6, 2020
Re: Specialization revisions: a) Economy and Society Specialization; b) Climate Change and Environment Specialization; c) Geomatics Specialization

Effective date: September 2021

Rationale: The current Economy and Society specialization is more heavily weighted toward a narrow view of economic geography than the geography of contemporary society; this revision broadens the lens to be more inclusive of traditional economic activity (food, tourism, labour, health systems.)

Changes to the other specializations reflect the addition of new courses (GEOG 484, GEOG 219) as well as the removal of courses we have not offered regularly (GEOG 410) or do not plan to offer regularly after 2020-21 (GEOG 454).

a) Economy and Society Specialization

Required Courses:

GEOG 202 Geography of the Global Economy
GEOG 203 Environment and Development in a Global Perspective
GEOG 293 Approaches to Research in Human Geography

Elective Courses:

- at least 3.0 units from List A, including at least one capstone course
- at least 1.0 unit from List B

List A:

GEOG 219 How Pandemics Change the World
GEOG 222 Geographical Study of Canada
GEOG 225 Global Environment and Health
GEOG 233 Geography of Tourism
GEOG 302 Geographies of Work and Employment
GEOG 311 ~~Local Development in a Global Context~~ **Money, Economy, and the State**
~~GEOG 319 Economic Analyses for Regional Planning~~
GEOG 323 Tourism Impacts – International Perspectives
GEOG 325 Geographies of Health
GEOG 336 Space, Power, and Politics: Citizenship in a Changing World
~~GEOG 340 Settlements of Rural Canada~~
GEOG 349 Urban Form and Internal Spatial Structure

GEOG 361 Food Systems and Sustainability

~~GEOG 411 Entrepreneurship and Startup Economies *The Digital Economy*~~

GEOG 423 Sustainable Tourism

GEOG 426 Geographies of Development

~~GEOG 436 Feminist Economic Geography: Gender, Identities and Social Change~~

~~GEOG 450 Changing Form and Structure of Metropolitan Canada~~

~~GEOG 454 Retail Landscapes~~

Capstone Courses:

GEOG 415 Economic Geography Project (1.0 unit)

GEOG 490A Honours Thesis Preparation/GEOG 490B Honours Thesis Completion* (1.0 unit)

List B:

GEOG 306 Human Dimensions of Natural Hazards

GEOG 307 Societal Adaptation to Climate Change

GEOG 316 Multivariate Statistics

GEOG 318 Spatial Analysis

GEOG 356 Resources Management

~~GEOG 323 Tourism Impacts—International Perspectives~~

~~GEOG 325 Geographies of Health~~

~~GEOG 361 Food Systems and Sustainability~~

~~GEOG 423 Sustainable Tourism~~

~~GEOG 426 Geographies of Development~~

b) Climate Change and Environment Specialization

Required Courses:

GEOG 203 Environment and Development in a Global Perspective

GEOG 207 Climate Change Fundamentals

GEOG 209 Hydroclimatology

Elective Courses:

- at least 3.0 units from List A, including at least one capstone course
- at least 1.0 unit from List B

List A:

GEOG 304 Carbon in the Biosphere

GEOG 306 Human Dimensions of Natural Hazards

GEOG 307 Societal Adaptation to Climate Change

GEOG 309 Physical Climatology

GEOG 356 Resources Management

GEOG 368 Conservation/Resource Management of the Built Environment

GEOG 420 Ice Sheets and Glaciers

Capstone Courses:

GEOG 408 Earth's Future Climates (1.0 unit)
GEOG 409 Energy Balance Climatology (1.0 unit)
GEOG 452 Resource Management Project (1.0 unit)
GEOG 456 Transforming Canadian Resource Management (1.0 unit)
GEOG 459 Energy and Sustainability (1.0 unit)
GEOG 490A Honours Thesis Preparation/GEOG 490B Honours Thesis Completion* (1.0 unit)

List B:

GEOG 219 How Pandemics Change the World

GEOG 316 Multivariate Statistics
GEOG 318 Spatial Analysis
GEOG 323 Tourism Impacts - International Perspectives
GEOG 325 Geographies of Health
GEOG 361 Food Systems and Sustainability
GEOG 426 Geographies of Development

c) Geomatics Specialization

The Geomatics Specialization is not available to Honours Geomatics students.

Required Courses:

GEOG 271 Earth from Space Using Remote Sensing
GEOG 281 Introduction to Geographic Information Systems (GIS)
GEOG 310 Geodesy and Surveying

Elective Courses:

- at least 3.0 units from List A, including at least one capstone course
- at least 1.0 unit from List B

List A:

GEOG 371 Advanced Remote Sensing Techniques
GEOG 381 Advanced Geographic Information Systems
GEOG 387 Spatial Databases
~~GEOG 410 Global Navigation Satellite Systems~~
GEOG 483 Geoweb and Location-Based Services
GEOG 484 Machine Learning in Geospatial Science
GEOG 487 Management Issues in Geographic Information Systems

Capstone Courses:

GEOG 471 Remote Sensing Project (1.0 unit)
GEOG 481 Geographic Information Systems Project (1.0 unit)
GEOG 490A Honours Thesis Preparation/GEOG 490B Honours Thesis Completion* (1.0 unit)

List B:

GEOG 270 Remotely Piloted Aircraft Systems (RPAS) Knowledge Requirements

GEOG 316 Multivariate Statistics

GEOG 318 Spatial Analysis

GEOG 325 Geographies of Health

GEOG 428 Spatial Demography

~~GEOG 454 Retail Landscapes~~

To: Senate Undergrad Council
 From: Faculty of Environment
 Date: October 6, 2020
 Re: Breadth Requirements

Effective: September 2021

Rationale: It was brought to the attention of KI that our current practice of directing students to consult our website for illustrative examples of courses that meet Breadth Course Requirements for the BKI is not consistent with the academic or Senate approvals process used throughout the university. We are updating our calendar content to better match other departments and will remove such content from our website once these calendar changes go into effect. Breadth Courses that are currently listed on the KI website but will now migrate to the calendar are an “editorial change” as noted in the consultative table below. Further information that may be helpful to understand the proposed changes:

- Explanatory text for the motivation for Breadth Course Requirements will be removed from the website, so we have added such text to our program requirements in the calendar.
- Rationale for specifying “or Breadth requirements” in Years Two through Four: The MRU (see Note 1) are 20.5 units. Up to 1.0 may be lab units; 6.5 are core requirements; 5.5 are breadth requirements; and the remainder (8.5 units) are general electives. Students may complete breadth requirements and general electives in any order they choose. We have found that referring to breadth requirements as ‘electives’ confuses students, so we propose in Years Two through Four to specify in the calendar that the courses students can freely choose are either their electives or courses to meet breadth requirements.
- Finally, the change to Note 3 is to bring the description of the approval process for heavier course loads in line with other units in the Faculty of Environment.

Units delivering Breadth courses	Consultative status
ANTH	Editorial change; no further consultation required
ARTS	Editorial change; no further consultation required
BIOL	Approval granted July 21, 2020
CHEM	Courses removed and added have been approved
CS	Editorial change; no further consultation required
EARTH	Courses removed and added have been approved
ECE	Courses removed and should never have been listed on website because they applied to transfer students only
ECON	Editorial change; no further consultation required
ENVS	<ul style="list-style-type: none"> • Editorial changes for Mathematics and Probability and Statistics breadth requirements; no further consultation required for those breadth requirements

	<ul style="list-style-type: none"> Added courses approved for Natural/Physical Sciences breadth requirement
GEOG	Added courses have been approved
INDEV	Editorial change; no further consultation required
KIN	Editorial change, with one course removed (KIN 312). KIN has been informed.
LS	Editorial change; no further consultation required
MATH	Editorial change; no further consultation required
ME	Courses removed and should never have been listed on website because they applied to transfer students only
MNS	Courses removed. MNS has been informed.
MSCI	Editorial change; no further consultation required
PACS	<ul style="list-style-type: none"> Editorial change for Conflict Management breadth requirement; no further consultation required for Conflict Management requirement Added courses have been approved for Ethics breadth requirement
PHIL	<ul style="list-style-type: none"> Editorial change for Mathematics breadth requirement; no further consultation required for Mathematics breadth requirement Added courses approved for Ethics breadth requirement
PHYS	Approval granted July 21, 2020
PLAN	Added courses have been approved
PSCI	Editorial change; no further consultation required
PSYCH	Editorial change; no further consultation required
RS	Editorial change; no further consultation required
SDS	Editorial change; no further consultation required
SPCOM	Editorial change; no further consultation required
SOC	Editorial change; no further consultation required
STAT	Editorial change; no further consultation required
SYDE	Courses removed and should never have been listed on website because they applied to transfer students only

Note: Course titles are listed below for approval purposes only. Calendar text will not include course titles for breadth requirements.

Legend

‡SPCOM 223 must be completed with a grade of 65% or higher to meet the Undergraduate Communication Requirement. See the [Overview of Academic Plan Requirements](#) section for the Faculty of Environment if you fail to meet this requirement.

†Breadth Course Requirements

In addition to the transferable skills developed in the core, a key objective of the Bachelors in Knowledge Integration (KI) is to also develop a breadth of specific skills—for example, students should be able to express an argument clearly and persuasively and should understand statistics well enough to be credible in a conversation. Skills selected through the

following Breadth Course Requirements transcend disciplinary boundaries and equip KI students to become effective interdisciplinary scholars and collaborators. Students should choose breadth courses from the lists below that are appropriate to their prior experience, their present interests, and their future course requisites.

Knowledge Integration (KI) students have significant flexibility in their course selection; **however, they** ~~but~~ must be careful when choosing ~~electives~~ **breadth courses to ensure that they** meet specific overall breadth requirements in the following areas. **It is recommended that students take at least one of their Mathematics and Natural/Physical Sciences courses in their first year.** Courses listed below are ~~examples of~~ those that students may take to meet their breadth requirements; ~~further guidance and a list of approved courses, for each breadth requirement, may be found on the Knowledge Integration website.~~ Suitable substitutes for breadth requirements require prior consent of the associate chair, undergraduate studies, Knowledge Integration.

In exceptional cases students may petition to have a course count towards a breadth requirement that is not listed below. In particular, students transferring from other programs may find that some of their courses may meet breadth requirements. Students considering these options should consult with the Knowledge Integration Academic Advisor.

Languages:

One 100-level or 200-level ENGL course (0.5 unit).

Two courses (1.0 unit) in the same second language (e.g., FR 151/FR 152 Basic French, GER 101/GER 102 Elementary German, SPAN 101/SPAN 102 Introduction to Spanish, etc.).

Mathematics:

~~Two mathematics courses (1.0 unit).~~

Two of (1.0 unit):

BIOL 364 Mathematical Modelling in Biology

ECON 211 Introduction to Mathematical Economics

ENVS 178 Environmental Applications of Data Management and Statistics

MATH 103 Introductory Algebra for Arts and Social Science

MATH 104 Introductory Calculus for Arts and Social Science

MATH 106 Applied Linear Algebra 1

MATH 114 Linear Algebra for Science

MATH 127 Calculus 1 for the Sciences

MATH 128 Calculus 2 for the Sciences

MSCI 331 Introduction to Optimization

PHIL 240 Introduction to Formal Logic

Probability and Statistics:

~~One probability/statistics course (0.5 unit).~~

One of (0.50 unit):

ARTS 280 Statistics for Arts Students
BIOL 361 Biostatistics and Experimental Design
ECON 221 Statistics for Economists
ENVS 278 Applied Statistics for Environmental Research
LS 280 Social Statistics
PSCI 314 Quantitative Analysis
PSYCH 292 Basic Data Analysis
PSYCH 391 Advanced Data Analysis
SDS 250R Social Statistics
SOC 280 Social Statistics
STAT 202 Introductory Statistics for Scientists
STAT 220 Probability (Non-Specialist Level)
STAT 221 Statistics (Non-Specialist Level)
STAT 230 Probability
STAT 316 Introduction to Statistical Problem Solving

Computer Science:

(The purpose of the Computer Science breadth requirement is to provide a minimum level understanding of concepts such as algorithmic thinking, scripting/programming, and databases. CS 200 is recommended for students wishing to enhance their computer competency. Note: This text will not be included in calendar)

~~One computer science course (0.5 unit).~~

One of (0.5 unit):

CS 105 Introductory computer Programming 1
CS 115 Introduction to Computer Science 1
CS 135 Designing Functional Programs
CS 145 Designing Functional Programs (Advanced Level)
CS 200 Concepts for Advanced Computer Usage
PHYS 236 Computational Physics 1

Ethics:

(The purpose of the Ethics breadth requirement is to engage students in sophisticated reflection on ethics that requires them to think deeply and engage with questions of morality and belief systems (as opposed to, for example, what would be provided by an historical introduction to ethics). Note: This text will not be included in the calendar)

~~One ethics course (0.5 unit).~~

One of (0.5 unit):

INDEV 300 Culture and Ethics
PACS 311 Doing Development: Issues of Justice and Peace
PACS 314 Restorative Justice and Transformative Education
PACS 315 Engineering and Peace
PACS 316 Violence, Nonviolence and War
PACS 332 The Ethics of Peacebuilding
PHIL 215 Professional and Business Ethics
PHIL 221 Ethics
PHIL 224 Environmental Ethics
PHIL 226 Biomedical Ethics
PHIL 227 Culture and Ethics
PHIL 228 Ethics and AI
PHIL 319J Ethics of End-of-Life Care
PHIL 320 Topics in Value Theory
PHIL 326J Philosophy of Social Justice
PHIL 328 Human Rights
PHIL 329 Violence, Nonviolence and War
PHIL 420 Studies in Ethics
RS 283 Current Ethical Issues

Conflict Management:

~~One conflict management course (0.5 unit).~~

One of (0.50 unit):

PACS 202 Conflict Resolution
PACS 313 Community Conflict Resolution
PACS 323 Negotiation: Theory and Strategies
PACS 327 Cultural Approaches to Conflict Resolution
SPCOM 432 Conflict Management

Natural/Physical Sciences:

~~Two natural/physical sciences courses (1.0 unit).~~

Students must successfully complete courses that include a hands-on investigative component such as field study or lab. Corresponding labs must be taken and passed but do not count toward the 1.0 unit of natural/physical sciences. For example, KIN 100 Human Anatomy: Limbs and Trunk (0.5 unit) and its corresponding KIN 100L Human Anatomy Lab (0.25 unit) count as one course (0.5 unit) for the purposes of satisfying the natural/physical sciences requirement.

~~Students are not limited to first-year courses or those with corresponding labs. They can satisfy the natural/physical sciences requirement with courses that include hands-on investigative components, such as:~~

- ~~ANTH 355 Human Osteology~~
- ~~ANTH 455 Skeletal Biology and Forensics~~
- ~~BIOL 211 Introductory Vertebrate Zoology~~
- ~~ENVS 200 Field Ecology~~
- ~~GEOG 271 Earth from Space Using Remote Sensing~~

The natural/physical sciences requirement cannot be satisfied with any “SCI”-labelled or “SCBUS”-labelled units or **CHEM 140**.

Two of (1.0 unit):

ANTH 204 Biological Anthropology
 ANTH 355 Human Osteology
 ANTH 455 Skeletal Biology and Forensics
BIOL 110 Introductory Zoology
BIOL 120 Introduction to Plant Structure and Function
BIOL 130 with 130L Introductory Cell Biology
BIOL 201 Human Anatomy
BIOL 211 Introductory Vertebrate Zoology
BIOL 240 with 240L Fundamentals of Microbiology
BIOL 241 Introduction to Applied Microbiology
BIOL 266 Introduction to Computational Biology
BIOL 302 Functional Histology
BIOL 309 with 335L Analytical Methods in Molecular Biology
BIOL 310 Invertebrate Zoology
BIOL 325 Flowering Plants
BIOL 354 Environmental Toxicology 1
BIOL 365 Methods in Bioinformatics
BIOL 370 with 477L Comparative Animal Physiology: Environmental Aspects
BIOL 371 with 477L Comparative Animal Physiology: Evolutionary Themes
BIOL 373 with 373L Principles of Human Physiology 2
BIOL 376 Cellular Neurophysiology
BIOL 426 Phycology
BIOL 458 Quantitative Ecology
BIOL 469 Genomics
BIOL 470 Methods of Aquatic Ecology
CHEM 120 with 120L General Chemistry 1
CHEM 121 with 121L Physical and Chemical Properties of Matter; Chemical Reaction 1
CHEM 123 with 123L General Chemistry 2
CHEM 125 with 125L Chemical Reactions, Equilibria and Kinetics; Chemical Reaction 2
EARTH 121 with 121L Introductory Earth Sciences
EARTH 122 with 122L Introductory Environmental Sciences
EARTH 123 with 223 Introductory Hydrology/Field Methods
EARTH 231 Mineralogy
EARTH 235 Stratigraphic Approaches to Understanding Earth’s History
EARTH 238 Introductory Structural Geology
EARTH 260 Applied Geophysics I
EARTH 342 Geomorphology and GIS Applications
 ENVS 200 Field Ecology
ENVS 300 Vascular Plants of Southern Ontario

ENVS 444 Ecosystem and Resource Management in Parks/Natural Areas
GEOG 181 Designing Effective Maps
GEOG 205 Principles of Geomorphology
GEOG 209 Hydroclimatology
GEOG 271 Earth from space Using Remote Sensing
GEOG/PLAN 281 Introduction to Geographic Information Systems (GIS)
GEOG 300 Geomorphology and the Southern Ontario Environment
GEOG 303 Physical Hydrology
GEOG 304 Carbon in the Biosphere
GEOG 310 Geodesy and Surveying
GEOG 320 The Cryosphere
GEOG 371 Advanced Remote Sensing Techniques
GEOG 407 Environmental Hydrology
GEOG 408 Earth's Future Climates
GEOG 420 Ice Sheets and Glaciers
GEOG 428 Spatial Demography
KIN 100 with 100L Human Anatomy; Limbs and Trunk
KIN 121 with 121L Biomechanics of Human Activity
KIN 221 with 221L Advanced Biomechanics of Human Movement
KIN 301 Human Anatomy of the Central Nervous System
PLAN 418 Spatial Demography
PHYS 111 with 111L Physics 1
PHYS 112 with 112L Physics 2
PHYS 121 with 121L Mechanics
PHYS 122 with 122L Waves, Electricity and Magnetism
PHYS 175 with 75L Introduction to the Universe
PHYS 232L Measurement Laboratory
PHYS 256 with 256L Geometrical and Physical Optics

Year One

INTEG 10 Knowledge Integration Seminar (0.0 unit)
INTEG 120 The Art and Science of Learning
INTEG 121 Collaboration, Design Thinking, and Problem Solving
PHIL 145 Critical Thinking
SPCOM 223 Public Speaking

Four Breadth Course requirements[†] (2.0 units): Students are required to complete 11 Breadth Courses to meet Bachelor of Knowledge Integration (BKI) degree requirements. It is recommended that students fulfil some of the following Breadth Course requirements during their first year: computer science, math, language, and natural/physical sciences.

Two electives (1.0 unit)

Total of 5.0 units

Year Two

INTEG 10 Knowledge Integration Seminar (0.0 unit)
INTEG 220 Nature of Scientific Knowledge
INTEG 221 The Social Nature of Knowledge
INTEG 230 The Museum Course: Preparation and Field Trip (0.25 unit)
Seven electives **or Breadth Course requirements**[†], totaling ~~4.0 units~~ (4.0 units)

Total of 5.25 units

Year Three

INTEG 10 Knowledge Integration Seminar (0.0 unit)
INTEG 320 The Museum Course: Research and Design
INTEG 321 The Museum Course: Practicum and Presentation (0.75 unit)
INTEG 340 Research Design and Methods
Seven electives **or Breadth Course requirements**[†], totaling ~~3.5 units~~ (3.5 units)

Total of 5.25 units

Year Four

INTEG 10 Knowledge Integration Seminar (0.0 unit)
INTEG 420A Senior Research Project A (**0.5 unit**)/INTEG 420B Senior Research Project B (see note 4) (1.0 unit)
Seven electives **or Breadth Course requirements**[†], totaling ~~3.5 units~~ (3.5 units)

Total of 5.0 units

Notes

1. Minimum Required Units
Total: 20.5 units, ~~of which up to 1.0 may be lab units.~~; **6.5 core requirements, 5.5 Breadth Course requirements, 8.5 electives (of which up to 1.0 may be lab units).**
3. Per Term Course Load Allowance
No more than five courses (2.75 units) may be taken in a term without approval of the ~~associate chair, undergraduate advisor studies, Knowledge Integration;~~ students seeking such approval must generally have an overall cumulative average of 80%.

To: Senate Undergrad Council
From: Faculty of Environment
Date: October 6, 2020
Re: Decision Support and Geographic Information Systems Specialization and Diploma of Excellence in Geographic Information Systems

Effective: retroactive to September 2020

Rationale: With the university-level change to the course count rules, courses counted towards the Planning BES may also be used towards Planning specializations as one count. The Decision Support and Geographic Information Systems Specialization is very similar to the Diploma of Excellence in Geographic Information Systems, so students should only qualify for one of these two credentials. This was not an issue prior to the change in course count rules, but now students can use the same courses to qualify for both the specialization and the diploma. The request to make these changes retroactive have been approved by the Registrar's Office.

Decision Support and Geographic Information Systems Specialization

Geographic information systems (GIS) are used commonly by planners to manage, analyze, and visualize data related to urban planning and resource management. Students completing this Specialization will have a sound grasp of the principles of GIS and the means to apply this technology effectively in research capacities and in planning practice. **The Diploma of Excellence in Geographic Information Systems is not available to students graduating with this specialization.**

Required Courses:

ENVS 278 Applied Statistics for Environmental Research
PLAN 281 Introduction to Geographic Information Systems (GIS)

2.5 units of Elective Courses:

PLAN 381 Advanced Geographic Information Systems
PLAN 387 Spatial Databases
PLAN 481 Geographic Information Systems Project (1.0 unit)
PLAN 487 Management Issues in Geographic Information Systems
PLAN 490 Senior Honours Essay (1.0 unit)

Diploma of Excellence in Geographic Information Systems

To be awarded the Diploma, students must complete the courses below. Students must attain a minimum overall average of 80% for the five courses required for the Diploma. **This diploma is not available to School of Planning students graduating with the Decision Support and Geographic Information Systems specialization.**

Required Courses

GEOG 281/PLAN 281, GEOG 381/PLAN 381, GEOG 387/PLAN 387, GEOG 481/PLAN 481, GEOG 487/PLAN 487

To: Senate Undergrad Council
From: Faculty of Environment
Date: October 6, 2020
Re: Urban Design Specialization

Effective: Retroactive to September 2020 (approved by Jennifer Coghlin)

Rationale: This modification to the Urban Design specialization reflects the changes made to PLAN 210 (removal of studio component) and addition of PLAN 211, a new foundational urban design studio that acts as a prerequisite for upper-year design courses.

Retroactive approval is being requested as these changes are being implemented immediately (Fall 2020) as a result of COVID-19 and will affect students who entered the Planning academic plan as of September 2019. Students who entered the academic plan in September 2019 have been notified of this change in requirements. PLAN 210, in which the studio component has already been removed for Fall 2020 due to remote teaching, is a core course in their 2A term (Fall 2020). The requirement term for students, who will or have, declared this specialization will be changed to Fall 2020. Pending SUC approval PLAN 211 will be scheduled in Winter 2021 and available to students in their 2B term.

Urban Design Planning Specialization

This specialization acknowledges the student's competence in design and prepares them for work in public and private practice. Urban design focuses on the look and feel of our communities. As an urban designer, you might be part of creating, for example, public squares, urban streetscapes, or urban parks. This specialization also provides a sound foundation for graduate studies in urban design.

Required Courses:

PLAN 110 Visual Approaches to Design and Communication

PLAN 210 ~~Urban Planning Design and the Environment~~ **Community Design Fundamentals**

PLAN 211 Design Studio Foundations

PLAN 409 Urban Design Studio (1.0 unit)

1.5 units of Elective Courses:

PLAN 309 Site Planning and Design Studio

PLAN 313 Community Design Studio (1.0 unit)

PLAN 408 Urban Design Seminar

PLAN 414 Heritage Planning Workshop

PLAN 431 Issues in Housing

PLAN 490 Senior Honours Essay (1.0 unit)

To: Senate Undergrad Council
From: Faculty of Environment
Date: October 6, 2020
Re: Diploma in Environmental Assessment

Effective: September 2021

Rationale: Remove ECON 357, which is being renumbered to ECON 457 along with addition of an econometrics (statistics) pre-requisite. Furthermore, this course has not been used towards an EA count in the last two years. ECON 357 is thus being replaced by ECON 255 (Introduction to the Economics of Natural Resources) in List C. Consent from Economics has been received.

List C:

Courses on related approaches to planning, analysis, and problem solving:

BIOL 455, CIVE 230, ~~ECON 357~~ **ECON 255**, ENVE 391, ENVS 201, ENVS 220, ERS 335, ERS 372, GEOG 356, PACS 202, PACS 313, PACS 323, PLAN 471

To: Senate Undergrad Council
From: Faculty of Environment
Date: October 6, 2020
Re: Urban Studies Minor

Effective: September 2021

Rationale: ECON 437 complements theme 1 and 3 (Urban Economics/Finance and Urban Societies) of the Urban Studies minor. Consent from Economics has been received.

Students are allowed to request only one theme.

Theme 1: Urban Economics/Finance

Required course: ECON 201

Elective courses

Four of: CIVE 392 or MSCI 261, ECON 241, ECON 351, ECON 361, **ECON 437**, ECON 441, ECON 451, ENBUS 204, ENBUS 307, ERS 320, GEOG 311, PLAN 103, PLAN 320, PLAN 362, PLAN 416, PLAN 450, PLAN 483

Theme 3: Urban Societies

Required course: ERS 253

Elective courses

Four of: ANTH 272, ECON 363, **ECON 437**, GEOG 325, GSJ 302, HIST 231R, HIST 260, HIST 374, INTEG 121, INTEG 221, PACS 313, PLAN 333, PLAN 431, PLAN 432, PLAN 433, PLAN 450, REC 422, SDS 231R, SDS 312R, SDS 322R, SOC 224R, SOC 248, SOC 369J, SOCWK 222R, STV 305

To: Senate Undergrad Council
From: Faculty of Environment
Date: October 6, 2020
Re: New 2+2 agreement with Shandong University of Economics and Finance, China

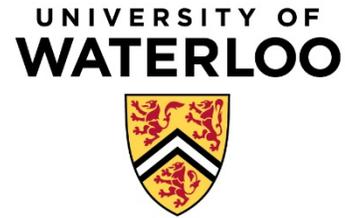
Effective Date: September 2021

Rationale:

This is a standard 2+2 program, but it involves a new partner for our faculty (SDUFE) and it is the first 2+2 program in Geography and Environmental Management specifying the Economy & Society Specialization. It is also larger than our other GEM 2+2 programs, involving up to 40 students per cohort (rather than 20). These 40 students will come from 100 students -- who are recruited from high school and have completed 2 years' study at SDUFE -- in an international education program approved by China's Ministry of Education.

Like other programs, the expected outcomes include the following:

- Raise and promote the international reputation of UWaterloo;
- Attract talented students;and
- Increase opportunities for Chinese students to experience Canadian higher education and expose Waterloo's students to China's culture and customs through interaction with the students from SDUFE



2+2 PROGRAM AGREEMENT

BETWEEN

**SHANDONG UNIVERSITY OF FINANCE AND ECONOMICS
CHINA**

AND

**UNIVERSITY OF WATERLOO
CANADA**

2+2 PROGRAM AGREEMENT

This 2+2 Program Agreement is made between:

SHANDONG UNIVERSITY OF FINANCE AND ECONOMICS, a university jointly supported by the Ministry of Finance, the Ministry of Education and the provincial government of Shandong, with its main campus located at 7366 Erhuan Donglu, Jinan, Shandong, China, 250014.
(“**SDUFE**”)

- AND -

UNIVERSITY OF WATERLOO, a university established by an Act of the Legislature of the Province of Ontario, with its main campus located at 200 University Avenue West, Waterloo, Ontario, Canada N2L 3G1.
(“**Waterloo**”)

CONTEXT:

- A. SDUFE and Waterloo (singularly an “**Institution**”, or collectively the “**Institutions**”) wish to establish a collaborative 2+2 Program, under which successful students will be awarded an academic credential from each Institution.
- B. The Institutions recognize the benefits of internationalizing their educational programs through joint academic programming aimed at developing global citizenship and thereby increasing student adaptability, cultural sensitivity, intercultural communication skills, and employability.
- C. The Institutions acknowledge that activities under this Agreement support their intent to participate in a greater collaborative joint academic program in the areas of resources and environmental economics supported by SDUFE and China’s Ministry of Education.
- D. Within their interests and abilities, the Institutions agree to (i) the exchange of information necessary for educational activities; (ii) the encouragement of educational activities involving the other Institution; and (iii) the interchange of students.

THEREFORE, both Institutions agree to provide for a Program (hereinafter defined) under the following conditions:

1. DEFINITIONS

- 1.1 In this Agreement, in addition to terms defined elsewhere in this Agreement, the following terms shall have the following meanings:

“**Academic Year**” refers to a period of twelve months from 1st September until 31st August, unless otherwise stated.

“**Agreement**” refers to this 2+2 Program Agreement and any schedules and appendices attached, and includes any amendments the Institutions may agree to in writing.

“**Applicant(s)**” refers to Undergraduate student(s) enrolled at SDUFE who formally apply to participate in the Program, but who have not yet met admissions criteria and have not been admitted to the Program.

“**EFAS**” refers to the Renison University College’s English for Academic Success program.

“**ELP**” refers to the English Language Proficiency requirements for admission to the Program.

“**Indemnitees**” refers to any or all of each Institution’s governors, directors, officers, faculty, students, employees, alumni, independent contractors, agents, and volunteers.

“**Participating Student(s)**” refers to the Undergraduate student(s) admitted into, and participating, in the Program.

“**Program**” refers to the overall 2+2 program operated under this Agreement.

“**Signatories**” refers to the individual representatives of the Institutions who have legal signing authority to bind their respective Institutions into the Agreement.

“**Term(s)/Semester(s)**” refers to the broad study segments of the Academic Year at the Institutions.

In regards to SDUFE, a dual semester system of study is in place with start dates in September and January. For full details, refer to the SDUFE Academic Calendars:

<https://www.sdufe.edu.cn/xyfw/zxxl.htm>

In regards to Waterloo, a tri-semester system of study is in place with start dates in September, January, and May. For full details, refer to the Waterloo Academic Calendars:

Undergraduate: <http://ugradcalendar.uwaterloo.ca/page/uWaterloo-Undergraduate-Calendar-Access>

“**Undergraduate**” refers to any student who is in pursuit of a bachelor’s degree that is a minimum of three (3) years in length.

2. SCOPE OF PROGRAM

2.1 Program Duration

Participating Students will complete two (2) years of study as a SDUFE student and spend a minimum of two (2) years as a Waterloo student.

2.2 Institutional Involvement

Applicants can apply the following eligible Waterloo Faculty of Environment Undergraduate regular program of Geography and Environmental Management:

Honors Geography and Environmental Management with Economy & Society Specialization.

Applicants will be enrolled in SDUFE's Resource and Environmental Economics Program (in the SDUFE School of Economics).

2.3 **Program Quota**

2.3.1 For each Academic Year of the Program, SDUFE and Waterloo will work together to select up to forty (40) Participating Students.

2.3.2 Program quota may be adjusted by written mutual agreement of both Institutions. Once an Applicant is enrolled in the Program, they shall be included in the overall quota of Participating Students in that Academic Year, even if they withdraw from the Program for any reason.

2.4 **Program Advertisement**

SDUFE is responsible for making Applicants aware of the Program in order to attract the most qualified students.

3. **ADMISSIONS**

3.1 **Potential Participants**

Prior to application to the Program, potential Applicants will have been admitted to SDUFE through its standard procedures into any eligible programs at SDUFE.

3.2 **Selection of Applicants**

3.2.1 SDUFE will pre-select Applicants according to Waterloo qualification criteria and Waterloo's minimum admission requirements. Where possible, SDUFE will encourage pre-selected Applicants to take part in extracurricular English language training and other preparatory activities while at SDUFE. When possible, Waterloo staff will visit SDUFE annually during Waterloo's Fall Term (September to December) to examine and interview Applicants for English language skills. Waterloo will be responsible for travel and living expenses of its staff while visiting SDUFE.

3.3 **Admissions Decisions and Requirements**

Admission decisions will be made by Waterloo in accordance with this Agreement, subject to Waterloo's policies, procedures, and regulations in effect at the time of said decisions.

3.3.1 Applicants must satisfy the following Waterloo minimum admission requirements before entering the Program:

3.3.1.1 **Academic Requirements**

Applicants must have successfully completed the first two (2) years of jointly recognized curriculum at SDUFE, including completing all courses with a minimum overall average of 75%.

3.3.1.2 **English Language Proficiency Requirements**

Applicants must complete an official ELP test with satisfactory scores or qualify for an ELP waiver. Waterloo's required ELP tests and scores are outlined on Waterloo's admissions website: <https://uwaterloo.ca/future-students/admissions/english-language-requirements>

- (i) Applicants who do not achieve satisfactory ELP scores, but who have satisfied all other conditions for admission, may meet the minimum required ELP scores to be considered for EFAS. Waterloo will coordinate placement of qualifying Applicants into the 6-week EFAS program. Students must obtain an overall average of 75% in the EFAS program to begin full-time Undergraduate studies in the Program at Waterloo.
- (ii) Applicants who did not successfully complete EFAS will require additional intensive English language training and may request to have their conditional offer of admission deferred for one term (or two terms maximum) in order to meet ELP criteria.
- (iii) Applicants who are exempt from providing ELP test scores, as well as those who have successfully met the ELP test criteria, are exempt from completing EFAS, although they are strongly recommended to take part in EFAS.
- (iv) Applicants who qualify for EFAS are responsible for applying, enrolling in, and attending EFAS, which begins annually in mid to late July.
- (v) Applicants are responsible for all costs associated with English language training.

3.3.1.3 **Transfer Credits**

Waterloo will grant eligible transfer credits for the first two years of course work to Participating Students who obtain marks with a minimum final grade of 70% in each course taken at SDUFE, to a maximum of 10.0 credit units (or 20 semester courses).

3.3.1.4 **Transfer Credit Assessment**

SDUFE will provide sufficient course information, including course syllabi, typical exam questions and student responses, to allow Waterloo to determine which of its courses qualify for Waterloo transfer credits.

3.4 **Application Fees and Form**

Applicants are responsible for all relevant application fees at each Institution.

3.5 **Application Deadlines and Required Documents**

Waterloo admission deadlines and required supporting documents are subject to change. Waterloo will advise SDUFE of relevant deadlines and required supporting documents on an annual basis.

3.6 **Right to Refuse**

Waterloo may refuse Applicants based on space limitations, fiscal constraints, Applicant's failure to meet admission standards, or external factors such as failure of the Applicant to obtain valid travel and study documents.

3.7 **Inclusivity**

Neither Institution will deny participation to, or unlawfully discriminate against, Applicants or Participating Students on the grounds of race, colour, age, religion, national origin, sex, sexual orientation, creed, disability, or any other factor prohibited by the applicable laws of Canada or Ontario or China or Shangdong.

4. **REGISTRATION**

4.1 **Continuous Registration**

Participating Students are responsible for maintaining continuous registration at both Institutions for the duration of their studies at Waterloo.

4.2 **Program Length**

The Program is designed for completion within four years of consecutive full-time study comprised of two years of full-time residence at SDUFE followed by four full-time academic Terms/Semesters (two Academic Years) at Waterloo. The actual length of study at Waterloo will depend on the number of transfer credits and the number of courses a Participating Student takes each Term/Semester.

4.3 **Program Transfer**

4.3.1 Participating Students must pursue the approved Program's course of study for the agreed period.

4.3.2 Participating Students are not permitted to apply for transfer to other Waterloo programs or Faculties, unless comparable 2+2 program agreements already exist with SDUFE and the transfer is agreed to in writing by both Institutions.

4.4 **Full-Time Enrolment**

Participating Students must maintain full-time enrolment for the duration of their studies at Waterloo.

4.5 **Degree Progression**

Waterloo is solely responsible for decisions regarding Participating Students' progression in years three and four of the Program.

4.6 **Regulations**

Notwithstanding any provisions in Section 9, Participating Students must comply with Waterloo's regulations, including the following (as same may be supplemented and/or updated from time to time):

4.6.1 Academic Regulations contained in the Undergraduate Studies Academic Calendar: <http://ugradcalendar.uwaterloo.ca>, and the Graduate Studies Academic Calendar: <https://uwaterloo.ca/graduate-studies-academic-calendar/>;

4.6.2 Academic and non-academic misconduct regulations contained in Policy 71 – Student Discipline: <https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-71>;

4.6.3 Ethical conduct of research through the Office of Research: <https://uwaterloo.ca/research/office-research-ethics>;

4.6.4 Academic integrity through the Office of Academic Integrity: <https://uwaterloo.ca/academic-integrity/>; and

4.6.5 All other applicable rules and regulations governing student discipline, academic misconduct, ethical research, and academic integrity.

4.7 **Travel and Study Documentation**

Participating Students are solely responsible for obtaining and maintaining valid travel and study documents for the duration of their studies.

5. TUITION AND EXPENSES

5.1 Tuition and Incidental Fees

Participating Students will pay tuition and incidental fees to the Institution at which they are in residence, as set by that Institution according to its usual procedures. While at Waterloo, Participating Students will be charged according to the relevant international student tuition standard.

5.2 Health Insurance

Participating Students are responsible for obtaining appropriate personal health and hospitalization insurance coverage (and other insurance, if required) while in residence at the Host Institution:

5.2.1 In regards to Waterloo, Participating Students are required to enrol in, and maintain coverage through, the University Health Insurance Plan (UHIP) and Waterloo's student health and dental plan or equivalent.

5.3 Expenses

Neither Institution is responsible for expenses incurred by Participating Students or visiting faculty and staff, including, but not limited to, travel/study documents, living, accommodation, medical care, ELP training, and personal expenses, except as may be arranged for specific cases, or such grants explicitly agreed upon by the Institutions.

5.4 Facilities and Services

Waterloo facilities and support services will be available to Participating Students on the same conditions and, where applicable, at the same incidental fees as for domestic students.

5.5 Accommodation

Waterloo is not responsible for providing accommodation for Participating Students, but may offer advice and assistance in securing housing during their participation in the Program.

5.5.1 Participating Students who receive a formal offer of admission are eligible to apply for, but are not guaranteed, Waterloo accommodation. More information on both Waterloo's on-campus accommodation and private housing can be found on Waterloo's Housing and Residences webpage: <https://uwaterloo.ca/housing/>.

5.6 Entrance Awards

At Waterloo's discretion, Participating Students may be awarded Waterloo entrance awards.

5.7 **Scholarships and Bursaries**

While in residence at Waterloo, Participating Students are entitled to apply for any Waterloo scholarship or bursary funds for which they are eligible.

6. **RECORDS**

6.1 **Official Records and Transcripts**

Each Institution will maintain official records for Participating Students during their enrolment in the Program and Terms/Semesters of residence.

6.1.1 Participating Students will be issued official transcripts by each Institution as appropriate.

6.1.2 Should translations of official transcripts and/or other documents be required, Applicants and Participating Students shall be responsible for this requirement and any associated costs.

6.2 **Privacy and Data Sharing**

Subject to applicable laws or regulations regarding privacy and access to student information, each Institution will transmit to the other:

6.2.1 Grades for all courses completed or attempted by Participating Students;

6.2.2 Disciplinary case summaries when a penalty has been imposed; and

Each Institution will use reasonable efforts to obtain Participating Students' consent to the release of information described in this Section.

6.3 **Curricular Co-operation**

Where possible, SDUFE will incorporate courses, information and materials from Waterloo into its curricula in order to help Participating Students to meet Waterloo prerequisites for upper year courses.

6.3.1 Waterloo and SDUFE will work together to facilitate curriculum compatibility in support of the Program.

6.4 **Degree Completion**

6.4.1 In regards to SDUFE, the appropriate SDUFE credential will be issued to Participating Students who successfully fulfill all SDUFE degree requirements, including requirements relating to enrolment, progression, and coursework.

6.4.2 In regards to Waterloo, the appropriate Waterloo Honours Bachelor's Degree will be issued to Participating Students who successfully fulfill all Waterloo degree

requirements, including requirements relating to enrolment, progression, and coursework.

6.5 Program Non-Completion

SDUFE agrees to accept returning Participating Students who cannot, for academic or other reasons, continue their study at Waterloo. For any Participating Student who returns having not completed Waterloo degree requirements, SDUFE will assess successfully completed Waterloo courses for possible credit transfer, so that these courses may count towards degree completion at SDUFE.

7. COORDINATOR(S)

7.1 Administrative Coordinator

Each Institution agrees to appoint an Administrative Coordinator for the Program to serve as the contact person for matters related to admissions and the academic progression of Participating Students

7.1.1 In regards to SDUFE, the Administrative Coordinator of this Program is:

Wang Jianbo
Dean
International Office
Phone: +86 531 88596192
Email: wangjianbo@sdufe.edu.cn

7.1.2 In regards to Waterloo, the Administrative Coordinator of this Program is:

Dual Degree Admissions Specialist
Registrar's Office
Telephone: +1 (519) 888-4567, ext. 41768
Email: registrar.jointacademic@uwaterloo.ca

7.2 Partnership Coordinator

Each Institution agrees to appoint a Partnership Coordinator to serve as the contact person for matters related to the institutional level relationship and other Partnership details.

7.2.1 In regards to SDUFE, the Partnership Coordinator for this Agreement is:

ZHANG Lei
Associate Dean
International Office
Phone: +86 531 88525287
Email: zlgary@foxmail.com

7.2.2 In regards to Waterloo, the Partnership Coordinator for this Agreement is:

Suping Zhao
International Relations Manager
Waterloo International
Phone: +1 (519) 888-4567, ext. 45486
Email: s3zhao@uwaterloo.ca

7.3 Faculty-level Coordinator

Each Institution may appoint a Faculty-level Coordinator. The Faculty-level Coordinator will work with the Administrative Coordinator to ensure that Participating Students are progressing appropriately. The Faculty-level Coordinator will also serve as the contact person for matters related to Program administration, arrangements associated with SDUFE visits, and to ensure the general welfare of Participating Students.

7.3.1 In regards to SDUFE, the Faculty Coordinator of this Program is:

QI Yang
Associate Dean
School of Economics
Phone: +86 531 82617697
Email: qy3385@163.com

7.3.2 In regards to Waterloo, the Faculty Coordinator of this Program is:

Fulu Mao
International Education Coordinator & 2+2 Program Officer
Faculty of Environment
Phone: +1 518 888 4567 ext. 33871
Email: fmao@uwaterloo.ca

8. NOTICES

8.1 Any notice to be given under this Agreement shall be in writing and addressed to the appropriate Contact for Notices.

8.1.1 In regards to SDUFE, the Contact for Notices of this Agreement is:

WANG Jianbo
International Office
Shandong University of Finance and Economics
7366 Erhuan Donglu,
Jinan, Shandong Province, China, 250014
Phone: (86-531) 88596192
Email: wangjianbo@sdufe.edu.cn

8.1.2 In regards to Waterloo, the Contact for Notices of this Agreement is:

Manager, International Agreements
Waterloo International
University of Waterloo
200 University Avenue West
Waterloo, Ontario, Canada, N2L 3G1
Phone: +1 (519) 888-4567, ext. 40151
Email: international.agreements@uwaterloo.ca

- 8.2 Notice will be deemed given when verified by written receipt if sent by courier, or electronic log if sent by email.

9. INTELLECTUAL PROPERTY

- 9.1 Participating Students shall be subject to the intellectual property policy of the Institution in which they are in residence. The Participating Student's physical residence for the purposes of completing this Program will determine which institutional Intellectual Property policy will be applied. For further clarity, if a Participating Student is residing at a SDUFE campus, the SDUFE Intellectual Property Policy will apply to the Participating Student. Further, if a Participating Student is residing at a Waterloo campus, the Waterloo Intellectual Property Policy will apply to the Participating Student.

9.1.1 In regards to SDUFE, ownership of intellectual property is governed by Patent Law, Copyright Law and Trademark Law of the People's Republic of China and their amendments, which operates under the principle that works of Chinese citizens, whether published or not, shall enjoy copyright, and works of foreigners first published in the territory of the People's Republic of China shall enjoy copyright in accordance with the Laws.

9.1.2 In regards to Waterloo, ownership of intellectual property is governed by Policy 73 – Intellectual Property Rights, as it is amended from time to time, which operates under the principle that intellectual property rights created in the course of teaching and research activities belong to the creator. Where a Participating Student wishes to enter into an agreement that waives, limits or assigns intellectual property rights, that agreement must be reviewed and approved by Waterloo's Vice-President, Research & International or delegate and, if graduate students are parties to the research, Waterloo's Associate Vice-President, Graduate Studies & Postdoctoral Affairs, or delegate. Waterloo's Policy 73: <http://www.secretariat.uwaterloo.ca/Policies/policy73.htm>.

10. COMMENCEMENT, TERM, AND TERMINATION

10.1 Term

This Agreement will be effective from the date of the last required signature on the signing page of this Agreement.

10.2 **Renewal, Extension, and Amendment**

This Agreement may be renewed, extended, or amended by written mutual agreement of the Institutions.

10.3 **Termination**

This Agreement will terminate on August 31 of the fifth calendar year from the Effective Date. This agreement may be terminated at any time upon the written request of either Institution with at least six (6) months' notice in accordance with the following provisions, provided such termination shall not affect any other existing contracts:

10.3.1 The terminating Institution will deliver a signed notice of termination to the designated Contact for Notice of the non-terminating Institution, which notice will expressly state it is a "Notice of Termination".

10.3.2 If an Institution elects to terminate this Agreement, all Program arrangements will cease on the effective date of termination, save and except for arrangements regarding Participating Students in the process of completing the Program at such time. The Institutions agree to reasonably permit any such Participating Student to complete their Program on the terms and conditions of this Agreement.

10.4 This Program may require approval from the Senate at Waterloo prior to the admission and enrolment of Participating Students.

11. **OTHER TERMS AND CONDITIONS**

11.1 **Entire Agreement**

This Agreement constitutes the entire agreement between the Institutions pertaining to the subject matter of this Agreement and supersedes all prior agreements, understandings, negotiations and discussions, whether oral or written, of the Institutions.

11.2 **Non-Exclusivity**

This agreement in no way restricts the Institutions from participating in similar activities or arrangements with others.

11.3 **Independent Institutions**

Nothing contained in this Agreement should be construed to create or imply any joint venture, partnership, principal-agent, trust, or employment relationship between the Institutions, and an Institution may not make, or allow to be made, any representation that any such relationship exists between the Institutions. An Institution shall not have the authority to act for, or to incur any obligation on behalf of, the other Institution, except as expressly provided for in this Agreement.

11.4 **Confidentiality**

Each Institution recognizes that, in connection with this Agreement, it may receive information regarding the business, affairs, operations and finances of the other Institution and personal information of Participating Students or Applicants (collectively, “**Confidential Information**”). Except as set out in this Agreement, each Institution agrees to not disclose any Confidential Information provided to it by the other Institution to any other person or party and agrees to use such Confidential Information solely for the limited purpose for which it was provided. Each Institution shall make all reasonable security arrangements necessary to protect the Confidential Information provided to it by the other Institution and will not copy or disclose the Confidential Information to a third party without the prior written consent of the Institution that provided it or as may be required by applicable law.

11.5 **Force Majeure**

Neither Institution shall be in breach of this Agreement if it is unable to carry out any obligation hereunder for any reason beyond its control including (without limiting the generality of the foregoing) acts of God, legislation, resource shortages, war, fire, flood, drought, failure of power supply, civil commotion, and/or employee action.

11.6 **News Releases and Publications**

Each Institution grants to the other Institution a non-exclusive, non-transferable, royalty-free license to use, reproduce, publish and display that Institution’s logo and name during the term of this Agreement solely (i) in conjunction with the materials created during the term of, and in connection with, this Agreement by either, or both, of the Institutions; and (ii) in conjunction with marketing and promotion of the Program described in this Agreement. All such displays of the logo and name of one Institution by another will comply with reasonable guidelines that may be provided by either Institution to the other Institution from time to time.

11.7 **Governing Law**

This Agreement, and any dispute or claim arising out of or in connection with it or its subject matter or formation (including non-contractual disputes or claims) (each, a “**Dispute**”), shall be governed by, and construed in accordance with, the laws of England and Wales applicable therein.

11.8 **Dispute Resolution**

11.8.1 In the event of any Dispute, the Institutions shall first meet and use reasonable efforts to resolve the Dispute by negotiation between the Institutions acting in good faith.

11.8.2 If a Dispute is not resolved by good faith negotiations, then the Dispute will be finally determined by a sole arbitrator under the London Court of International Arbitration rules. The seat, or legal place, of arbitration shall be London, England.

11.9 Indemnification

Each Institution (the “**Indemnifying Institution**”) shall indemnify and hold the other Institution (the “**Indemnified Institution**”) harmless in respect of any claim, demand, action, investigation, proceeding, cause of action, damage, loss, injury, cost, liability, or expense, which may be made or brought against the Indemnified Institution or which the Indemnified Institution or its Indemnitees may suffer or incur as a result of or arising out of:

- 11.9.1 Any breach or non-fulfillment of any representations, warranties, covenants, or other contractual obligations under this Agreement on the part of the Indemnifying Institution; or
- 11.9.2 Any negligence or willful misconduct on the part of the Indemnifying Institution or anyone for whom the Indemnifying Institution is responsible at law, except intellectual property.

Neither Institution will be liable for any indirect, special, incidental, consequential, punitive or exemplary damages or damages for loss of revenue or profit arising in any way from a breach of this Agreement or the performance of an Institution’s duties and responsibilities under this Agreement.

The foregoing indemnity shall survive the termination of this Agreement notwithstanding any provisions of this Agreement to the contrary.

11.10 Insurance

During the term of this Agreement, each Institution shall maintain professional liability insurance and comprehensive general liability insurance, or equivalent protections, for itself, its students, faculty, staff, and employees, as applicable, on a basis and in amounts sufficient to provide coverage in respect of all matters related to this agreement, and in no event, less than CAD two million dollars (\$2,000,000.00), or equivalent, per occurrence.

Each Institution shall provide to the other Institution with proof of its insurance confirming this coverage.

11.11 Translations

11.11.1 The official operational language of this Agreement is English.

11.11.2 Should a translation of this Agreement be completed:

- (i) The translation must be completed by a certified translator. Waterloo will be solely responsible for the hiring and cost of translation services.
- (ii) Any differences in interpretation of this Agreement shall defer to the official English language version; and
- (iii) Any translations of this Agreement will not require a signature page.

11.12 Counterparts

This Agreement is executed in two [2] English counterparts, each of which is deemed as original, but all of which taken together constitute one of the same Agreement and two [2] certified Chinese translations. The Agreement may be executed by exchange of a signed and scanned signature page in PDF format.

[Signature Page follows]

In signing hereunder, the Signatories affirm their legal authority to bind their respective Institutions into, and execute, this Agreement on the dates shown hereunder.

SHANDONG UNIVERSITY OF FINANCE AND ECONOMICS

per: _____
ZHAO Zhongxiu
President

date: _____

per: _____
HAN Zuosheng
Vice-President

date: _____

UNIVERSITY OF WATERLOO

per: _____
Dr. Feridun Hamdullahpur
President & Vice-Chancellor

date: _____

per: _____
Dr. Ian Rowlands
Associate Vice-President, International

date: _____

per: _____
Dr. Jean Andrey
Dean, Faculty of Environment

date: _____

To: Senate Undergrad Council
From: Faculty of Environment
Date: October 6, 2020
Re: Information only: Undergraduate Communication Requirement / BES English requirement

Effective: September 2021

Rationale: ENGL 129R and EMLS129R are currently cross-listed in the calendar, but the former is no longer being offered so EMLS 129R will now be the only course scheduled (as per Julia Williams, Renison). The Faculty of Arts and Renison College have confirmed that ENGL 129R is expected to be inactivated within the next year. Accordingly, references to ENGL 129R are being changed to EMLS 129R.

- Undergraduate communication requirement: <http://ugradcalendar.uwaterloo.ca/page/ENV-Overview-of-Academic-Plan-Requirements>
Geography and Environmental Management (all programs): ENGL 109 or ENGL 129R **EMLS 129R**

-- GEM 3yr: <http://ugradcalendar.uwaterloo.ca/page/ENV-Geography-Environmental-Management-3-Yr-Gen>

Legend

‡ENGL 109 or ENGL 129R **EMLS 129R** must be completed with a grade of 65% or higher to meet the Undergraduate Communication Requirement. See the Overview of Academic Plan Requirements section for the Faculty of Environment if you fail to meet this requirement.

Year One

GEOG 100 On Becoming a Geographer
GEOG 101 Human Geographies: People, Space and Change
GEOG 102 Global Environmental Systems: Processes and Change
GEOG 181 Designing Effective Maps

One of:

~~ENGL 109~~‡ Introduction to Academic Writing
ENGL 129R **EMLS 129R** ‡ Written Academic English

Five electives (2.5 units)

GEM Honours: <http://ugradcalendar.uwaterloo.ca/page/ENV-Geography-Environmental-Management-4-Yr-Honour>

Legend

‡ENGL 109 or ~~ENGL 129R~~ **EMLS 129R** must be completed with a grade of 65% or higher to meet the Undergraduate Communication Requirement. See the [Overview of Academic Plan Requirements section](#) for the Faculty of Environment if you fail to meet this requirement.

Year One

GEOG 100 On Becoming a Geographer

GEOG 101 Human Geographies: People, Space and Change

GEOG 102 Global Environmental Systems: Processes and Change

GEOG 181 Designing Effective Maps

ENVS 178 Environmental Applications of Data Management and Statistics

ENVS 278 Applied Statistics for Environmental Research

One of:

ENGL 109‡ Introduction to Academic Writing

~~ENGL 129R~~ **EMLS 129R** ‡ Written Academic English

Three electives (1.5 units)

Geography and Aviation: <http://ugradcalendar.uwaterloo.ca/page/ENV-Honours-Geography-and-Aviation-Regular>

Legend

‡ENGL 109 or ~~ENGL 129R~~ **EMLS 129R** must be completed with a grade of 65% or higher to meet the Undergraduate Communication Requirement. See the [Overview of Academic Plan Requirements section](#) for the Faculty of Environment if you fail to meet this requirement.

†Professional Pilot Program courses: 5.0 units. The Professional Pilot Program courses will not count towards any other University of Waterloo program requirement.

*Theme courses can be counted towards a [specialization](#).

Year One

AVIA 100 Introduction to Aviation

GEOG 101 Human Geographies: People, Space and Change

GEOG 102 Global Environmental Systems: Processes and Change

GEOG 181 Designing Effective Maps

ENVS 178 Environmental Applications of Data Management and Statistics

CS 100 Introduction to Computing through Applications

One of:

ENGL 109[‡] Introduction to Academic Writing

~~ENGL 129R~~ **EMLS 129R**[‡] Written Academic English

Geomatics Honours: <http://ugradcalendar.uwaterloo.ca/page/ENV-Honours-Geomatics-Regular-and-Co-op>

Legend

‡ENGL 109 or ~~ENGL 129R~~ **EMLS 129R** must be completed with a grade of 65% or higher to meet the Undergraduate Communication Requirement. See the Overview of Academic Plan Requirements section for the Faculty of Environment if you fail to meet this requirement.

*Theme courses can be counted towards a specialization.

Geomatics Four-Year Honours Requirements (Regular and Co-op)

Year One

GEOG 101 Human Geographies: People, Space and Change

GEOG 102 Global Environmental Systems: Processes and Change

GEOG 181 Designing Effective Maps

GEOG 187 Geospatial Data Science

GEOG 281 Introduction to Geographic Information Systems (GIS)

ENVS 178 Environmental Applications of Data Management and Statistics

One of:

ENGL 109[‡] Introduction to Academic Writing

~~ENGL 129R~~ EMLS 129R[‡] Written Academic English

Attachment 10, SUC October 6, 2020

Rule	Exception	Term(s)	relayed to students
	removal/change of course prereqs to allow enrollment and accommodate resequencing of courses.	S20/F20	see below
	re-sequencing of core courses	F20/W21	through first year course selection website - GEOG 101 and 187 moved from Fall to Winter; and emails to affected students from units, i.e., KI INTEG 320/321 museum courses and thesis
Academic Progression rules	removal of Labs, Studios and Field trips	S20/F20	through email and at time of enrollment: ENVS 200, various GEOG and ERS course, and PLAN 210
Awards of Excellence	Co-op 3+3+3	S20 / F20	sent from our office for S20 / CEE for F20
Foundation Term	allowing a 2nd ND term to facilitate transfer if not admitted after W20	S2020/F2020	all faculties are in agreement - will be relayed to individual students by the R/O upon receipt of notice that transfer after W20 was not approved.
CR Grades for Prerequisites	allowing students to enter F20 Foundation after S20 term	W2020/S2020	in W20 CND/FL3 email from R/O
UCR Milestones	CR will result in UCR milestone (50% - 64%)	W2020	This is an important ENV-specific exemption. Students were notified on the 'implications' for students of choosing CR/NCR page; and through email to affected students.
Diploma requirements	may exceed 50% rule	W2020	not required

**Submission to Senate Undergraduate Council – October 2020
Faculty of Mathematics**

Contents

1. New Courses

- 1.1 Computing and Financial Management (CFM)
- 1.2 Computer Science (CS)

2. Course Changes

- 2.1 Combinatorics and Optimization (CO)
- 2.2 Computer Science (CS)
- 2.3 Pure Mathematics (PMATH)
- 2.4 Statistics (STAT)

3. Course Inactivations

- 3.1 Pure Mathematics (PMATH)

4. Academic Plan Changes (Major Modifications)

- 4.1 Computing and Financial Management
- 4.2 Mathematics/Chartered Professional Accountancy
- 4.3 Mathematics/Chartered Professional Accountancy – Finance Specialization

5. Academic Plan Changes (Minor Modifications)

- 5.1 Computer Science

6. Plan Inactivation

- 6.1 Pure Mathematics

7. Regulations

- 7.1 Upgrade General degree to Honours degree
- 7.2 Communications Requirement

NEW COURSES (for approval)

Computer Science - David R. Cheriton School of

Effective 01-SEP-2021

CS 114 (0.50) LAB, LEC, TST, TUT Principles of Computing for Science

Introduction to basic imperative programming principles; programming concepts including functions, flow control, lists, arrays; numerical accuracy and efficiency; data analysis and general-purpose algorithms. Introduction to object-oriented programming concepts.

Requisites : Prereq: Not open to Faculty of Math Students
Antireqs: CS 116, CS 135, CS 136, CS 137, CS 138, CS 145, CS 146, BME 121, CHE 120, CIVE 121, ECE 150, GENE 121/MTE 121, ME 101, MSCI 121, NE 111, PHYS 236, SYDE 121

Rationale : This new first year course is being proposed so that students in Physics (and more broadly) are provided with a strong foundation in computing and programming. It will form a core part of the Physics curriculum, and we expect it to be of broader interest. The course has been developed in consultation with the Physics department and at their request.

Interdisciplinary Studies

Effective 01-SEP-2021

CFM 101 (0.50) LEC, TST, TUT Introduction to Financial Markets and Data Analytics

This course introduces financial markets and institutions, commonly used financial data, and data schema and visualization therein. It covers fundamental functions of financial institutions and their usage of data, and basic financial data management techniques. The course will focus on buy side institutions and stock market data.

Requisites : Prereq: Computing and Financial Management students. Antireq: AFM 121

Rationale : This course serves to introduce financial markets and preliminary financial data analytics skills to CFM students before the students start their first co-op job search during the 1B term. This course will provide students with the knowledge and skills for their first co-op job in finance.

Effective 01-SEP-2021

CFM 301 (0.50) LEC, TST, TUT Financial Data Analytics

This course covers financial data analytics in the areas of asset pricing, securities trading, and portfolio management. It covers data usage and application in basic testing of asset pricing theories, trading algorithms and strategies, back-testing techniques, and aspects of portfolio management associated with trading strategies.

Requisites : Prereq: CFM 101, AFM 272/ACTSC 291; Computing and Financial Management

Rationale : students.
This course covers financial data analytics in the areas of asset pricing, securities trading, and portfolio management. It builds on the skills that CFM students have developed in finance, math, statistics, and computer science during the first two years of studies.

Effective 01-SEP-2021

CFM 401 (0.50) LEC, TST, TUT Topics in Financial Technology

This course introduces current topics in financial technology. Students will apply data analytics or general computational concepts to gain a better understanding of new financial technology.

Requisites : Prereq: CFM 301; Computing and Financial Management students
Rationale : Financial technology is fast moving and is becoming very large in its scope. This course is used to introduce in-depth knowledge in given areas, depending on instructor expertise and also on industry trends.

COURSE CHANGES (for approval)

Combinatorics & Optimization

Current Catalog Information

CO 250 (0.50) LEC, TST Introduction to Optimization

A broad introduction to the field of optimization, discussing applications, and solution techniques. Mathematical models for real life applications; algorithms; aspects of computational complexity; geometry; linear programming duality, focusing on the development of algorithms. [Offered: F,W,S]

No Special Consent Required

Requisites : Prereq: One of (MATH 106, MATH 114, MATH 115 with a grade of at least 70%) or MATH 136 or MATH 146; cumulative overall average of at least 60%.
Antireq: CO 227, 255

Effective 01-SEP-2021

Component Change: LEC, TST, TUT
Rationale : To add a one hour tutorial component. CO 250 is a large course that accommodates students from many different areas, including Laurier Double Degree students. For a number of reasons including academic integrity, many course co-ordinators are moving towards an assessment model where assignments are given zero credit weight and more emphasis is placed on midterms and quizzes. For quizzes to be meaningful requires concurrent scheduling of tutorial slots for each section. The intention of this motion is to alleviate the difficulty of doing this scheduling manually, and to provide more certainty for students when they plan their own schedule.

Computer Science - David R. Cheriton School of

Current Catalog Information

CS 338 (0.50) LAB, LEC Computer Applications in Business: Databases

A user-oriented approach to the management of large collections of data. Methods used for the storage, selection and presentation of data. Common database management systems. [Note: Lab is not scheduled and students are expected to find time in open hours to complete their work. Offered: F,W,S]

No Special Consent Required

Requisites : Prereq: One of CS 230, 231, 234, 246, 330; Not open to Computer Science students. Antireq: CS 348, 448, MSCI 346

Effective 01-SEP-2021

Requisite Change : Prereq: One of CS 230, 231, 234, 246, 330; or (AFM 341 and (CS 116 or CS 136 or CS 146)); Not open to Computer Science students. Antireq: CS 348, 448, MSCI 346

Rationale : Math/CPA would like their students to take CS338 without taking CS330. So AFM341 (and a computing course) is proposed to be added as a prerequisite to allow Math/CPA students to take CS338. AFM341 (and a computing course) and CS330 contains similar course content that students will be sufficiently prepared for CS338.

Current Catalog Information

CS 383 (0.50) STU Computational Digital Art Studio

An upper-level studio course to create computational projects that function as art works and aesthetic experiences. Students will work in interdisciplinary teams to combine computer science principles with fine art technical and conceptual skills.

[Offered: W]

No Special Consent Required

Requisites : Prereq: CS 240, FINE 229, 257

Cross-listed as: FINE 383

Effective 01-SEP-2021

Description Change : An upper-level studio course to create computational projects that function as art works and aesthetic experiences. Students will work in an interdisciplinary environment to combine computer science principles with fine art technical and conceptual skills. [Offered: W]

Requisite Change : Prereq: CS 240; FINE 228 or 229; FINE 257 or ENGL 293

Rationale : To change description and prerequisites (both offerings). The change to the description highlights the way the course is taught, rather than a teamwork component that is not a focus of the course as it has been delivered. The changes to prerequisites is to add alternative courses that still enable students to be comparably prepared. As is often the case with cross-listed courses, requisites differ slightly for the respective FINE 383 and CS 383 student audiences.

Current Catalog Information

CS 450 (0.50) LAB, LEC, TST Computer Architecture

The course is intended to provide the student with an appreciation of modern computer design and its relation to system architecture, compiler technology and operating system functionality. The course places an emphasis on design based on the measurement of performance and its dependency on parallelism, efficiency, latency and resource utilization. [Note: Lab is not scheduled and students are expected to find time in open hours to complete their work. Offered: W]

No Special Consent Required

Requisites : Prereq: (CS 245 or SE 212) and (CS 350 or SE 350); Computer Science students only. Antireq: ECE 429

Effective 01-SEP-2021

Requisite Change : Prereq: (CS 245 or SE 212) and (CS 350 or SE 350); Computer Science students only. Antireq: ECE 320, ECE 429

Rationale : To update antirequisites. ECE 320 was first offered in fall 2020 while ECE 429 is going to be inactivated in 2022. Both are computer architecture courses and are antirequisites.

Pure Mathematics

Current Catalog Information

PMATH 330 (0.50) LEC Introduction to Mathematical Logic

A broad introduction to Mathematical Logic. The notions of logical consequence and derivation are introduced in the settings of propositional and first order logic, with discussions of the completeness theorem and satisfiability. [Note: PMATH 432 may be substituted for PMATH 330 whenever the latter is a requirement in an Honours plan.]

No Special Consent Required

Requisites : Prereq: (MATH 135 or 145) and (MATH 225 or 235 or 245); Not open to Computer Science students. Antireq: CS 245, SE 212.

Effective 01-SEP-2021

Component Change: LEC, TST

Rationale : In the past, this minor-level course has been taught with an in-class midterm test during on-campus offerings, and no midterm test during online offerings. Due to the increasing prevalence of cheating on assignments, the instructors would like to reduce the weight that assignments contribute to students final grades. To mitigate the stress of a very-high-stakes final exam, the department and instructors want to incorporate a more robust midterm test, and in particular to introduce a midterm test to online offerings. (This was successfully trialed in the Winter 2020 term with the help of CEL.) This TST slot is to be added to both the on-campus and online offerings.

Current Catalog Information

PMATH 370 (0.50) LEC Chaos and Fractals

The mathematics of iterated functions, properties of discrete dynamical systems, Mandelbrot and Julia sets. [Note: Programming experience on one computer language

with graphical output is recommended.]

No Special Consent Required

Requisites : Prereq: (One of MATH 118, 119, 128, 138, 148) and (One of MATH 114, 115, 225, 235, 245)

Effective 01-SEP-2021

Requisite Change : Prereq: (One of MATH 118, 119, 128, 138, 148) and (One of MATH 114, 115, 136, 146, 225)

Rationale : This is a house-keeping measure, making the linear algebra requirements more internally consistent. The content of this minor-level course is unchanged. As the level of knowledge provided by MATH 114 (Science) or 115 (Engineering) has been deemed to be sufficient for success in this course, MATH 136 or 146 (Mathematics) should also be deemed to be sufficient. Note that students in the non-specialist track will still be required to take the second linear algebra course in that track (MATH 225). Over 90% of the students who have recently taken PMATH 370 came through the Mathematics track (MATH 136 and 235), so this motion gives these students the option of taking PMATH 370 earlier than they might otherwise have done.

Statistics & Actuarial Science

Current Catalog Information

STAT 333 (0.50) LEC, TUT Applied Probability

Review of basic probability. Generating functions. Theory of recurrent events. Markov chains, Markov processes, and their applications. [Offered: F,W,S]

No Special Consent Required

Requisites : Prereq: STAT 230 with a grade of at least 60% or STAT 240; Level at least 3A. Antireq: STAT 334

Effective 01-SEP-2021

Title Change: Stochastic Processes 1

Description Change: This course provides an introduction to stochastic processes, with an emphasis on regenerative phenomena. Topics cover generating functions, conditional probability distributions and conditional expectation, discrete-time Markov chains with a countable state space, limit distributions for ergodic and absorbing chains, applications including the random walk, the gambler's ruin problem, and the Galton-Watson branching process, an introduction to counting processes, connections between the exponential distribution and Poisson process, and non-homogeneous and compound Poisson processes. [Offered: F,W,S]

Requisite Change : Prereq: STAT 230 with a grade of at least 60% or STAT 240; MATH 237 or 247. Antireq: STAT 334

Rationale : To update course title, description and prerequisites. Title change was made to better reflect the material in the course. The descriptions were updated to provide more details on the topics being covered. The new topics more accurately reflect the teaching material currently being taught. Furthermore, the department wants to make it very clear what is covered in STAT 333 and 433. The 3A requirement was removed because it is an opaque

prerequisite that no other third year STAT course has. MATH 237 will serve as a more useful prerequisite for this course.

Current Catalog Information

STAT 433 (0.50) LEC Stochastic Processes
Point processes. Renewal theory. Stationary processes. Selected topics. [Offered: F]
No Special Consent Required
Requisites : Prereq: STAT 333

Effective 01-SEP-2021

Title Change: Stochastic Processes 2
Description Change: This course provides further ideas and methods in stochastic modelling, with an emphasis on continuous-time stochastic processes. Topics cover time to absorption based quantities and discrete phase-type distributions of discrete-time Markov chains, continuous-time Markov chains with a countable state space, limit distributions for ergodic and absorbing chains, and applications including birth and death processes and queueing models of practical interest. Other topics may include continuous phase-type distributions, renewal theory and limit theorems for regenerative processes, and phase-type renewal processes. [Offered: F]
Rationale : To update course title and description. Title change was made to better reflect the material in the course. The descriptions were updated to provide more details on the topics being covered. The new topics more accurately reflect the teaching material currently being taught. Furthermore, the department wants to make it very clear what is covered in STAT 333 and 433.

COURSE INACTIVATIONS (for approval)

Pure Mathematics

Effective 01-SEP-2021
PMATH 360 (0.50) Geometry
Rationale : This minor-level course was last taught in 2017; subsequently, the department has replaced it with two new minor-level courses, PMATH 320 (Euclidean Geometry) and PMATH 321 (Non-Euclidean Geometry), which are being taught in alternate years since 2018. PMATH 360 has already been replaced by the two new courses in the plan requirements for Mathematics/Teaching.

End of Report

PLAN CHANGES (MAJOR MODIFICATIONS)

4.1 Computing and Financial Management (CFM)

4.2.1 Effective 1 September 2021. To change the Math/CPA plan to reflect parallel changes made by the School of Accounting and Finance (SAF) in the Accounting and Financial Management (AFM) curriculum.

Background and Rationale:

1. Replace AFM 101 with the new course AFM 191 that SAF students will take in place of AFM 101.
2. Remove AFM 102 since it focuses on accounting within the company for management decision making. This is not a route that CFM students take, nor are they required to take courses with AFM 102 as a prerequisite.
3. Replace AFM 121 with CFM 101. Both are introductory finance courses however CFM 101 is designed specifically to recognize the needs and skills of CFM students.
4. Replace AFM 131 with AFM 132, the course that SAF students now take in place of AFM 131.
5. Remove AFM 231. A program review determined that this course is no longer necessary to meet program objectives. The newly created AFM 334 – Business Law for Financial Managers, may be taken as an elective.
6. Replace AFM 372/ACTSC 391 with AFM 275/ACTSC 391. AFM 372 has been re-numbered by SAF to reflect when the course will be taken and has been taking for 4 years by students in the CFM and Math/CPA programs. The title of the course has been changed to reflect the name change of AFM 272.
7. A new set is being added which will allow students to select which “set” of courses they want to take to complete the additional 1.5 AFM units, including taking CFM 401.

Calendar text:

bold= new, ~~strikeout= delete~~

[...]

All of

~~AFM 101 Introduction to Financial Accounting~~

~~AFM 102 Introduction to Managerial Accounting~~

~~AFM 121 Introduction to Global Financial Markets~~

~~AFM 131 Introduction to Business in North America~~

AFM 132 Introduction to Business Stages

AFM 191 Foundations for Financial Reporting

~~AFM 231 Business Law~~

AFM 272/ACTSC 291 Global Capital Markets

AFM 275/ACTSC 391 Corporate Finance

AFM 322 Derivative Securities

~~AFM 372/ACTSC 391 Corporate Finance 2~~

AFM 424 Equity Investments

AFM 425 Fixed Income Securities

CFM 101 Introduction to Financial Markets and Data Analytics

CFM 301 Financial Data Analytics

CS 240 Data Structures and Data Management

CS 241 Foundations of Sequential Programs

CS 245 Logic and Computation

CS 246 Object-Oriented Software Development

CS 341 Algorithms

ECON 101 Introduction to Microeconomics

ECON 102 Introduction to Macroeconomics

STAT 373 Regression and Forecasting Methods in Finance

Two of

AFM 291 Intermediate Financial Accounting 1

Any AFM course at the 300- or 400-level not listed above

CFM 401 Topics in Financial Technology

ECON 201 Microeconomic Theory for Business and Policy

ECON 206 Money and Banking 1

ECON 207 Economic Growth and Development 1

ECON 231 Introduction to International Economics

ECON 332 International Finance

MGMT 244 Principles of Marketing

PHIL 215 Professional and Business Ethics

Two additional AFM courses (1.0 unit) at the 300 or 400 level not listed above.

One of these sets of three additional courses

- **Two additional AFM courses (1.0 unit) at the 300-level or higher, not listed above, and CFM 401 if not taken to fulfil a requirement above**
- **Three additional AFM courses (1.5 units) at the 300-level or higher, not listed above**

[...]

Plan impacted: CFM: <http://ugradcalendar.uwaterloo.ca/page>

4.2 Mathematics/Chartered Professional Accountancy (Math/CPA)

4.2.2 Effective 1 September 2021. To change the Math/CPA plan to reflect parallel changes made by the School of Accounting and Finance (SAF) in the Accounting and Financial Management (AFM) curriculum.

Background and Rationale: These changes are approved by CPA Ontario and are necessary to maintain CPA accreditation and Masters of Accounting (MAcc) eligibility. A reduction in the number of CPA accreditation–required AFM courses allows for the addition of MATH 237 to the math core for Math/CPA, and a subsequent increase to the minimum math requirement from 18 to **19** courses. Most math plans require at least 26 math courses. A reduction in the number of CPA accreditation–required AFM courses allows for an increase in the number of AFM, COMM, ECON, MSCI, or math electives from 1 to **2**.

Calendar text:

bold= new, ~~strikeout= delete~~

~~*AFM 131 may be substituted with consent of the department.~~

Students in this plan must fulfil all the requirements in Table I. This must include at least ~~18~~ **19** math courses, and the following specific requirements:

One of

CS 115 Introduction to Computer Science 1
CS 135 Designing Functional Programs
CS 145 Designing Functional Programs (Advanced Level)

One of

CS 116 Introduction to Computer Science 2
CS 136 Elementary Algorithm Design and Data Abstraction
CS 146 Elementary Algorithm Design and Data Abstraction (Advanced Level)

One of

MATH 127 Calculus 1 for the Sciences
MATH 137 Calculus 1 for Honours Mathematics
MATH 147 Calculus 1 (Advanced Level)

One of

MATH 128 Calculus 2 for the Sciences
MATH 138 Calculus 2 for Honours Mathematics
MATH 148 Calculus 2 (Advanced Level)

One of

MATH 135 Algebra for Honours Mathematics
MATH 145 Algebra (Advanced Level)

One of

MATH 136 Linear Algebra 1 for Honours Mathematics
MATH 146 Linear Algebra 1 (Advanced Level)

One of

MATH 237 Calculus 3 for Honours Mathematics
MATH 247 Calculus 3 (Advanced Level)

One of

STAT 230 Probability
STAT 240 Probability (Advanced Level)

One of

STAT 231 Statistics
STAT 241 Statistics (Advanced Level)

All of

~~AFM 272/ACTSC 291 Corporate Finance~~ **Global Capital Markets**
~~AFM 372 275/ACTSC 391 Corporate Finance 2~~
~~AFM 476/ACTSC 471 Advanced Corporate Finance~~ **Corporate Financial Decision Making**
STAT 373 Regression and Forecasting Methods in Finance

One of

~~AFM 231/LS 283~~ **AFM 335 Business Law for Financial Managers**
COMM 231 Commercial and Business Law for Mathematics Students

All of

~~AFM 101 Introduction to Financial Accounting~~
~~AFM 102 Introduction to Managerial Accounting~~
AFM 111 Professional Pathways and Problem-solving
~~AFM 132 Introduction to Business Stages*~~
AFM 182 Foundations for Management Accounting
AFM 191 Foundations for Financial Reporting
AFM 206 Introduction to Tax and AFM 208 Introduction to Assurance (0.25 units each)
AFM 212 Financial Analysis and Planning
AFM 291 Intermediate Financial Accounting 1
AFM 311 Connections to Ethical Context
AFM 321 Personal Financial Planning
AFM 341 Accounting Information Systems
~~AFM 362 Taxation 1—Foundations~~ **Corporate Taxation**
~~AFM 363 Taxation 2—Integration~~
~~AFM 484~~ **AFM 382** Cost Management Systems
AFM 391 Intermediate Financial Accounting 2
~~AFM 401 Accounting Theory~~
AFM 433 Business Strategy
~~AFM 354~~ **AFM 451** Audit Strategy
~~AFM 462 Taxation 3—Tax Planning Topics~~ **Specialized Topics in Taxation**
~~AFM 479 Cases and Applications in Finance II~~
AFM 482 Performance Measurement and Organization Control
AFM 491 Advanced Financial Accounting
COMM 103/ECON 100 Principles of Economics or (ECON 101 Introduction to Microeconomics and ECON 102 Introduction to Macroeconomics)
SPCOM 111 Leadership, Communication, and Collaboration

~~Two of~~

~~AFM 205 Introduction to Financial Services~~
~~AFM 206 Introduction to Tax~~
~~AFM 207 Introduction to Analytics~~
~~AFM 208 Introduction to Assurance~~

Six additional math courses (3.0 units)

~~One~~ **Two** additional AFM, COMM, ECON, MSCI, or math courses (0-5 **1.0** unit).

Notes

1. ~~AFM 363, AFM 401~~, AFM 462, AFM 482, AFM 491 may be substituted with an acceptable 300-/400-level AFM elective, with the understanding that any such substitution would forfeit Master of Accounting (MAcc) admission eligibility and will impact the path to a CPA designation pursued through CPA Ontario.
2. ~~Students may take AFM 322 and AFM 424 to replace the AFM 479 and the "One additional AFM, COMM, ECON, MSCI, or math course" degree requirements.~~

[...]

4.2.3 Effective 1 September 2021. Update the Faculty of Math communication skills requirements for Math/CPA by replacing AFM 211 with AFM 111 (Professional Pathways and Problem-solving).

Background and Rationale: *The current second communications course for Math/CPA, AFM 211, is no longer being offered. AFM 111 and SPCOM 111 comprise the communications requirement for AFM students.*

4.2.4 Effective 1 September 2021. Update the Math/CPA Admissions page to reflect new first-year provisional requirements.

Calendar text:

bold= new, ~~strikeout= delete~~

Admissions

Students normally apply for direct admission from high school into the first year of the Mathematics/CPA plan. Upon successful completion of a provisional first year, students will formally proceed into the Mathematics/CPA plan in second year. Successful completion of the provisional year requires all of the following:

- Successful completion of ~~at least 5.0 units including~~ the following courses: ~~AFM 101 AFM 102~~ **AFM 111; AFM 182; AFM 191; ~~AFM 131; COMM 103/ECON 100~~** or (one of ~~ECON 101, ECON 102~~); one of ~~CS 115, CS 135, CS 145; one of MATH 135, or MATH 145; one of MATH136, or MATH 146; one of MATH 127, MATH 137, or MATH 147; one of MATH 128, MATH138, or MATH 148; SPCOM 111~~. These courses must be completed within 12 months of admission into the provisional year.

[...]

4.3 Mathematics/Chartered Professional Accountancy – Finance Specialization

4.3.1 Effective 1 September 2021. To make changes to the Math/CPA-Finance Specialization plan by decreasing the total number of courses required (42 to 41) and providing more flexibility and selection with finance courses.

Background and Rationale:

1. MATH 237 to be included in Math/CPA core math requirement.
2. An increase in the number of finance-related math courses from 2 ('Two of') to 3 ('Three of') reflects the increase in the minimum math course requirement for Math/CPA from 18 to 19.
3. Expansion of 'Three of' list of math courses to include courses deemed to be of relevance to finance and to provide students with more scheduling flexibility.
4. Inclusion in the 'Two of' AFM list of several recently developed courses gives the student more scheduling flexibility and a broader selection of finance-related AFM courses.
5. A reduction in the Math/CPA-required AFM courses allows for a decrease in the number of required courses for Math/CPA – Finance Specialization from 42 to 41.

Calendar text:

bold= new, ~~strikeout= delete~~

[...]

~~One of~~

~~MATH 237 Calculus 3 for Honours Mathematics~~

MATH 247 Calculus 3 (Advanced Level)

All of

ACTSC 231 Introductory Financial Mathematics

AFM 205 Introduction to Financial Services

Two ~~Two~~ **Three** of

~~ACTSC 371 Introduction to Investments~~

AMATH 350 Differential Equations for Business and Economics

CS 335 Computational Methods in Business and Finance

CO 372 Portfolio Optimization Models*

MATBUS 470 Derivatives

MATBUS 471 Fixed Income Securities MATBUS 472 Risk Management

STAT 334 Probability Models for Business and Accounting

STAT 341 Computational Statistics and Data Analysis

NEW NOTE: (additional CO course may be required to meet CO 372 prerequisite)

Two of

AFM 321 Personal Financial Planning AFM 322 Derivative Securities

AFM 328 and AFM 329, or AFM 328 and AFM 428, or AFM 329 and AFM 429 Invstmt. Mgmt. (0.25 unit each)

AFM 324 Wealth Management

AFM 334 International Study Experience

AFM 377 Private Equity and Venture Capital

AFM 415 Special Topics or AFM 416 Special Topics in Finance or **AFM 417 Special Topics in Accounting**

AFM 423 Topics in Financial Econometrics

AFM 424 Equity Investments

AFM 434 Governance and Enterprise Risk Management for Global Organizations

AFM 470 Financial Mgmt. of High Growth Companies

AFM 477 Mergers and Acquisitions

AFM 478 International Financial Management

AFM 492 Financial Statement Analysis

Two additional math courses (1.0 unit).

Notes

~~1. Students in this Specialization may take AFM 322 and AFM 424 to replace the AFM 470 Math/CPA requirement. If so, students need only take one of the remaining AFM courses in the above "Two of" list of AFM courses.~~

1. In order to meet the requirements of both the Faculty of Mathematics and the School of Accounting and Finance, the Mathematics/CPA - Finance Specialization requires the successful completion of ~~42~~ **41** courses.

PLAN CHANGES (MINOR MODIFICATIONS)

5.1 Computer Science

5.1.1 Effective 1 September 2021: Update the Digital Hardware Specialization to include ECE 320 (Computer Architecture) in the "one of" computer architecture list because Electrical and Computer Engineering plans to replace ECE 439 with ECE 320. ECE 439, which has previously been approved to become inactivated in Sept 2022, will be removed from the list from the September 2022 Calendar.

Calendar text: <https://ugradcalendar.uwaterloo.ca/page/MATH-Computer-Sci-Digital-Hardware-Spec>

5.1.2 Effective 1 September 2021: Remove corresponding text about Canadian Information Processing Society (CIPS) in the Computer Science Overview page because Computer Science has not been accredited since 2018.

Calendar text:

Strikeout= delete

[...]

The following regular and co-operative plans are accredited by the Computer Science Accreditation Council, which is sponsored by the [Canadian Information Processing Society](#).

- ~~• Bachelor of Mathematics (BMath) Honours Computer Science~~
- ~~• Bachelor of Mathematics (BMath) Honours Computer Science Business Specialization~~
- ~~• Bachelor of Mathematics (BMath) Honours Computer Science Digital Hardware Specialization~~
- ~~• Honours Bachelor of Computer Science~~
- ~~• Honours Bachelor of Computer Science Business Specialization~~
- ~~• Honours Bachelor of Computer Science Digital Hardware Specialization~~
- ~~• Honours Bachelor of Computer Science Software Engineering Specialization~~
- ~~• Any double Honours plan involving an accredited Computer Science plan~~
- ~~• Any accredited Computer Science plan with a minor~~

[...]

5.1.3 Effective 1 September 2021. Update the plan combinations table on the *Bachelor of Computer Science and Bachelor of Mathematics Academic Plan Combinations* page by adding FARM as an invalid combination with BCS or BMATH (CS)- Business Option or Specialization.

Background and Rationale: The Business Option/Specialization requires students to take six courses from a list of business courses. These six courses are also required courses in Mathematics/Financial Analysis and Risk Management (FARM). If a student chooses to double major in FARM and CS business option/specialization, they can currently automatically earn the designation without any real additional work.

Calendar text:

Bold=new

Plan	Cannot be Combined With
Applied Mathematics - Biology Specialization	Any plan offered by the Biology Department
Applied Mathematics - Economics Specialization	Any plan offered by the Economics Department
Applied Mathematics - Physics Specialization	Any plan offered by the Physics and Astronomy Department
Applied Mathematics with Scientific Computation	Any plan offered in Computational Mathematics
BCS or BMath (CS) - Bioinformatics Option or Specialization	Any plan offered by the Biology Department
BCS or BMath (CS) - Business Option or Specialization	Mathematics/Financial Analysis and Risk Management , or a minor in Economics, Human Resources Management, or Management Studies
BCS (Data Science)	Artificial Intelligence Option or Specialization
Business Administration and BCS/BMath Double Degree plans	Any plan similar to one appearing on the student's Laurier academic record transcript
Computer Science Joint (BCS or BMath)	Joint Statistics
Computational Fine Arts Option or Specialization	Any plan offered by the Fine Arts Department
Computing Option or Minor	Computer Science Minor or Information Technology Management
Mathematical Economics	Any plan offered by the Economics Department
Mathematical Physics	Any plan offered by the Physics and Astronomy Department
Mathematical Studies (with or without a Business Specialization)	Any other stand-alone or Mathematics Joint plan
Mathematical Studies - Business Specialization	Management Studies Option or Minor

6. Plan Inactivation

6.1 Pure Mathematics

Effective 1 September 2021. Inactivate the Pure Mathematics/Teaching plan.

Background and Rationale: In recent years, there has been on average only one student graduating from this plan per year. Students desiring a teaching credential are largely choosing the Mathematics/Teaching plan. There will still remain multiple paths for students desiring a teaching credential combined with Pure Mathematics courses, such as adding the Teaching Option to the full Honours Pure Mathematics plan, or adding a Pure Mathematics minor to the Mathematics/Teaching plan.

REGULATION CHANGES

7.1 Upgrade General degree to Honours degree

Effective 1 September 2021.

Background and Rationale: Under the current process, students graduating with a general degree in Mathematics must declare their intent to return for a four-year Honours degree before graduating, and then also apply for readmission later. This change removes the need to declare their intent ahead of time, and clarifies the process for readmission. To update Note 1 with the following text:

- ~~1. Students are not normally awarded an Honours BMath degree if they already hold a General BMath degree. Petitions for exceptions to this rule will normally be considered only after an absence from the Faculty of several terms.~~ **Graduates who were previously awarded a general degree may apply for readmission to upgrade to an honours degree. These applications will be considered on a case-by-case basis. Students wishing an upgrade are required to return the earlier degree in order to be granted the upgraded degree. Courses and grades from the general degree would be used towards the upgraded degree if applicable, but students would otherwise need to meet current calendar requirements.**

Calendar text: <http://ugradcalendar.uwaterloo.ca/page/MATH-Degree-Requirements-for-Math-students>

7.2 Update Communications Skills List 2.

Effective 1 September 2021.

Background and Rationale: Add ENGL 101B (Introduction to Rhetorical Studies) to the Communication Skills List 2. This course was removed from this list in 2017. The Department of English is now able to support the demand and as recommended we re-add this course to List 2.

SCIENCE UNDERGRADUATE STUDIES COMMITTEE REPORT FOR
FOR SUBMISSION TO OCTOBER 2020 SENATE UNDERGRADUATE COUNCIL (SUC)

1. NEW COURSES
 - 1.1. Physics

2. CHANGES TO EXISTING COURSES
 - 2.1. Physics

3. COURSE INACTIVATION
 - 3.1. Physics

4. COURSE EFFECTIVE DATE CHANGE
 - 4.1. PHYS 365

5. ACADEMIC PLAN CHANGES (MINOR MODIFICATIONS)
 - 5.1. Computational Physics Curriculum Renewal for Department of Physics and Astronomy Plans
 - 5.2. Physics Plan Changes Related to Computational Physics Renewal Program
 - 5.2.1. Honours Physics (Reg. & Co-op)
 - 5.2.2. Honours Physics and Astronomy (Reg. & Co-op)
 - 5.2.3. Honours Mathematical Physics (Reg. & Co-op)
 - 5.2.4. Joint Honours X with Physics
 - 5.2.5. Honours Life Physics, Biophysics Specialization (Reg. & Co-op)
 - 5.2.6. Honours Life Physics, Medical Physiology Specialization (Reg. & Co-op)
 - 5.3. Honours Materials and Nanosciences (Reg. & Co-op)
 - 5.4. Medical Physiology Minor

1 NEW COURSES

1.1 Physics

PHYS 249, 349, and 449
(See report 10)

2 CHANGES TO EXISTING COURSES

2.1 Physics

PHYS 121, 122, 234, 267, 359, 363, 364, and 375
(See report 10)

3 COURSE INACTIVATION

3.1 Physics

PHYS 236 and 239
(See report 10)

NEW COURSES (for approval)

Physics & Astronomy

Effective 01-SEP-2021

PHYS 249 (0.50) LAB, LEC, TUT Computational Physics and Linear Algebra

Computational techniques; numerical accuracy and speed; Python libraries and implementation; algorithms for numerical integration; matrix operations.

Computational approach to vectors in 2- and 3-space; linear equations, matrices, determinants; eigenvalues and diagonalization. [Offered: F]

Requisites :

Prereq: One of CS 114, 116, 136, 146

Rationale :

This new course builds on computation skills learned in CS 114, teaching computational physics concepts taken from PHYS 236 (which will become inactive fall 2022) as well key linear algebra concepts formerly taught via MATH 114, for students in Honours Physics, Honours Physics and Astronomy, Honours Mathematical Physics, and Honours Materials and Nanosciences plans. While some of the same concepts are taught in PHYS 249, PHYS 236 and MATH 114, there are sufficient differences that the two latter courses will not be listed as antirequisites of PHYS 249. The course is part of a computational physics curriculum renewal plan, and will first be offered in fall 2022.

Effective 01-SEP-2021

PHYS 349 (0.50) LAB, LEC, TUT Advanced Computational Physics

Algorithms for solving differential equations; Monte Carlo techniques; Fourier transforms; programming and computational techniques using Python, applied to physical problems such as astrophysics, electricity and magnetism, classical and quantum mechanics; introduction to machine learning and artificial intelligence.

[Offered: W]

Requisites :

Prereq: PHYS 236 or PHYS 249; PHYS 234, PHYS 242, and (AMATH 271 or PHYS 263). Antireq: PHYS 239

Rationale :

This new course provides an opportunity to build on computation skills learned in PHYS 249. It replaces most of the content from PHYS 239, which will become inactive at the same time, and has a similar course description. PHYS 349 is more appropriate for third year and is one in a series of new "X49" courses representing computational physics, and introduces concepts of Machine Learning that will be used in PHYS 449. The course explicitly requires PHYS 234, PHYS 242 and PHYS 263 as prerequisites as the course will draw on examples in electricity and magnetism, and mechanics. PHYS 236 is also listed as a prerequisite to allow students following older plans to take PHYS 349 instead of the inactivated PHYS 239 as an elective. With PHYS 236 as a prerequisite, the course can first be

offered in winter 2022.

Effective 01-SEP-2021

PHYS 449 (0.50) LAB, LEC, TUT Machine Learning in Physics
Machine learning applications in the physical sciences. [Offered: F]

Requisites : Prereq: PHYS 236 or PHYS 349
Rationale : This new course applies machine learning to concepts in physics and builds on computation skills learned in PHYS 249 and PHYS 349. To allow the course to be offered as early as possible, PHYS 236 is included as an optional prerequisite. The course will first be offered in fall 2021.

COURSE CHANGES (for approval)

Current Catalog Information

PHYS 121 (0.50) LEC, TST, TUT Mechanics

An introductory course in physics for students intending to concentrate their future studies in the physical sciences, optometry or mathematics; includes particle kinematics and dynamics, forces in nature, work and energy, conservation of energy and linear momentum, rotational kinematics and dynamics, and conservation of angular momentum. [Note: Successful completion of 4U Calculus and Vectors, 4U Advanced Functions and 4U Physics is required. Offered: F, also offered online: W]

No Special Consent Required

Requisites : Coreq: One of MATH 104, 127, 137, 147. Antireq: PHYS 111, 115, ECE 105

Effective 02-SEP-2021

Description Change: An introductory course in physics for students intending to concentrate their future studies in the physical sciences, optometry, or mathematics; includes vectors (dot and cross products), particle kinematics and dynamics, forces in nature, work and energy, conservation of energy and linear momentum, rotational kinematics and dynamics, and conservation of angular momentum. [Note: Successful completion of 4U Calculus and Vectors, 4U Advanced Functions and 4U Physics is required. Offered: F, also offered online: W]

Rationale : As part of the Department of Physics and Astronomy's computational physics renewal plan, the description for PHYS 121 is updated to include vectors (dots and cross products) as additional course content.

Current Catalog Information

PHYS 122 (0.50) LEC, TST, TUT Waves, Electricity and Magnetism

Simple harmonic motion, resonance, damped harmonic motion, wave motion and sound, electrostatic force and potential, electric current and power, capacitors, DC circuits, LRC circuits, introduction to magnetic fields Lorentz Force. [Offered: W,S; also offered online: S]

No Special Consent Required

Requisites : Prereq: PHYS 111 (minimum grade 70%) or PHYS 115 or 121 or ECE 105. Coreq:
One of MATH 127, 137, 147. Antireq: PHYS 112, 125

Effective 02-SEP-2021

Description Change: Simple harmonic motion, resonance, damped harmonic motion, complex numbers,
wave motion and sound, electrostatic force and potential, electric current
and power, capacitors, DC circuits, LRC circuits, introduction to magnetic
fields Lorentz Force. [Offered: W, S; also offered online: S]

Rationale : As part of the Department of Physics and Astronomy's computational physics
renewal plan, the description for PHYS 122 is updated to include complex
numbers as additional course content.

Current Catalog Information

PHYS 234 (0.50) LEC, TUT Quantum Physics 1

Background of quantum physics. Introduction to formalism of quantum physics.
Introduction to operators. Quantization, waves and particles. The uncertainty
principle. The Schroedinger equation for one-dimensional problems: bound states in
square wells. Harmonic oscillator; transmission through barriers. [Note: PHYS 236 or
knowledge of computational methods is recommended. Offered: W, S]

No Special Consent Required

Requisites : Prereq: PHYS 112 or 122; MATH 114 or 136; MATH 128 or 138 or 148. Coreq:
One of MATH 228, AMATH 250, AMATH 251. Antireq: CHEM 356, NE 232, PHYS 233,
ECE 405

Effective 01-SEP-2021

Description Change: Background of quantum physics. Introduction to formalism of quantum
physics. Introduction to operators. Quantization, waves, and particles. The
uncertainty principle. The Schroedinger equation for one-dimensional
problems: bound states in square wells, harmonic oscillator, transmission
through barriers. [Note: CS 114, PHYS 236, or knowledge of computational
methods is recommended. Offered: W, S]

Requisite Change : Prereq: PHYS 112 or 122; One of PHYS 249, MATH 114, 136; One of MATH 128,
138, 148. Coreq: One of MATH 228, AMATH 250, AMATH 251. Antireq: CHEM 356,
NE 232, PHYS 233, ECE 405

Rationale : As part of the computational physics renewal plan within the Department of
Physics and Astronomy, content from MATH 114 is being moved into PHYS 249,
therefore, it is added as an optional prerequisite. As part of the same
plan, CS 114 will be introduced as a new programming course, therefore the
description note is updated to recommend taking CS 114 before PHYS 234.

Current Catalog Information

PHYS 267 (0.50) LEC, TUT Probability, Statistics, and Data Analysis for Physics and Astronomy

Probability, probability distributions, errors, descriptive statistics, statistical
inference (hypothesis testing, fitting, confidence intervals), computational methods
(e.g. Monte Carlo), examples from physics and astronomy. [Offered: W, S]

No Special Consent Required

Requisites : Prereq: PHYS 122, MATH 227; PHYS 236 or CS 116. Antireq: STAT 230, 231

Effective 01-SEP-2021

Description Change: Probability, probability distributions, errors, descriptive statistics, statistical inference (hypothesis testing, fitting, confidence intervals), computational methods (e.g., Monte Carlo) in Python, examples from physics and astronomy. [Offered: W, S]

Requisite Change : Prereq: PHYS 122, MATH 227; One of PHYS 236 or CS 114, 116, 136, 146. Antireq: STAT 230, 231

Rationale : As part of the computational physics renewal plan by the Department of Physics and Astronomy, Python is the chosen programming language for new computational courses, building off of CS 114, a new program requirement in physics department plans. As such, Python is explicitly added to the description for PHYS 267 and CS 114 is added as an option to the list of required prerequisites.

Current Catalog Information

PHYS 359 (0.50) LEC, TUT Statistical Mechanics

Fundamental postulate of statistical thermodynamics. Entropy. Microcanonical, canonical, and grand canonical ensembles. Fermi-Dirac, Bose-Einstein, and Boltzmann Statistics. Maxwell-Boltzmann velocity distribution. Applications to specific heat of solids, classical and quantum gases, electrons in metals, Planck's law of radiation, and Bose-Einstein condensation. [Offered: W]

No Special Consent Required

Requisites : Prereq: (PHYS 358 or ECE 403 or CHEM 254 or ME 250); (PHYS 233 or 234 or CHEM 356 or co-requisite: AMATH 373).

Effective 01-SEP-2024

Requisite Change : Prereq: One of PHYS 236, CS 114, 116, 136, 146; One of PHYS 358, ECE 403, CHEM 254, ME 250; One of PHYS 233, 234, CHEM 356, Coreq: AMATH 373

Rationale : A programming course requisite is added to PHYS 359 to allow the use of computational problems in the course. An effective date of Sept. 1, 2024 is needed to accommodate MNS plans having appropriate prerequisites.

Current Catalog Information

PHYS 363 (0.50) LEC, TUT Intermediate Classical Mechanics

Non-inertial frames of reference. Calculus of variations. Lagrangian mechanics. Coupled oscillations and normal modes. Hamiltonian dynamics. [Note: PHYS 236 or knowledge of computational methods recommended. Offered: F, S]

No Special Consent Required

Requisites : Prereq: One of PHYS 263, AMATH 261, 271 ; One of MATH 227, 237, 247; One of MATH 228, AMATH 250, AMATH 251

Effective 01-SEP-2021

Description Change: Non-inertial frames of reference. Calculus of variations. Lagrangian mechanics. Coupled oscillations and normal modes. Hamiltonian dynamics. [Offered: F, S]

Requisite Change : Prereq: One of PHYS 236, CS 114, 116, 136, 146; One of PHYS 263 or AMATH 271; One of MATH 227, 237, 247; One of MATH 228, AMATH 250, AMATH 251

Rationale : A programming course requisite is added to PHYS 363 to allow the use of computational problems in the course. As such, the description note recommending PHYS 236 is removed because it is no longer required. In addition, an inactive (2011) AMATH 261 is removed from the list of prerequisite options.

Current Catalog Information

PHYS 364 (0.50) LEC, TUT Mathematical Physics 1
Sturm-Liouville theory. Legendre, Bessel and other special functions. Fourier series and introduction to Fourier transforms. Separation of variables. Green's function.
[Offered: F,S]
No Special Consent Required
Requisites :

Prereq: MATH 227, MATH 228 or AMATH 250 or 251; Honours Physics, Chemical Physics, Physics and Astronomy, Life Physics and Materials and Nanosciences students only. Antireq: AMATH 353

Effective 01-SEP-2021

Requisite Change : Prereq: One of PHYS 236, CS 114, 116, 136, 146; One of MATH 227, 228, AMATH 250, 251; Honours Physics, Chemical Physics, Physics and Astronomy, Life Physics and Materials and Nanosciences students only. Antireq: AMATH 353

Rationale : A programming course requisite is added to PHYS 364 to allow the use of computational problems in the course.

Current Catalog Information

PHYS 375 (0.50) LEC, TUT Stars
Stellar distances, masses, ages. Stellar interiors and atmospheres, star formation and evolution. Supernovae, white dwarfs, neutron stars, black holes. [Offered: W]
No Special Consent Required
Requisites :

Prereq: PHYS 112 or 122 and two of PHYS 234, 242, 256, 275, 358, AMATH 271

Effective 01-SEP-2021

Requisite Change : Prereq: PHYS 112 or 122; One of PHYS 149, 236, CS 116, 136, 146; Two of PHYS 234, 242, 256, 275, 358, AMATH 271

Rationale : A programming course requisite is added to PHYS 375. Explicitly requiring a programming course will allow the use of computational problems in the course.

COURSE INACTIVATIONS (for approval)

Effective 01-SEP-2022
PHYS 236 (0.50)

Computational Physics 1

Rationale : The computational content of this course is being merged with linear algebra content from MATH 114, into a new course, PHYS 249, which will be one of a set of new computational physics courses being introduced into physics plans as part of a computational physics renewal plan by the

Department of Physics and Astronomy. Of the new courses, CS 114 and PHYS 249 will be required, while PHYS 349 and PHYS 449 will be optional PHYS elective courses. PHYS 236 will last be offered fall 2021.

Effective 01-SEP-2021
PHYS 239 (0.50)
Rationale :

Computational Physics 2

Content of this PHYS elective course is being placed in a new course, PHYS 349, which will be one of a set of new computational physics courses being introduced into physics plans as part of a computational physics renewal plan by the Department of Physics and Astronomy. Of the new courses, CS 114 and PHYS 249 will be required, while PHYS 349 and PHYS 449 will be optional PHYS elective courses. The description of PHYS 349 reads similar to PHYS 239, but the course has been reworked into a third year course in the new "X49" number series to represent the computational physics content, therefore, requiring inactivation of PHYS 239, which will last be offered spring 2021.

End of Report

4 COURSE EFFECTIVE DATE CHANGE

4.1 PHYS 365

Effective Date: September 1, 2023

Background and Rationale:

The description change to remove “introductory probability and statistics” and to add “Green's functions”, approved at the September 2019 SUC, for a September 1, 2022 effective date, needs to be effective one year later, to ensure students will have the statistics background via PHYS 267. Co-op students who started in 2019 will not have access to PHYS 267 and are scheduled to take PHYS 365 winter 2023, therefore, the changes can only take effect Sept. 1, 2023 at earliest.

5 ACADEMIC PLANS (MINOR MODIFICATIONS)

5.1 Computational Physics Curriculum Renewal for Department of Physics and Astronomy Plans

Effective date: September 1, 2021

Background and Rationale:

Students in Physics programs are currently underserved in computational physics training. Computational physics training is currently offered in PHYS 236 and PHYS 239, the former with a broad population of students, including almost 50% with no programming experience. PHYS 236 is required only for PHYS 239, and PHYS 239 is not required for any course that follows, allowing no opportunity to build on the limited computational skills that have been introduced.

A recently introduced data analysis/statistics course, PHYS 267, has a significant computational component and requires PHYS 236. These two courses have the potential to serve as a strong foundation for upper year courses that use or build on computational physics. However, the need to teach basic programming in PHYS 236 would be better served in a first-year course. Meanwhile MATH 114 (Linear Algebra) which contains important training on matrices, eigenvalues, eigenvectors etc., is sequenced in 1A for Physics programs, which is too distant from when it is used in 2B, and in practice this material is being retaught in a two to three-week period in PHYS 234. Thus, an opportunity to teach linear algebra in a computational context, by merging it with the content currently taught in PHYS 236, was identified, resulting in a Physics curriculum revision, that provides one computational course per year, as summarized below:

- A new first year course, CS 114, is introduced in 1A to teach basic Python programming (Given the widespread usage of Python, particularly for machine learning applications in physics and astronomy, this is the language of choice to use in courses within Physics programs)
- PHYS 236 is inactivated to be replaced by PHYS 249
- A new second year course, PHYS 249, is introduced to teach computational physics and linear algebra
- PHYS 239 is inactivated to be replaced by PHYS 349
- A new third year course, PHYS 349, is introduced to build on computational skills learned in PHYS 249; it will serve as a PHYS elective for interested students
- A new fourth year course, PHYS 449, is introduced to teach machine learning applications in physics; it will serve as a PHYS elective for interested students
- The MATH 114 requirement is removed from Honours Physics and Honours Physics and Astronomy plans, as the needed material is covered in other courses, primarily PHYS 249
- An elective is removed from Honours Mathematical Physics plans to accommodate the addition of CS 114. The advanced Linear Algebra course, MATH 136, is moved from 1A to 1B, to make room for CS 114 in 1A.
- CS 114 is added as a prerequisite for PHYS 359, PHYS 363, PHYS 364, PHYS 365, and PHYS 375 to make use of the computational training

There is support from the Faculty of Mathematics for the plan. They were consulted on the changes to include the removal of MATH 114 from physics programs.

5.2 Physics Plan Changes Related to Computation Physics Curriculum Renewal

Plans	Added requirements	Removed requirements	Other changes
Honours Physics (Reg. & Co-op)	CS 114, PHYS 249	PHYS 236, MATH 114	
Honours Physics and Astronomy (Reg. & Co-op)	CS 114, PHYS 249	PHYS 236, MATH 114	
Honours Mathematics Physics (Reg. & Co-op)	CS 114, PHYS 249	PHYS 236, one 0.5-unit elective	MATH 136 moves from 1A to 1B term
Joint Honours X with Physics	CS 114, PHYS 249	PHYS 236, MATH 114	
Honours Life Physics, Biophysics Specialization (Reg. & Co-op)			Remove PHYS 236 and add PHYS 249 to suggested electives for experimental and theoretical method interests
Honours Life Physics, Medical Physiology Specialization (Reg. & Co-op)			Remove PHYS 236, 239 and add PHYS 249, 349 to list of suggested program electives

5.2.1 Honours Physics (Reg. & Co-op)

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1. 22.0 units that include:
 - 10.0 PHYS units: PHYS 121, PHYS 122, PHYS 124, PHYS 131L, PHYS 132L, PHYS 232L, PHYS 234, ~~PHYS 236~~, PHYS 242, PHYS 242L, PHYS 249, PHYS 256, PHYS 256L, PHYS 260L, PHYS 263, PHYS 267, PHYS 334, PHYS 342, PHYS 358, PHYS 359, PHYS 360A, PHYS 363, PHYS 364, and PHYS 365
 - ~~2.5~~ 2.0 MATH units: ~~MATH 114~~, MATH 127, MATH 128, MATH 227, and MATH 228
 - 1.25 CHEM units: CHEM 120, CHEM 120L, and CHEM 123
 - 0.5 CS unit: CS 114
 - 0.5 ENGL unit: ENGL 193/SPCOM 193
 - 7.75 elective units distributed as follows:
 - 2.0 PHYS lecture units that must include at least 1.5 units at the 400-level
 - 0.25 PHYS lab unit at the 300- or 400-level
 - 5.5 units chosen from any subject, with a maximum of 1.5 lab units

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5.2.2 Honours Physics and Astronomy (Reg. & Co-op)

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1. 22.0 units that include:
 - 11.25 PHYS units: PHYS 121, PHYS 122, PHYS 122L, PHYS 124, PHYS 131L, PHYS 175, PHYS 175L, PHYS 234, ~~PHYS 236~~, PHYS 242, PHYS 242L, PHYS 249, PHYS 256, PHYS 256L, PHYS 263, PHYS 267, PHYS 270L, PHYS 334, PHYS 342, PHYS 358, PHYS 359, PHYS 363, PHYS 364, PHYS 370L, PHYS 375, PHYS 474, and PHYS 475
 - 1.0 PHYS elective unit selected from: PHYS 249, PHYS 275, or PHYS 476
 - ~~2.5~~ 2.0 MATH units: ~~MATH 114~~, MATH 127, MATH 128, MATH 227, and MATH 228
 - 1.25 CHEM units: CHEM 120, CHEM 120L, and CHEM 123
 - 0.5 CS unit: CS 114
 - 0.5 ENGL unit: ENGL 193/SPCOM 193
 - 5.5 elective units distributed as follows:
 - 1.5 PHYS lecture units that include at least a 0.5 unit at the 400-level
 - 0.5 PHYS lab unit 300-level or higher
 - 3.5 units chosen from any subject, with a maximum of 1.5 lab units

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5.2.3 Honours Mathematical Physics (Reg. & Co-op)

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1. 21.0 units that include:
 - 7.25 PHYS units: PHYS 121, PHYS 122, PHYS 124, PHYS 131L, PHYS 132L, PHYS 234, ~~PHYS 236~~, PHYS 242, PHYS 249, PHYS 263, PHYS 342, PHYS 358, PHYS 359, PHYS 363, PHYS 434, and PHYS 442
 - 2.5 MATH units: MATH 136, MATH 137, MATH 138, MATH 235, and MATH 237
 - 3.0 AMATH units: AMATH 231, AMATH 250, AMATH 332, AMATH 351, AMATH 353, and AMATH 373
 - 0.5 CS unit: CS 114
 - 1.0 STAT unit: STAT 230 and STAT 231
 - 1.25 CHEM units: CHEM 120, CHEM 120L, and CHEM 123
 - 0.5 ENGL unit: ENGL 193/SPCOM 193
 - ~~5.5~~ 5.0 elective units distributed as follows:
 - 1.5 PHYS or AMATH lecture units at the 300-level or higher
 - 1.5 program elective units chosen from: PHYS 444, PHYS 454, PHYS 476, AMATH 361, AMATH 456, or AMATH 463
 - ~~2.5~~ 2.0 units chosen from any subject, with a maximum of 1.5 lab units

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5.2.4 Joint Honours X with Physics

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The successful completion of the Joint Honours X with Physics plan requires the following:

13.75 units distributed as follows:

- ~~2.5~~ 2.0 MATH units: ~~MATH 114~~, MATH 127, MATH 128, MATH 227, and MATH 228 (or equivalents)
- 9.5 PHYS units: PHYS 121, PHYS 131L, PHYS 122, PHYS 124, PHYS 132L, PHYS 232L, PHYS 234, ~~PHYS 236~~, PHYS 242, PHYS 242L, PHYS 249, PHYS 256, PHYS 256L, PHYS 260L, PHYS 263, PHYS 334, PHYS 342, PHYS 358, PHYS 359, PHYS 360A, PHYS 363, PHYS 364, and PHYS 365
- 1.5 PHYS lecture units, 400-level
- 0.25 PHYS lab unit, 300-level or higher
- 0.5 CS unit: CS 114

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5.2.5 Honours Life Physics, Biophysics Specialization (Reg. & Co-op)

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Suggested Electives...

Interested in Experimental Methods

2.0 units from the following: BIOL 335L, BIOL 361, PHYS 131L (in place of PHYS 111L), PHYS 132L (in place of PHYS 122L), ~~PHYS 236~~, PHYS 249, PHYS 260L, or PHYS 391/PHYS 391L

Interest in Theoretical Methods

2.0 units from the following: BIOL 364, BIOL 382/AMATH 382, ~~PHYS 236~~, PHYS 249, PHYS 334, PHYS 364, PHYS 365, PSYCH 420, SYDE 544, or SYDE 584 (if BIOL 273 not yet completed)

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5.2.6 Honours Life Physics, Medical Physiology Specialization (Reg. & Co-op)

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Suggested Electives for the Medical Physics Specialization

BIOL 201 Human Anatomy

CHEM 333 Metabolism 1

PHYS 249 Computational Physics and Linear Algebra

PHYS 349 Advanced Computational Physics

~~PHYS 236 Computational Physics 1~~

~~PHYS 239 Computational Physics 2~~

PHYS 391/PHYS 391L Electronics/Electronics Laboratory

PHYS 437A Research Project

PHYS 437B Research Project (continued)

STAT 202 Introductory Statistics for Scientists

5.3 Honours Materials and Nanosciences (Reg. & Co-op)

Effective Date: September 1, 2021

Background and Rationale:

There are several changes proposed for Material and Nanosciences plans (MNS) that have been approved by both the Departments of Physics and Astronomy and Chemistry. They primarily include the introduction of two new course requirements (CS 114 and PHYS 249), and the removal of three course requirements (MATH 114, CHEM 237, and one elective), resulting in a total overall unit reduction by 0.5 unit. More courses are added to the list of program electives and the CHEM 264 or CHEM 266 requirement is no longer listed under total electives, but rather as a CHEM requirement necessary as a corequisite for the CHEM 266L requirement.

In line with the Computational Physics curriculum renewal, the MNS plans will also remove the MATH 114 requirement in first year, to incorporate a new Python programming course, CS 114 as well as a new computational and linear algebra course, PHYS 249, as requirements. Important training from MATH 114 will be incorporated into PHYS 249, which will be sequenced into second year where it will be closer to subsequent courses requiring knowledge of the material. PHYS 249 requires CS 114 as a prerequisite. PHYS 236 is removed from the recommended elective list because it will be inactivated and there is content overlap with PHYS 249.

To accommodate the addition of PHYS 249 in Year two fall, CHEM 209 is being sequenced to Year four fall, as this important course is not required as a prerequisite for other program requirements. Similarly, PHYS 334 is being sequenced in Year three winter versus Year four winter, to place it closer to its prerequisite, PHYS 234, and to provide fourth year students, enrolled in research projects, more time for research.

The introductory biochemistry course, CHEM 237, will be removed as a requirement for the MNS plans as it is not required as a prerequisite for any later required courses. Instead, students will be required to select a CHEM program elective of choice as one of their electives, to keep a balance between CHEM and PHYS courses, and to provide greater flexibility to take some recently added 200-level CHEM program electives, which will include CHEM 237.

A recently introduced data analysis/statistics course, PHYS 267, has a significant computational component and would be a beneficial course for MNS students. Therefore, PHYS 267 will be added to the list of program electives.

The 0.5-unit requirement of either CHEM 264 or CHEM 266 is being removed from the list of required electives. CHEM 266L is a required course, with a corequisite of an organic chemistry lecture, thus CHEM 264 or CHEM 266 are CHEM requirements rather than electives.

Finally, total program units will be reduced from 21.75 to 21.25. To provide some relief from the demanding MNS plans, the total number of program electives, at any level, are reduced from 1.5 to 1.0 unit, resulting in a reduction of total elective units from 5.0 to 4.5. These electives will be redistributed throughout the plans to provide better balance in course load across the terms. For the regular plan only, CHEM 266/266L will be sequenced into third year versus second year to provide an elective in second year.

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Successful completion of this program requires:

1. ~~21.75~~ 21.25 units that include:
 - 5.0 MNS units: MNS 101, MNS 102, MNS 201L, MNS 211, MNS 221, MNS 321, MNS 322, MNS 331, MNS 410, and MNS 431
 - 3.5 CHEM units: CHEM 121, CHEM 121L, CHEM 125, CHEM 125L, CHEM 140, CHEM 209, CHEM 250L, CHEM 254, and CHEM 266L
 - 0.5 CHEM unit from CHEM 264 or CHEM 266 (Refer to Note)
 - ~~4.25~~ 4.75 PHYS units: PHYS 121, PHYS 121L, PHYS 122, PHYS 122L, PHYS 232L, PHYS 234, PHYS 249, PHYS 242, PHYS 334, PHYS 342, and PHYS 359
 - ~~2.5~~ 2.0 MATH units: ~~MATH 114~~, MATH 127, MATH 128, MATH 227, and MATH 228
 - 0.5 CS unit: CS 114
 - ~~6.0~~ 4.5 elective units, distributed as follows:
 - ~~0.5 unit from CHEM 233 or CHEM 237 (Refer to Note 1)~~
 - ~~0.5 unit from CHEM 264 or CHEM 266 (Refer to Note 2)~~
 - 1.0 program unit, 300-level or higher
 - 1.0 program unit, 400-level
 - ~~1.5 program units~~ 1.0 program unit, any level, at least 0.5 unit from Chemistry
 - 1.5 units of any 0.25 or 0.5 unit courses
 - 0.5 ENGL unit: ENGL 193/SPCOM 193

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Notes

- ~~1. Students wishing to take CHEM 233 and CHEM 237L must obtain permission from the instructor of CHEM 237L to override the prerequisite of CHEM 237.~~
1. Students wishing to take CHEM 264 instead of CHEM 266 must obtain permission from the instructor of CHEM 266L to override the prerequisite of CHEM 266.

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5.4 Medical Physiology Minor

Effective Date: September 1, 2021

Background and Rationale:

An update to the Medical Physiology Minor is required to reflect a renumber of KIN 408 to KIN 308, and to add KIN 312 and BIOL 354 as electives to the minor, based on a joint review of upper year BIOL and KIN courses to determine what other electives were appropriate. KIN 312, Introduction to Movement Disorders, has a prerequisite of BIOL 273, already required for BIOL 373, and provides an appropriate elective for the winter term. The content of BIOL 354, Environmental Toxicology, which has a CHEM 120 prerequisite, was also deemed ideal for this minor.

This is a joint minor between the departments of Biology and Kinesiology. Accordingly, both departments are aware of the changes and are putting forward for approval, parallel changes to their Calendar text.

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Successful completion of this minor requires:

1. 5.0 units distributed as follows:
 - 1.0 BIOL unit: BIOL 239 and BIOL 373
 - 1.0 BIOL unit chosen from: BIOL 341, BIOL 354, BIOL 355, BIOL 376, BIOL 444, BIOL 473, and BIOL 476
 - 1.0 KIN unit: KIN 308 and ~~KIN 404 and KIN 408~~
 - 1.0 KIN unit chosen from: KIN 301, KIN 310/HLTH 310, KIN 312, KIN 343, KIN 356, KIN 406, KIN 407, KIN 416, and KIN 429
 - 0.5 PHIL unit: PHIL 226 or PHIL 319J
 - 0.5 PSYCH unit chosen from: PSYCH 207, PSYCH 261, PSYCH 307, and PSYCH 335
2. An average of 60% in the above courses.

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WATERLOO | ENGINEERING

Engineering Undergraduate Office

M E M O R A N D U M

September 22, 2020

TO: Rebecca Wickens, Associate University Secretary, Secretariat

FROM: Dan Davison, Associate Dean, Undergraduate Studies, Faculty of Engineering
Benoit Charbonneau, Associate Dean, Undergraduate Studies, Faculty of Mathematics

SUBJECT: Items for Approval at October 6, 2020 Senate Undergraduate Council

ALL CURRICULUM CHANGES ARE EFFECTIVE SEPTEMBER 2021 UNLESS OTHERWISE NOTED.

- 1. Academic Plans (Minor Modifications)**
 - 1.1 Software Engineering

1.1 Software Engineering

a. Minor Plan Modifications: Software Engineering

- Update the Software Engineering Awards section to align with different criteria in the Faculties of Engineering and Mathematics. This is an amendment to 2020-2021 calendar, and has been approved by the Registrar's Office.
- Add ENGL 119, 209 and 210E to the communications elective list.
- Update the ECE ATE and CS ATE lists.
- Amend "One additional course from the CS and ECE lists above" to "One additional course from the CS and ECE lists above, or the extended list below."
- Add courses from STAT, CO, SYDE, MTE and MSCI to the extended ATE list.
- Increase the SE Science Elective list to include the courses on the ECE science elective list.

Rationale:

Students have requested more choices, and specifically more challenging choices for their communications electives. The SE Director worked with English to identify courses that would be appropriate. This is unlikely to affect the total number of English courses that SE students take, and we will not identify special sections of these ENGL courses.

Courses added to the ECE ATE, CS ATE, Extended ATE and SE Science Elective lists are technical and science courses that are relevant and provide students with more choice. The SE curriculum should follow the ECE and CS curricula. We should deviate from their leads when it makes sense to do so, but otherwise follow them. Students following the 2017/2018, 2018/2019, 2019/2020, or 2020/2021 Calendar requirements can access the courses on these lists via course substitutions, to be recorded in Quest.

The Faculty of Science was consulted for the updates to the SE Science Elective list, and the Faculty of Arts was consulted with regard to the update to the communications elective list.



Software Engineering Awards

Students in the Bachelor of Software Engineering plan are eligible for Awards of Excellence in the Faculty of Mathematics. Students in the Bachelor of Software Engineering plan are eligible for Awards of Excellence in the Faculty of Engineering.

~~Term Dean's Honours List~~

~~In recognition of outstanding academic achievement in an academic term, the designation Dean's Honours List is awarded to any BSE student who satisfies either of the following criteria:~~

- ~~1. The student is unconditionally promoted at the end of that term, and their term average minus their percentile rank from the top for that academic term is at least 80%.~~
- ~~2. The student completes the academic term with a term average of at least 87% based upon a course load which includes a minimum of 2.5 units with numeric or letter grades and which does not include any failing grades or any INC, IP, or UR grades (see Grades for description).~~

~~This designation will be reflected on the official university transcript.~~

~~Graduation With Distinction – Dean's Honours List~~

~~In recognition of outstanding academic achievement throughout undergraduate studies, the designation Graduation With Distinction – Dean's Honours List is awarded to any BSE graduate who satisfies either of the following criteria:~~

- ~~1. The student has satisfied criterion "1" of the term Dean's Honours List for at least two of the six academic terms preceding graduation, and has a cumulative average over these last six academic terms of at least 80%.~~
- ~~2. The student has a cumulative average (as specified in Mathematics' Faculty Policies) of at least 87% with no record of INC, IP, or UR grades (see Grades for description). Any student who satisfies this criterion will have their name displayed in gold on the walls of the Math & Computer (MC) corridor 1108.~~

~~This designation will appear on the student's official transcript and diploma.~~

~~Some of the upper-year awards offered by the faculties of Engineering and Mathematics are open to Software Engineering students. If such an Engineering or Mathematics award specifies that the recipient achieve term "Dean's Honours List" or "Graduating 'With Distinction – Dean's Honours List'," then a Software Engineering student must satisfy the appropriate Faculty's Dean's Honours List criteria in order to be eligible for the award.~~

Three Advanced Technical Electives (ATE)

The advanced technical electives comprise fourth-year course offerings in CS or ECE. Students are advised to plan ahead when selecting ATEs. Most ATEs are not offered every term, and some ATEs have other ATEs as prerequisites. The academic advisors may approve other courses.

One of the following CS courses (CS List):

[CS 360 Introduction to the Theory of Computing](#)

[CS 365 Models of Computation](#)

[CS 370 Numerical Computation](#)

[CS 371 Introduction to Computational Mathematics](#)

[CS 442 Principles of Programming Languages](#)

[CS 444 Compiler Construction](#)

[CS 448 Database Systems Implementation](#)

[CS 449 Human-Computer Interaction](#)

[CS 450 Computer Architecture](#)

[CS 451 Data-Intensive Distributed Computing](#)

[CS 452 Real-time Programming](#)

[CS 454 Distributed Systems](#)

[CS 457 System Performance Evaluation](#)

[CS 458 Computer Security and Privacy](#)

[CS 462 Formal Languages and Parsing](#)

[CS 466 Algorithm Design and Analysis](#)

[CS 479 Neural Networks](#)

[CS 480 Introduction to Machine Learning](#)

[CS 484 Computational Vision](#)

[CS 485 Statistical and Computational Foundations of Machine Learning](#)

[CS 486 Introduction to Artificial Intelligence](#)

[CS 487 Introduction to Symbolic Computation](#)

[CS 488 Introduction to Computer Graphics](#)

[CS 489 Advanced Topics in Computer Science](#)

One of the following ECE courses (ECE list):

[ECE 313 Digital Signal Processing](#)

[ECE 320 Computer Architecture](#)

[ECE 327 Digital Hardware Systems](#)

[ECE 340 Electronic Circuits 2](#)

[ECE 409 Cryptography and System Security](#)

[ECE 416 Advanced Topics in Networking](#)

[ECE 417 Image Processing](#)

[ECE 423 Embedded Computer Systems](#)

[ECE 429 Computer Architecture](#)

[ECE 454](#) Distributed Computing
[ECE 455](#) Embedded Software
[ECE 457A](#) Cooperative and Adaptive Algorithms
[ECE 457B](#) Fundamentals of Computational Intelligence
[ECE 457C Reinforcement Learning](#)
[ECE 458](#) Computer Security
[ECE 459](#) Programming for Performance
[ECE 481](#) Digital Control Systems
[ECE 486](#) Robot Dynamics and Control
[ECE 488](#) Multivariable Control Systems
[ECE 493 Special Topics in Electrical and Computer Engineering](#)
[ECE 495 Autonomous Vehicles](#)

One additional course from the CS and ECE lists above, [or from the Extended list below.](#)

Extended list:

[CO 331 Coding Theory](#)
[CO 342 Introduction to Graph Theory](#)
[CO 351 Network Flow Theory](#)
[CO 353 Computational Discrete Optimization](#)
[CO 367 Nonlinear Optimization](#)
[CO 456 Introduction to Game Theory](#)
[CO 481 Introduction to Quantum Information Processing](#)
[CO 485 The Mathematics of Public-Key Cryptography](#)
[CO 487 Applied Cryptography](#)
[MSCI 343 Human-Computer Interaction](#)
[MSCI 446 Introduction to Machine Learning](#)
[MSCI 543 Analytics and User Experience](#)
[MTE 544 Autonomous Mobile Robots](#)
[MTE 546 Multi-Sensor Data Fusion](#)
[SE 498 Advanced Topics in Software Engineering](#)
[STAT 440 Computational Inference](#)
[STAT 441 Statistical Learning – Classification](#)
[STAT 442 Data Visualization](#)
[STAT 444 Statistical Learning – Advanced Regression](#)
[SYDE 533 Conflict Resolution](#)
[SYDE 543 Cognitive Ergonomics](#)
[SYDE 548 User-Centred Design Methods](#)
[SYDE 552 Computational Neuroscience](#)
[SYDE 556 Simulating Neurobiological Systems](#)
[SYDE 575 Image Processing](#)

Two Science Electives (SCE)

Normally, these courses are in the natural sciences, chosen from the list below. Alternate courses may be chosen in consultation with the SE academic advisors.

Science Elective Courses:

[BIOL 110](#), [BIOL 120](#), ([BIOL 130](#) and [BIOL 130L](#)), [BIOL 150](#), [BIOL 165](#), [BIOL 211](#), [BIOL 239](#), ([BIOL 240](#) and [BIOL 240L](#)), [BIOL 241](#), [BIOL 273](#), ([BIOL 373](#) and [BIOL 373L](#)), [CHE 161](#), ([CHEM 123](#) and [CHEM 123L](#)), [CHEM 209](#), ([CHEM 237](#) and [CHEM 237L](#)), [CHEM 254](#), ([CHEM 262](#) and [CHEM 262L](#)), [CHEM 266](#), [CHEM 356](#), [CHEM 404](#), [EARTH 121](#), [EARTH 122](#), [EARTH 123](#), [EARTH 221](#), [EARTH 270](#), [EARTH 281](#), [ECE 231](#), [ECE 403](#), [ECE 404](#), [ECE 405](#), [ENVE 275](#), [ENVS 200](#), [NE 222](#), [PHYS 124](#), [PHYS 175](#), [PHYS 234](#), [PHYS 263](#), [PHYS 275](#), [PHYS 280](#), [PHYS 334](#), [PHYS 335](#), [PHYS 375](#), [PHYS 380](#), [SCI 238](#), [SCI 250](#)

Three Linkage Electives (LE)

At least one from each of the areas of Societal Issues, Humanities and Social Sciences, and Communications, as specified below. Students should be aware that these courses may have enrolment limits, or may not fit their schedules.

One course on Societal Issues:

[CS 492](#), [Complementary Studies Elective](#) List A

One additional course on Humanities and Social Sciences:

[Complementary Studies Elective](#) List C

One course on Communications:

[ENGL 109](#), [ENGL 119](#), [ENGL 129R/EMLS 129R](#), [ENGL 209](#), [ENGL 210E](#), [EMLS 101R](#), [EMLS 102R](#), [SPCOM 100](#), [SPCOM 223](#)

Notes

1. There are 10 electives. As detailed above, these electives must include three advanced technical electives, two science electives, and three linkage electives. For their remaining two electives, students may choose to take additional courses from the elective lists above or any other 0.5 credit course(s) for which they meet the requisites. Advanced Technical Electives may not be taken before the 3A term.
2. Students must take one elective in third year, but can choose to take it in either 3A or 3B. Students may take electives in both terms if they choose.
3. Students may choose to take three electives in 4A and four electives in 4B, instead of two in 4A and five in 4B.
4. Students enrolled in Software Engineering will only be permitted to use the WD and WF (see [Grades](#) for descriptions) provisions used in the Faculty of Mathematics to withdraw from extra courses taken above the degree requirements.
5. Students may replace [STAT 206](#) and one of their unrestricted electives with the combination of [STAT 230](#) and [STAT 231](#).
6. The linkage elective on communication is normally taken in the 2A term. It must be completed with a grade of at least 60% prior to enrolling in the 3A term.

7. CHE 102 is treated as an elective for the purpose of reduced load; that is, students may take CHE 102 either before or after their 2A term. Students may take [CHEM 120](#) instead of CHE 102.

Communication Skills Requirement

Strong communication skills are essential to academic, professional, and personal success. As such, Software Engineering students must take a course from the Linkage Elective Communication List in the 2A term. ~~This elective list parallels the Mathematics Communication Skills Requirements List 1.~~ **This elective list is intended to include all of Mathematics Communication Skills Requirements List 1, and selections from Mathematics Communication Skills Requirements List 2.** Communication skills are further developed and evaluated in three work-term reports (described below) and in [SE 101](#), [SE 390](#), [SE 490](#), and [SE 491](#).

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**OFFICE OF THE REGISTRAR REPORT TO
SENATE UNDERGRADUATE COUNCIL**
October 2020

1. REGULATIONS

- 1.1.** Recording Students' Names
- 1.2.** Academic Calendar Dates, 2021-2022

1. REGULATIONS

1.1. Recording Students' Names

Effective date: September 1, 2021. The intention is that the new rule will be implemented for all current students as of the effective date – it is not tied to their program requirement term.

Background and rationale: New text for the Undergraduate Calendar is being created to formalize the University of Waterloo's current practices regarding student name usage on campus.

In response to feedback from students, the "Improving Name Usage" project was launched to students in January 2020 to allow them the opportunity to use a chosen/preferred first name broadly on campus, while retaining their legal first name on tax receipts and official documents. This project, influencing 26 information systems throughout campus, required collaboration among a number of key partners, and the participation of number of committees. Privacy and human rights legislation informed the process, and student consultations helped drive decision-making. More specifically, direction was provided, and decisions were made, through numerous meetings with units including the Secretariat, Legal Office, Equity Office, Glow Centre for Sexual and Gender Diversity, and the Gender and Sexual Diversity Working group. Policy 33 (Ethical Behaviour) was also considered during the decision-making process.

With the introduction of the chosen/preferred first name option in January 2020, this proposed Calendar text adds transparency for undergraduate students and ensures they understand their options. The University continues to work on measures to improve equity and inclusion for its students, and data related to names, gender identity, and pronoun use will evolve. Based on publicly available websites and academic calendars, the University of Waterloo appears to be one of the early adopters of a chosen/preferred name option compared to other Canadian universities.

The University is committed to displaying a student's chosen/preferred first name wherever possible, and to continuing to increase that use across various systems, processes, and documents. Thus, specifics about current use have not been included in the academic calendar text, allowing greater flexibility to make changes by not being tied to the University calendar publication timelines.

- Examples of official documents displaying legal name: transcripts, diplomas, tax receipts, official and/or legal University letters.
- Examples of where chosen/preferred first name is displayed: systems (e.g., LEARN, Quest, WaterlooWorks), class and exam lists, email, WatCard. Students can use this name on forms and in many communication they request (e.g., reference letters).

The legal name is being treated as protected data and employees have access only to students' chosen/preferred first name – unless the employee role demonstrably requires that they have access to the legal name.

Details as well as procedural aspects of changing a student's legal name and/or their chosen/preferred first name are outlined on The Centre's "[updating personal information](#)" web page.

- A legal name change requires the completion of a [Change of Name Form](#), and must be accompanied by legal documentation or photo identification (e.g., marriage certificate, adoption papers, driver's license, passport, etc.). For those that don't have the required documentation or identification, they can have a Commissioner for Taking Affidavits sign a statutory declaration.
- A chosen/preferred first name change is done via WatIAM, requires no documentation, and can be done as often as a student desires.

Proposed Calendar text:**Section of Calendar:** [University Policies, Guidelines, and Academic Regulations](#)**New Calendar page:** Recording Students' Names

In order to maintain the integrity of the University of Waterloo's student records, each student is required to provide, either on application for admission or on personal data forms needed for initial registration, their complete legal name.

Students' Legal Names

The University requires that individuals use their legal name on all legal records and official documents.

Students' Chosen/Preferred First Name

A student's chosen/preferred first name is typically the first name that they commonly use, and may differ from their legal first name. Waterloo also recognizes that, as an inclusive community, many of its members use first names other than their legal first names to identify themselves. The University acknowledges that as per the Ontario Human Rights Code, students have the right to be addressed by their chosen name.

Changing Students' Names on Official Documents

Students who wish to change their legal name(s) (first, middle, and/or last) used for official documents are required to provide acceptable documentation or photo identification reflecting the change, or in their absence, complete a statutory declaration.

Note: It is not currently possible to accommodate requests to include accents and special characters on official transcripts nor can these characters be displayed as part of the student's centrally maintained academic record. Students wishing to include accents or special characters in their names on diplomas need to provide that information during the Application to Graduate process.

Example addition of accents or special characters:

- Noelle to Noëlle
- Francois to François

More information

View the [updating name\(s\) web page](#) for options and instructions.

1.2 Academic Calendar Dates, 2021-2022 (Revised October 1, 2020)

	Fall 2021	Winter 2022	Spring 2022
Co-operative Work Term Begins	Sept. 7 (T)	Jan. 4 (T)	May 2 (M)
Classes Begin	Sept. 8 (W)	Jan. 5 (W)	May 2 (M)
Holidays	Oct. 11 (M)	Feb. 21 (M) Apr. 15 (F)	May 23 (M) July 1 (F) Aug. 1 (M)
Reading Week	Oct. 9-17 (S-U)	Feb. 19-27 (S-U)	N/A
Convocation	Oct. 22, 23 (F,S)	N/A	June 14-18 (T-S)
Classes End	Dec. 7 (T)	Apr. 5 (T)	July 26 (T)
Make-up Day(s) for in-term holidays	N/A	N/A	July 25 (M) for May 23 (M) July 26 (T) for July 1 (F schedule)
Pre-Examination Study Day(s)	Dec. 8 (W)	Apr. 6,7 (W,R)	July 27, 28 (W,R)
Examinations Begin	Dec. 9 (R)	Apr. 8 (F)	July 29 (F)
In-Person Exam Days for Online/Remote Courses Online Class Examination Days	TBD Dec. 10,11 (F,S)	TBD Apr. 8,9 (F,S)	TBD Aug. 5,6 (F,S)
Examinations on Sunday	Dec. 12 (U)	N/A	N/A
Examinations End (including Emergency Day)	Dec. 23 (R)	Apr. 26 (T)	Aug. 13 (S)
Co-operative Work Term Ends	Dec. 23 (R)	Apr. 22 (F)	Aug. 19 (F)
Teaching days	60	60	60
Pre-examination Study Day(s)	1	2	2
Examination days	13 (+1 Emergency Day)	13 (+1 Emergency Day)	11 (+1 Emergency Day)

Symbols and abbreviations:

(M) Monday, (T) Tuesday, (W) Wednesday, (R) Thursday, (F) Friday, (S) Saturday, (U) Sunday, N/A – Not Applicable

Guidelines for Determining Academic Calendar of Dates

The following are principles and guidelines either formally agreed upon by Senate or adopted as common practice in determining the dates for the academic year.

1. That the practice of setting dates for each academic year continues to be an annual exercise.
2. That there be no fewer than 60 teaching days (12 weeks) in a term. A clear rationale for fewer than 60 teaching days must be communicated to Senate at the time calendar dates are approved. In calculating teaching days in a term, Saturdays, Sundays, and statutory or University holidays are excluded.
3. That attention be given to balancing the number of meets in courses. Where an imbalance may occur because of statutory holidays, the class schedule for a day different than the calendar day can be used to balance the number of course meets.
4. That Fall Convocation be the Friday and Saturday that fall in the third full week (beginning Sunday) of October.
5. That Spring Convocation be the Tuesday to Saturday in the second full week (beginning Sunday) in June.
6. That the Reading Weeks occur in all Faculties and must begin on the Tuesday following Thanksgiving in October and the Tuesday following Family Day in February.
7. That Fall Term classes in September begin on the Wednesday following the Labour Day holiday.
Exception: The Fall Term begins on Tuesday, September 8th when Labour Day is September 7th.
8. That the start date for Winter Term be set as follows:
 - If January 1st is a Sunday, then start of classes is Wednesday, January 4th.
 - If January 1st is a Monday, then start of classes is Wednesday, January 3rd.
 - If January 1st is a Tuesday, then start of classes is Monday, January 7th.
 - If January 1st is a Wednesday, then start of classes is Monday, January 6th.
 - If January 1st is a Thursday, then start of classes is Monday, January 5th.
 - If January 1st is a Friday, then start of classes is Tuesday, January 5th.
 - If January 1st is a Saturday, then start of classes is Wednesday, January 5th.
9. The start date for Spring Term be set as follows:
 - If May 1st is a Sunday, then start of classes is Monday, May 2nd.
 - If May 1st is a Monday, then start of classes is Monday, May 1st.
 - If May 1st is a Tuesday, then start of classes is Tuesday, May 1st.
 - If May 1st is a Wednesday, then start of classes is Wednesday, May 1st.
 - If May 1st is a Thursday, then start of classes is Monday, May 5th.
 - If May 1st is a Friday, then start of classes is Monday, May 4th.
 - If May 1st is a Saturday, then start of classes is Monday, May 3rd.
10. That there be no fewer than one pre-examination study day and when possible, two pre-examination study days (excluding Saturday, Sunday, and holidays) between the end of classes and the beginning of

examinations. A clear rationale for using fewer than 2 days or Saturday, Sunday, and holidays as pre-examination study days, must be communicated to Senate at the time calendar dates are approved.

11. That there be no fewer than 13 examination days in the Fall and Winter Terms, and 11 examination days in the Spring Term. In addition, one Emergency Day with no scheduled examinations is added to the end of the examination period.
12. In calculating examination days, Saturdays which fall within the period are included, whereas Sundays and statutory or University holidays are excluded.
Exceptions:
Examinations will not be scheduled on the Saturday following Good Friday when that day falls within the examination schedule or the Saturday of the Civic Day weekend.
The first Sunday within the examination period may be used when required to accommodate the prescribed number of examination days in the Fall Term.
13. That in the Fall Term no examinations be scheduled beyond December 22nd. The Emergency Day cannot be scheduled beyond December 23rd.
14. That Online Course Examination Days in each term be the first consecutive Friday and Saturday in the examination period.
15. Grades due dates for on campus courses are normally scheduled seven days from the date of the final examination. Grades for Online (Centre for Extended Learning) courses that have a scheduled final examination are due on the last day of the grades submission period. Grades for all courses without a scheduled final examination are normally due 14 days after the start of examinations.
16. Co-op work terms are expected to be 16 week in duration. Actual start and end dates may vary depending on employer or student requirements in consultation with Co-operative Education.

Prepared by:
C. Newell Kelly, Registrar
July, 2020

Rules that Require Exceptions:

Rule 10

... A clear rationale for using fewer than 2 days or Saturday, Sunday, and holidays as pre-examination study days, must be communicated to Senate at the time calendar dates are approved.

Rule 12

... The first Sunday within the examination period may be used when required to accommodate the prescribed number of examination days in the Fall Term.

... Examinations will not be scheduled on the Saturday following Good Friday when that day falls within the examination schedule or the Saturday of the Civic Day weekend.

Rule 14

... That Online Course Examination Days in each term be the first consecutive Friday and Saturday in the examination period.

Rationale for Exceptions

Rule 10

By introducing a Fall Reading Week (October 9-17), and also because the term does not begin until September 8, the number of study days had to be reduced to one day in order to ensure the number of required teaching days. A Sunday was also added to the examination period.

Rule 12

The Online Course Examinations for Spring ~~2022~~ 2021 have been moved to the second consecutive Friday and Saturday in the examination period due to the Civic Day weekend.

Rule 14

As a result of the need for flexibility due to COVID-19 impacts, and expected increases in demand for in-person exams for online and remote courses, dates for in-person exams for online and remote courses will be determined at a later date. When scheduled, these exam dates will fall within the defined exam period (i.e. none will be scheduled before the “Examinations Begin” date, nor after the “Examinations End” date).

Some dates lack synchronicity with Laurier dates

Date	UWaterloo	WLU
December 23, 2021	Emergency Day for Fall Term Final Exams	Closed
January 3, 2022	Closed	First Day of Winter Term Classes
January 5, 2022	First Day of Winter Term Classes	N/A
April 4, 2022	Regular Classes	Study Day
April 5, 2022	Regular Classes	Study Day
April 6, 2022	Study Day	First Day of Winter Term Final Exams
April 7, 2022	Study Day	Winter Term Final Exams
April 8, 2022	First Day of Winter Term Final Exams	Winter Term Final Exams

Handling of Final Assessment Reports & Two-Year Progress Reports related to academic program reviews

Introduction

Waterloo's Senate Undergraduate Council (SUC) and Senate Graduate and Research Council (SGRC) have a duty to consider all aspects relating to the academic quality of undergraduate studies and graduate studies within the University. As described in Waterloo's Institutional Quality Assurance Process ([IQAP](#)), documentation emerging from the [cyclical program review](#) process includes:

- [Final Assessment Report](#), which summarizes the self-study, external reviewers' report, program response, and implementation plan, and
- [Two-Year Progress Report](#), which reports on progress related to the implementation plan.

Final Assessment Reports (FARs), require two SUC or SGRC members to review the report, whereas, Two-Year Progress Reports only require one SUC or SGRC member, although at the SUC/SGRC Chair's discretion, a second reviewer may be sought. In order to ensure that student representatives have the opportunity to review each report, the WUSA VP, Education and GSA President receive these documents in advance for information. Any questions or concerns they might have can be raised and addressed, if needed, prior to the report being approved at SUC/SGRC. This review process is coordinated by the Quality Assurance (QA) Office.

To promote transparency and foster integrity in the review process, reviewers should not be members of the Faculty or Affiliated and Federated Institutions of Waterloo (AFIW) from which the report originates.

Assessment

Reviewers will consider a series of **guiding questions** (see below) in arriving at their recommendation for revision or approval to SUC or SGRC. Before reporting to SUC or SGRC, reviewers will ask questions and share their observations, as well as any concerns they have identified with the report, to the Quality Assurance Office, who will then connect with the Chair or Director of the program. The FEDS and GSA representative will also receive these reports for information prior to submission to SUC/SGRC.

The Quality Assurance Office will ensure that any revisions to the reports are completed by the Chair or Director of the program, prior to the QA Office submitting the report for approval at a SUC or SGRC.

Does the Final Assessment Report:

- 1) Include a credible implementation plan that not only addresses the substantive issues identified from the program review process but also identifies clearly:
 - What actions will follow from specific recommendations?
 - Who will be responsible for acting on those recommendations?
 - Who will be responsible for providing resources?
 - Priorities for implementation and realistic timelines for initiating and monitoring actions?
- 2) Provide a rationale as to why a recommendation(s) will not be pursued?

Does the Two-Year Progress Report:

- 1) Clearly describe progress achieved on the various action items in the implementation plan?
- 2) Explain convincingly any circumstances that would have altered the original implementation plan?
- 3) For items that are behind schedule, propose an amended implementation schedule that is reasonable and credible?
- 4) Address significant developments or initiatives that have arisen since the program review process, or that were not contemplated by the program review process?

The program Chair or Director (or their chosen delegate) will attend the SUC or SGRC meeting to address any questions or concerns that might arise during SUC/SGRC.

SUC's and SGRC's responsibility will be to focus on the overall credibility and feasibility of the report and the proposed plan of action – seeking to uncover, for example, unexplained disjunctions between the reviewers' recommendations and the program's response – as opposed to the minutiae of course content and curriculum structure.

A Final Assessment Report or Two-Year Progress Report that is approved by a majority vote of SUC/SGRC will be submitted to Senate for information. Should the discussion at SUC or SGRC reveal issues of concern that require revision, the Quality Assurance Office will work with the program Chair or Director to address the concern(s). If minor revisions are needed, the report will be edited and then it will proceed to Senate for information without re-approval from SUC/SGRC; however, any major revisions will require SUC/SGRC review and approval.

Status of Reports under Review

A summary of the status of all reports under review, including reports for which the QA Office is seeking reviewers, can be found at the following link:

<https://uwaterloo.ca/academic-program-reviews/status-reports-under-review>

Two-Year Progress Report

Applied Mathematics, Combinatorics and Optimization, Computational Mathematics, and Pure Mathematics (BMath)

December 2019

Background

This particular combination of plans was reviewed for the first time in 2015-16, but each of these plans has been reviewed twice before, as part of a larger review of all undergraduate non-Computer Science plans in the Faculty of Mathematics, in 2008 and 2001 (Computational Mathematics did not exist in 2001, and so it was not reviewed at that time).

The 2015-16 review was carried out by Professor Michael Lamoureux, from the University of Calgary, and Professor Mary Pugh, from the University of Toronto. In addition, Professor Michael Dixon, from the Department of Psychology, served as an internal reviewer.

Progress on Implementation Plan

Recommendations

- 1) Significant effort must be made to improve the information and advice provided to potential and current undergraduate students in the programs in mathematics, whether that be through online resources and webpages, or in-person advising. The wide variety of math programs offered from these four units should be presented as a cohesive unit that students can enter with confidence. Currently, online information on what programs are available and their requirements is spread across many webpages, presenting a confusing matrix of data for the students to sort through. Some programs are described in various Department webpages, others in the Faculty's webpages, and many details are explained in University documents. In particular, Computational Mathematics being independent of Departments does not appear in any prominent way in the online documentation. Some information on possibilities and expectations (such as the option to take graduate courses while an undergrad, or to take a minor outside the Faculty) seems to be absent altogether.

The Departments state that they do not have the resources to do one-on-one advising with all students. Even if such advising were available, it would have to be complemented by clear, easy-to-understand documentation on proper program information which would allow

students to explore their options and formulate their questions. It is strongly recommended program documentation for students be revised and clarified for student use. Such documentation could include student profiles of real (or hypothetical) students including the generic student who came in with top grades and went through the programs with the goal of going to graduate school in math, the “good at everything” student who came in with top grades and either needed to discern a single focus or chose to focus on two subjects, the “Renaissance/Non-standard” student who came in with top grades and wants to study both computer science and psychology, the “challenged” student whose path through university has had bumps in the road and how they kept on track and so forth. One does see student profiles if one clicks on the “Future Undergraduates” link of the Faculty of Mathematics page but current undergraduates wouldn’t be looking there.

Status: Completed

Details: The Faculty of Mathematics is constantly updating its web presence, and seeking better tools with which to track and assist our students. The size of the faculty makes a distributed representation of its many plans and programs an unavoidable reality. Faculty web pages act as an aggregator, provide a broad overview of what programs are available in the various units, and include links to detail web pages that are owned by the respective units. Each unit constantly maintains the information on programs they own. Many of the units also present additional useful tools for their programs, like degree checklists, as well as profiles of students in their programs. The [Undergraduate Calendar](#) has all of the information described in the above recommendation, and departmental and Faculty-level advisors can and do dispense this information to students on a daily basis. More advisors have been hired to help students, and more communications personnel have been hired to assist departments in making opportunities more apparent to students.

- 2) We encourage the Departments and Faculty to reconsider the program entrance requirements. While the emphasis on contest exams scores (in conjunction with high school grades) has served the Departments well in selecting highly competitive, performance-focused students who will succeed in the program, it also may bias against creative, mathematically talented individuals who don't necessarily like competition. This does not serve the wider community of potential students who could have a full and productive career in mathematics. We understand that the math competitions and math education outreach are a vital service that the Faculty of Mathematics is providing to Canada and that, as a result, it's part of its branding. We also understand that the mandate of the University is broader than simply trying to train undergraduates who might become world-class research academics. That said, it would likely be healthier if the math competition aspect be significantly downplayed the moment students arrive at Waterloo and start the next stage of their lives.

Status: Completed

Details: From the Final Assessment Report: “This recommendation is for something beyond the mandate of the reviewers, and outside of the mandate of the units being reviewed; admissions are handled by the Faculty of Mathematics, and math students enter into the programs under review after their first year of study. Despite that, it is worth mentioning that the faculty has made a number of changes recently to the way that undergraduate students are admitted. All students are now required to supply a “Admissions Information Form” with their applications. This allow the students to discuss things beyond their grades and competition scores. The Faculty of Math takes these forms quite seriously, and tries to admit students who are “well-rounded” as well as being very strong academically. It has been the faculty's experience that these are the students that are most successful in University.”

- 3) A process should be put in place to continuously update and keep current the courses and curricula in the programs. It was somewhat surprising to these reviewers to see, for instance, that the Pure Math program is almost identical to similar programs from 35 years ago. There needs to be room in the programs for modern advances. Ideally, these course reviews would be done as a team by the three Departments (Applied Math, Combinatorics & Optimization, and Pure Math). In addition, it would be wonderful if there were some sort of teaching credit mechanism by which a faculty member from one department could teach a course that is affiliated with another department. One would want to have some sort of bookkeeping to ensure that over a five year windows, say, that these teaching exchanges are fair and balanced. Also, it would be helpful if there were faculty hires who were joint hires between two departments. While joint hires can be delicate when departments have markedly different cultures and professional expectations, because Applied Mathematics, Combinatorics & Optimization, and Pure Mathematics would normally be all in a single department and so the usual difficulties that joint hires would face should be quite minimal.

Status: Completed

Details: From the Final Assessment Report: “The recommendation was made based on incorrect information. All departments have processes in place to ensure that the programs are continuously updated and improved. In particular, all three departments have an Associate Chair for undergraduate studies, (Mohammad Kohandel for Applied Math, David McKinnon for Pure Math and Ricardo Fukasawa for Combinatorics & Optimization). Part of the mandate of these Associate Chairs is to oversee, update and improve the undergraduate curriculum. They would also identify any gaps within the curriculum and work to remove them. The position of Associate Chair rotates amount the faculty, and is supported by a Curriculum Committee. This ensures that the program is always being kept modern, and that multiple viewpoints are always involved. The structure for Computational Math is slightly different, in that the role of the Associate Chair is done by the Director, in consultation with the Undergraduate Advisor (Martin Pei), and the role of the Curriculum Committee is done by the Steering Committee. All four units have undergone changes, sometimes minor, sometimes significant, on a regular basis as part of this process. The reviewers were informed

that this was the case and given many examples of improvements to the programs. These processes currently work well, and there is no evidence to support the suggestion that the Pure Math curriculum has been unchanged for 35 years – or that it is 35 years behind the times. As the programs are already doing what the recommendation asked, it is believed that no further action is required to address this recommendation.”

The mechanism for facilitating inter-departmental teaching has been implemented, and has resulted in several examples of faculty members teaching course offered by other units. There are also several examples of faculty members in one unit who have formal membership status in other units as well.

- 4) On a related matter, a process is needed to identify and cover any gaps in the curriculum. Perhaps because of the division of math into separate departments, there seem to be some holes that are not covered in the various mathematical programs. Geometric PDE's, theoretical PDE's, mathematical probability, some modern harmonic analysis (both pure and in applications), and industrial applications are some examples that highlight the issue. To present the students with a comprehensive mathematics education, it is important to monitor the breadth across all program and ensure important fields are covered.

Status: Completed

Details: From the Final Assessment Report: “Each department has an undergraduate committee whose purpose is to examine and renew the curriculum in each department. In addition, the Undergraduate Affairs Committee at the Faculty level is charged with the same task at a higher level. We will continue to work on providing the most excellent and broad-ranging courses that we can, given the resource constraints we must work with.” There is no evidence to support the notion that the departments under review do not offer as broad and deep a program as they can.

- 5) The university needs to also consider the issue of renewal of faculty in Pure Math and Combinatorics & Optimization. Both departments appear to be “top heavy”, especially the Pure Math department:

	Asst. Prof.	Assoc. Prof.	Full Prof.
Applied Math	4 (17%)	7 (30%)	12 (52%)
C & O	3 (11%)	6 (22%)	18 (67%)
Pure Math	2 (9%)	4 (17%)	17 (74%)

Assuming that the time to tenure/promotion is 6 years and that the professorial career is 35 years, then one could expect 17% of the faculty to be assistant professors. In practice, one

would want higher numbers than this. Junior faculty are vital for bringing in new fields, new ideas, and for shaking up the status quo (however much senior faculty might resent such disruption). Not all assistant professors get tenure. Also, strong departments will have hired so well (and supported their hires so well) that some assistant and associate professors will move to even better departments. While such losses are unfortunate to the department, they are a sign of good taste in hiring and vigour - the departing faculty member will, no doubt, have invigorated the department while they were there and will, one hopes, have left with nothing but good things to say about the department they left.

Status: In progress

Details: As should be expected, all Departments are always willing and eager to hire strong candidates. In fact, all three Departments hired in 2017 and 2018, and all three are hiring again for 2020. The Departments will continue to hire excellent and energetic junior faculty members to all three Departments, as resources allow.

- 6) While we did not meet with any lecturers, the research faculty felt that lecturers need to be more fully integrated into departments so that they can be full participants in the delivery of the programs. For the lecturers to properly prepare the students for upper level courses, likely they need to do more than just teach first-year courses -- it might be appropriate for them to also teach the upper level courses. This would help address concerns raised about the mismatch between what is being delivered in first year courses, and what professors are needing their students to master before entering the upper years of the programs. Also, it would help if lecturers have a primary departmental affiliation. Having a departmental affiliation would, one hopes, allow them to be more fully aware of what students will need to know after their first year. Some of the research faculty expressed concerns that some of the first-year courses are not open to innovation. Running a large first-year course is a complicated, delicate job and it's easy to imagine that once the course coordinator has "figured things out" that he/she would prefer to let the machine run without change. This is the easiest thing to do but it doesn't allow for pedagogical innovation or for the introduction (or elimination) of topics or the redistribution of focus on topics. Further, because there seems to be a tradition of providing lecture notes for courses, rather than having students read a textbook, there's a risk that whoever writes the notes sets the tenor of the course. Experienced lecturers will lecture in an independent manner from the notes, providing their own vision and allowing the notes to serve as an additional resource, but inexperienced lecturers may not do so --- this makes having lecture notes instead of a book somewhat risky.

Status: Completed

Details: After much discussion, it was concluded that lecturers are best served by allowing a variety of different administrative structures. Some lecturers are at home in a department, and others are best used in the Centre for Education in Mathematics and Computing, or the

Dean of Mathematics Office, or the Mathematics Undergraduate Office, or indeed in the Mathematics and Business group.

Since the review, research active members of the Faculty have thoroughly reviewed the introductory algebra and calculus courses, resulting in a significant overhaul and improvement.

- 7) Some concrete decision needs to be taken on the Computational Math program. Specifically, either promote it, or close it down. There seems to be a great opportunity for an exciting math program that could lead to outstanding careers for students. This would be in computational math, modeling, data analytics, and related industrial careers that merge math skills with cutting edge computation. Yet we see little enthusiasm by current participants and little effort to advertise and promote the program. Without an effort by the Faculty of Mathematics to properly grow this endeavour, perhaps resources should be re-allocated elsewhere. We recognize that the program is probably not expensive to run and that the graduate portion of the program may be valuable --- it should at the very least be easy for current students to know about this program. For example, it is listed under “programs” on the “future undergraduates” page of the Faculty of Mathematics but is not listed under “majors, minors, and specializations” on the “current undergraduates” page.

Status: Completed

Details: Computational Mathematics (CM) is an important and vibrant part of the Faculty’s undergraduate and graduate programs, and we are supporting it vigorously. Advertising for the program has significantly increased over the last two years, and in particular, it is advertised through the future undergraduates web page (<https://uwaterloo.ca/math/future-undergraduates/programs>). The undergraduate CM programs have been growing in recent years, increasing their enrolment by at least 30% each year since 2015 – from 32 students in Fall 2015, to 143 students in Fall 2019.

- 8) In our discussions with the research faculty, there was great concern about the New Resource Allocation Model (NRAM) that is being implemented. For example, the Applied Mathematics department is in a precarious position vis a vis engineering. Engineering programs at other universities have created their own courses, with their own course codes, in which they present mathematical material. They then changed their program requirements so that they no longer require a particular course that is taught by the mathematicians and, instead, required their own course. It is our understanding that the Applied Math department has made great efforts to staff first year math courses for engineering students and so they are, naturally concerned, about whether the NRAM will encourage engineering departments to try and play the types of games that have been played at other universities. And, of course, because of the three-department structure any such behaviours would disproportionately

affect the Applied Math department which has been acting for the common good by sending its faculty members to teach courses that are focussed on students from an outside faculty.

Status: N/A

Details: This is not a recommendation.

- 9) As a final note, the innovation goals of the university need to be better addressed in the programs. While the co-op programs, and online course development are a notable and worthy contribution to innovation, it would be outstanding to see the introduction of professional skills training for the students. This could include courses that work on presentation skills, project management, team management, use of technology in mathematical work, a math modelling course in AMATH for use in industry, and so on. Experiments in novel teaching methods, experiential learning, and entrepreneurial activities should be actively promoted by the Faculty for delivery in its programs.

Status: Complete

Details: From the Final Assessment Report: "The co-op program includes substantial professional skills training for students, and our departments' courses already include presentations, project and team management, technology, and mathematical modelling. All units under review are constantly examining their teaching methods, and we will continue to teach our students in the best way possible, using both novel and tried-and-true techniques." In particular, we require all of our students to take communications courses which are designed to enhance the students' communications skills, in part to enable them to be more successful in the workplace.

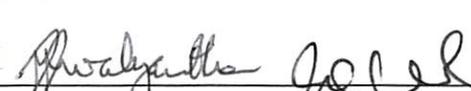
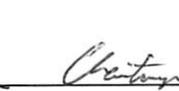
Updated Implementation Plan

	Recommendations	Proposed Actions	Responsibility for Leading and Resourcing (if applicable) the Actions	Timeline for addressing Recommendations
5.	Faculty Renewal	Hire more junior faculty	Department Chairs and Faculty Dean	2020 and ongoing

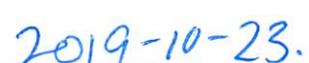
The Department Chair/Director, in consultation with the Dean of the Faculty shall be responsible for monitoring the Implementation Plan.

Date of next program review: _____
Date

Signatures of Approval:

   
Chair/Director Date

AFIW Administrative Dean/Head (For AFIW programs only) Date

 
Faculty Dean Date

Note: AFIW programs fall under the Faculty of ARTS; however, the Dean does not have fiscal control nor authority over staffing and administration of the program.

Associate Vice-President, Academic Date
(For undergraduate and augmented programs)

Associate Vice-President, Graduate Studies and Postdoctoral Affairs Date
(For graduate and augmented programs)

Date of next program review: _____ **2022-2023**
Date

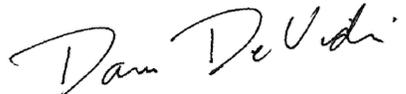
Signatures of Approval:

Chair/Director _____ Date

AFIW Administrative Dean/Head (For AFIW programs only) _____ Date
 Mark Giesbrecht
Dean, Faculty of Mathematics Aug 27, 2020

Faculty Dean _____ Date

Note: AFIW programs fall under the Faculty of ARTS; however, the Dean does not have fiscal control nor authority over staffing and administration of the program.

 _____ Date
May 26, 2020

Associate Vice-President, Academic _____ Date
(For undergraduate and augmented programs)

Associate Vice-President, Graduate Studies and Postdoctoral Affairs _____ Date
(For graduate and augmented programs)

Two-Year Progress Report: Applied Mathematics, Combinatorics and Optimization, Computational Mathematics, and Pure Mathematics (BMath)

Name of Reviewer: Kathy Acheson

Date: 8/20/2020

Does the Two-Year Progress Report:

- | | | |
|--|--|------------------------------------|
| 1. Clearly describe progress achieved on the various action items in the implementation plan? | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| 2. Explain convincingly any circumstances that would have altered the original implementation plan? | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| 3. For items that are behind schedule, propose an amended implementation schedule that is reasonable and credible? | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| 4. Address significant developments or initiatives that have arisen since the program review process, or that were not contemplated by the program review process? | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |

General Comments

N/A