The following Motions and Documents were considered by the GFCPrograms Committee at its Thursday, December 07, 2023 meeting:

Agenda Title: **Course, Minor Program, and Minor Regulation Changes**
- Arts
- Education
- Engineering
- Medicine & Dentistry
- Science
- Pharmacy
- Agricultural, Life, and Environmental Sciences (ALES)

CARRIED MOTION:
THAT the GFC Programs Committee approve, with delegated authority from General Faculties Council, the attached submissions from the Faculties of Arts, Education, Engineering, Medicine & Dentistry, Science, Pharmacy and Agricultural, Life and Environmental Sciences.

Final Item: 4.

Agenda Title: **Course-Based Masters Maintenance of Registration**

CARRIED MOTION:
THAT the GFC Programs Committee approve the calendar additions for CB Maintenance of Registration and end of program registration patterns for course-based students, for implementation upon final approval, and inclusion in the next Calendar.

Final Item: 5.

FINAL ITEM NO. 4

Decision ☒ Discussion ☐ Information ☐

ITEM OBJECTIVE: To approve course, minor program, and minor regulations changes for the Faculties of Arts, Education, Engineering, Medicine & Dentistry, Science, Pharmacy, and Agricultural, Life and Environmental Sciences.

DATE	December 7, 2023
TO	GFC Programs Committee
RESPONSIBLE PORTFOLIO	Provost and Vice-President (Academic)

MOTION: THAT the GFC Programs Committee approve, with delegated authority from General Faculties Council, the attached submissions from the Faculties of Arts, Education, Engineering, Medicine & Dentistry, Science, Pharmacy and Agricultural, Life and Environmental Sciences.

EXECUTIVE SUMMARY:

All routine course, minor program, and minor regulation changes that do not involve or affect other Faculties or units, and do not form part of a proposal for a new program or a substantive program change, are approved regularly by the GFC Programs Committee in an omnibus motion.

See individual item for Faculty Council approval information.

Supporting Materials:

Attachments:

1. Arts,
2. Education,
3. Engineering,
4. Medicine & Dentistry,
5. Science
6. Pharmacy
7. Agricultural, Life and Environmental Sciences

GOVERNANCE OUTLINE

UNIVERSITY OF ALBERTA
FACULTY OF ARTS

Package Code: AR – UGC 10.17.23 Post AAC

This package contains: Undergraduate - Courses

Faculty approval date:

AAC Date: October 17, 2023

Page	Department or Unit	What is Changing
2	**Economics**	ECON 331, 334, 415, 431, 489
5	**Music**	MUSIC 481, 483, 484, 485, 487, 488, 555, 556
9	**Political Science**	POLS 456
11	**Political Science**	POLS 224
12	**Psychology**	PSYCH 212, 223, 239, 241, 310, 405, 415, 423, 431, 443, 445, 447, 495
19	**Sociology**	SOC 272, 472
21	**St. Stephen's College**	CATS 385, 400, 411, 480
24	**St. Stephen's College**	SPRIT 400, 411, 450

UNIVERSITY OF ALBERTA

Calendar Change Request Form - **Course Changes**

See the Calendar Guide for tips on how to complete this form

Faculty of Arts	**Economics**
Level of change (choose one only)	x Undergraduate ☐ Graduate
Contact Person:	Chelsi Hudson
Department/Unit Approval Date:	2023-09-25

Rationale for change (Indicate other consultation groups, departments, units or faculties)

New courses; updated courses

ECON 334: We consulted with the Department of Strategy, Entrepreneurship and Management in the School of Business. They investigated one potential course, SEM 311. The conclusion was that our proposed course does not overlap with SEM 311. ECON 334 is a labour economics course and uses tools and models in microeconomic theory. SEM 311 is a business course and focuses exclusively on the strategic and contextual elements related to SEM, with no content related to labour economics or microeconomic theory.

Calendar Copy

Current: ~~Removed language~~ (Include all parts of course)	**Proposed:** New language
ECON 331 Labor Economics Course Career Undergraduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Economics Typically Offered either term Description ~~Theory and empirical evidence concerning the supply of and demand for labor services, wage differentials, and the impact of unions, with particular reference to Canadian contemporary issues. Some of the policy issues to be discussed are income maintenance, unemployment insurance, and minimum wage legislation.~~ Prerequisites: ECON 109 and ECON 281.	ECON 331 Introduction to Labor Economics Course Career Undergraduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Economics Typically Offered either term Description Introduction to labor economics, supply and demand for labor, labor market equilibrium, human capital investments, compensating wage differentials, inequality, incentive pay, unemployment, and job search. Not open to students with credit in or enrolled in ECON 431. Prerequisites: ECON 109 and ECON 281.

	ECON 334 Personnel Economics Course Career Undergraduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Economics Typically Offered either term Description Microeconomic approach to personnel economics. Topics covered include selection, recruitment and training of new workers, optimal job design, and optimal compensation design. Prerequisites: ECON 109 and ECON 281.
ECON 415 ~~Economic Persistence~~ Course Career Undergraduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Economics Typically Offered either term Description A survey and critical analysis of long-lasting and multi-generational economic outcomes. Topics include: intergenerational mobility, comparative economic development, and economic geography. Case studies will highlight issues ranging from the perpetuation of gender roles to the enduring consequences of slavery, forced labour, and colonial economic policy. Prerequisites: ECON 109, ECON 281, STAT 161 or equivalent, and MATH 154 or equivalent. ECON 299 or equivalent is recommended.	ECON 415 Economics of Social Mobility Course Career Undergraduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Economics Typically Offered either term Description A survey and critical analysis of long-lasting and multi-generational economic outcomes. Topics include: intergenerational mobility, comparative economic development, and economic geography. Case studies will highlight issues ranging from the perpetuation of gender roles to the enduring consequences of slavery, forced labour, and colonial economic policy. Prerequisites: ECON 109, ECON 281, STAT 161 or equivalent, and MATH 154 or equivalent. ECON 299 or equivalent is recommended.

ECON 431 Labor Economics Course Career Undergraduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Economics Typically Offered either term Description ~~Topics include demand for labor, supply of labor, wage differentials, trade union behavior, the minimum wage, education and income distribution, discrimination, mandatory retirement, and non-market work. Prerequisites: ECON 109, ECON 281 and MATH 154 or equivalent.~~	ECON 431 Labor Economics Course Career Undergraduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Economics Typically Offered either term Description Empirical labor economics literature on selected topics, including labor markets, job attributes, schooling, labor mobility, wage differentials, compensation strategies, wage structures, and unemployment. Prerequisites: ECON 109, ECON 281, and ECON 399 or equivalent.
	ECON 489 Central Banking: Models and Computation Course Career Undergraduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Economics Typically Offered either term Description Examples of empirical macroeconomic models using latest computer programming and estimation techniques. Models used by the Bank of Canada and other central banks to quantitatively and empirically evaluate macroeconomic models using current data from Canada and other countries. Introduces students to applied dynamic, stochastic general equilibrium modelling techniques that are used in empirical macroeconomic models. Prerequisites: ECON 109 and ECON 385.

UNIVERSITY OF ALBERTA

Calendar Change Request Form - **Course Changes**

See the Calendar Guide for tips on how to complete this form

Faculty of Arts	**Music**
Level of change (choose one only)	☒ Undergraduate ☐ Graduate
Contact Person:	Brian Fauteux (fauteux@ualberta.ca)
Department/Unit Approval Date:	February 1, 2023

Rationale for change (Indicate other consultation groups, departments, units or faculties)

The idea for these changes came about after reflecting on the courses we would like to teach as undergraduate/graduate slash courses and who the Faculty members are that would be teaching them (and what their research areas are). Given our current roster, a switch to Music and Media for 488/588 makes sense because it can change based on who is teaching it and could incorporate topics such as Print Media and Music, Radio and Music, Film and Television and Music, and so forth. The course does not need to be specific to Film and this allows it to be taught in different ways by different people which will give students more options and will help to keep these courses in rotation and to be taught more often.

The move to change a number of our split level courses to a variable designation (which in Music indicates that the topic will be different and will be reflected on a student's record) and have it be completed up to 5 times accounts for the fact that different instructors will teach the course with different topics and this may mean that it is offered a few times over a number of years and there is no reason that a student couldn't take the course multiple times given this fact. The number 5 as the indicator of total completions is used because it is likely to be the maximum time that the course would run, under different variable or special topics, over a student's time here, and in terms of how many 400 or 500 level courses a student would have the capacity to take. These variable topics courses suit our department and students well and allow for more focused explorations of topics in music studies under broad course titles, like "Music and Society," without the need to create a new course every time a seminar style course is to be developed.

Calendar Copy

Current: ~~Removed language~~ (Include all parts of course)	**Proposed:** New language
MUSIC 481 – Topics in Contemporary Music and Sonic Arts **Course Career** Undergraduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Arts **Department** Music **Typically Offered** either term **Description** ~~Co- or prerequisite: Music 455 or consent of the Department.~~	MUSIC 481 – Topics in Contemporary Music and Sonic Arts **Course Career** Undergraduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Arts **Department** Music **Typically Offered** either term **Description** Prerequisite: Music 256 or consent of the Department.

MUSIC 483 – Studies in Musical Genre **Course Career** Undergraduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Arts **Department** Music **Typically Offered** either term **Description** Prerequisite: consent of the Department.	Variable topic course which may be repeated 5 times when content varies MUSIC 483 – Studies in Musical Genre **Course Career** Undergraduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Arts **Department** Music **Typically Offered** either term **Description** Prerequisite: consent of the Department. Variable topic course which may be repeated 5 times when content varies
MUSIC 484 – Studies in Music and Society **Course Career** Undergraduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Arts **Department** Music **Typically Offered** either term **Description** Prerequisite: consent of the Department.	MUSIC 484 – Studies in Music and Society **Course Career** Undergraduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Arts **Department** Music **Typically Offered** either term **Description** Prerequisite: consent of the Department. Variable topic course which may be repeated 5 times when content varies
MUSIC 485 – Composer Studies **Course Career** Undergraduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Arts **Department** Music **Typically Offered** either term **Description** Prerequisite: consent of the Department.	MUSIC 485 – Composer Studies **Course Career** Undergraduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Arts **Department** Music **Typically Offered** either term **Description** Prerequisite: consent of the Department. Variable topic course which may be repeated 5 times when content varies
MUSIC 487 – Period Studies **Course Career** Undergraduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Arts **Department** Music	MUSIC 487 – Period Studies **Course Career** Undergraduate **Units** 3 **Approved Hours** 3-0-0

Typically Offered either term **Description** Prerequisite: consent of the Department.	**Fee index** 6 **Faculty** Arts **Department** Music **Typically Offered** either term **Description** Prerequisite: consent of the Department. Variable topic course which may be repeated 5 times when content varies
MUSIC 488 - Studies in Music and ~~Film~~ **Course Career** Undergraduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Arts **Department** Music **Typically Offered** either term **Description** The intersections of music and ~~filmmaking studies~~ from academic, analytical, historical and critical perspectives. Prerequisite: consent of the Department.	MUSIC 488 - Studies in Music and Media **Course Career** Undergraduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Arts **Department** Music **Typically Offered** either term **Description** The intersections of music and media from academic, analytical, historical and critical perspectives. Prerequisite: consent of the Department. Variable topic course which may be repeated 5 times when content varies
MUSIC 555 – ~~Issues~~ in Theory and Analysis **Course Career** Undergraduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Arts **Department** Music **Typically Offered** either term **Description** Prerequisite: MUSIC 455 or 456.	MUSIC 555 – Topics in Theory and Analysis **Course Career** Undergraduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Arts **Department** Music **Typically Offered** either term **Description** Prerequisite: MUSIC 455 or 456. Variable topic course which may be repeated 5 times when content varies
MUSIC 556 – Seminar in Music Theory **Course Career** Undergraduate **Units** 3 **Approved Hours** 0-3S-0 **Fee index** 6 **Faculty** Arts **Department** Music **Typically Offered** either term	MUSIC 556 – Seminar in Music Theory **Course Career** Undergraduate **Units** 3 **Approved Hours** 0-3S-0 **Fee index** 6 **Faculty** Arts

Description Prerequisite: MUSIC 256 ~~and~~ consent of Department.	**Department** Music **Typically Offered** either term **Description** Prerequisite: MUSIC 256 or consent of Department. Variable topic course which may be repeated 5 times when content varies

UNIVERSITY OF ALBERTA

Calendar Change Request Form - **Course Changes**

See the Calendar Guide for tips on how to complete this form

Faculty of Arts	**Political Science**
Level of change (choose one only)	☒ Undergraduate Graduate
Contact Person:	Rob Aitken
Department/Unit Approval Date:	Political Science/ 26 September 2023

Rationale for change (Indicate other consultation groups, departments, units or faculties)

This is a proposal for a new course, “The Politics of International Migration,” to be taught as a combined senior undergraduate and graduate course. The area of migration is of growing significance both nationally and internationally and carries major policy as well as political and ethical implications which confront countries as well as the international system. This is indicated in the fact that in 2018 the United Nations forged international agreements (Global Compacts) focused on migration as well as refugees, as well as the increased salience of climate-induced forced migration. This course is designed to meet the growing interest of students at both the undergraduate and graduate levels for a course dealing with migration governance from a political science perspective, as well as an international perspective attuned to issues of borders, surveillance and ethics. It also responds to the need to modernize the curriculum in light of the emergence of sections in the American Political Science Association (2012) and the International Political Science Association (2018) devoted to migration and citizenship. At present, the Department only offers one course on migration, which is taught at the fourth-year level, and takes as its focus national social policies and ethnicity (Pol S 425 Ethnicity, Immigration and Social Policy). In relation to sister disciplines, the only course on offer is also a fourth-year course exploring debates concerning immigration, ethnicity and crime (Soc 427 Immigration, Ethnicity and Crime). In addition to offering a split course open to both undergraduate and graduate students, this course responds to needs in the Department’s field of International Relations for increased options following faculty retirements, and also covers different types of themes reflected in the growing literature on migration in the discipline, as well as the multidisciplinary field of migration studies. It should be noted that an open course dealing with migration from an international perspective has been successfully taught at just the graduate level in the past on two occasions in the past in the Department and drew a healthy enrollment.

Calendar Copy

Current: ~~Removed language~~ (Include all parts of course)	**Proposed:** New language

	POLS 456 - The Politics of International Migration Course Career: Undergraduate Units: 3 Approved Hours: 0-3S-0 Faculty: Arts Department: Political Science Typically Offered: Either Term Description: Examines the causes and responses to international migration, and probes the ethical questions raised by borders and surveillance, who gets in, and how newcomers are treated. Restricted to students with 60 units of course weight completed or consent of the department".

UNIVERSITY OF ALBERTA

Calendar Change Request Form - **Course Changes**

See the Calendar Guide for tips on how to complete this form

Faculty of Arts	**Political Science**
Level of change (choose one only)	☒ Undergraduate ☐ Graduate
Contact Person:	Rob Aitken
Department/Unit Approval Date:	Political Science/ 26 September 2023

Rationale for change (Indicate other consultation groups, departments, units or faculties)

The existing calendar description for POL S 224 unhelpfully explicit about the format the class will be taught in (3 lecture hours), reflecting an earlier vision of the course by an earlier constellation of teaching staff. These changes prevent staff from innovating with the use of active learning in class – for example, by having two lecture hours at the start of the week and a subsequent workshop that has variable time slots for a large course.

The proposed change reflects the discretion that teaching staff have in constructing each iteration of the course.

This clarity will increase student satisfaction with the course and lessen churn during add/drop.

Calendar Copy

Current: ~~Removed language~~ (Include all parts of course)	**Proposed:** New language
POL S 224 - Canadian Government Course Career Undergraduate Units 3 Approved Hours ~~3-0-0~~ Fee index 6 Faculty Arts Department Political Science Typically Offered either term Description Examines the constitutional and institutional foundations of Canadian government. Not to be taken by students with credit in POL S 220. Prerequisite: POL S 101 or consent of Department.	**POL S 224 - Canadian Government** Course Career Undergraduate Units 3 Approved Hours VARIABLE Fee index 6 Faculty Arts Department Political Science Typically Offered either term Description Examines the constitutional and institutional foundations of Canadian government. Not to be taken by students with credit in POL S 220. Prerequisite: POL S 101 or consent of Department.

UNIVERSITY OF ALBERTA

Calendar Change Request Form - **Course Changes**

See the Calendar Guide for tips on how to complete this form

Faculty of Arts	**Psychology**
Level of change (choose one only)	☒ Undergraduate ☐ Graduate
Contact Person:	Wendy Hoglund
Department/Unit Approval Date:	05.31.2023 and 09.29.2023

Rationale for change (Indicate other consultation groups, departments, units or faculties)

1. The Department's Undergraduate Program Committee has reviewed our course prerequisites for 200 level PSYCH Arts Courses: PSYCH 223, 239 and 241. We are requesting to remove PSYCH 104 as a prerequisite for PSYCH 223, 239 and 241. The content covered in PSYCH 104 is not necessary for these classes.

2. It has been determined that the prior successful coverage and understanding of all statistical topics in STAT 151 is not essential for students to enroll and be successful in PSYCH 212. New proposed calendar changes for all psychology programs list PSYCH 212 as a required course. Early completion of this course within the program will be necessary to meet later senior level course prerequisites. The removal of STAT 151 as a prerequisite creates more freedom to complete PSYCH 212 sooner within the degree program.

3. Update prerequisites for 400 level courses to include the new PSYCH 213 (Introduction to Data Analysis in Psychology I) as an alternative to STAT 151. PSYCH 213 (new course in Science) will be a new requirement of all psychology programs as of Fall 2024. Students may still elect to complete STAT 151 in place of PSYCH 213.

4. Update the prerequisites for PSYCH 415 to now include PSYCH 213 (new course). PSYCH 233 no longer exists and PSYCH 239 is now an acceptable prerequisite in its place.

5. Some prerequisites for PSYCH 495 no longer exist (Psych 233) and is now PSYCH 333. The inclusion of a senior level course in ART, ART H, C Lit, DES, Drama, ENGL, F ST, MUSIC, or WRITE is overly restrictive. We request to remove these senior level prerequisites. Prerequisites should include PSYCH 223, 239 or 241 as the 200-level ARTS prerequisites.

6. Add a NEW course PSYCH 310 (Foundations in Professional Competencies). This course was taught for the past 2 academic years as a special topics course (PSYCH 305 – Special Topics in Psychology I) and previously taught for 6 years as INTD 400 and INTD 401. This was a required course for students completing the Arts Work Experience or Science Internship Program.

Calendar Copy

Current: ~~Removed language~~ (Include all parts of course)	**Proposed:** New language
PSYCH 212 - Introduction to Research Methods in Psychology Course Career Undergraduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Psychology Typically Offered either term Description Experimental and nonexperimental methods in psychology. Topics covered include philosophy of science, measurement, reliability and validity of methods, measures, and effects; experimental quasi-experimental, and single-subject designs; biases in experimentation; and research ethics. Prerequisites: PSYCH 104 or SCI 100, ~~and~~ PSYCH 105~~, and STAT 141 or 151 or 161~~. [Faculty of Arts]	PSYCH 212 -Introduction to Research Methods in Psychology Course Career Undergraduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Psychology Typically Offered either term Description Experimental and nonexperimental methods in psychology. Topics covered include philosophy of science, measurement, reliability and validity of methods, measures, and effects; experimental quasi-experimental, and single-subject designs; biases in experimentation; and research ethics. Prerequisites: PSYCH 104 or SCI 100, or PSYCH 105. [Faculty of Arts]
PSYCH 223 - Lifespan Developmental Psychology Course Career Undergraduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Psychology Typically Offered either term Description Introduction to biological, cognitive and social aspects of psychological development. Prerequisite~~s~~: ~~PSYCH 104 or SCI 100, and~~ PSYCH 105 or equivalent. [Faculty of Arts]	PSYCH 223 - Lifespan Developmental Psychology Course Career Undergraduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Psychology Typically Offered either term Description Introduction to biological, cognitive and social aspects of psychological development. Prerequisite: PSYCH 105. [Faculty of Arts]
PSYCH 239 - Lifespan Abnormal Psychology Course Career Undergraduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Psychology Typically Offered either term	PSYCH 239 - Lifespan Abnormal Psychology Course Career Undergraduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Psychology Typically Offered either term

Description Nature and treatment of psychological disorders, such as cross-disciplinary perspectives and an emphasis on improving understanding of psychopathology in everyday life. Prerequisites: ~~PSYCH 104 or SCI 100, and~~ PSYCH 105. Not open to students with credit in PSYCH 339. [Faculty of Arts]	Description Nature and treatment of psychological disorders, such as cross-disciplinary perspectives and an emphasis on improving understanding of psychopathology in everyday life. Prerequisite: PSYCH 105. Not open to students with credit in PSYCH 339. [Faculty of Arts]
PSYCH 241 - Social Psychology Course Career Undergraduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Psychology Typically Offered either term Description A survey of theories and research on the individual in a social context. Prerequisites: ~~PSYCH 104 or SCI 100, and~~ PSYCH 105 ~~or equivalent~~. Note: PSYCH 241 and SOC 241 may not both be taken for credit. [Faculty of Arts]	PSYCH 241 - Social Psychology Course Career Undergraduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Psychology Typically Offered either term Description A survey of theories and research on the individual in a social context. Prerequisite: PSYCH 105. Note: PSYCH 241 and SOC 241 may not both be taken for credit. [Faculty of Arts]
	PSYCH 310 - Foundations in Professional Competencies Course Career Undergraduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Psychology Typically Offered either term Description This course is a practical competencies development course open to all students interested in acquiring skills relevant to the workplace. The course focuses on professional development, including skills in written and verbal communication and the ability to make contributions in a team environment. The emphasis is on hands-on practice of skills considered applicable after graduation. Prerequisites: PSYCH 104, PSYCH 105, and a 200-

	level PSYCH class. [Faculty of Arts]

PSYCH 405 - Special Topics in Psychology II Course Career Undergraduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Psychology Typically Offered either term Description Review and discussion of special theoretical or methodological topics, or a novel or emerging research areas in contemporary psychology. Prerequisites: PSYCH 104 ~~or SCI 100, and~~ PSYCH 105, STAT ~~141 or~~ 151 or 161, and a 300-level PSYCH course. Note: Consult the Department of Psychology's ~~website for the specific(s) topic offered each~~ year and any additional prerequisites. [Faculty of Arts].	PSYCH 405 - Special Topics in Psychology II Course Career Undergraduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Psychology Typically Offered either term Description Review and discussion of special theoretical or methodological topics, or a novel or emerging research areas in contemporary psychology. Prerequisites: PSYCH 104, PSYCH 105, PSYCH 213 or STAT 151 or 161, and a 300-level PSYCH course. Note: Consult the Department of Psychology webpage for the topics for the year and any additional prerequisites. [Faculty of Arts]
PSYCH 415 - Qualitative Methods in Sociocultural Psychology Course Career Undergraduate Units 3 Approved Hours 3-0-2 Fee index 6 Faculty Arts Department Psychology Typically Offered either term Description The assumptions that inform the design of qualitative research in sociocultural psychology; the	PSYCH 415 - Qualitative Methods in Sociocultural Psychology Course Career Undergraduate Units 3 Approved Hours 3-0-2 Fee index 6 Faculty Arts Department Psychology Typically Offered either term Description The assumptions that inform the design of qualitative research in sociocultural psychology; the

procedures for gathering meaningful information through interviews, conversation, observed interaction, and textual archives; and the analysis of such information. Prerequisites: STAT ~~141 or~~ 151 or 161, ~~and~~ PSYCH 212, and one of PSYCH 223~~, 233,~~ 241, or 341. [Faculty of Arts].	procedures for gathering meaningful information through interviews, conversation, observed interaction, and textual archives; and the analysis of such information. Prerequisites: PSYCH 212, PSYCH 213 or STAT 151 or 161, and one of PSYCH 223, 239, 241, or 341. [Faculty of Arts].
PSYCH 423 - Advanced Topics in Developmental Psychology Course Career Undergraduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Psychology Typically Offered either term	PSYCH 423 - Advanced Topics in Developmental Psychology Course Career Undergraduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Psychology Typically Offered either term
Description An in-depth review and analysis of research in an area of developmental psychology. Prerequisites: ~~STAT 141 or 151 or 161~~, and PSYCH 323 or PSYCH 327 or 329. Note: Consult with the Department for the specific topic offered each year and any additional prerequisites. [Faculty of Arts].	Description An in-depth review and analysis of research in an area of developmental psychology. Prerequisites: PSYCH 213 or STAT 151 or 161, and PSYCH 323 or PSYCH 327 or 329. Note: Consult with the Department for the specific topic offered each year and any additional prerequisites. [Faculty of Arts]
PSYCH 431 - Theory and Practice of Psychometrics Course Career Undergraduate Units 3 Approved Hours 3-0-3 Fee index 6 Faculty Arts Department Psychology Typically Offered either term	PSYCH 431 - Theory and Practice of Psychometrics Course Career Undergraduate Units 3 Approved Hours 3-0-3 Fee index 6 Faculty Arts Department Psychology Typically Offered either term
Description The nature of psychological tests: some practical work in administration, scoring and interpretation of tests. Prerequisites: STAT ~~141 or~~ 151 or 161 and PSYCH 333 or 335. [Faculty of Arts].	Description The nature of psychological tests: some practical work in administration, scoring and interpretation of tests. Prerequisites: PSYCH 213 or STAT 151 or 161, and PSYCH 333 or 335. [Faculty of Arts].
PSYCH 443 - Social Cognition Course Career Undergraduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Psychology Typically Offered either term	PSYCH 443 - Social Cognition Course Career Undergraduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Psychology Typically Offered either term Description

Description Advanced treatment of topics in the study of how we think about the world of persons and events. Topics may include the role of categories, schemas, theories, and heuristics in social cognition, factors underlying the stereotyping of persons and groups, and the question of motivated bias in social perception. Prerequisites: STAT ~~141 or~~ 151 or 161 and PSYCH 241. [Faculty of Arts].	Advanced treatment of topics in the study of how we think about the world of persons and events. Topics may include the role of categories, schemas, theories, and heuristics in social cognition, factors underlying the stereotyping of persons and groups, and the question of motivated bias in social perception. Prerequisites: PSYCH 213 or STAT 151 or 161 and PSYCH 241. [Faculty of Arts].
PSYCH 445 - Social Psychology and Cinema Course Career Undergraduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Psychology Typically Offered either term	PSYCH 445 - Social Psychology and Cinema Course Career Undergraduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Psychology Typically Offered either term
Description The purpose of this course is to use a combination of social psychological theory, research and feature length films to explore the psychological determinants of important forms of human social behavior. Topics include the existential realities of the human condition, aggression, obedience, prejudice, attraction, and relationships. Prerequisites: One of STAT ~~141 or~~ 151 or 161 ~~or~~ PSYCH 212, and one of PSYCH 333, 342, 343, or 347. PSYCH 212 is strongly recommended. Note: Not open to students with credit in PSYCH 405 Topic: Studies of Self Through Cinema. [Faculty of Arts].	Description The purpose of this course is to use a combination of social psychological theory, research and feature length films to explore the psychological determinants of important forms of human social behavior. Topics include the existential realities of the human condition, aggression, obedience, prejudice, attraction, and relationships. Prerequisites: One of PSYCH 212 or PSYCH 213 or STAT 151 or 161, and one of PSYCH 333, 342, 343, or 347. PSYCH 212 is strongly recommended. Note: Not open to students with credit in PSYCH 405 Topic: Studies of Self Through Cinema. [Faculty of Arts].
PSYCH 447 - Self and Identity Course Career Undergraduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Psychology Typically Offered either term	PSYCH 447 - Self and Identity Course Career Undergraduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Psychology Typically Offered either term
Description Review of theory and research on the self, primarily from a social psychological perspective. Prerequisites: One of STAT ~~141 or~~ 151 or 161 ~~or~~ PSYCH 212, and one of PSYCH 342 or PSYCH 347. PSYCH 212 is strongly recommended. Note:	Description Review of theory and research on the self, primarily from a social psychological perspective. Prerequisites: One of PSYCH 212 or PSYCH 213 or STAT 151 or 161, and one of PSYCH 342 or PSYCH 347. PSYCH 212 is strongly recommended.

Not open to students with credit in PSYCH 405 Topic: Self and Identity. [Faculty of Arts]. PSYCH 495 - Psychology of Aesthetics Course Career Undergraduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Science Department Psychology Typically Offered either term Description: An introduction to the psychological analysis of response to art. Consideration is both theoretical and empirical. Illustrative materials are drawn from several arts, including painting, sculpture and literature. The contribution of aesthetic behavior to personality development is considered. Prerequisites: One of PSYCH ~~233,~~ 241, ~~or 341; and a senior level course in ART, ART H, C LIT, DES, DRAMA, ENGL, F ST, MUSIC or WRITE~~. [Faculty of Arts]	Note: Not open to students with credit in PSYCH 405 Topic: Self and Identity. [Faculty of Arts]. PSYCH 495 - Psychology of Aesthetics Course Career Undergraduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Science Department Psychology Typically Offered either term Description: An introduction to the psychological analysis of response to art. Consideration is both theoretical and empirical. Illustrative materials are drawn from several arts, including painting, sculpture and literature. The contribution of aesthetic behavior to personality development is considered. Prerequisites: One of PSYCH 223, 239 or 241. [Faculty of Arts]

UNIVERSITY OF ALBERTA

Calendar Change Request Form - **Course Changes**

See the Calendar Guide for tips on how to complete this form

Faculty of Arts	**Sociology**
Level of change (choose one only)	X Undergraduate ☐ Graduate
Contact Person:	Alison Dunwoody
Department/Unit Approval Date:	April 19, 2023

Rationale for change (Indicate other consultation groups, departments, units or faculties)

The Department is seeking to create a new course (SOC 272) as well as a permanent number for a popular "Topics" course (SOC 472). These courses are critical to expanding our offerings and contributing to the Indigenization of the curriculum.

While the intention is for SOC 272 to serve as the pre-requisite for SOC 472, we don't anticipate offering SOC 272 until at least the 2025/26 academic year. As such, we would like to keep SOC 100 as the pre-requisite for SOC 472 until we are able to offer SOC 272. Please note that all 400 level Sociology courses are limited to students in their third or fourth year. Thus, while the pre-requisite for SOC 472 is SOC 100, the restriction will ensure that students are further along in their programs before taking this course.

This proposal has the support of the Faculty of Native Studies and has been approved by the Undergraduate Teaching Committee (UTC) as well as Department Council.

Calendar Copy

Current: ~~Removed language~~ (Include all parts of course)	**Proposed:** New language
	SOC 272 – Navigating Settler Institutions **Course Career** Undergraduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Arts **Department** Sociology **Typically Offered** either term **Description** Through an Indigenous sociological lens, this course examines settler institutions that uphold inequality and racism towards Indigenous Peoples within Canada. Prerequisite: SOC 100 or consent of Instructor. **SOC 472 – Indigenous-Settler Relations**

	Course Career Undergraduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Arts **Department** Sociology **Typically Offered** either term **Description** Examines the ongoing relationships shaped through Indigenous and non-Indigenous worldviews, social structures, and institutions. Prerequisite: SOC 100 or consent of Instructor.

UNIVERSITY OF ALBERTA

Calendar Change Request Form - **Course Changes**

See the Calendar Guide for tips on how to complete this form

Faculty of Arts	**St. Stephen's College**
Level of change (choose one only)	☒ Undergraduate ☐ Graduate
Contact Person:	Frederick Tappenden (tappende@ualberta.ca)
Department/Unit Approval Date:	September 5, 2023

Rationale for change (Indicate other consultation groups, departments, units or faculties)

CATS 385 is a new course offering at St. Stephen's College, though it complements and extends the College's other offerings in the Creative Arts Therapies discipline (such as CATS 321/521: Art Therapy Fundamentals, CATS 381: Intro to Music Therapy, CATS 382: Intro to Drama Therapy, and CATS 384: Intermodal Expressive Arts). This course will provide arts elective credits for students in a variety of undergraduate programs, including students in Kinesiology, Sport, and Recreation where other dance courses are housed. The value of the course is that it exposes students to a lesser-known career path within the mental health profession. This proposal has been reviewed and endorsed by the St. Stephen's Faculty Council. Support received from the Faculty of Kinesiology, Sport, and Recreation.

CATS 400: The creation this course fills a current lacuna in the Academic Calendar: namely, there are no special topics courses available within the CATS subject area. The scope of study within this subject area aligns with the scope of CATS courses offered at St. Stephen's College: namely, spiritually-integrated psychotherapy, creative arts therapies, and/or spiritual care.

CATS 411: The creation of this course fills a current lacuna in the Academic Calendar: namely, there are no Independent Study courses available within the CATS subject area. The scope of study within this subject area aligns with the scope of CATS courses offered at St. Stephen's College: namely, spiritually-integrated psychotherapy, creative arts therapies, and/or spiritual care.

CATS 480 is proposed as one course that has both a 400-level and 500-level offering (similar to EDPY 446/546); the subject matter of this course is appropriate to both upper-level undergrads and graduate students, and thus the two courses will be offered concurrently (with level-appropriate assessments). CATS 480 builds upon and extends existing UAlberta courses offered by St. Stephen's, including Psychotherapy and Spirituality: An Introduction (CATS 383), Contemplation and the Arts (SPRIT 311), and Mindfulness in Education and the Workplace (SPRIT 330). The course will fill undergraduate/graduate level arts electives within a variety of programs, and will be of particular interest to students in Psychology, Ed. Psych., Religious Studies, and various health disciplines. The primary impetus for CATS 480 has emerged from the research interests of both core and associate faculty at St. Stephen's College. Contemporary research exploring psychedelic substances and their intersection with human spirituality and mental health is currently burgeoning across disciplines. Growing understanding of the neuropsychology, phenomenology, and clinical significance of psychedelic mental states presents various theoretical, clinical, sociological, and theological implications. Accordingly, this course seeks to provide students with both an overview and synthesis of the current literature at the interface of these disciplines. This proposal has been reviewed and endorsed by the St. Stephen's Faculty Council. Supporting consultation from the Psychology, Educational Psychology, Religious Studies, and St. Joseph's College. Additional course details, including draft course objectives, readings, and assessments and assignments are available upon request.

Calendar Copy

Current: ~~Removed language~~ (Include all parts of course)	**Proposed:** New language

CATS 385 – Introduction to Dance Movement Therapy

Course Career: Undergraduate
Units: 3
Approved Hours: 0-3s-0
Fee index: fi 6
Faculty: St Stephen's College
Department: St Stephen's College
Typically Offered: either term

An introduction to the history, approaches, and tools used in Dance Movement Therapy: topics to be covered include methods, populations, sociocultural domains, experiential engagement, body/mind connections, intersection with counselling, and human wellness.

CATS 400 – Special Topics

Course Career: Undergraduate
Units: 3
Approved Hours: 0-3s-0
Fee index: fi 6
Faculty: St Stephen's College
Department: St Stephen's College
Typically Offered: either term

Discussion of topics relevant to spiritually-integrated psychotherapy, creative arts therapies, and/or spiritual care. May be repeated for credit when course content differs.

CATS 411 – Independent Study

Course Career: Undergraduate
Units: 3
Approved Hours: 0-3s-0
Fee index: fi 6
Faculty: St Stephen's College
Department: St Stephen's College
Typically Offered: either term

Directed reading or research in a chosen area of spiritually-integrated psychotherapy, creative arts therapies, and/or spiritual care. May be repeated for credit when course content differs.

	CATS 480 – Psychedelics, Spirituality, and Mental Health Course Career: Undergraduate Units: 3 Approved Hours: 0-3s-0 Fee index: fi 6 Faculty: St Stephen's College Department: St Stephen's College Typically Offered: either term An interdisciplinary examination of the intersection of psychedelic substances, spirituality, and mental health, including: entheogens and religion, psychedelics and mysticism, awe and self-transcendence, psychedelics and psychological well-being, spirituality and mental health, neurotheology, and psychedelic-assisted psychotherapy.

UNIVERSITY OF ALBERTA

Calendar Change Request Form - **Course Changes**

See the Calendar Guide for tips on how to complete this form

Faculty of Arts	**St. Stephen's College**
Level of change (choose one only)	☒ Undergraduate ☐ Graduate
Contact Person:	Frederick Tappenden (tappende@ualberta.ca)
Department/Unit Approval Date:	September 5, 2023

Rationale for change (Indicate other consultation groups, departments, units or faculties)

SPRIT 400: The proposed changes (a) align at both the undergraduate and graduate levels the scope of fields permitted for study within these courses, and also (b) remove the reference to "creative arts therapies" (which is now covered in the corresponding CATS 400 course). The impetus for this change is due to the creation of the CATS 400 course.

SPRIT 411: The proposed changes (a) remove the reference to "creative arts therapies" (which is now covered in the corresponding CATS 411 and CATS 511 courses), and (b) expand the subject fields to include "spiritual care and/or ministry studies" (as befits this subject area as taught by St. Stephen's College). The impetus for this change is due to the creation of the CATS 411 and CATS 511 courses.

SPRIT 450 is proposed one course that has both a 400-level and 500-level offering (similar to EDPY 446/546); the subject matter of this course is appropriate to both upper-level undergrads and graduate students, and thus the two courses will be offered concurrently.

SPRIT 450 is new to the University of Alberta, though it has been offered at St. Stephen's College for more than a decade as part of the College's graduate programs. The proposed course is one of the College's most popular courses, and it has even (from time to time) attracted UAlberta students who enroll in it as a Special Topics course (for UAlberta credit). This proposal responds to such student interest by making the course available as a standing UAlberta offering.

SPRIT 450 builds upon and extends existing UAlberta courses offered by St. Stephen's, including Contemplation and the Arts (SPRT 311), Mindfulness in Education and the Workplace (SPRIT 330), and Practicing Peace (SPRIT 451/551). The course content examines a diversity of spiritual/religious traditions. The course will fill undergraduate/graduate level arts electives within a variety of programs.

This proposal has been reviewed and endorsed by the St. Stephen's Faculty Council. Support received from St. Joseph's College and Religious Studies.

Calendar Copy

Current: ~~Removed language~~ (Include all parts of course)	**Proposed:** New language
SPRIT 400 - Special Topics Course Career: Undergraduate Units: 3 Approved Hours: ~~1-2S~~-0 Fee index: 6 Faculty: St Stephen's College Department: St Stephen's College Typically Offered: either term ~~or Spring/Summer~~	**SPRIT 400 - Special Topics** Course Career: Undergraduate Units: 3 Approved Hours: 0-3S-0 Fee index: 6 Faculty: St Stephen's College Department: St Stephen's College Typically Offered: either term

Discussion of topics relevant to theology, spiritual care, and/or ~~creative arts therapies. Credit may be obtained for this course more than once.~~ **SPRIT 411 - Independent Study** Course Career: Undergraduate Units: 3 Approved Hours: 0-3S-0 Fee index: 6 Faculty: St Stephen's College Department: St Stephen's College Typically Offered: either term ~~or Spring/Summer~~ Directed reading or research in a chosen area of theology, spirituality, or ~~the creative arts therapies~~. ~~Credit may be obtained for this course more than once.~~	Discussion of topics relevant to theology, spirituality, spiritual care, and/or ministry studies. May be repeated for credit when course content differs. **SPRIT 411 - Independent Study** Course Career: Undergraduate Units: 3 Approved Hours: 0-3S-0 Fee index: 6 Faculty: St Stephen's College Department: St Stephen's College Typically Offered: either term Directed reading or research in a chosen area of theology, spirituality, spiritual care, and/or ministry studies. May be repeated for credit when course content differs. **SPRIT 450 – Spirituality: From Contemplation to Action** Course Career: Undergraduate Units: 3 Approved Hours: 0-3S-0 Fee index: 6 Faculty: St Stephen's College Department: St. Stephen's College Typically Offered: either term Explores spirituality as a personal and social response to the human quest for integration and transcendence. Multi-faith and secular perspectives are examined.

UNIVERSITY OF ALBERTA
FACULTY OF ARTS

Package Code: AR – UGMP 10.17.23 Post AAC

This package contains: Undergraduate - Minor Program Changes

Faculty approval date:

AAC Date: October 17, 2023

Page	Department or Unit	What is Changing
2	**Mathematical and Statistical Sciences**	BA Major in Mathematics
6	**Mathematical and Statistical Sciences**	BA Honors in Mathematics
8	**Music**	BMus Performance W&P

UNIVERSITY OF ALBERTA

Calendar Change Form - **Program and Regulations**

See the Calendar Guide for tips on how to complete this form

Faculty of Arts	**Mathematical and Statistical Sciences**
Level of change	☒ Undergraduate ☐ Graduate
Type of Change	☒ Program ☐ Regulation
Are there corresponding course changes?	☐ Yes ☒ No
Additional Documentation Attached	☐ Yes ☒ No
Contact Person:	David McNeilly
Department/Unit Approval Date:	Mathematical and Statistical Sciences, September 28, 2023

Rationale for change (Indicate other consultation groups, departments, units or faculties)

The purpose of this change is to align the current Arts Mathematics major program with the new Science Mathematics major program being introduced in Fall 2024 as part of the BSc Renewal project. The 100- and 200-level requirements are essentially the same, but laid out differently for greater clarity. The total number of units required is the same.

https://calendar.ualberta.ca/preview_program.php?catoid=39&poid=47349&returnto=12335

Calendar Copy

Current: ~~Removed language~~ (Include name of program)	**Proposed:** New language
Major in Mathematics [Arts]	**Major in Mathematics [Arts]**
General Information	**General Information**
See Bachelor of Arts for additional regulations and requirements.	See Bachelor of Arts for additional regulations and requirements.
Requirements for the Major	**Requirements for the Major**
Minimum of 30 units to a maximum of 48 units of senior level Mathematics courses including 6 units at the 400-level.	Minimum of 30 units to a maximum of 48 units of senior level Mathematics courses including 6 units at the 400-level.

Required Courses

- ~~MATH 228 - Algebra: Introduction to Ring Theory~~

~~6~~ units from

- ~~MATH 114 - Elementary Calculus I~~
- ~~MATH 115 - Elementary Calculus II~~
- MATH 117 - Honors Calculus I
- ~~MATH 118 - Honors Calculus II~~
- MATH 134 - Calculus for the Life Sciences I
- ~~MATH 136 - Calculus for the Life Sciences II~~
- MATH 144 - Calculus for the Mathematical and Physical Sciences I
- ~~MATH 146 - Calculus for the Mathematical and Physical Sciences II~~
- MATH 154 - Calculus for Business and Economics I
- ~~MATH 156 - Calculus for Business and Economics II~~

~~3 units from~~

- ~~MATH 214 - Calculus III~~
- ~~MATH 217 - Honors Calculus III~~

~~3 units from~~

- ~~MATH 315 - Calculus IV~~
- ~~MATH 317 - Honors Calculus IV~~

~~6 units from~~

- ~~MATH 125 - Linear Algebra I~~
- ~~MATH 127 - Honors Linear Algebra I~~
- ~~MATH 225 - Linear Algebra II~~
- ~~MATH 227 - Honors Linear Algebra II~~

Required Courses

3 units from:

- MATH 117 - Honors Calculus I
- MATH 134 - Calculus for the Life Sciences I
- MATH 144 - Calculus for the Mathematical and Physical Sciences I
- MATH 154 - Calculus for Business and Economics I

3 units from:

- MATH 118 - Honors Calculus II
- MATH 136 - Calculus for the Life Sciences II
- MATH 146 - Calculus for the Mathematical and Physical Sciences II
- MATH 156 - Calculus for Business and Economics II

3 units from:

- MATH 125 - Linear Algebra I
- MATH 127 - Honors Linear Algebra I

Senior Courses

- MATH 216 - Introduction to Analysis (See Note 1)

- MATH 226 - Algebraic Structures (See Note 2)
- STAT 265 - Probability and Statistics I

3 units from:

- MATH 214 - Calculus III
- MATH 217 - Honors Calculus III

3 units from:

- MATH 225 - Linear Algebra II
- MATH 227 - Honors Linear Algebra II

3 units from:

- MATH 315 - Calculus IV
- MATH 317 - Honors Calculus IV

3 units from:

- MATH 334 - Ordinary Differential Equations
- MATH 336 - Honors Ordinary Differential Equations

3 units from:

- MA PH 364 - Group Theory in Physics
- MATH 327 - Algebra I

3 units from:

- MATH 311 - Theory of Functions of a Complex Variable
- MATH 411 - Honors Complex Variables

Note

1. ~~Students not presenting MATH 117 must include MATH 216 in the degree.~~

3 units from:

- MATH 348 - Differential Geometry of Curves and Surfaces
- MATH 448 - Introduction to Differential Geometry

Notes:

1. Students who successfully complete MATH 117 must replace MATH 216 with 3 units selected from MATH at the 200-level or higher.
2. Students who complete MATH 127 and MATH 227 can replace MATH 226 with 3 units selected from any 200-, 300-, and 400-level MATH course.
3. With consent of the Department, students may substitute MATH 100 for MATH 117, MATH 134, MATH 144 or MATH 154; MATH 101 for MATH 118, MATH 136, MATH 146 or MATH 156; MATH 102 for MATH 125 or MATH 127.
4. Several of the 400-level options, including MATH 411 and MATH 448, may only be offered in alternate years.

UNIVERSITY OF ALBERTA

Calendar Change Form - **Program and Regulations**

See the Calendar Guide for tips on how to complete this form

Faculty of Arts	**Mathematical and Statistical Sciences**
Level of change	☒ Undergraduate ☐ Graduate
Type of Change	☒ Program ☐ Regulation
Are there corresponding course changes?	☐ Yes ☒ No
Additional Documentation Attached	☐ Yes ☒ No
Contact Person:	David McNeilly
Department/Unit Approval Date:	September 28, 2023

Rationale for change (Indicate other consultation groups, departments, units or faculties)

- The purpose of this change is to align the current Arts Mathematics Honors program with the new Science Mathematics Honors program being introduced in Fall 2024 as part of the BSc Renewal project. The total number of units required is increasing from 48 to 54.

https://calendar.ualberta.ca/preview_program.php?catoid=39&poid=47393

Calendar Copy

Current: ~~Removed language~~ (Include name of program)	**Proposed:** New language
Honors in Mathematics [Arts] **Honors in Mathematics** **General Information** […] Program Requirements Honors in Mathematics requires a minimum of ~~48~~ units as follows. **Course Requirements** MATH 117 - Honors Calculus I MATH 118 - Honors Calculus II MATH 127 - Honors Linear Algebra I MATH 217 - Honors Calculus III MATH 227 - Honors Linear Algebra II MATH 317 - Honors Calculus IV ~~MATH 326 - Rings and Modules~~ ~~MATH 328 - Group Theory~~ ~~MATH 334 - Ordinary Differential Equations~~	**Honors in Mathematics [Arts]** **Honors in Mathematics** **General Information** […] **Program Requirements** Honors in Mathematics requires a minimum of 54 and a maximum of 57 units as follows. **Course Requirements** MATH 117 - Honors Calculus I MATH 118 - Honors Calculus II MATH 127 - Honors Linear Algebra I **Senior Courses** MATH 217 - Honors Calculus III MATH 227 - Honors Linear Algebra II MATH 317 - Honors Calculus IV MATH 329 - Algebra II MATH 336 - Honors Ordinary Differential

MATH 411 - Honors Complex Variables MATH 417 - Real Analysis MATH 418 - Linear Analysis MATH 429 - Advanced Group Theory MATH 447 - Elementary Topology MATH 448 - Introduction to Differential Geometry **Note:** ~~MATH 447 and MATH 448 are normally offered only every second year. Normally, a maximum of 57 units in Mathematics is permitted. The program must include a minimum of 63 units in courses offered by the Faculty of Arts. This program does not have a minor requirement.~~	Equations MATH 411 - Honors Complex Variables MATH 412 - Algebraic Number Theory MATH 417 - Real Analysis MATH 418 - Linear Analysis MATH 429 - Advanced Group Theory MATH 447 - Elementary Topology MATH 448 - Introduction to Differential Geometry MATH 499 - Research Project STAT 265 - Probability and Statistics I **3 units from:** MA PH 364 - Group Theory in Physics MATH 327 - Algebra I **Notes:** 1. With consent of the Department, students may substitute MATH 100, MATH 134, MATH 144, or MATH 154 for MATH 117; MATH 101, MATH 136, MATH 146, or MATH 156 for MATH 118; MATH 102 or MATH 125 for MATH 127; MATH 225 for MATH 227. Students replacing MATH 117 with an alternate calculus course will need to take MATH 216, while those replacing MATH 227 with MATH 225 will need to take MATH 226. 2. Several of the required courses, including MATH 411, MATH 412, MATH 447, MATH 448, may only be offered in alternate years. […]

UNIVERSITY OF ALBERTA

Calendar Change Form - **Program and Regulations**

See the Calendar Guide for tips on how to complete this form

Faculty of Arts	**Music**
Level of change	☒ Undergraduate ☐ Graduate
Type of Change	☒ Program ☐ Regulation
Are there corresponding course changes?	☐ Yes ☒ No
Additional Documentation Attached	☐ Yes ☒ No
Contact Person:	Stephen Tchir (stchir@ualberta.ca)
Department/Unit Approval Date:	4 October 2023

Rationale for change (Indicate other consultation groups, departments, units or faculties)

This program change request is to correct a mistake that occurred in a previous calendar change cycle. The courses MUSIC 301 and 302 were initially planned to be added to BMus Performance Route programs, but the Department of Music reversed their decision to activate these courses part-way through the governance process. In most cases, the courses did not appear in the calendar, with the exception of the BMus Performance Route - Wind and Percussion program.

MUSIC 301 and 302 should be replaced with MUSIC options (6 units) as it appears in all other Performance Route programs, and as it was previously (until the error was first published in the 2022-2023 Calendar).

2024-25 Draft

Calendar Copy

Current: ~~Removed language~~ (Include name of program)	**Proposed:** New language
Program Requirements for Bachelor of Music **[…]** **Performance Route - Wind and Percussion [Arts]** **[…]** **Year 3 (30 units)** ~~MUSIC 301~~ ~~MUSIC 302~~ MUSIC 425 - Applied Music MUSIC 439 - Vocal and Instrumental Chamber Ensemble MUSIC 441 - Instrumental Ensemble MUSIC 455 - Music Theory V **One of** MUSIC 450 - Analysis Through Performance MUSIC 451 - Aural and Keyboard Skills III	**Program Requirements for Bachelor of Music** **[…]** **Performance Route - Wind and Percussion [Arts]** **[…]** **Year 3 (30 units)** MUSIC options (6 units) MUSIC 425 - Applied Music MUSIC 439 - Vocal and Instrumental Chamber Ensemble MUSIC 441 - Instrumental Ensemble MUSIC 455 - Music Theory V **One of** MUSIC 450 - Analysis Through Performance MUSIC 451 - Aural and Keyboard Skills III

MUSIC 456 MUSIC 458 - Music Theory Vll MUSIC 480 - Survey of Contemporary Music and Sonic Arts **6 units in** MUSIC, Arts, or Science option (6 units)	MUSIC 456 MUSIC 458 - Music Theory Vll MUSIC 480 - Survey of Contemporary Music and Sonic Arts **6 units in** MUSIC, Arts, or Science option (6 units)

UNIVERSITY OF ALBERTA
FACULTY OF ARTS

Package Code: AR – GC 09.26.23

This package contains: Graduate - Courses

Faculty approval date:

AAC Date: September 26, 2023

Page	Department or Unit	What is Changing
2	**Art & Design**	HADVC 555
3	**Linguistics**	LING 509
4	**Linguistics**	LING 510
5	**Linguistics**	LING 601
6	**Linguistics**	LING 602
7	**Music**	MUSIC 546
8	**Music**	MUSIC 511,512,535,536

UNIVERSITY OF ALBERTA

Calendar Change Request Form - **Course Changes**

See the Calendar Guide for tips on how to complete this form

Faculty of Arts	**Art & Design**
Level of change (choose one only)	☐ Undergraduate ☒ Graduate
Contact Person:	Elizabeth Boone
Department/Unit Approval Date:	September 7, 2023

Rationale for change (Indicate other consultation groups, departments, units or faculties)

Things to consider (maximum 500 words, delete these questions before entering your own text):

This course number is no longer used as faculty members teaching topics in the 19th century prefer to use the less restrictive course number and title: HADVC 511: Special Topics in the History of Art, Design, and Visual Culture. Deleting the class from the calendar will simplify and clarify the curriculum.

This change has been approved by the HADVC division and the department of Art and Design

Calendar Copy

Current: ~~Removed language~~ (Include all parts of course)	**Proposed:** New language
~~**HADVC 555**~~ ~~Title: Topics in Art, Design and Visual Culture in the Second Half of the 19th Century~~ ~~Course Career: graduate~~ ~~Units: 3~~ ~~Approved Hours: 0-3S-0~~ ~~Fee index: 6~~ ~~Faculty: Arts~~ ~~Department: Art & Design~~ ~~Typically Offered: either term:~~ ~~Description: Prerequisite: consent of Department. Variable content course which may be repeated if topic(s) vary.~~	

UNIVERSITY OF ALBERTA

Calendar Change Request Form - **Course Changes**

See the Calendar Guide for tips on how to complete this form

Faculty of Arts	**Linguistics**
Level of change (choose one only)	☐ Undergraduate ☒ Graduate
Contact Person:	Grace Jamieson
Department/Unit Approval Date:	March 13, 2023

Rationale for change (Indicate other consultation groups, departments, units or faculties)

Changes to course description will make LING 509 align better with the more advanced syntax course, LING 602, and with the 500-level phonology course, LING 510. Changes to description better reflect current course content. Existing course description is over 10 years old.

Calendar Copy

Current: ~~Removed language~~ (Include all parts of course)	**Proposed:** New language
Subject & Number: **LING 509** Title: Syntactic Theory Course Career: Graduate Units: 3 Approved Hours: 3-0-0 Fee index: 6 Faculty: Arts Department: Linguistics Typically Offered: Every year Description: Advanced syntactic analysis and ~~related theoretical issues~~. Prerequisite: LING 309 or consent of Department.	Subject & Number: **LING 509** Title: Syntactic Theory Course Career: Graduate Units: 3 Approved Hours: 3-0-0 Fee index: 6 Faculty: Arts Department: Linguistics Typically Offered: Every year Description: Advanced syntactic analysis and discussion of theoretical approaches in syntax. Prerequisite: LING 309 or consent of Department.

UNIVERSITY OF ALBERTA

Calendar Change Request Form - **Course Changes**

See the Calendar Guide for tips on how to complete this form

Faculty of Arts	**Linguistics**
Level of change (choose one only)	☐ Undergraduate ☒ Graduate
Contact Person:	Grace Jamieson
Department/Unit Approval Date:	March 13, 2023

Rationale for change (Indicate other consultation groups, departments, units or faculties)

Changes to course description will make LING 510 align better with the more advanced phonology course, LING 601, and with the 500-level syntax course, LING 509. Changes to description better reflect current course content. Existing course title and description are over 10 years old.

Calendar Copy

Current: ~~Removed language~~ (Include all parts of course)	**Proposed:** New language
Subject & Number: **LING 510** Title: ~~Current~~ Phonological Theory Course Career: Graduate Units: 3 Approved Hours: 3-0-0 Fee index: 6 Faculty: Arts Department: Linguistics Typically Offered: Every year Description: ~~Current approaches to phonological theory, focusing on constraint-based analysis.~~ Prerequisite: LING 310 or consent of Department.	Subject & Number: **LING 510** Title: Phonological Theory Course Career: Graduate Units: 3 Approved Hours: 3-0-0 Fee index: 6 Faculty: Arts Department: Linguistics Typically Offered: Every year Description: Overview of phonological theory, comparing different approaches to selected theoretical issues. Prerequisite: LING 310 or consent of Department.

UNIVERSITY OF ALBERTA

Calendar Change Request Form - **Course Changes**

See the Calendar Guide for tips on how to complete this form

Faculty of Arts	**Linguistics**
Level of change (choose one only)	☐ Undergraduate ☒ Graduate
Contact Person:	Grace Jamieson
Department/Unit Approval Date:	March 13, 2023

Rationale for change (Indicate other consultation groups, departments, units or faculties)

Changes to course description and title will make LING 601 align better with the 500-level phonology course, LING 510, and with the 600-level syntax course, LING 602. Changes to description better reflect current course content. Existing course title and description are over 10 years old.

Calendar Copy

Current: ~~Removed language~~ (Include all parts of course)	**Proposed:** New language
Subject & Number: **LING 601** Title: Phonology ~~I~~ Course Career: Graduate Units: 3 Approved Hours: 0-3S-0 Fee index: 6 Faculty: Arts Department: Linguistics Typically Offered: Every year Description: ~~Current approaches to phonological theory, focusing on constraint-based analysis-advanced level.~~ Prerequisite: consent of Department.	Subject & Number: **LING 601** Title: Advanced Phonology Course Career: Graduate Units: 3 Approved Hours: 0-3S-0 Fee index: 6 Faculty: Arts Department: Linguistics Typically Offered: Every year Description: Critical examination of selected theoretical issues in phonology. Prerequisite: consent of Department.

UNIVERSITY OF ALBERTA

Calendar Change Request Form - **Course Changes**

See the Calendar Guide for tips on how to complete this form

Faculty of Arts	**Linguistics**
Level of change (choose one only)	☐ Undergraduate ☒ Graduate
Contact Person:	Grace Jamieson
Department/Unit Approval Date:	March 13, 2023

Rationale for change (Indicate other consultation groups, departments, units or faculties)

Changes to course description and title will make LING 602 align better with the 500-level syntax course, LING 509, and with the 600-level phonology course, LING 601. Changes to description better reflect current course content. Existing course title and description are over 10 years old.

Calendar Copy

Current: ~~Removed language~~ (Include all parts of course)	**Proposed:** New language
Subject & Number: **LING 602** Title: ~~Seminar in~~ Syntax Course Career: Graduate Units: 3 Approved Hours: 0-3S-0 Fee index: 6 Faculty: Arts Department: Linguistics Typically Offered: Every year Description: Critical examination of selected theoretical ~~issues~~ in ~~morpho~~syntax. Prerequisite: consent of Department.	Subject & Number: **LING 602** Title: Advanced Syntax Course Career: Graduate Units: 3 Approved Hours: 0-3S-0 Fee index: 6 Faculty: Arts Department: Linguistics Typically Offered: Every year Description: Critical examination of selected theoretical approaches to topics in syntax. Prerequisite: consent of Department.

UNIVERSITY OF ALBERTA

Calendar Change Request Form - **Course Changes**

See the Calendar Guide for tips on how to complete this form

Faculty of Arts	**Music**
Level of change (choose one only)	☒ Undergraduate ☐ Graduate
Contact Person:	John Tessier
Department/Unit Approval Date:	April 8, 2022

Rationale for change (Indicate other consultation groups, departments, units or faculties)

Three of the four course number associated with this course the Title were changed. This course number was missed and appears in the calendar with the incorrect title. All four course numbers should have the same name. The numbers previously changed were Mus 446, Mus 646 and Mus 746.

Calendar Copy

Current: ~~Removed language~~ (Include all parts of course)	**Proposed:** New language
MUSIC 546 – ~~Opera Workshop~~ **Course Career** undergraduate **Units** 3 **Approved Hours** 0-4L-0 **Fee index** 6 **Faculty** Arts **Department** Music **Typically Offered** two term The coaching and staging of opera literature. Prerequisite: Consent of the Department, based on Audition.	**MUSIC 546 – University Opera Theatre** **Course Career** undergraduate **Units** 3 **Approved Hours** 0-4L-0 **Fee index** 6 **Faculty** Arts **Department** Music **Typically Offered** two term The coaching and staging of opera literature. Prerequisite: Consent of the Department, based on Audition.

UNIVERSITY OF ALBERTA

Calendar Change Request Form - **Course Changes**

See the Calendar Guide for tips on how to complete this form

Faculty of Arts	**Music**
Level of change (choose one only)	☐ Undergraduate ☒ Graduate
Contact Person:	John Tessier
Department/Unit Approval Date:	December 14, 2022

Rationale for change (Indicate other consultation groups, departments, units or faculties)

These courses are to be taught in conjunction with MUS 321 & 322, Diction for singers I & II as well as MUS 435 & 436, Vocal Pedagogy I & II. Approved by performance area committee and Music Department Council.

Calendar Copy

Current: ~~Removed language~~ (Include all parts of course)	**Proposed:** New language
	MUSIC 511 – Advanced Diction for Singers I Course Career Graduate Units 3 Approved Hours 0-3L-0 Fee index 6 Faculty Arts Department Music Typically Offered either term An advanced application of the International Phonetic Alphabet (IPA) to singing in English and German. **MUSIC 512 – Advanced Diction for Singers II** Course Career Graduate Units 3 Approved Hours 0-3L-0 Fee index 6 Faculty Arts Department Music Typically Offered either term An advanced application of the International Phonetic Alphabet (IPA) to singing in French and Italian.

	Music 535 Advanced Vocal Pedagogy I Course Career Graduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Music Typically Offered either term An advanced study of vocal techniques, and methods of vocal training in classical singing including the physicality of the instrument. **Music 536 Advanced Vocal Pedagogy II** Course Career Graduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Music Typically Offered either term A continuing advanced study of vocal techniques, and methods of vocal training in classical singing, including the physicality of the instrument. Prerequisite: MUSIC 535.

UNIVERSITY OF ALBERTA
FACULTY OF ARTS

Package Code: AR – GMP 10.17.23 Post AAC

This package contains: Graduate - Minor Program Changes

Faculty approval date:

AAC Date: October 17, 2023

Page	Department or Unit	What is Changing
2	**Economics**	Doctor of Philosophy (Economics)
3	**Economics**	Master of Arts with a specialization in Economics and Finance (Economics)
4	**Economics**	Master of Arts (Economics)

UNIVERSITY OF ALBERTA

Calendar Change Form - **Program and Regulations**

See the Calendar Guide for tips on how to complete this form

Faculty of Arts	**Economics**
Level of change	☐ Undergraduate ☐ Graduate
Type of Change	☐ Program ☐ Regulation
Are there corresponding course changes?	☐ Yes ☐ No
Additional Documentation Attached	☐ Yes ☐ No
Contact Person:	Heather Eckert
Department/Unit Approval Date:	2023-09-25

Rationale for change (Indicate other consultation groups, departments, units or faculties)

- Currently, students in the MA and PhD program take shared microeconomic and macroeconomic theory in the fall, with PhD students taking a second course for each in the winter. The shared courses do not serve either the MA or PhD students as well as having separate, single MA microeconomic & macroeconomic theory courses. Historically, we have not had the instructional resources or PhD class size to offer separate MA theory courses. We now have the instructional capacity to offer MA level theory courses, and expect to intake at least 5 PhD students each year.
- The department is changing their graduate program requirements for its PhD program to require students to take a sequence of two PhD-level microeconomic theory and two PhD-level macroeconomic theory courses.
- This change will improve learning outcomes for both MA and PhD students and bring us in line with other large Canadian Economics departments.
- We are changing the descriptions of the current combined courses to be exclusively MA courses (Econ 503 and 581), introducing two new PhD level Microeconomic I and Macroeconomic Theory I Courses (Econ 603 and 681), and changing the course numbers of the second courses in the PhD theory sequences (Econ 605 and 682) .

Calendar Copy

Doctor of Philosophy (Economics) **Program Requirements** The PhD program consists of at least 36 units in coursework and a thesis. Required courses (21 units): ~~ECON 503 - Microeconomic Theory I~~ ~~ECON 505 - Microeconomic Theory II~~ ~~ECON 581 - Macroeconomic Theory I~~ ~~ECON 582 - Macroeconomic Theory II~~ ECON 591 - Graduate Research Workshop I ECON 598 - Econometric Theory and Applications ECON 599 - Applied Econometrics Students who have already taken any of the required courses and applied them to another degree must fulfill the 21-units of required courses with other Graduate-level ECON courses.	**Doctor of Philosophy (Economics)** **Program Requirements** The PhD program consists of at least 36 units in coursework and a thesis. Required courses (21 units): ECON 603 - PhD Microeconomic Theory I ECON 604 - PhD Microeconomic Theory II ECON 681 - PhD Macroeconomic Theory I ECON 682 - PhD Macroeconomic Theory II ECON 591 - Graduate Research Workshop I ECON 598 - Econometric Theory and Applications ECON 599 - Applied Econometrics Students who have already taken any of the required courses and applied them to another degree must fulfill the 21-units of required courses with other Graduate-level ECON courses.

UNIVERSITY OF ALBERTA

Calendar Change Form - **Program and Regulations**

See the Calendar Guide for tips on how to complete this form

Faculty of Arts	**Economics**
Level of change	☐ Undergraduate ☒ Graduate
Type of Change	☒ Program ☐ Regulation
Are there corresponding course changes?	☒ Yes ☐ No
Additional Documentation Attached	☐ Yes ☐ No
Contact Person:	Heather Eckert
Department/Unit Approval Date:	2023-09-25

Rationale for change (Indicate other consultation groups, departments, units or faculties)

- Currently, students in the MA and PhD program take shared microeconomic and macroeconomic theory in the fall, with PhD students taking a second course for each in the winter. The shared courses do not serve either the MA or PhD students as well as having separate, single MA microeconomic & macroeconomic theory courses. Historically, we have not had the instructional resources or PhD class size to offer separate MA theory courses. We now have the instructional capacity to offer MA level theory courses, and expect to intake at least 5 PhD students each year.
- The department is changing their graduate program requirements for its PhD program to require students to take a sequence of two PhD-level microeconomic theory and two PhD-level macroeconomic theory courses.
- This change will improve learning outcomes for both MA and PhD students and bring us in line with other large Canadian Economics departments.
- We are changing the descriptions of the current combined courses to be exclusively MA courses (Econ 503 and 581), introducing two new PhD level Microeconomic I and Macroeconomic Theory I Courses (Econ 603 and 681), and changing the course numbers of the second courses in the PhD theory sequences (Econ 605 and 682) .

Calendar Copy

Master of Arts with a specialization in Economics and Finance (Economics) The MA in Economics and Finance, offered collaboratively with the Department of Finance and Statistical Analysis of the Faculty of Business is a course-based program requiring 42 units in coursework including a 3-unit independent research project. Program Requirements Required courses (15 units): ECON 503 - Microeconomic Theory ~~I~~ ECON 581 - Macroeconomic Theory ~~I~~ ECON 598 - Econometric Theory and Applications ECON 599 - Applied Econometrics FIN 501 - Managerial Finance	**Master of Arts with a specialization in Economics and Finance (Economics)** The MA in Economics and Finance, offered collaboratively with the Department of Finance and Statistical Analysis of the Faculty of Business is a course-based program requiring 42 units in coursework including a 3-unit independent research project. Program Requirements Required courses (15 units): ECON 503 - MA Microeconomic Theory ECON 581 - MA Macroeconomic Theory ECON 598 - Econometric Theory and Applications ECON 599 - Applied Econometrics FIN 501 - Managerial Finance ECON 503 and 581 may be replaced by ECON 603 and ECON 681, with consent of the department.

UNIVERSITY OF ALBERTA

Calendar Change Form - **Program and Regulations**

See the Calendar Guide for tips on how to complete this form

Faculty of Arts	**Economics**
Level of change	☐ Undergraduate ☐ Graduate
Type of Change	☐ Program ☐ Regulation
Are there corresponding course changes?	☐ Yes ☐ No
Additional Documentation Attached	☐ Yes ☐ No
Contact Person:	Heather Eckert
Department/Unit Approval Date:	2023-09-25

Rationale for change (Indicate other consultation groups, departments, units or faculties)

- Currently, students in the MA and PhD program take shared microeconomic and macroeconomic theory in the fall, with PhD students taking a second course for each in the winter. The shared courses do not serve either the MA or PhD students as well as having separate, single MA microeconomic & macroeconomic theory courses. Historically, we have not had the instructional resources or PhD class size to offer separate MA theory courses. We now have the instructional capacity to offer MA level theory courses, and expect to intake at least 5 PhD students each year.
- The department is changing their graduate program requirements for its PhD program to require students to take a sequence of two PhD-level microeconomic theory and two PhD-level macroeconomic theory courses.
- This change will improve learning outcomes for both MA and PhD students and bring us in line with other large Canadian Economics departments.
- We are changing the descriptions of the current combined courses to be exclusively MA courses (Econ 503 and 581), introducing two new PhD level Microeconomic I and Macroeconomic Theory I Courses (Econ 603 and 681), and changing the course numbers of the second courses in the PhD theory sequences (Econ 605 and 682) .

Calendar Copy

Master of Arts (Economics) The MA in Economics is a course-based program consisting of at least 27 units in coursework including a 3-unit independent research project**.** Program Requirements Required courses (12 units): ECON 503 - Microeconomic Theory~~I~~ ECON 581 - Macroeconomic Theory~~I~~ ECON 598 - Econometric Theory and Applications ECON 599 - Applied Econometrics	**Master of Arts (Economics)** The MA in Economics is a course-based program consisting of at least 27 units in coursework including a 3-unit independent research project. Program Requirements Required courses (12 units): ECON 503 - MA Microeconomic Theory ECON 581 - MA Macroeconomic Theory ECON 598 - Econometric Theory and Applications ECON 599 - Applied Econometrics ECON 503 and 581 may be replaced by ECON 603 and ECON 681, with consent of the department.

UNIVERSITY OF ALBERTA
FACULTY OF ARTS

Package Code: AR – GC 10.17.23 Post AAC

This package contains: Graduate - Courses

Faculty approval date:

AAC Date: October 17, 2023

Page	Department or Unit	What is Changing
2	**Economics**	ECON 503, 504, 505, 515, 581, 582, 589, 603, 604, 681, 682
8	**Music**	MUSIC 566, 581, 583, 584, 585, 587, 588, 645
12	**Political Science**	POLS 556
14	**St. Stephen's College**	CATS 500, 511, 580, 581
17	**St. Stephen's College**	SPRIT 500, 511, 550

UNIVERSITY OF ALBERTA

Calendar Change Request Form - **Course Changes**

See the Calendar Guide for tips on how to complete this form

Faculty of Arts	**Economics**
Level of change (choose one only)	☐ Undergraduate ☒ Graduate
Contact Person:	Chelsi Hudson
Department/Unit Approval Date:	2023-09-25

Rationale for change (Indicate other consultation groups, departments, units or faculties)

Elective: 504: new course, 515/589: title changes to accurately reflect content and appeal to students.

Core:

- Currently, students in the MA and PhD program take shared microeconomic and macroeconomic theory in the fall, with PhD students taking a second course for each in the winter. The shared courses do not serve either the MA or PhD students as well as having separate, single MA microeconomic & macroeconomic theory courses. Historically, we have not had the instructional resources or PhD class size to offer separate MA theory courses. We now have the instructional capacity to offer MA level theory courses, and expect to intake at least 5 PhD students each year.
- The department is changing their graduate program requirements for its PhD program to require students to take a sequence of two PhD-level microeconomic theory and two PhD-level macroeconomic theory courses.
- This change will improve learning outcomes for both MA and PhD students and bring us in line with other large Canadian Economics departments.
- We are changing the descriptions of the current combined courses to be exclusively MA courses (503, 581), introducing two new PhD level Microeconomic I and Macroeconomic Theory I Courses (603, 681), and changing the course numbers of the second courses in the PhD theory sequences (505/582 to 605/682).

Calendar Copy

Current: ~~Removed language~~ (Include all parts of course)	**Proposed:** New language
ECON 503 Microeconomic Theory ~~I~~ Course Career Graduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Economics Typically offered either term Description ~~Producer and consumer behavior; partial equilibrium models of perfectly and imperfectly competitive markets; Walrasian general equilibrium; welfare economics. Prerequisites: ECON 386 and 387, 481 and 482..~~	ECON 503 MA Microeconomic Theory Course Career Graduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Economics Typically offered either term Description: An introduction to graduate-level microeconomic tools. Topics covered may include producer and consumer behavior, partial equilibrium models of markets, Walrasian general equilibrium, choice under uncertainty, and game theory.

	ECON 504 Applied Economics Projects II Course Career Graduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Economics Typically Offered either term Description This is an applied projects course in which you will be interacting directly with a partner organization in industry, government, or the non-profit sector, with an Economics faculty member to provide guidance and supervision. No in-class meeting pattern; group meetings and advisor meetings will be scheduled throughout the term as needed.
~~ECON 505~~ ~~Microeconomic Theory II~~ ~~Course Career Graduate~~ ~~Units 3~~ ~~Approved Hours 3-0-0~~ ~~Fee index 6~~ ~~Faculty Arts~~ ~~Department Economics~~ ~~Typically Offered either term~~ ~~Description~~ ~~Choice under uncertainty; contingent claims and models of general equilibrium under uncertainty; markets with information asymmetries; non-cooperative game theory, games of incomplete information, repeated games, and bargaining theory. Prerequisite: ECON 503.~~	
ECON 515 ~~Economic Persistence~~ Course Career Undergraduate Units 3 Approved Hours 3-0-0 Fee index 6	ECON 515 Economics of Social Mobility Course Career Undergraduate Units 3 Approved Hours 3-0-0 Fee index 6

Faculty Arts Department Economics Typically Offered either term Description A survey and critical analysis of long-lasting and multi-generational economic outcomes with special attention given to empirical methods. Topics include intergenerational mobility, comparative economic development, and economic geography, historical record linking, and spatial autocorrelation.	Faculty Arts Department Economics Typically Offered either term Description A survey and critical analysis of long-lasting and multi-generational economic outcomes with special attention given to empirical methods. Topics include intergenerational mobility, comparative economic development, and economic geography, historical record linking, and spatial autocorrelation.
ECON 581 Macroeconomic Theory ~~I~~ Course Career Graduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Economics Typically offered either term Description ~~An examination of the core topics in macroeconomic theory. These will generally include methods of modelling output, employment, prices, business cycles, and macroeconomics policy. Prerequisite or corequisite: ECON 481 and 482 or equivalent.~~	ECON 581 MA Macroeconomic Theory Course Career Graduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Economics Typically offered either term Description A graduate-level examination of the core topics in macroeconomic theory: determinants of growth, business cycles and stabilization policy.
~~ECON 582~~ ~~Macroeconomic Theory II~~ ~~Course Career Graduate~~ ~~Units 3~~ ~~Approved Hours 3-0-0~~ ~~Fee index 6~~ ~~Faculty Arts~~ ~~Department Economics~~ ~~Typically Offered either term~~ ~~Description~~ ~~This course extends the analysis of ECON 581 and introduces students to more advanced issues.~~	

~~Prerequisite: ECON 581 or equivalent.~~	
ECON 589 ~~Macroeconometric Analysis~~ Course Career Graduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Economics Typically Offered either term Description Introduction to applied structural dynamic stochastic general equilibrium (DSGE) modeling, employing various DSGE models with a focus on estimation and testing for inference. Advanced solution techniques for stochastic difference equations and general modeling setup.	ECON 589 Empirical Macroeconomics Course Career Graduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Economics Typically Offered either term Description Introduction to applied structural dynamic stochastic general equilibrium (DSGE) modeling, employing various DSGE models with a focus on estimation and testing for inference. Advanced solution techniques for stochastic difference equations and general modeling setup. ECON 604 PhD Microeconomic Theory I Course Career Graduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Economics Typically offered either term Description The course covers classical microeconomics topics including producer and consumer behavior, partial equilibrium models of perfectly competitive and monopolistic markets, Walrasian general equilibrium, welfare economics, and choice under uncertainty.

	ECON 605 PhD Microeconomic Theory II Course Career Graduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Economics Typically offered either term Description Topics include noncooperative game theory, models of imperfect competition, and the economics of information. Prerequisite: ECON 604 or equivalent. ECON 681 PhD Macroeconomic Theory I Course Career Graduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Economics Typically offered either term Description Material covered will include an introduction to dynamic mathematics, with applications to optimal and endogenous growth theories, and real business cycles. ECON 682 PhD Macroeconomic Theory II Course Career Graduate Units 3 Approved Hours 3-0-0 Fee index 6 Faculty Arts Department Economics Typically offered either term Description

	The course extends the methods and analyses in ECON 681 and topics covered may include New Keynesian theories of the business cycle, as well as models of search, consumption theory, and the economics of incomplete markets. Prerequisite: ECON 681 or equivalent.

UNIVERSITY OF ALBERTA

Calendar Change Request Form - **Course Changes**

See the Calendar Guide for tips on how to complete this form

Faculty of Arts	**Music**
Level of change (choose one only)	☐ Undergraduate ☒ Graduate
Contact Person:	Brian Fauteux (fauteux@ualberta.ca)
Department/Unit Approval Date:	February 1, 2023

Rationale for change (Indicate other consultation groups, departments, units or faculties)

The idea for these changes came about after reflecting on the courses we would like to teach as undergraduate/graduate slash courses and who the Faculty members are that would be teaching them (and what their research areas are). Given our current roster, a switch to Music and Media for 488/588 makes sense because it can change based on who is teaching it and could incorporate topics such as Print Media and Music, Radio and Music, Film and Television and Music, and so forth. The course does not need to be specific to Film and this allows it to be taught in different ways by different people which will give students more options and will help to keep these courses in rotation and to be taught more often.

The move to change a number of our split level courses to a variable designation (which in Music indicates that the topic will be different and will be reflected on a student's record) and have it be completed up to 5 times accounts for the fact that different instructors will teach the course with different topics and this may mean that it is offered a few times over a number of years and there is no reason that a student couldn't take the course multiple times given this fact. The number 5 as the indicator of total completions is used because it is likely to be the maximum time that the course would run, under different variable or special topics, over a student's time here, and in terms of how many 400 or 500 level courses a student would have the capacity to take. These variable topics courses suit our department and students well and allow for more focused explorations of topics in music studies under broad course titles, like "Music and Society," without the need to create a new course every time a seminar style course is to be developed.

Calendar Copy

Current: ~~Removed language~~ (Include all parts of course)	**Proposed:** New language
MUSIC 566 - ~~Topics~~ in Ethnomusicology **Course Career** Graduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Arts **Department** Music **Typically Offered** either term **Description** Prerequisite: ~~MUSIC 365 or~~ consent of Department	MUSIC 566 – Advanced Studies in Ethnomusicology **Course Career** Graduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Arts **Department** Music **Typically Offered** either term **Description** Prerequisite: consent of the Department

MUSIC 581 – Advanced Studies in Avant-Garde **Course Career** Graduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Arts **Department** Music **Typically Offered** either term **Description** Prerequisite: ~~Music 256.~~	MUSIC 581 – Advanced Studies in Avant-Garde **Course Career** Graduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Arts **Department** Music **Typically Offered** either term **Description** Prerequisite: consent of the Department. Variable topic course which may be repeated 5 times when content varies
MUSIC 583 – Advanced Studies in Musical Genre **Course Career** Graduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Arts **Department** Music **Typically Offered** either term **Description** Prerequisite: consent of the Department.	MUSIC 583 – Advanced Studies in Musical Genre **Course Career** Graduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Arts **Department** Music **Typically Offered** either term **Description** Prerequisite: consent of the Department. Variable topic course which may be repeated 5 times when content varies
MUSIC 584 – Advanced Studies in Music and Society **Course Career** Graduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Arts **Department** Music **Typically Offered** either term **Description** Prerequisite: consent of the Department.	MUSIC 584 – Advanced Studies in Music and Society **Course Career** Graduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Arts **Department** Music **Typically Offered** either term **Description** Prerequisite: consent of the Department. Variable topic course which may be repeated 5 times when content varies
MUSIC 585 – Advanced Composer Studies **Course Career** Graduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Arts	MUSIC 585 – Advanced Composer Studies **Course Career** Graduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Arts **Department** Music

Department Music **Typically Offered** either term **Description** Prerequisite: consent of the Department.	**Typically Offered** either term **Description** Prerequisite: consent of the Department. Variable topic course which may be repeated 5 times when content varies
MUSIC 587 – Advanced Period Studies **Course Career** Graduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Arts **Department** Music **Typically Offered** either term **Description** Prerequisite: consent of the Department.	MUSIC 587 – Advanced Period Studies **Course Career** Graduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Arts **Department** Music **Typically Offered** either term **Description** Prerequisite: consent of the Department. Variable topic course which may be repeated 5 times when content varies
MUSIC 588 - Advanced Studies in Music and ~~Film~~ **Course Career** Graduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Arts **Department** Music **Typically Offered** either term **Description** The intersections of music and ~~filmmaking studies~~ from academic, analytical, historical and critical perspectives. Prerequisite: consent of the Department.	MUSIC 588 - Advanced Studies in Music and Media **Course Career** Graduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Arts **Department** Music **Typically Offered** either term **Description** The intersections of music and media from academic, analytical, historical and critical perspectives. Prerequisite: consent of the Department. Variable topic course which may be repeated 5 times when content varies
MUSIC 645 – ~~Topics~~ in Applied Music Technologies **Course Career** Graduate **Units** 3 **Approved Hours** 0-3S-0 **Fee index** 6 **Faculty** Arts **Department** Music **Typically Offered** either term **Description**	MUSIC 645 – Advanced Studies in Applied Music Technologies **Course Career** Graduate **Units** 3 **Approved Hours** 0-3S-0 **Fee index** 6 **Faculty** Arts **Department** Music **Typically Offered** either term **Description**

Prerequisite: MUSIC 445 or equivalent, or consent of Department.	Prerequisite: MUSIC 445 or equivalent, or consent of the Department. Variable topic course which may be repeated 5 times when content varies

UNIVERSITY OF ALBERTA

Calendar Change Request Form - **Course Changes**

See the Calendar Guide for tips on how to complete this form

Faculty of Arts	**Political Science**
Level of change (choose one only)	Graduate
Contact Person:	Rob Aitken
Department/Unit Approval Date:	Political Science/ 26 September 2023

Rationale for change (Indicate other consultation groups, departments, units or faculties)

This is a proposal for a new course, "The Politics of International Migration," to be taught as a combined senior undergraduate and graduate course. The area of migration is of growing significance both nationally and internationally and carries major policy as well as political and ethical implications which confront countries as well as the international system. This is indicated in the fact that in 2018 the United Nations forged international agreements (Global Compacts) focused on migration as well as refugees, as well as the increased salience of climate-induced forced migration. This course is designed to meet the growing interest of students at both the undergraduate and graduate levels for a course dealing with migration governance from a political science perspective, as well as an international perspective attuned to issues of borders, surveillance and ethics. It also responds to the need to modernize the curriculum in light of the emergence of sections in the American Political Science Association (2012) and the International Political Science Association (2018) devoted to migration and citizenship. At present, the Department only offers one course on migration, which is taught at the fourth-year level, and takes as its focus national social policies and ethnicity (Pol S 425 Ethnicity, Immigration and Social Policy). In relation to sister disciplines, the only course on offer is also a fourth-year course exploring debates concerning immigration, ethnicity and crime (Soc 427 Immigration, Ethnicity and Crime). In addition to offering a split course open to both undergraduate and graduate students, this course responds to needs in the Department's field of International Relations for increased options following faculty retirements, and also covers different types of themes reflected in the growing literature on migration in the discipline, as well as the multidisciplinary field of migration studies. It should be noted that an open course dealing with migration from an international perspective has been successfully taught at just the graduate level in the past on two occasions in the past in the Department and drew a healthy enrollment.

Calendar Copy

Current: ~~Removed language~~ (Include all parts of course)	**Proposed:** New language

	POL S 556 - The Politics of International Migration Course Career: Graduate Units: 3 Approved Hours: 0-3S-0 Faculty: Arts Department: Political Science Typically Offered: Either Term Description: Examines the causes of and responses to international migration, and probes the ethical questions raised by borders and surveillance, who gets in, and how newcomers are treated.

UNIVERSITY OF ALBERTA

Calendar Change Request Form - **Course Changes**

See the Calendar Guide for tips on how to complete this form

Faculty of Arts	**St. Stephen's College**
Level of change (choose one only)	☐ Undergraduate ☒ Graduate
Contact Person:	Frederick Tappenden (tappende@ualberta.ca)
Department/Unit Approval Date:	September 5, 2023

Rationale for change (Indicate other consultation groups, departments, units or faculties)

CATS 500: The creation this course fills a current lacuna in the Academic Calendar: namely, there are no special topics courses available within the CATS subject area. The scope of study within this subject area aligns with the scope of CATS courses offered at St. Stephen's College: namely, spiritually-integrated psychotherapy, creative arts therapies, and/or spiritual care.

CATS 511: The creation this course fills a current lacuna in the Academic Calendar: namely, there are no Independent Study courses available within the CATS subject area. The scope of study within this subject area aligns with the scope of CATS courses offered at St. Stephen's College: namely, spiritually-integrated psychotherapy, creative arts therapies, and/or spiritual care.

CATS 580 is proposed as one course that has both a 400-level and 500-level offering (similar to EDPY 446/546); the subject matter of this course is appropriate to both upper-level undergrads and graduate students, and thus the two courses will be offered concurrently (with level-appropriate assessments).

CATS 580 builds upon and extends existing UAlberta courses offered by St. Stephen's, including Psychotherapy and Spirituality: An Introduction (CATS 383), Contemplation and the Arts (SPRT 311), and Mindfulness in Education and the Workplace (SPRIT 330). The course will fill undergraduate/graduate level arts electives within a variety of programs, and will be of particular interest to students in Psychology, Ed. Psych., Religious Studies, and various health disciplines.

The primary impetus for CATS 580 has emerged from the research interests of both core and associate faculty at St. Stephen's College. Contemporary research exploring psychedelic substances and their intersection with human spirituality and mental health is currently burgeoning across disciplines. Growing understanding of the neuropsychology, phenomenology, and clinical significance of psychedelic mental states presents various theoretical, clinical, sociological, and theological implications. Accordingly, this course seeks to provide students with both an overview and synthesis of the current literature at the interface of these disciplines.

This proposal has been reviewed and endorsed by the St. Stephen's Faculty Council. Supporting consultation from the Psychology, Educational Psychology, Religious Studies, and St. Joseph's College.

Additional course details, including draft course objectives, readings, and assessments and assignments are available upon request.

CATS 581 is a new course offering at St. Stephen's College, which will be a 500-level offering of our current CATS 381; the two courses will be scheduled concurrently and each run with appropriate undergraduate/graduate instruction and requirements (similar to EDPY 446/546). Over the past three years, St. Stephen's has offered the proposed course in a special topics format (catalogued as SPRIT 500), and though enrollment has struggled, we suspect this is due to the challenge of students finding special topics offerings. The impetus for this course has come from specific request from graduate students for the offering. This course will provide arts elective credits for students in MA, MMus, and other graduate programs. The value of the course is that it exposes students to a musical career path outside of traditional performance/composition/production pathways. This proposal has been reviewed and endorsed by the St. Stephen's Faculty Council and Dr. Michael Friskopf from the Department of Music.

Calendar Copy

Current: ~~Removed language~~ (Include all parts of course)	**Proposed:** New language

CATS 500 – Special Topics

Course Career: Graduate
Units: 3
Approved Hours: 0-3s-0
Fee index: fi 6
Faculty: St Stephen's College
Department: St Stephen's College
Typically Offered: either term
Discussion of topics relevant to spiritually-integrated psychotherapy, creative arts therapies, and/or spiritual care. May be repeated for credit when course content differs.

CATS 511 Independent Study

Course Career: Graduate
Units: 3
Approved Hours: 0-3s-0
Fee index: fi 6
Faculty: St Stephen's College
Department: St Stephen's College
Typically Offered: either term
Directed reading or research in a chosen area of spiritually-integrated psychotherapy, creative arts therapies, and/or spiritual care. May be repeated for credit when course content differs.

CATS 580 – Psychedelics, Spirituality, and Mental Health

Course Career: Graduate
Units: 3
Approved Hours: 0-3s-0
Fee index: fi 6
Faculty: St Stephen's College
Department: St Stephen's College
Typically Offered: either term
An interdisciplinary examination of the intersection of psychedelic substances, spirituality, and mental health, including: entheogens and religion, psychedelics and mysticism, awe and self-transcendence, psychedelics and psychological well-being, spirituality and mental health, neurotheology, and psychedelic-assisted psychotherapy.

CATS 581 – Introduction to Music Therapy

Course Career: Graduate
Units: 3
Approved Hours: 1-2s-0
Fee index: fi 6
Faculty: St Stephen's College
Department: St Stephen's College

	Typically Offered: either term Introduction to the discipline of music therapy: physical, mental, social, emotional, and spiritual applications of music.

UNIVERSITY OF ALBERTA

Calendar Change Request Form - **Course Changes**

See the Calendar Guide for tips on how to complete this form

Faculty of Arts	**St. Stephen's College**
Level of change (choose one only)	☐ Undergraduate ☒ Graduate
Contact Person:	Frederick Tappenden (tappende@ualberta.ca)
Department/Unit Approval Date:	September 5, 2023

Rationale for change (Indicate other consultation groups, departments, units or faculties)

SPRIT 500: The proposed changes (a) align at both the undergraduate and graduate levels the scope of fields permitted for study within these courses, and also (b) remove the reference to "creative arts therapies" (which is now covered in the corresponding CATS 400 and CATS 500 courses). The impetus for this change is due to the creation of the CATS 400 and CATS 500 courses.

SPRIT 511: The proposed changes (a) remove the reference to "creative arts therapies" (which is now covered in the corresponding CATS 411 and CATS 511 courses), and (b) expand the subject fields to include "spiritual care and/or ministry studies" (as befits this subject area as taught by St. Stephen's College). The impetus for this change is due to the creation of the CATS 411 and CATS 511 courses.

SPRIT 550 is proposed as one course that has both a 400-level and 500-level offering (similar to EDPY 446/546); the subject matter of this course is appropriate to both upper-level undergrads and graduate students, and thus the two courses will be offered concurrently.

SPRIT 550 is new to the University of Alberta, though it has been offered at St. Stephen's College for more than a decade as part of the College's graduate programs. The proposed course is one of the College's most popular courses, and it has even (from time to time) attracted UAlberta students who enroll in it as a Special Topics course (for UAlberta credit). This proposal responds to such student interest by making the course available as a standing UAlberta offering.

SPRIT 550 builds upon and extends existing UAlberta courses offered by St. Stephen's, including Contemplation and the Arts (SPRT 311), Mindfulness in Education and the Workplace (SPRIT 330), and Practicing Peace (SPRIT 451/551). The course content examines a diversity of spiritual/religious traditions. The course will fill undergraduate/graduate level arts electives within a variety of programs.

This proposal has been reviewed and endorsed by the St. Stephen's Faculty Council. Supporting Received from St. Joseph's College and Religious Studies.

Calendar Copy

Current: ~~Removed language~~ (Include all parts of course)	**Proposed:** New language
SPRIT 500 - Special Topics Course Career: Graduate Units: 3 Approved Hours: 0-3S-0 Fee index: 6 Faculty: St Stephen's College Department: St Stephen's College Typically Offered: either term Discussion of topics relevant to theology, spirituality or ~~the creative arts therapies. Credit may be obtained for this course more than once.~~	**SPRIT 500 - Special Topics** Course Career: Graduate Units: 3 Approved Hours: 0-3S-0 Fee index: 6 Faculty: St Stephen's College Department: St Stephen's College Typically Offered: either term Discussion of topics relevant to theology, spirituality, spiritual care, and/or ministry studies. May be repeated for credit when course content differs.

SPRIT 511 - Independent Study Course Career: Graduate Units: 3 Approved Hours: 0-3S-0 Fee index: 6 Faculty: St Stephen's College Department: St Stephen's College Typically Offered: either term ~~or Spring/Summer~~ Directed reading or research in a chosen area of theology, spirituality, or ~~the creative arts therapies~~. ~~Credit may be obtained for this course more than once.~~	**SPRIT 511 - Independent Study** Course Career: Graduate Units: 3 Approved Hours: 0-3S-0 Fee index: 6 Faculty: St Stephen's College Department: St Stephen's College Typically Offered: either term Directed reading or research in a chosen area of theology, spirituality, spiritual care, and/or ministry studies. May be repeated for credit when course content differs. **SPRIT 550 – Spirituality: From Contemplation to Action** Course Career: Graduate Units: 3 Approved Hours: 0-3S-0 Fee index: 6 Faculty: St Stephen's College Department: St. Stephen's College Typically Offered: either term Explores spirituality as a personal and social response to the human quest for integration and transcendence. Multi-faith and secular perspectives are examined.

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Course Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	English Language School
Contact Person:	Donald Mason
Level of change: (choose one only) [?]	• Undergraduate
	•
For which term will this change take effect?	Fall 2023

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

The Academic Foundations course titles and descriptions were revised as non-credit courses in 2021. Course titles and descriptions were updated to represent new course objectives, positioning the English Foundations courses to appeal to a broader, more general audience by focusing less on academic literacy and more on general production of language.

At the time, we did not change the course titles and descriptions for the credit courses as we were not sure that we would continue offering these courses as credit courses. Now, however, as international students are beginning to travel more frequently, the International Visiting Student Program (IVSP) wishes to continue registering students as credit students. As IVSP students are registered through Open Studies, they register as credit students. IVSP students are the only students who take these courses as credit courses.

The changes in course titles and descriptions from Academic Foundations to English Foundations will now bring the credit and non-credit sides into alignment.

Course Template

Current: ~~Removed language~~	**Proposed:** New language
Subject & Number: EAP 101 **Title: ~~Academic Foundations I~~** **Course Career: Undergraduate** **Units: 0** **Approved Hours** **Fee index: 6** **Faculty: Education** **Department: English Language School** **Typically Offered: either term** **Description** ~~This course represents the first stage in preparing students for academic study in English. EAP 101 develops the academic literacy and oral fluency necessary for a strong foundation in academic English skills. The course is delivered in two parts: one focused on reading and writing, and the other focused on speaking and listening. By the end of the course, students will be able to read and speak about a limited~~	**Subject & Number: EAP 101** **Title: English Foundations I** **Course Career: Undergraduate** **Units: 0** **Approved Hours** **Fee index: 6** **Faculty: Education** **Department: English Language School** **Typically Offered: either term** **Description** This course will help beginner-level students to develop a strong foundation of basic oral and written fluency in English. By the end of the course, you should be able to make contributions in small group discussions and engage in simple conversations. You will also demonstrate a growing understanding of written and spoken texts about general interest topics, as well as express ideas in writing at the sentence level with some

~~range of academic topics, demonstrate elementary proficiency in academic vocabulary, and write about everyday academic life at the sentence level with some clarity.~~	clarity.

Reviewed/Approved by:

REQUIRED: Faculty Council (or delegate) and approval date. Faculty of Education, Undergraduate Academic Affairs - Approved - April 27, 2023
OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates.

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Course Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	Education, English Language School
Contact Person:	Donald Mason
Level of change: (choose one only) [?]	• Undergraduate
	•
For which term will this change take effect?	Fall 2023

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

The Academic Foundations course titles and descriptions were revised as non-credit courses in 2021. Course titles and descriptions were updated to represent new course objectives, positioning the English Foundations courses to appeal to a broader, more general audience by focusing less on academic literacy and more on general production of language.

At the time, we did not change the course titles and descriptions for the credit courses as we were not sure that we would continue offering these courses as credit courses. Now, however, as international students are beginning to travel more frequently, the International Visiting Student Program (IVSP) wishes to continue registering students as credit students. As IVSP students are registered through Open Studies, they register as credit students. IVSP students are the only students who take these courses as credit courses.

The changes in course titles and descriptions from Academic Foundations to English Foundations will now bring the credit and non-credit sides into alignment.

Course Template

Current: ~~Removed language~~	**Proposed:** New language
Subject & Number: EAP 102 **Title: ~~Academic Foundations II~~** **Course Career: Undergraduate** **Units: 0** **Approved Hours** **Fee index: 6** **Faculty: Education** **Department: English Language School** **Typically Offered: either term** **Description** ~~This course represents the second stage in preparing students for academic study in English. EAP 102 develops the academic literacy and oral fluency necessary for a strong foundation in academic English skills. The course is delivered in two parts: one focused on reading and writing, and the other focused on speaking and listening. By the end of the course, students will be able to participate in group discussions~~	**Subject & Number: EAP 102** **Title: English Foundations II** **Course Career: Undergraduate** **Units: 0** **Approved Hours** **Fee index: 6** **Faculty: Education** **Department: English Language School** **Typically Offered: either term** **Description** This course will help intermediate-level students to develop language skills in English. You will participate in interactive classes that provide many opportunities for meaningful language learning. Classes will include interactive tasks such as participating in group discussions, giving class presentations, and engaging with video, audio, and digital material. The focus will be on developing fluency, accuracy, and vocabulary as you

~~about straightforward academic topics, demonstrate a growing understanding of written and spoken academic texts, and express ideas in writing at the sentence level with some clarity.~~	develop speaking, listening, reading, and writing skills with an emphasis on practical use.

Reviewed/Approved by:

REQUIRED: Faculty Council (or delegate) and approval date. Faculty of Education, Undergraduate Academic Affairs - Approved - April 27, 2023
OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates.

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Course Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	Education, English Language School
Contact Person:	Donald Mason
Level of change: (choose one only) [?]	• Undergraduate
	•
For which term will this change take effect?	Fall 2023

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

The Academic Foundations course titles and descriptions were revised as non-credit courses in 2021. Course titles and descriptions were updated to represent new course objectives, positioning the English Foundations courses to appeal to a broader, more general audience by focusing less on academic literacy and more on general production of language.

At the time, we did not change the course titles and descriptions for the credit courses as we were not sure that we would continue offering these courses as credit courses. Now, however, as international students are beginning to travel more frequently, the International Visiting Student Program (IVSP) wishes to continue registering students as credit students. As IVSP students are registered through Open Studies, they register as credit students. IVSP students are the only students who take these courses as credit courses.

The changes in course titles and descriptions from Academic Foundations to English Foundations will now bring the credit and non-credit sides into alignment.

Course Template

Current: ~~Removed language~~	**Proposed:** New language
Subject & Number: EAP 103 **Title:** ~~**Academic Foundations III**~~ **Course Career: Undergraduate** **Units: 0** **Approved Hours: variable** **Fee index: 6** **Faculty: Education** **Department: English Language School** **Typically Offered: either term** **Description** ~~This course represents the third stage in preparing students for academic study in English. EAP 103 develops the academic literacy and oral fluency necessary for a strong foundation in academic English skills. The course is delivered in two parts: one focused on reading and writing, and the other focused on speaking and listening. By the end of the course, students will be able to deliver short academic~~	**Subject & Number: EAP 103** **Title: English Foundations III** **Course Career: Undergraduate** **Units: 0** **Approved Hours: variable** **Fee index: 6** **Faculty: Education** **Department: English Language School** **Typically Offered: either term** **Description** This course will help high-intermediate-level students to develop their language skills in English. You will participate in interactive classes that provide many opportunities for meaningful language learning. Classes will include giving presentations, leading and participating in group discussions, and engaging with authentic video, audio, and digital material. By the end of the course, you should be able to deliver short presentations,

~~presentations, demonstrate a basic understanding of issues related to academic integrity and write about academically focused topics with some clarity~~.	demonstrate an understanding of intermediate-level written and spoken texts, and write about familiar topics with increased fluency.

Reviewed/Approved by:

REQUIRED: Faculty Council (or delegate) and approval date. Faculty of Education, Undergraduate Academic Affairs - Approved - April 27, 2023
OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates.

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Program and Regulation Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	Education
Contact Person:	
Level of change: (choose one only)	☑ Undergraduate
	☐ Graduate
Type of change request: (check all that apply)	☑ Program
	☐ Regulation
For which term is this intended to take effect?	Fall 2024
Does this proposal have corresponding course changes? (Should be submitted at the same time)	

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

Rationale for changing 3 ucw to require English (ENGL) and not ENGL or WRS is to bring the calendar language into alignment with the Alberta government's provincial requirement for teacher certification. Previously there was risk that students might not complete the minimum of 3 ucw of literature, as required by the provincial government, if they complete WRS for both of the language requirements (listed as options but these are required courses for all BEd degrees.

Calendar Copy

URL in current Calendar (or "New page") Bachelor of Science Specialization in Science and Education / Bachelor of Education in Secondary Education Combined Degrees Program [Education]

Current Copy: ~~Removed language~~	**Proposed Copy:** New language
BSc (Specialization in Science and Education)/BEd (Secondary) Combined Degrees Program Requirements	**BSc (Specialization in Science and Education)/BEd (Secondary) Combined Degrees Program Requirements**
Note: Year 1 and Year 2 are completed in the Faculty of Science. Years 3, 4 and 5 are completed in the Faculty of Education.	**Note:** Year 1 and Year 2 are completed in the Faculty of Science. Years 3, 4 and 5 are completed in the Faculty of Education.
• Biological Sciences Major/Mathematical Sciences Minor (150 units) **Biological Sciences Major/Mathematical Sciences Minor (150 units) [Science]**	• Biological Sciences Major/Mathematical Sciences Minor (150 units) **Biological Sciences Major/Mathematical Sciences Minor (150 units) [Science]**

Core Program Requirements Education: 51 units Major: 45 units Minor: 24 units 100-level: 30 units (Maximum 42 units) **Graduation Requirements:** GPA of 2.3 on **all** courses GPA of 2.3 on **Major** courses **Area "B"** • ANTHR 230 - Anthropology of Science, Technology, and Environment • BIOL 315 - Biology: An Historical Perspective • CHRTC 350 - Science and Religion • CHRTC 352 - Bioethics and Christianity • CLASS 294 - Ancient Science, Technology, and Medicine • HIST 115 - Technology and History • HIST 294 - An Introduction to the History of Sciences, Technology, and Medicine • HIST 391 - History of Technology • HIST 394 - History of Astronomy and Cosmology from Stonehenge to the Space Age • HIST 397 • HIST 398 - History of Science II • HIST 496 - Topics in the History of Science • PHIL 217 - Biology, Society, and Values • PHIL 265 - Philosophy of Science • STS 200 - Introduction to Studies in Science, Technology and Society • SUST 201 - Introduction to Sustainability • WGS 250 - Gender and Science • **Note:** It is the student's responsibility to ensure that all prerequisites for higher level courses are met. **Year 1 (30 units)** • BIOL 107 - Introduction to Cell Biology	**Core Program Requirements** Education: 51 units Major: 45 units Minor: 24 units 100-level: 30 units (Maximum 42 units) **Graduation Requirements:** GPA of 2.3 on **all** courses GPA of 2.3 on **Major** courses **Area "B"** • ANTHR 230 - Anthropology of Science, Technology, and Environment • BIOL 315 - Biology: An Historical Perspective • CHRTC 350 - Science and Religion • CHRTC 352 - Bioethics and Christianity • CLASS 294 - Ancient Science, Technology, and Medicine • HIST 115 - Technology and History • HIST 294 - An Introduction to the History of Sciences, Technology, and Medicine • HIST 391 - History of Technology • HIST 394 - History of Astronomy and Cosmology from Stonehenge to the Space Age • HIST 397 • HIST 398 - History of Science II • HIST 496 - Topics in the History of Science • PHIL 217 - Biology, Society, and Values • PHIL 265 - Philosophy of Science • STS 200 - Introduction to Studies in Science, Technology and Society • SUST 201 - Introduction to Sustainability • WGS 250 - Gender and Science • **Note:** It is the student's responsibility to ensure that all prerequisites for higher level courses are met. **Year 1 (30 units)** • BIOL 107 - Introduction to Cell Biology

• BIOL 108 - Introduction to Biological Diversity • CHEM 101 - Introductory University Chemistry I • CHEM 261 - Organic Chemistry I • EDU 100 - Contexts of Education • ~~3 units in junior ENGL or WRS~~ • 6 units in Arts options • **3 units from** --- • MATH 134 - Calculus for the Life Sciences I • MATH 144 - Calculus for the Mathematical and Physical Sciences I • MATH 154 - Calculus for Business and Economics I • **3 units from** --- • MATH 125 - Linear Algebra I • MATH 136 - Calculus for the Life Sciences II • MATH 146 - Calculus for the Mathematical and Physical Sciences II • MATH 156 - Calculus for Business and Economics II • STAT 151 - Introduction to Applied Statistics I • **Year 2 (30 units)** --- • BIOL 207 - Molecular Genetics and Heredity • BIOL 208 - Principles of Ecology • BIOCH 200 - Introductory Biochemistry • EDU 211 - Aboriginal Education and Contexts for Professional and Personal Engagement • 6 units in Biological Sciences at the 200-level • 6 units in Mathematical Sciences at the 200-level • 3 units in junior ENGL or WRS • **3 units from** --- • MATH 125 - Linear Algebra I • MATH 136 - Calculus for the Life Sciences II • MATH 146 - Calculus for the Mathematical and Physical Sciences II • MATH 156 - Calculus for Business and Economics II	• BIOL 108 - Introduction to Biological Diversity • CHEM 101 - Introductory University Chemistry I • CHEM 261 - Organic Chemistry I • EDU 100 - Contexts of Education • 3 units in junior ENGL • 6 units in Arts options • **Note:** --- No more than 6 units in junior English, or equivalent, may be taken for credit in a Bachelor of Science / Bachelor of Education degree program. • **3 units from** --- • MATH 134 - Calculus for the Life Sciences I • MATH 144 - Calculus for the Mathematical and Physical Sciences I • MATH 154 - Calculus for Business and Economics I • **3 units from** --- • MATH 125 - Linear Algebra I • MATH 136 - Calculus for the Life Sciences II • MATH 146 - Calculus for the Mathematical and Physical Sciences II • MATH 156 - Calculus for Business and Economics II • STAT 151 - Introduction to Applied Statistics I • **Year 2 (30 units)** --- • BIOL 207 - Molecular Genetics and Heredity • BIOL 208 - Principles of Ecology • BIOCH 200 - Introductory Biochemistry • EDU 211 - Aboriginal Education and Contexts for Professional and Personal Engagement • 6 units in Biological Sciences at the 200-level • 6 units in Mathematical Sciences at the 200-level • 3 units in junior ENGL or WRS • **3 units from** --- • MATH 125 - Linear Algebra I

- STAT 151 - Introduction to Applied Statistics I
- **Year 3 (30 units)**

- EDPY 304 - Adolescent Development and Learning
- EDU 210 - Introduction to Educational Technology
- 6 units in Biological Sciences at the 200-level
- 6 units from Area “B”
- 6 units in Arts options
- 3 units in Mathematical Sciences at the 300- or 400-level
- **3 units from**

- MATH 125 - Linear Algebra I
- MATH 136 - Calculus for the Life Sciences II
- MATH 146 - Calculus for the Mathematical and Physical Sciences II
- MATH 156 - Calculus for Business and Economics II
- STAT 151 - Introduction to Applied Statistics I
- **Year 4 (30 units)**

- EDFX 350 - Secondary Route Field Experience for the Introductory Professional Term (5 weeks)
- EDSE 355 - Curriculum and Teaching for Secondary School Science Majors I (Major)
- EDSE 307 - Language, Literacy and Society in Educational Contexts
- EDPY 303 - Educational Assessment
- EDSE 338 - Curriculum and Teaching for Secondary School Mathematics Minors (Minor)
- EDPY 301 - Introduction to Inclusive Education: Adapting Classroom Instruction for Students with Special Needs
- EDPS 410 - Ethics and Law in Teaching
- 6 units in Biological Sciences at the 200-, 300- or 400-level
- **Note:**

First four courses above constitute the Introductory Professional Term and must be taken concurrently.

- MATH 136 - Calculus for the Life Sciences II
- MATH 146 - Calculus for the Mathematical and Physical Sciences II
- MATH 156 - Calculus for Business and Economics II
- STAT 151 - Introduction to Applied Statistics I
- **Year 3 (30 units)**

- EDPY 304 - Adolescent Development and Learning
- EDU 210 - Introduction to Educational Technology
- 6 units in Biological Sciences at the 200-level
- 6 units from Area “B”
- 6 units in Arts options
- 3 units in Mathematical Sciences at the 300- or 400-level
- **3 units from**

- MATH 125 - Linear Algebra I
- MATH 136 - Calculus for the Life Sciences II
- MATH 146 - Calculus for the Mathematical and Physical Sciences II
- MATH 156 - Calculus for Business and Economics II
- STAT 151 - Introduction to Applied Statistics I
- **Year 4 (30 units)**

- EDFX 350 - Secondary Route Field Experience for the Introductory Professional Term (5 weeks)
- EDSE 355 - Curriculum and Teaching for Secondary School Science Majors I (Major)
- EDSE 307 - Language, Literacy and Society in Educational Contexts
- EDPY 303 - Educational Assessment
- EDSE 338 - Curriculum and Teaching for Secondary School Mathematics Minors (Minor)
- EDPY 301 - Introduction to Inclusive Education: Adapting Classroom Instruction for Students with Special Needs
- EDPS 410 - Ethics and Law in Teaching
- 6 units in Biological Sciences at the 200-, 300- or 400-level

Year 5 (30 units)

- EDFX 450 - Secondary Route: Advanced Field Experience (9 weeks)
- EDSE 455 - Curriculum and Teaching for Secondary School Science Majors II (Major) (6 units)
- 12 units in Biological Sciences at the 300- or 400-level
- 3 units in Mathematical Sciences at the 300- or 400-level

- **Note:**

First two courses above constitute the Advanced Professional Term and must be taken concurrently

- Biological Sciences Major/Physical Sciences Minor (150 units)

Biological Sciences Major/Physical Sciences Minor (150 units) [Science]

Core Program Requirements

Education 51 units

Major: 42 units

Minor: 27 units

100-level: 33 units (Maximum 42 units)

Graduation Requirements:

GPA of 2.3 on **all** courses

GPA of 2.3 on **Major** courses

Area "A"

- CHEM 211 - Quantitative Analysis I
- CHEM 263 - Organic Chemistry II
- PHYS 208 - Aspects of Modern Physics
- PHYS 271 - Introduction to Modern Physics

- **Note:**

First four courses above constitute the Introductory Professional Term and must be taken concurrently.

Year 5 (30 units)

- EDFX 450 - Secondary Route: Advanced Field Experience (9 weeks)
- EDSE 455 - Curriculum and Teaching for Secondary School Science Majors II (Major) (6 units)
- 12 units in Biological Sciences at the 300- or 400-level
- 3 units in Mathematical Sciences at the 300- or 400-level

- **Note:**

First two courses above constitute the Advanced Professional Term and must be taken concurrently

- Biological Sciences Major/Physical Sciences Minor (150 units)

Biological Sciences Major/Physical Sciences Minor (150 units) [Science]

Core Program Requirements

Education 51 units

Major: 42 units

Minor: 27 units

100-level: 33 units (Maximum 42 units)

Graduation Requirements:

GPA of 2.3 on **all** courses

GPA of 2.3 on **Major** courses

Area "A"

- CHEM 211 - Quantitative Analysis I

- **Area "B"**

  - ANTHR 230 - Anthropology of Science, Technology, and Environment
  - BIOL 315 - Biology: An Historical Perspective
  - CHRTC 350 - Science and Religion
  - CHRTC 352 - Bioethics and Christianity
  - CLASS 294 - Ancient Science, Technology, and Medicine
  - HIST 115 - Technology and History
  - HIST 294 - An Introduction to the History of Sciences, Technology, and Medicine
  - HIST 391 - History of Technology
  - HIST 394 - History of Astronomy and Cosmology from Stonehenge to the Space Age
  - HIST 397
  - HIST 398 - History of Science II
  - HIST 496 - Topics in the History of Science
  - PHIL 217 - Biology, Society, and Values
  - PHIL 265 - Philosophy of Science
  - STS 200 - Introduction to Studies in Science, Technology and Society
  - SUST 201 - Introduction to Sustainability
  - WGS 250 - Gender and Science
- **Area "C"**

  - ASTRO 320 - Stellar Astrophysics I
  - ASTRO 322 - Galactic and Extragalactic Astrophysics
  - PHYS 301 - Particles, Nuclei, and the Cosmos
  - PHYS 308 - Statistical, Molecular, and Solid State Physics
  - PHYS 310 - Thermodynamics and Kinetic Theory
  - PHYS 311 - Statistical Physics
  - PHYS 362 - Optics and Lasers
  - PHYS 364 - Environmental Physics II or any 300-level CHEM (not to include CHEM 300 or CHEM 399)
- **Note:**

  It is the student's responsibility to ensure all prerequisites for 300-level courses are met.

  Year 1 (30 units)

  - BIOL 107 - Introduction to Cell Biology
  - CHEM 263 - Organic Chemistry II
  - PHYS 208 - Aspects of Modern Physics
  - PHYS 271 - Introduction to Modern Physics
- **Area "B"**

  - ANTHR 230 - Anthropology of Science, Technology, and Environment
  - BIOL 315 - Biology: An Historical Perspective
  - CHRTC 350 - Science and Religion
  - CHRTC 352 - Bioethics and Christianity
  - CLASS 294 - Ancient Science, Technology, and Medicine
  - HIST 115 - Technology and History
  - HIST 294 - An Introduction to the History of Sciences, Technology, and Medicine
  - HIST 391 - History of Technology
  - HIST 394 - History of Astronomy and Cosmology from Stonehenge to the Space Age
  - HIST 397
  - HIST 398 - History of Science II
  - HIST 496 - Topics in the History of Science
  - PHIL 217 - Biology, Society, and Values
  - PHIL 265 - Philosophy of Science
  - STS 200 - Introduction to Studies in Science, Technology and Society
  - SUST 201 - Introduction to Sustainability
  - WGS 250 - Gender and Science
- **Area "C"**

  - ASTRO 320 - Stellar Astrophysics I
  - ASTRO 322 - Galactic and Extragalactic Astrophysics
  - PHYS 301 - Particles, Nuclei, and the Cosmos
  - PHYS 308 - Statistical, Molecular, and Solid State Physics
  - PHYS 310 - Thermodynamics and Kinetic Theory
  - PHYS 311 - Statistical Physics
  - PHYS 362 - Optics and Lasers
  - PHYS 364 - Environmental Physics II or any 300-level CHEM (not to include CHEM 300 or CHEM 399)
- **Note:**

  It is the student's responsibility to ensure all prerequisites for 300-level courses are met.

- BIOL 108 - Introduction to Biological Diversity
- CHEM 101 - Introductory University Chemistry I
- CHEM 261 - Organic Chemistry I
- One of MATH 134, 144, or 154
- One of MATH 136, 146, or 156
-
- PHYS 124 - Particles and Waves **OR**
- PHYS 144 - Newtonian Mechanics and Relativity
-
- PHYS 126 - Fluids, Fields, and Radiation **OR**
- PHYS 146 - Fluids and Waves
-
- EDU 100 - Contexts of Education
- ~~3 units in junior ENGL or WRS~~

- **Year 2 (30 units)**

- BIOL 207 - Molecular Genetics and Heredity
- BIOL 208 - Principles of Ecology
- CHEM 102 - Introductory University Chemistry II
- BIOCH 200 - Introductory Biochemistry
- EDU 211 - Aboriginal Education and Contexts for Professional and Personal Engagement
- 3 units from Area “A”
- 3 units in Biological Sciences at the 200-level
- 6 units in Arts options
- 3 units in junior ENGL or WRS

- **Year 3 (30 units)**

- EDU 210 - Introduction to Educational Technology
- PHYS 261 - Physics of Energy
- EDPY 304 - Adolescent Development and Learning
- 6 units in Biological Sciences at the 200-level
- 6 units from Area “B”
- 6 units in Arts options
- 3 units from Area “C”

- **Year 4 (30 units)**

- EDFX 350 - Secondary Route Field Experience for the Introductory Professional Term (5 weeks)

Year 1 (30 units)

- BIOL 107 - Introduction to Cell Biology
- BIOL 108 - Introduction to Biological Diversity
- CHEM 101 - Introductory University Chemistry I
- CHEM 261 - Organic Chemistry I
- One of MATH 134, 144, or 154
- One of MATH 136, 146, or 156
-
- PHYS 124 - Particles and Waves **OR**
- PHYS 144 - Newtonian Mechanics and Relativity
-
- PHYS 126 - Fluids, Fields, and Radiation **OR**
- PHYS 146 - Fluids and Waves
-
- EDU 100 - Contexts of Education
- 3 units in junior ENGL
-

- **Note:**

No more than 6 units in junior English, or equivalent, may be taken for credit in a Bachelor of Science / Bachelor of Education degree program.

- **Year 2 (30 units)**

- BIOL 207 - Molecular Genetics and Heredity
- BIOL 208 - Principles of Ecology
- CHEM 102 - Introductory University Chemistry II
- BIOCH 200 - Introductory Biochemistry
- EDU 211 - Aboriginal Education and Contexts for Professional and Personal Engagement
- 3 units from Area “A”
- 3 units in Biological Sciences at the 200-level
- 6 units in Arts options
- 3 units in junior ENGL or WRS

- **Year 3 (30 units)**

- EDU 210 - Introduction to Educational Technology
- PHYS 261 - Physics of Energy
- EDPY 304 - Adolescent Development and Learning

- EDSE 355 - Curriculum and Teaching for Secondary School Science Majors I (Major)
- EDSE 307 - Language, Literacy and Society in Educational Contexts
- EDPY 303 - Educational Assessment
- EDSE 3XX (Minor) or Education Elective (see note below)
- EDPS 410 - Ethics and Law in Teaching
- EDPY 301 - Introduction to Inclusive Education: Adapting Classroom Instruction for Students with Special Needs
- 6 units in Biological Sciences at the 200-, 300- or 400-level

- **Note:**

First four courses above constitute the Introductory Professional Term and must be taken concurrently. EDSE 356 is not open to students whose major is Biological Sciences, Chemistry, General Sciences, Physical Sciences or Physics. These students must choose to either register for another EDSE (Minor) provided they meet the course prerequisites, OR register in an additional Education Elective.

Year 5 (30 units)

- EDFX 450 - Secondary Route: Advanced Field Experience (9 weeks)
- EDSE 455 - Curriculum and Teaching for Secondary School Science Majors II (Major) (6 units)
- 12 units in Biological Sciences at the 300- or 400-level
- 3 units from Area “C”

- **Note:**

First two courses above constitute the Advanced Professional Term and must be taken concurrently.

- Mathematical Sciences Major/Biological Sciences Minor (150 units)

- 6 units in Biological Sciences at the 200-level
- 6 units from Area “B”
- 6 units in Arts options
- 3 units from Area “C”

- **Year 4 (30 units)**

- EDFX 350 - Secondary Route Field Experience for the Introductory Professional Term (5 weeks)
- EDSE 355 - Curriculum and Teaching for Secondary School Science Majors I (Major)
- EDSE 307 - Language, Literacy and Society in Educational Contexts
- EDPY 303 - Educational Assessment
- EDSE 3XX (Minor) or Education Elective (see note below)
- EDPS 410 - Ethics and Law in Teaching
- EDPY 301 - Introduction to Inclusive Education: Adapting Classroom Instruction for Students with Special Needs
- 6 units in Biological Sciences at the 200-, 300- or 400-level

- **Note:**

First four courses above constitute the Introductory Professional Term and must be taken concurrently. EDSE 356 is not open to students whose major is Biological Sciences, Chemistry, General Sciences, Physical Sciences or Physics. These students must choose to either register for another EDSE (Minor) provided they meet the course prerequisites, OR register in an additional Education Elective.

Year 5 (30 units)

- EDFX 450 - Secondary Route: Advanced Field Experience (9 weeks)
- EDSE 455 - Curriculum and Teaching for Secondary School Science Majors II (Major) (6 units)
- 12 units in Biological Sciences at the 300- or 400-level
- 3 units from Area “C”

- **Note:**

First two courses above constitute the Advanced

Mathematical Sciences Major/Biological Sciences Minor (150 units) [Science]

Core Program Requirements

Education: 51 units

Major: 42 units

Minor: 27 units

100-level: 33 units (Maximum 42 units)

Graduation Requirements:

GPA of 2.3 on **all** courses

GPA of 2.3 on **Major** courses

Area "B"

- ANTHR 230 - Anthropology of Science, Technology, and Environment
- BIOL 315 - Biology: An Historical Perspective
- CHRTC 350 - Science and Religion
- CHRTC 352 - Bioethics and Christianity
- CLASS 294 - Ancient Science, Technology, and Medicine
- HIST 115 - Technology and History
- HIST 294 - An Introduction to the History of Sciences, Technology, and Medicine
- HIST 391 - History of Technology
- HIST 394 - History of Astronomy and Cosmology from Stonehenge to the Space Age
- HIST 397
- HIST 398 - History of Science II
- HIST 496 - Topics in the History of Science
- PHIL 217 - Biology, Society, and Values
- PHIL 265 - Philosophy of Science
- PHYS 261 - Physics of Energy
- STS 200 - Introduction to Studies in Science, Technology and Society
- SUST 201 - Introduction to Sustainability
- WGS 250 - Gender and Science

- **Note:**

It is the student's responsibility to ensure that all Professional Term and must be taken concurrently.

- Mathematical Sciences Major/Biological Sciences Minor (150 units)

Mathematical Sciences Major/Biological Sciences Minor (150 units) [Science]

Core Program Requirements

Education: 51 units

Major: 42 units

Minor: 27 units

100-level: 33 units (Maximum 42 units)

Graduation Requirements:

GPA of 2.3 on **all** courses

GPA of 2.3 on **Major** courses

Area "B"

- ANTHR 230 - Anthropology of Science, Technology, and Environment
- BIOL 315 - Biology: An Historical Perspective
- CHRTC 350 - Science and Religion
- CHRTC 352 - Bioethics and Christianity
- CLASS 294 - Ancient Science, Technology, and Medicine
- HIST 115 - Technology and History
- HIST 294 - An Introduction to the History of Sciences, Technology, and Medicine
- HIST 391 - History of Technology
- HIST 394 - History of Astronomy and Cosmology from Stonehenge to the Space Age
- HIST 397
- HIST 398 - History of Science II
- HIST 496 - Topics in the History of Science
- PHIL 217 - Biology, Society, and Values
- PHIL 265 - Philosophy of Science
- PHYS 261 - Physics of Energy

prerequisites for higher level courses are met.

Year 1 (30 units)

- BIOL 107 - Introduction to Cell Biology
- BIOL 108 - Introduction to Biological Diversity
- EDU 100 - Contexts of Education
- One of MATH 134, 144, or 154
- One of MATH 136, 146, or 156
- MATH 125 - Linear Algebra I
- STAT 151 - Introduction to Applied Statistics I
- ~~3 units in junior ENGL or WRS~~
- 6 units in Physical Sciences at the 100-level

- **Year 2 (30 units)**

- BIOL 207 - Molecular Genetics and Heredity
- BIOL 208 - Principles of Ecology
- EDU 211 - Aboriginal Education and Contexts for Professional and Personal Engagement
- MATH 214 - Calculus III
- MATH 315 - Calculus IV
- MATH 228 - Algebra: Introduction to Ring Theory
- MATH 241 - Geometry
- 6 units in Arts options
- 3 units in junior ENGL or WRS

- **Year 3 (30 units)**

- EDPY 301 - Introduction to Inclusive Education: Adapting Classroom Instruction for Students with Special Needs
- EDPY 304 - Adolescent Development and Learning
- EDU 210 - Introduction to Educational Technology
- 3 units in Biological Sciences at the 200-level
- 6 units in Mathematical Sciences at the 200- or 300- or 400-level
- 3 units in Biological Sciences at the 200- or 300- or 400-level
- 3 units in Arts options
- 6 units from Area “B”

- **Year 4 (30 units)**

- STS 200 - Introduction to Studies in Science, Technology and Society
- SUST 201 - Introduction to Sustainability
- WGS 250 - Gender and Science

- **Note:**

It is the student’s responsibility to ensure that all prerequisites for higher level courses are met.

Year 1 (30 units)

- BIOL 107 - Introduction to Cell Biology
- BIOL 108 - Introduction to Biological Diversity
- EDU 100 - Contexts of Education
- One of MATH 134, 144, or 154
- One of MATH 136, 146, or 156
- MATH 125 - Linear Algebra I
- STAT 151 - Introduction to Applied Statistics I
- 3 units in junior ENGL
- 6 units in Physical Sciences at the 100-level
-

- **Note:**

No more than 6 units in junior English, or equivalent, may be taken for credit in a Bachelor of Science / Bachelor of Education degree program.

- **Year 2 (30 units)**

- BIOL 207 - Molecular Genetics and Heredity
- BIOL 208 - Principles of Ecology
- EDU 211 - Aboriginal Education and Contexts for Professional and Personal Engagement
- MATH 214 - Calculus III
- MATH 315 - Calculus IV
- MATH 228 - Algebra: Introduction to Ring Theory
- MATH 241 - Geometry
- 6 units in Arts options
- 3 units in junior ENGL or WRS

- **Year 3 (30 units)**

- EDPY 301 - Introduction to Inclusive Education: Adapting Classroom Instruction for Students with Special Needs

- EDFX 350 - Secondary Route Field Experience for the Introductory Professional Term (5 weeks)
- EDSE 337 - Curriculum and Teaching for Secondary School Mathematics Majors I (Major)
- EDSE 307 - Language, Literacy and Society in Educational Contexts
- EDPY 303 - Educational Assessment
- EDSE 356 - Curriculum and Teaching for Secondary School Science Minor (Minor)
- EDPS 410 - Ethics and Law in Teaching
- 6 units in Biological Sciences at the 300- or 400-level
- 3 units in Mathematical Sciences at the 300- or 400-level

- Note:

First four courses above constitute the Introductory Professional Term and must be taken concurrently.

Year 5 (30 units)

- EDFX 450 - Secondary Route: Advanced Field Experience (9 weeks)
- EDSE 437 - Curriculum and Teaching for Secondary School Mathematics Majors II (Major) (6 units)
- 9 units in Mathematical Sciences at the 300- or 400- level
- 3 units in Arts options
- 3 units in Biological Sciences at the 200- or 300- or 400-level

- **Note:**

First two courses above constitute the Advanced Professional Term and must be taken concurrently

- Mathematical Sciences Major/Physical Sciences Minor (150 units)

Mathematical Sciences Major/Physical Sciences Minor (150 units) [Science]

Core Program Requirements

- EDPY 304 - Adolescent Development and Learning
- EDU 210 - Introduction to Educational Technology
- 3 units in Biological Sciences at the 200-level
- 6 units in Mathematical Sciences at the 200- or 300- or 400-level
- 3 units in Biological Sciences at the 200- or 300- or 400-level
- 3 units in Arts options
- 6 units from Area “B”

- **Year 4 (30 units)**

- EDFX 350 - Secondary Route Field Experience for the Introductory Professional Term (5 weeks)
- EDSE 337 - Curriculum and Teaching for Secondary School Mathematics Majors I (Major)
- EDSE 307 - Language, Literacy and Society in Educational Contexts
- EDPY 303 - Educational Assessment
- EDSE 356 - Curriculum and Teaching for Secondary School Science Minor (Minor)
- EDPS 410 - Ethics and Law in Teaching
- 6 units in Biological Sciences at the 300- or 400-level
- 3 units in Mathematical Sciences at the 300- or 400-level

- Note:

First four courses above constitute the Introductory Professional Term and must be taken concurrently.

Year 5 (30 units)

- EDFX 450 - Secondary Route: Advanced Field Experience (9 weeks)
- EDSE 437 - Curriculum and Teaching for Secondary School Mathematics Majors II (Major) (6 units)
- 9 units in Mathematical Sciences at the 300- or 400- level
- 3 units in Arts options
- 3 units in Biological Sciences at the 200- or 300- or 400-level

- **Note:**

First two courses above constitute the Advanced Professional Term and must be taken concurrently

Education: 51 units

Major: 42 units

Minor: 27 units

100-level: 39 units (Maximum 42 units)

Graduation Requirements:

GPA of 2.3 on **all** courses

GPA of 2.3 on **Major** courses

Area "A"

- BIOCH 200 - Introductory Biochemistry
- CHEM 211 - Quantitative Analysis I
- CHEM 263 - Organic Chemistry II
- PHYS 208 - Aspects of Modern Physics
- PHYS 271 - Introduction to Modern Physics

- **Area "B"**

- ANTHR 230 - Anthropology of Science, Technology, and Environment
- BIOL 315 - Biology: An Historical Perspective
- CHRTC 350 - Science and Religion
- CHRTC 352 - Bioethics and Christianity
- CLASS 294 - Ancient Science, Technology, and Medicine
- HIST 115 - Technology and History
- HIST 294 - An Introduction to the History of Sciences, Technology, and Medicine
- HIST 391 - History of Technology
- HIST 394 - History of Astronomy and Cosmology from Stonehenge to the Space Age
- HIST 397
- HIST 398 - History of Science II
- HIST 496 - Topics in the History of Science
- PHIL 217 - Biology, Society, and Values
- PHIL 265 - Philosophy of Science
- PHYS 261 - Physics of Energy
- STS 200 - Introduction to Studies in Science, Technology and Society
- SUST 201 - Introduction to Sustainability
- WGS 250 - Gender and Science

- **Area "C"**

- ASTRO 320 - Stellar Astrophysics I
- Mathematical Sciences Major/Physical Sciences Minor (150 units)

Mathematical Sciences Major/Physical Sciences Minor (150 units) [Science]

Core Program Requirements

Education: 51 units

Major: 42 units

Minor: 27 units

100-level: 39 units (Maximum 42 units)

Graduation Requirements:

GPA of 2.3 on **all** courses

GPA of 2.3 on **Major** courses

Area "A"

- BIOCH 200 - Introductory Biochemistry
- CHEM 211 - Quantitative Analysis I
- CHEM 263 - Organic Chemistry II
- PHYS 208 - Aspects of Modern Physics
- PHYS 271 - Introduction to Modern Physics

- **Area "B"**

- ANTHR 230 - Anthropology of Science, Technology, and Environment
- BIOL 315 - Biology: An Historical Perspective
- CHRTC 350 - Science and Religion
- CHRTC 352 - Bioethics and Christianity
- CLASS 294 - Ancient Science, Technology, and Medicine
- HIST 115 - Technology and History
- HIST 294 - An Introduction to the History of Sciences, Technology, and Medicine
- HIST 391 - History of Technology
- HIST 394 - History of Astronomy and Cosmology from Stonehenge to the Space Age

- ASTRO 322 - Galactic and Extragalactic Astrophysics
- PHYS 301 - Particles, Nuclei, and the Cosmos
- PHYS 308 - Statistical, Molecular, and Solid State Physics
- PHYS 310 - Thermodynamics and Kinetic Theory
- PHYS 311 - Statistical Physics
- PHYS 362 - Optics and Lasers
- PHYS 364 - Environmental Physics II or any 300-level CHEM (not to include CHEM 300 or CHEM 399)

- **Note:**

It is the student's responsibility to ensure all prerequisites for 300-level courses are met.

Year 1 (30 units)

- BIOL 107 - Introduction to Cell Biology
- BIOL 108 - Introduction to Biological Diversity
- EDU 100 - Contexts of Education
- One of MATH 134, 144, or 154
- One of MATH 136, 146, or 156
- MATH 125 - Linear Algebra I
- STAT 151 - Introduction to Applied Statistics I

- **6 units chosen from**

- CHEM 101 - Introductory University Chemistry I
- CHEM 102 - Introductory University Chemistry II
-
- PHYS 124 - Particles and Waves **OR**
- PHYS 144 - Newtonian Mechanics and Relativity
-
- PHYS 126 - Fluids, Fields, and Radiation **OR**
- PHYS 146 - Fluids and Waves

- **Options**

- ~~3 units in junior ENGL or WRS~~

- **Year 2 (30 units)**

- CHEM 261 - Organic Chemistry I
- HIST 397
- HIST 398 - History of Science II
- HIST 496 - Topics in the History of Science
- PHIL 217 - Biology, Society, and Values
- PHIL 265 - Philosophy of Science
- PHYS 261 - Physics of Energy
- STS 200 - Introduction to Studies in Science, Technology and Society
- SUST 201 - Introduction to Sustainability
- WGS 250 - Gender and Science

- **Area "C"**

- ASTRO 320 - Stellar Astrophysics I
- ASTRO 322 - Galactic and Extragalactic Astrophysics
- PHYS 301 - Particles, Nuclei, and the Cosmos
- PHYS 308 - Statistical, Molecular, and Solid State Physics
- PHYS 310 - Thermodynamics and Kinetic Theory
- PHYS 311 - Statistical Physics
- PHYS 362 - Optics and Lasers
- PHYS 364 - Environmental Physics II or any 300-level CHEM (not to include CHEM 300 or CHEM 399)

- **Note:**

It is the student's responsibility to ensure all prerequisites for 300-level courses are met.

Year 1 (30 units)

- BIOL 107 - Introduction to Cell Biology
- BIOL 108 - Introduction to Biological Diversity
- EDU 100 - Contexts of Education
- One of MATH 134, 144, or 154
- One of MATH 136, 146, or 156
- MATH 125 - Linear Algebra I
- STAT 151 - Introduction to Applied Statistics I

- **6 units chosen from**

- CHEM 101 - Introductory University Chemistry I
- CHEM 102 - Introductory University Chemistry II
-
- PHYS 124 - Particles and Waves **OR**

- EDU 211 - Aboriginal Education and Contexts for Professional and Personal Engagement
- MATH 214 - Calculus III
- MATH 315 - Calculus IV
- MATH 228 - Algebra: Introduction to Ring Theory
- MATH 241 - Geometry

- **6 units chosen from**

- CHEM 101 - Introductory University Chemistry I
- CHEM 102 - Introductory University Chemistry II
-
- PHYS 124 - Particles and Waves **OR**
- PHYS 144 - Newtonian Mechanics and Relativity
-
- PHYS 126 - Fluids, Fields, and Radiation **OR**
- PHYS 146 - Fluids and Waves

- **Options**

- 3 units in junior ENGL or WRS
- 3 units in Arts options

- **Year 3 (30 units)**

- EDPY 301 - Introduction to Inclusive Education: Adapting Classroom Instruction for Students with Special Needs
- EDPY 304 - Adolescent Development and Learning
- EDU 210 - Introduction to Educational Technology
-
- PHYS 208 - Aspects of Modern Physics **OR**
- PHYS 271 - Introduction to Modern Physics
-
- 3 units from Area “A”
- 6 units in Mathematical Sciences at the 200, 300 or 400-level
- 3 units in Arts Options
- 6 units from Area “B”

- **Note:**

Students wishing to take PHYS 364 as their Area “C” option must take PHYS 261 as an Area “B”

- PHYS 144 - Newtonian Mechanics and Relativity
-
- PHYS 126 - Fluids, Fields, and Radiation **OR**
- PHYS 146 - Fluids and Waves

- **Options**

- 3 units in junior ENGL

- **Note:**

No more than 6 units in junior English, or equivalent, may be taken for credit in a Bachelor of Science / Bachelor of Education degree program.

- **Year 2 (30 units)**

- CHEM 261 - Organic Chemistry I
- EDU 211 - Aboriginal Education and Contexts for Professional and Personal Engagement
- MATH 214 - Calculus III
- MATH 315 - Calculus IV
- MATH 228 - Algebra: Introduction to Ring Theory
- MATH 241 - Geometry

- **6 units chosen from**

- CHEM 101 - Introductory University Chemistry I
- CHEM 102 - Introductory University Chemistry II
-
- PHYS 124 - Particles and Waves **OR**
- PHYS 144 - Newtonian Mechanics and Relativity
-
- PHYS 126 - Fluids, Fields, and Radiation **OR**
- PHYS 146 - Fluids and Waves

- **Options**

- 3 units in junior ENGL or WRS
- 3 units in Arts options

- **Year 3 (30 units)**

- EDPY 301 - Introduction to Inclusive Education: Adapting Classroom Instruction for Students with Special Needs

option.

Year 4 (30 units)

- EDFX 350 - Secondary Route Field Experience for the Introductory Professional Term (5 weeks)
- EDSE 337 - Curriculum and Teaching for Secondary School Mathematics Majors I (Major)
- EDSE 307 - Language, Literacy and Society in Educational Contexts
- EDPY 303 - Educational Assessment
- EDPS 410 - Ethics and Law in Teaching
- EDSE 356 - Curriculum and Teaching for Secondary School Science Minor
- 3 units in Mathematical Sciences at the 300- or 400-level
- 3 units from Area “A”
- 3 units from Area “C”

- **Note:**

First four courses above constitute the Introductory Professional Term and must be taken concurrently.

Year 5 (30 units)

- EDFX 450 - Secondary Route: Advanced Field Experience (9 weeks)
- EDSE 437 - Curriculum and Teaching for Secondary School Mathematics Majors II (Major) (6 units)
- 9 units in Mathematical Sciences at the 300- or 400- level
- 3 units in Arts Options
- 3 units Area “C”

- **Note:**

First two courses above constitute the Advanced Professional Term and must be taken concurrently.

- Physical Sciences Major/Biological Sciences Minor, Chemistry Concentration (150 units)

Physical Sciences Major/Biological Sciences Minor, Chemistry Concentration [Science]

- EDPY 304 - Adolescent Development and Learning
- EDU 210 - Introduction to Educational Technology
-
- PHYS 208 - Aspects of Modern Physics **OR**
- PHYS 271 - Introduction to Modern Physics
-
- 3 units from Area “A”
- 6 units in Mathematical Sciences at the 200, 300 or 400-level
- 3 units in Arts Options
- 6 units from Area “B”

- **Note:**

Students wishing to take PHYS 364 as their Area “C” option must take PHYS 261 as an Area “B” option.

Year 4 (30 units)

- EDFX 350 - Secondary Route Field Experience for the Introductory Professional Term (5 weeks)
- EDSE 337 - Curriculum and Teaching for Secondary School Mathematics Majors I (Major)
- EDSE 307 - Language, Literacy and Society in Educational Contexts
- EDPY 303 - Educational Assessment
- EDPS 410 - Ethics and Law in Teaching
- EDSE 356 - Curriculum and Teaching for Secondary School Science Minor
- 3 units in Mathematical Sciences at the 300- or 400-level
- 3 units from Area “A”
- 3 units from Area “C”

- **Note:**

First four courses above constitute the Introductory Professional Term and must be taken concurrently.

Year 5 (30 units)

- EDFX 450 - Secondary Route: Advanced Field Experience (9 weeks)
- EDSE 437 - Curriculum and Teaching for Secondary School Mathematics Majors II (Major) (6 units)

Core Program Requirements

Education: 51 units

Major: 42 units

Minor: 24 units

100-level: 33 units (Maximum 42 units)

Graduation Requirements:

GPA of 2.3 on **all** courses

GPA of 2.3 on **Major** courses

Area "B"

- ANTHR 230 - Anthropology of Science, Technology, and Environment
- BIOL 315 - Biology: An Historical Perspective
- CHRTC 350 - Science and Religion
- CHRTC 352 - Bioethics and Christianity
- CLASS 294 - Ancient Science, Technology, and Medicine
- HIST 115 - Technology and History
- HIST 294 - An Introduction to the History of Sciences, Technology, and Medicine
- HIST 391 - History of Technology
- HIST 394 - History of Astronomy and Cosmology from Stonehenge to the Space Age
- HIST 397
- HIST 398 - History of Science II
- HIST 496 - Topics in the History of Science
- PHIL 217 - Biology, Society, and Values
- PHIL 265 - Philosophy of Science
- PHYS 261 - Physics of Energy
- STS 200 - Introduction to Studies in Science, Technology and Society
- SUST 201 - Introduction to Sustainability
- WGS 250 - Gender and Science

- **Area "C"**
  - ASTRO 320 - Stellar Astrophysics I
  - ASTRO 322 - Galactic and Extragalactic Astrophysics
  - MA PH 251 - Differential Equations for Physics
  - MA PH 351 - Mathematical Methods for Physics I
  - 9 units in Mathematical Sciences at the 300- or 400- level
  - 3 units in Arts Options
  - 3 units Area "C"
- **Note:**

  First two courses above constitute the Advanced Professional Term and must be taken concurrently.

- Physical Sciences Major/Biological Sciences Minor, Chemistry Concentration (150 units)

Physical Sciences Major/Biological Sciences Minor, Chemistry Concentration [Science]

Core Program Requirements

Education: 51 units

Major: 42 units

Minor: 24 units

100-level: 33 units (Maximum 42 units)

Graduation Requirements:

GPA of 2.3 on **all** courses

GPA of 2.3 on **Major** courses

Area "B"

- ANTHR 230 - Anthropology of Science, Technology, and Environment
- BIOL 315 - Biology: An Historical Perspective
- CHRTC 350 - Science and Religion
- CHRTC 352 - Bioethics and Christianity
- CLASS 294 - Ancient Science, Technology, and Medicine
- HIST 115 - Technology and History
- HIST 294 - An Introduction to the History of Sciences, Technology, and Medicine
- HIST 391 - History of Technology
- HIST 394 - History of Astronomy and Cosmology from Stonehenge to the Space Age

- PHYS 301 - Particles, Nuclei, and the Cosmos
- PHYS 308 - Statistical, Molecular, and Solid State Physics
- PHYS 310 - Thermodynamics and Kinetic Theory
- PHYS 311 - Statistical Physics
- PHYS 362 - Optics and Lasers
- PHYS 364 - Environmental Physics II or any 300-level CHEM (not to include CHEM 300 or CHEM 399)

- **Note:**

It is the student's responsibility to ensure all prerequisites for 300-level courses are met.

Year 1 (30 units)

- BIOL 107 - Introduction to Cell Biology
- BIOL 108 - Introduction to Biological Diversity
- CHEM 101 - Introductory University Chemistry I
- CHEM 102 - Introductory University Chemistry II
- EDU 100 - Contexts of Education
- One of MATH 134, 144, or 154
- One of MATH 136, 146, or 156
-
- PHYS 124 - Particles and Waves **OR**
- PHYS 144 - Newtonian Mechanics and Relativity
-
- PHYS 126 - Fluids, Fields, and Radiation **OR**
- PHYS 146 - Fluids and Waves
-
- ~~3 units in junior ENGL or WRS~~

- **Year 2 (30 units)**

- BIOL 207 - Molecular Genetics and Heredity
- BIOL 208 - Principles of Ecology
- CHEM 261 - Organic Chemistry I
- EDU 210 - Introduction to Educational Technology
- EDU 211 - Aboriginal Education and Contexts for Professional and Personal Engagement
-
- PHYS 208 - Aspects of Modern Physics
-

- HIST 397
- HIST 398 - History of Science II
- HIST 496 - Topics in the History of Science
- PHIL 217 - Biology, Society, and Values
- PHIL 265 - Philosophy of Science
- PHYS 261 - Physics of Energy
- STS 200 - Introduction to Studies in Science, Technology and Society
- SUST 201 - Introduction to Sustainability
- WGS 250 - Gender and Science

- **Area "C"**

- ASTRO 320 - Stellar Astrophysics I
- ASTRO 322 - Galactic and Extragalactic Astrophysics
- MA PH 251 - Differential Equations for Physics
- MA PH 351 - Mathematical Methods for Physics I
- PHYS 301 - Particles, Nuclei, and the Cosmos
- PHYS 308 - Statistical, Molecular, and Solid State Physics
- PHYS 310 - Thermodynamics and Kinetic Theory
- PHYS 311 - Statistical Physics
- PHYS 362 - Optics and Lasers
- PHYS 364 - Environmental Physics II or any 300-level CHEM (not to include CHEM 300 or CHEM 399)

- **Note:**

It is the student's responsibility to ensure all prerequisites for 300-level courses are met.

Year 1 (30 units)

- BIOL 107 - Introduction to Cell Biology
- BIOL 108 - Introduction to Biological Diversity
- CHEM 101 - Introductory University Chemistry I
- CHEM 102 - Introductory University Chemistry II
- EDU 100 - Contexts of Education
- One of MATH 134, 144, or 154
- One of MATH 136, 146, or 156
-
- PHYS 124 - Particles and Waves **OR**
- PHYS 144 - Newtonian Mechanics and Relativity

- CHEM 211 - Quantitative Analysis I **OR**
- PHYS 294 - General Physics Laboratory
-
- 3 units in junior ENGL or WRS
- 6 units in Arts options

- **Year 3 (30 units)**

- CHEM 263 - Organic Chemistry II
- MATH 214 - Calculus III
-
- CHEM 211 - Quantitative Analysis I **OR**
- PHYS 294 - General Physics Laboratory
-
- EDPY 304 - Adolescent Development and Learning
- PHYS 281 - Electricity and Magnetism
- 6 units in Biological Sciences at the 200-level
- 6 units from Area “B”
- 3 units from Area “C”

- **Note:**

Students wishing to take PHYS 364 as their Area “C” option must take PHYS 261 as an Area “B” option.

Year 4 (30 units)

- EDFX 350 - Secondary Route Field Experience for the Introductory Professional Term (5 weeks)
- EDSE 307 - Language, Literacy and Society in Educational Contexts
- EDSE 355 - Curriculum and Teaching for Secondary School Science Majors I (Major)
- EDPY 303 - Educational Assessment
- EDPS 410 - Ethics and Law in Teaching
- EDSE 3XX (Minor) or Education Elective (see note below)
- 6 units in Biological Sciences at the 300- or 400-level
- 3 units in Arts options

- **Note:**

First four courses above constitute the Introductory Professional Term and must be taken concurrently. EDSE 356 is not open to students whose major is Biological Sciences, Chemistry, General Sciences,

-
- PHYS 126 - Fluids, Fields, and Radiation **OR**
- PHYS 146 - Fluids and Waves
-
- 3 units in junior ENGL

- **Note:**

No more than 6 units in junior English, or equivalent, may be taken for credit in a Bachelor of Science / Bachelor of Education degree program.

- **Year 2 (30 units)**

- BIOL 207 - Molecular Genetics and Heredity
- BIOL 208 - Principles of Ecology
- CHEM 261 - Organic Chemistry I
- EDU 210 - Introduction to Educational Technology
- EDU 211 - Aboriginal Education and Contexts for Professional and Personal Engagement
-
- PHYS 208 - Aspects of Modern Physics
-
- CHEM 211 - Quantitative Analysis I **OR**
- PHYS 294 - General Physics Laboratory
-
- 3 units in junior ENGL or WRS
- 6 units in Arts options

- **Year 3 (30 units)**

- CHEM 263 - Organic Chemistry II
- MATH 214 - Calculus III
-
- CHEM 211 - Quantitative Analysis I **OR**
- PHYS 294 - General Physics Laboratory
-
- EDPY 304 - Adolescent Development and Learning
- PHYS 281 - Electricity and Magnetism
- 6 units in Biological Sciences at the 200-level
- 6 units from Area “B”
- 3 units from Area “C”

- **Note:**

Students wishing to take PHYS 364 as their Area “C” option must take PHYS 261 as an Area “B”

Physical Sciences or Physics. These students must choose to either register for another EDSE (Minor) provided they meet the course prerequisites, OR register in an additional Education Elective.

Year 5 (30 units)

- EDFX 450 - Secondary Route: Advanced Field Experience (9 weeks)
- EDSE 455 - Curriculum and Teaching for Secondary School Science Majors II (Major) (6 units)
- EDPY 301 - Introduction to Inclusive Education: Adapting Classroom Instruction for Students with Special Needs
- 3 units Arts option
- 9 units from Area “C”

- **Note:**

First two courses above constitute the Advanced Professional Term and must be taken concurrently.

- Physical Sciences Major/Biological Sciences Minor, Physics Concentration (150 units)

Physical Sciences Major/Biological Sciences Minor, Physics Concentration [Science]

Core Program Requirements

Education: 51 units

Major: 42 units

Minor: 24 units

100-level: 33 units (Maximum 42 units)

Graduation Requirements:

GPA of 2.3 on **all** courses

GPA of 2.3 on **Major** courses

option.

Year 4 (30 units)

- EDFX 350 - Secondary Route Field Experience for the Introductory Professional Term (5 weeks)
- EDSE 307 - Language, Literacy and Society in Educational Contexts
- EDSE 355 - Curriculum and Teaching for Secondary School Science Majors I (Major)
- EDPY 303 - Educational Assessment
- EDPS 410 - Ethics and Law in Teaching
- EDSE 3XX (Minor) or Education Elective (see note below)
- 6 units in Biological Sciences at the 300- or 400-level
- 3 units in Arts options

- **Note:**

First four courses above constitute the Introductory Professional Term and must be taken concurrently. EDSE 356 is not open to students whose major is Biological Sciences, Chemistry, General Sciences, Physical Sciences or Physics. These students must choose to either register for another EDSE (Minor) provided they meet the course prerequisites, OR register in an additional Education Elective.

Year 5 (30 units)

- EDFX 450 - Secondary Route: Advanced Field Experience (9 weeks)
- EDSE 455 - Curriculum and Teaching for Secondary School Science Majors II (Major) (6 units)
- EDPY 301 - Introduction to Inclusive Education: Adapting Classroom Instruction for Students with Special Needs
- 3 units Arts option
- 9 units from Area “C”

- **Note:**

First two courses above constitute the Advanced Professional Term and must be taken concurrently.

Area "B"

- ANTHR 230 - Anthropology of Science, Technology, and Environment
- BIOL 315 - Biology: An Historical Perspective
- CHRTC 350 - Science and Religion
- CHRTC 352 - Bioethics and Christianity
- CLASS 294 - Ancient Science, Technology, and Medicine
- HIST 115 - Technology and History
- HIST 294 - An Introduction to the History of Sciences, Technology, and Medicine
- HIST 391 - History of Technology
- HIST 394 - History of Astronomy and Cosmology from Stonehenge to the Space Age
- HIST 397
- HIST 398 - History of Science II
- HIST 496 - Topics in the History of Science
- PHIL 217 - Biology, Society, and Values
- PHIL 265 - Philosophy of Science
- PHYS 261 - Physics of Energy
- STS 200 - Introduction to Studies in Science, Technology and Society
- SUST 201 - Introduction to Sustainability
- WGS 250 - Gender and Science

- **Area "C"**

  - ASTRO 320 - Stellar Astrophysics I
  - ASTRO 322 - Galactic and Extragalactic Astrophysics
  - PHYS 301 - Particles, Nuclei, and the Cosmos
  - PHYS 308 - Statistical, Molecular, and Solid State Physics
  - PHYS 310 - Thermodynamics and Kinetic Theory
  - PHYS 311 - Statistical Physics
  - PHYS 362 - Optics and Lasers
  - PHYS 364 - Environmental Physics II or any 300-level CHEM (not to include CHEM 300 or CHEM 399)

- **Note:**

  It is the student's responsibility to ensure all prerequisites for 300-level courses are met.

- Physical Sciences Major/Biological Sciences Minor, Physics Concentration (150 units)

Physical Sciences Major/Biological Sciences Minor, Physics Concentration [Science]

Core Program Requirements

Education: 51 units

Major: 42 units

Minor: 24 units

100-level: 33 units (Maximum 42 units)

Graduation Requirements:

GPA of 2.3 on **all** courses

GPA of 2.3 on **Major** courses

Area "B"

- ANTHR 230 - Anthropology of Science, Technology, and Environment
- BIOL 315 - Biology: An Historical Perspective
- CHRTC 350 - Science and Religion
- CHRTC 352 - Bioethics and Christianity
- CLASS 294 - Ancient Science, Technology, and Medicine
- HIST 115 - Technology and History
- HIST 294 - An Introduction to the History of Sciences, Technology, and Medicine
- HIST 391 - History of Technology
- HIST 394 - History of Astronomy and Cosmology from Stonehenge to the Space Age
- HIST 397
- HIST 398 - History of Science II
- HIST 496 - Topics in the History of Science
- PHIL 217 - Biology, Society, and Values
- PHIL 265 - Philosophy of Science
- PHYS 261 - Physics of Energy
- STS 200 - Introduction to Studies in Science, Technology and Society

Year 1 (30 units)

- BIOL 107 - Introduction to Cell Biology
- BIOL 108 - Introduction to Biological Diversity
- CHEM 101 - Introductory University Chemistry I
- CHEM 102 - Introductory University Chemistry II
- EDU 100 - Contexts of Education
- One of MATH 134, 144, or 154
- One of MATH 136, 146, or 156
-
- PHYS 124 - Particles and Waves **OR**
- PHYS 144 - Newtonian Mechanics and Relativity
-
- PHYS 126 - Fluids, Fields, and Radiation **OR**
- PHYS 146 - Fluids and Waves
-
- ~~3 units in junior ENGL or WRS~~

- **Year 2 (30 units)**

- BIOL 207 - Molecular Genetics and Heredity
- BIOL 208 - Principles of Ecology
- CHEM 261 - Organic Chemistry I
- EDU 210 - Introduction to Educational Technology
- EDU 211 - Aboriginal Education and Contexts for Professional and Personal Engagement
-
- PHYS 208 - Aspects of Modern Physics **OR**
- PHYS 271 - Introduction to Modern Physics
-
- MATH 125 - Linear Algebra I
-
- CHEM 211 - Quantitative Analysis I **OR**
- PHYS 294 - General Physics Laboratory
-
- 3 units in Arts options
- 3 units in junior ENGL or WRS

- **Year 3 (30 units)**

- CHEM 263 - Organic Chemistry II
-
- CHEM 211 - Quantitative Analysis I **OR**
- PHYS 294 - General Physics Laboratory
- SUST 201 - Introduction to Sustainability
- WGS 250 - Gender and Science

- **Area "C"**

- ASTRO 320 - Stellar Astrophysics I
- ASTRO 322 - Galactic and Extragalactic Astrophysics
- PHYS 301 - Particles, Nuclei, and the Cosmos
- PHYS 308 - Statistical, Molecular, and Solid State Physics
- PHYS 310 - Thermodynamics and Kinetic Theory
- PHYS 311 - Statistical Physics
- PHYS 362 - Optics and Lasers
- PHYS 364 - Environmental Physics II or any 300-level CHEM (not to include CHEM 300 or CHEM 399)

- **Note:**

It is the student's responsibility to ensure all prerequisites for 300-level courses are met.

Year 1 (30 units)

- BIOL 107 - Introduction to Cell Biology
- BIOL 108 - Introduction to Biological Diversity
- CHEM 101 - Introductory University Chemistry I
- CHEM 102 - Introductory University Chemistry II
- EDU 100 - Contexts of Education
- One of MATH 134, 144, or 154
- One of MATH 136, 146, or 156
-
- PHYS 124 - Particles and Waves **OR**
- PHYS 144 - Newtonian Mechanics and Relativity
-
- PHYS 126 - Fluids, Fields, and Radiation **OR**
- PHYS 146 - Fluids and Waves
-
- 3 units in junior ENGL

- **Note:**

No more than 6 units in junior English, or equivalent, may be taken for credit in a Bachelor of Science / Bachelor of Education degree program.

-
- EDPY 304 - Adolescent Development and Learning
- MATH 214 - Calculus III
- PHYS 281 - Electricity and Magnetism
- 6 units in Biological Sciences at the 200-level
- 3 units in Arts options
- 3 units from Area “B”
- 3 units from Area “C”

- **Note:**

Students wishing to take PHYS 364 as their Area “C” option must take PHYS 261 as an Area “B” option.

Year 4 (30 units)

- EDFX 350 - Secondary Route Field Experience for the Introductory Professional Term (5 weeks)
- EDPY 303 - Educational Assessment
- EDSE 307 - Language, Literacy and Society in Educational Contexts
- EDSE 355 - Curriculum and Teaching for Secondary School Science Majors I (Major)
- EDPS 410 - Ethics and Law in Teaching
- EDSE 3XX (Minor) or Education Elective (see note below)
- 6 units in Biological Sciences at the 300- or 400- level
- 3 units in Arts option

- **Note:**

First four courses above constitute the Introductory Professional Term and must be taken concurrently. EDSE 356 is not open to students whose major is Biological Sciences, Chemistry, General Sciences, Physical Sciences or Physics. These students must choose to either register for another EDSE (Minor) provided they meet the course prerequisites, OR register in an additional Education Elective.

Year 5 (30 units)

- **Year 2 (30 units)**

- BIOL 207 - Molecular Genetics and Heredity
- BIOL 208 - Principles of Ecology
- CHEM 261 - Organic Chemistry I
- EDU 210 - Introduction to Educational Technology
- EDU 211 - Aboriginal Education and Contexts for Professional and Personal Engagement
-
- PHYS 208 - Aspects of Modern Physics **OR**
- PHYS 271 - Introduction to Modern Physics
-
- MATH 125 - Linear Algebra I
-
- CHEM 211 - Quantitative Analysis I **OR**
- PHYS 294 - General Physics Laboratory
-
- 3 units in Arts options
- 3 units in junior ENGL or WRS

- **Year 3 (30 units)**

- CHEM 263 - Organic Chemistry II
-
- CHEM 211 - Quantitative Analysis I **OR**
- PHYS 294 - General Physics Laboratory
-
- EDPY 304 - Adolescent Development and Learning
- MATH 214 - Calculus III
- PHYS 281 - Electricity and Magnetism
- 6 units in Biological Sciences at the 200-level
- 3 units in Arts options
- 3 units from Area “B”
- 3 units from Area “C”

- **Note:**

Students wishing to take PHYS 364 as their Area “C” option must take PHYS 261 as an Area “B” option.

Year 4 (30 units)

- EDFX 350 - Secondary Route Field Experience for the Introductory Professional Term (5 weeks)

- EDFX 450 - Secondary Route: Advanced Field Experience (9 weeks)
- EDSE 455 - Curriculum and Teaching for Secondary School Science Majors II (Major) (6 units)
- EDPY 301 - Introduction to Inclusive Education: Adapting Classroom Instruction for Students with Special Needs
- 9 units in Arts options
- 9 units in Area "C"

- **Note:**

  First two courses above constitute the Advanced Professional Term and must be taken concurrently.

- Physical Sciences Major/Mathematical Sciences Minor (150 units)

Physical Sciences Major/Mathematical Sciences Minor (150 units) [Science]

Core Program Requirements

Education: 51 units

Major: 42 units

Minor: 24 units

100-level: 36 units (Maximum 42 units)

Graduation Requirements:

GPA of 2.3 on **all** courses

GPA of 2.3 on **Major** courses

Area "B"

- ANTHR 230 - Anthropology of Science, Technology, and Environment
- BIOL 315 - Biology: An Historical Perspective
- CHRTC 350 - Science and Religion
- CHRTC 352 - Bioethics and Christianity
- CLASS 294 - Ancient Science, Technology, and Medicine
- HIST 115 - Technology and History
- EDPY 303 - Educational Assessment
- EDSE 307 - Language, Literacy and Society in Educational Contexts
- EDSE 355 - Curriculum and Teaching for Secondary School Science Majors I (Major)
- EDPS 410 - Ethics and Law in Teaching
- EDSE 3XX (Minor) or Education Elective (see note below)
- 6 units in Biological Sciences at the 300- or 400- level
- 3 units in Arts option

- **Note:**

  First four courses above constitute the Introductory Professional Term and must be taken concurrently. EDSE 356 is not open to students whose major is Biological Sciences, Chemistry, General Sciences, Physical Sciences or Physics. These students must choose to either register for another EDSE (Minor) provided they meet the course prerequisites, OR register in an additional Education Elective.

  Year 5 (30 units)

- EDFX 450 - Secondary Route: Advanced Field Experience (9 weeks)
- EDSE 455 - Curriculum and Teaching for Secondary School Science Majors II (Major) (6 units)
- EDPY 301 - Introduction to Inclusive Education: Adapting Classroom Instruction for Students with Special Needs
- 9 units in Arts options
- 9 units in Area "C"

- **Note:**

  First two courses above constitute the Advanced Professional Term and must be taken concurrently.

- Physical Sciences Major/Mathematical Sciences Minor (150 units)

- HIST 294 - An Introduction to the History of Sciences, Technology, and Medicine
- HIST 391 - History of Technology
- HIST 394 - History of Astronomy and Cosmology from Stonehenge to the Space Age
- HIST 397
- HIST 398 - History of Science II
- HIST 496 - Topics in the History of Science
- PHIL 217 - Biology, Society, and Values
- PHIL 265 - Philosophy of Science
- PHYS 261 - Physics of Energy
- STS 200 - Introduction to Studies in Science, Technology and Society
- WGS 250 - Gender and Science

- **Area "C"**

- ASTRO 320 - Stellar Astrophysics I
- ASTRO 322 - Galactic and Extragalactic Astrophysics
- PHYS 301 - Particles, Nuclei, and the Cosmos
- PHYS 308 - Statistical, Molecular, and Solid State Physics
- PHYS 310 - Thermodynamics and Kinetic Theory
- PHYS 311 - Statistical Physics
- PHYS 362 - Optics and Lasers
- PHYS 364 - Environmental Physics II or any 300-level CHEM (not to include CHEM 300 or CHEM 399)

- **Note:**

It is the student's responsibility to ensure all prerequisites for 300-level courses are met.

Year 1 (30 units)

- BIOL 107 - Introduction to Cell Biology
- BIOL 108 - Introduction to Biological Diversity
- CHEM 101 - Introductory University Chemistry I
- CHEM 102 - Introductory University Chemistry II
- EDU 100 - Contexts of Education
- One of MATH 134, 144, or 154
- One of MATH 136, 146, or 156
-
- PHYS 124 - Particles and Waves **OR**

Physical Sciences Major/Mathematical Sciences Minor (150 units) [Science]

Core Program Requirements

Education: 51 units

Major: 42 units

Minor: 24 units

100-level: 36 units (Maximum 42 units)

Graduation Requirements:

GPA of 2.3 on **all** courses

GPA of 2.3 on **Major** courses

Area "B"

- ANTHR 230 - Anthropology of Science, Technology, and Environment
- BIOL 315 - Biology: An Historical Perspective
- CHRTC 350 - Science and Religion
- CHRTC 352 - Bioethics and Christianity
- CLASS 294 - Ancient Science, Technology, and Medicine
- HIST 115 - Technology and History
- HIST 294 - An Introduction to the History of Sciences, Technology, and Medicine
- HIST 391 - History of Technology
- HIST 394 - History of Astronomy and Cosmology from Stonehenge to the Space Age
- HIST 397
- HIST 398 - History of Science II
- HIST 496 - Topics in the History of Science
- PHIL 217 - Biology, Society, and Values
- PHIL 265 - Philosophy of Science
- PHYS 261 - Physics of Energy
- STS 200 - Introduction to Studies in Science, Technology and Society
- WGS 250 - Gender and Science

- **Area "C"**

- ASTRO 320 - Stellar Astrophysics I
- ASTRO 322 - Galactic and Extragalactic Astrophysics

- PHYS 144 - Newtonian Mechanics and Relativity
-
- PHYS 126 - Fluids, Fields, and Radiation **OR**
- PHYS 146 - Fluids and Waves
-
- ~~3 units in junior ENGL or WRS~~

- **Year 2 (30 units)**

- EDU 210 - Introduction to Educational Technology
- EDU 211 - Aboriginal Education and Contexts for Professional and Personal Engagement
- CHEM 261 - Organic Chemistry I
- MATH 125 - Linear Algebra I
- MATH 214 - Calculus III
-
- PHYS 261 - Physics of Energy **OR**
- PHYS 281 - Electricity and Magnetism
-
- PHYS 208 - Aspects of Modern Physics **OR**
- PHYS 271 - Introduction to Modern Physics
-
- CHEM 211 - Quantitative Analysis I **OR**
- PHYS 294 - General Physics Laboratory
-
- 3 units in junior ENGL or WRS
- 3 units in Arts options

- **Year 3 (30 units)**

- CHEM 263 - Organic Chemistry II
- EDPY 304 - Adolescent Development and Learning
- MATH 228 - Algebra: Introduction to Ring Theory
- MATH 315 - Calculus IV
-
- CHEM 211 - Quantitative Analysis I **OR**
- PHYS 294 - General Physics Laboratory
-
- 3 units in Arts options
- 6 units from Area “B”
- 6 units from Area “C”

- **Year 4 (30 units)**

- EDFX 350 - Secondary Route Field Experience for the Introductory Professional Term (5 weeks)
- PHYS 301 - Particles, Nuclei, and the Cosmos
- PHYS 308 - Statistical, Molecular, and Solid State Physics
- PHYS 310 - Thermodynamics and Kinetic Theory
- PHYS 311 - Statistical Physics
- PHYS 362 - Optics and Lasers
- PHYS 364 - Environmental Physics II or any 300-level CHEM (not to include CHEM 300 or CHEM 399)

- **Note:**

It is the student’s responsibility to ensure all prerequisites for 300-level courses are met.

Year 1 (30 units)

- BIOL 107 - Introduction to Cell Biology
- BIOL 108 - Introduction to Biological Diversity
- CHEM 101 - Introductory University Chemistry I
- CHEM 102 - Introductory University Chemistry II
- EDU 100 - Contexts of Education
- One of MATH 134, 144, or 154
- One of MATH 136, 146, or 156
-
- PHYS 124 - Particles and Waves **OR**
- PHYS 144 - Newtonian Mechanics and Relativity
-
- PHYS 126 - Fluids, Fields, and Radiation **OR**
- PHYS 146 - Fluids and Waves
-
- 3 units in junior ENGL

- **Note:**

No more than 6 units in junior English, or equivalent, may be taken for credit in a Bachelor of Science / Bachelor of Education degree program.

- **Year 2 (30 units)**

- EDU 210 - Introduction to Educational Technology
- EDU 211 - Aboriginal Education and Contexts for Professional and Personal Engagement

- EDPY 303 - Educational Assessment
- EDSE 307 - Language, Literacy and Society in Educational Contexts
- EDSE 355 - Curriculum and Teaching for Secondary School Science Majors I (Major)
- EDPS 410 - Ethics and Law in Teaching
- EDSE 338 - Curriculum and Teaching for Secondary School Mathematics Minors (Minor)
- 6 units in Mathematical Sciences at the 300- or 400-level
- 3 units in Science options

- **Note:**

First four courses above constitute the Introductory Professional Term and must be taken concurrently.

Year 5 (30 units)

- EDFX 450 - Secondary Route: Advanced Field Experience (9 weeks)
- EDSE 455 - Curriculum and Teaching for Secondary School Science Majors II (Major) (6 units)
- EDPY 301 - Introduction to Inclusive Education: Adapting Classroom Instruction for Students with Special Needs
- 6 units in Arts options
- 6 units in Area “C”

- **Note:**

First two courses above constitute the Advanced Professional Term and must be taken concurrently.

- CHEM 261 - Organic Chemistry I
- MATH 125 - Linear Algebra I
- MATH 214 - Calculus III
-
- PHYS 261 - Physics of Energy **OR**
- PHYS 281 - Electricity and Magnetism
-
- PHYS 208 - Aspects of Modern Physics **OR**
- PHYS 271 - Introduction to Modern Physics
-
- CHEM 211 - Quantitative Analysis I **OR**
- PHYS 294 - General Physics Laboratory
-
- 3 units in junior ENGL or WRS
- 3 units in Arts options

- **Year 3 (30 units)**

- CHEM 263 - Organic Chemistry II
- EDPY 304 - Adolescent Development and Learning
- MATH 228 - Algebra: Introduction to Ring Theory
- MATH 315 - Calculus IV
-
- CHEM 211 - Quantitative Analysis I **OR**
- PHYS 294 - General Physics Laboratory
-
- 3 units in Arts options
- 6 units from Area “B”
- 6 units from Area “C”

- **Year 4 (30 units)**

- EDFX 350 - Secondary Route Field Experience for the Introductory Professional Term (5 weeks)
- EDPY 303 - Educational Assessment
- EDSE 307 - Language, Literacy and Society in Educational Contexts
- EDSE 355 - Curriculum and Teaching for Secondary School Science Majors I (Major)
- EDPS 410 - Ethics and Law in Teaching
- EDSE 338 - Curriculum and Teaching for Secondary School Mathematics Minors (Minor)
- 6 units in Mathematical Sciences at the 300- or 400-level
- 3 units in Science options

- **Note:**

	First four courses above constitute the Introductory Professional Term and must be taken concurrently. **Year 5 (30 units)** --- • EDFX 450 - Secondary Route: Advanced Field Experience (9 weeks) • EDSE 455 - Curriculum and Teaching for Secondary School Science Majors II (Major) (6 units) • EDPY 301 - Introduction to Inclusive Education: Adapting Classroom Instruction for Students with Special Needs • 6 units in Arts options • 6 units in Area “C” • **Note:** --- First two courses above constitute the Advanced Professional Term and must be taken concurrently.

Reviewed/Approved by:

REQUIRED: Faculty Council (or delegate) and approval date. Faculty of Education, Undergraduate Academic Affairs Council (UAAC) Approved - October 19, 2023
OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates.

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Course Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	Educational Policy Studies
Contact Person:	Dip Kapoor (SJI Specialization Coordinator, 2023-24)
Level of change: (choose one only) [?]	☑ Undergraduate
	☐ Graduate
For which term will this change take effect?	Fall 2024 (preferable) or Fall 2025

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

Why:
_Course has been taught for over 3 decades without a calendar change. Requires updating to reflect contemporary content/pedagogical approaches.
_Contemporary relevance for new College Model given recent re-structuring at the UofA, i.e., is a course with potential for cross Faculty/College of Social Sciences and Humanities student interest within and beyond Education (e.g. Faculty of Arts & Native Studies)
_Makes K-12 curricular connections more explicit and relevant for Ed students, e.g. Social Studies: neo/**colonialism** (global contexts), modernization/development/**capitalism**, **globalization**, **human rights** and the **environment**.

Benefit:
Will benefit students, specialization and faculty by ensuring that content and approaches are current and therefore relevant for today's programs. Will enhance elective opportunities for undergraduate students in Education and across the College of Social Sciences and Humanities, if not other Faculties (e.g. Native Studies).

Historical context:
First offered by the Department of Ed Foundations (1970s-80s); then the Department of Ed Policy Studies (EPS), Theoretical, Cultural and International Studies in Ed (TCI) specialization (1990s), followed by the SJI specialization (since 2014).

Current and existing open/education elective. No **impacts to admin/program structure** as this is a request for a calendar change for a course that has always been offered once each year.

Consultation:
SJI course reviewed and approved by SJI specialization. Submitted to FC for review/approval at Faculty level.

Course Template

Current: ~~Removed language~~	**Proposed:** New language
EDPS 425 - Global Education~~: Issues and Strategies for Teachers~~ **Course Career** Undergraduate **Units:** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Education **Department** Education	**EDPS 425 - Global Education** **Course Career** Undergraduate **Units:** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Education **Department** Education **Typically Offered:** either term

Typically Offered: either term **Description:** This course ~~explores,~~ ~~in theory and practice,~~ how global education ~~in schools can~~ facilitate critical understanding ~~and develop skills and values for building more peaceful futures in local, national, and global contexts. It draws on North and South scholars and educators to clarify underlying conceptual and pedagogical principles of global education and related fields (education for peace, justice, development, human rights, cultural solidarity, environmental care). Exemplars of creative curriculum content and teaching-learning strategies for global literacy will be included.~~	**Description** This course considers how global education facilitates critical understanding concerning the contradictions of capitalist development and globalization for the Global South by addressing: dispossession-displacement-slumization of Indigenous Peoples and peasants; land, water, hunger and food sovereignty; migrant labor; poverty-inequality-debt; environment; conflict-peace; development-racism; educational neocolonialism; human rights, NGOs and social movements.

Reviewed/Approved by:

REQUIRED: Faculty Council (or delegate) and approval date. Faculty of Education, Undergraduate Academic Affairs Council: Approved - September 21, 2023
OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates. SJI Specialization: Approved (June 29, 2023)

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Course Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	English Language School
Contact Person:	Donald Mason
Level of change: (choose one only) [?]	• Undergraduate •
For which term will this change take effect?	Fall 2023

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

In March 2022, ELS submitted a course change to delete EAP 135 as a 0-credit course. Here is the rationale for that change:

"EAP 135 will continue to be offered as a non-credit course, but no longer for 0 credit as part of the Bridging Program. It was previously offered as 0 credit so that students could be admitted to the University as Bridging Program students. As EAP 135 will no longer be part of the Bridging Program, it is no longer necessary to offer it as a 0-credit course."

We made this change because Arts was no longer accepting students into EAP 135 and as they were the major source of students for this course there did not seem to be a need to continue to offer it. However, with the introduction of the new Bridging Program courses set to launch in Fall 2023, Arts has now decided that they would like to resume admitting students at the EAP 135 level.

Because of this, we would now like to reintroduce EAP 135 as a 0-credit course as part of the Bridging Program. There are no changes to the course or the course description.

The University will recommence admitting students to EAP 135 as Stage 1 of the Bridging Program in Fall 2023.

Course Template

Current: ~~Removed language~~	**Proposed:** New language
Subject & Number **Title** **Course Career** **Units** **Approved Hours** **Fee index** **Faculty** **Department** **Typically Offered** **Description**	**Subject & Number: EAP 135** **Title: Introduction to Academic English** **Course Career: Undergraduate** **Units: 0** **Approved Hours:** **Fee index: 19** **Faculty: Education** **Department: English Language School** **Typically Offered: Either term, variable** **Description** EAP 135 - Introduction to Academic English ★0 (*fi 19)* (either term, variable) Focuses on the development of language fluency and accuracy and

	on building the necessary vocabulary for further studies within an academic environment. Listening, reading, speaking, and writing skills are emphasized by engaging students in a variety of academic activities. This course, which precedes EAP 140, will enable students to lay the foundations for successful academic writing. Students will be introduced to language learning strategies and will develop study skills that are crucial to their success in an English-medium university. Prerequisite: Minimum TOEFL score of 65 (internet based) with a minimum score of 16 in each band, or a score of 5.0 IELTS with a minimum score of 4.5 in each band.

Reviewed/Approved by:

REQUIRED: Faculty Council (or delegate) and approval date. Faculty of Education, Undergraduate Academic Affairs - Approved - February 16, 2023
OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates.

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Course Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	Faculty of Education
Contact Person:	Mike Carbonaro & Cathy Adams
Level of change: (choose one only) [?]	☑ Undergraduate
	☐ Graduate
For which term will this change take effect?	Spring 2024

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

Since 2001 this course has been offered every year (except COVID) in the Faculty of Education in both Spring and Summer sessions using the special topics **subject & number** course code EDCT400, with the course title:
Along with continuing to offer the course during special sessions (Spring/Summer), we now intend to offer the course during either the Fall or Winter term. Therefore, we request a permanent **subject & number instead** of using the special topics subject and number EDCT 400.

The course will be continued to be offered as part of the Career Technology Studies (CTS) program area in the Faculty of Education undergraduate program and continue using the **EDCT** course code. In addition, the Faculty of Education has demonstrated an ongoing commitment to this course over the past 23 years through the class sets purchased (investment) of four generations of LEGO® Robotics equipment: 1) 2001 LEGO® Mindstorms Robotics Invention System - RCX; 2) 2007 - LEGO® Mindstorms NXT; 3) 2014 - LEGO® Mindstorms EV3; and 4) 2022 - LEGO® Mindstorms Robot Inventor.

The primary student audience for this course is pre-service/in-service teachers at the K-12 grade level as either an option course or as part of the Career Technology Studies undergraduate program in the Faculty of Education. Robotics (especially LEGO® robotics) has been a popular topic in many K-12 schools across Alberta and Western Canada. For example, hundreds of K-12 schools throughout Alberta currently use this LEGO® robotic technology in their instructional environment. Many teachers who have participated in the course have created school teams that participate in the FIRST LEGO® League Challenge, which is held locally, nationally, and internationally (https://www.firstlegoleague.org/). The course is very popular among undergraduate students and usually has a waiting list for entry.

Students from the Faculty of Arts, Faculty of Science or open studies (e.g., Librarians, Early Childhood educators) have also taken this course as an option. In addition, students who have taken this course have also been instructors at UofA Engineering and Science summer camps. Although this course covers engineering and computing science topics, it differs significantly from the robotics courses offered in the faculties of Engineering and Science. The course subject content and design are intended for K-12 classroom teachers using Robotic technology (LEGO® to support and enhance teaching, learning and problem-solving. This technology integration in classroom pedagogical practice will help to facilitate children's understanding of engineering and computer science concepts and stimulate their interest in STEM.

**** Please note that this course change is NOT intended to replace EDCT 400 - Conference Seminar ★ 1 (fi VAR)(EITHER, VARIABLE). EDCT 400 is used for other special topics courses in the CTS area.**

Course Template

Current: ~~Removed language~~	**Proposed:** New language

	EDCT 470 - Robotics & Learning: Constructionism in Practice ★ 3 (fi 6)(EITHER, 3-0-3) **Faculty of Education** **Description:** Theoretical and applied approaches in using robotic technology integration to support and enhance pedagogical practice in the K-12 educational environment include applying constructionist learning theory and designing, developing and implementing curriculum projects that support learning STEM.

Reviewed/Approved by:

REQUIRED: Faculty Council (or delegate) and approval date. Education, Undergraduate Academic Affairs Council (UAAC) Approved - October 19, 2023
OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates.

University of Alberta
Department of Secondary Education

Course Outline
EDCT 470
Robotics & Learning: Constructionism in Practice

Policy about course outlines can be found in the University Regulations and Information for Students, Academic Regulations, Evaluation Procedures and Grading System of the University Calendar.

Introduction
Technology is rapidly changing the way we function as teachers and students. Over the last 25 years, microcomputer technology has continued to evolve and its role in the education process is constantly being redefined. As teachers or pre-service teachers, you will continue to be faced with the constant challenge of "keeping-up" with the goal of integrating technology across the curriculum. In June 2000, Alberta Education released the technology outcomes that students in grades K-12 are expected to obtain. The objective of this course is to support the curriculum technology integration process by linking the use of robotics in the classroom with Career & Technology Studies (CTS). The designing and building of various types of programmable Robots (LEGO Education Spike™) is one way to achieve these cross-curriculum links.

Course Prerequisites
None

Relationship of the Course to the Teaching Quality Standard (TQS) and Leader Quality Standard (LQS) (Alberta Education, 2018)

If you are a teacher and / or educational leader in the Province of Alberta then this course will contribute to the your professional growth in relation to the TQS and LQS in the following ways:

Teacher Quality Standard Competency	Focus of Course	Experiences in the Course will Contribute to the Development
#1 Fostering Effective Relationships	✓	✓
#2 Engaging in Career-Long Learning	✓	✓
#3 Demonstrating a Professional Body of Knowledge	✓	✓
#4 Establish Inclusive Learning Environments		✓
#5 Applying Foundational Knowledge about First Nations, Métis, and Inuit		✓
#6 Adhering to Legal Frameworks and Policies		✓

Leader Quality Standard Competency	Focus of Course	Experiences in the Course will Contribute to the Development
#1 Fostering Effective Relationships	✓	✓
#2 Engaging in Career-Long Learning	✓	✓
#3 Demonstrating a Professional Body of Knowledge	✓	✓
#4 Establish Inclusive Learning Environments		✓
#5 Applying Foundational Knowledge about First Nations, Métis, and Inuit		✓
#6 Adhering to Legal Frameworks and Policies		✓

Objectives

General Outcome:
Explore curriculum enhancement through the integration of robotics as a tool for Constructivist and Constructionist learning.

Specific Outcomes
Students will:

- Examine how the tenets of constructivism and constructionism can be applied across various disciplines and grade levels to enhance student engagement and understanding.
- Evaluate the importance of tangible objects in the learning process which allow for iterative experimentation and growth.
- Review Lego robotics as a hands-on tool to integrate STEAM (Science, Technology, Engineering, the Arts, and Mathematics) concepts into the wider curriculum, enhancing lessons and making abstract concepts tangible and engaging for students.
- Analyze Lego robotics projects as an assessment tool, not just for subject-specific knowledge, but also to evaluate students' problem-solving abilities, teamwork, creativity, and perseverance, providing a more holistic view of a student's competencies.
- Review Lego robotics projects designed to promote a positive and interactive classroom environment, fostering peer-to-peer learning, mutual respect, and a sense of accomplishment, thereby improving overall student self-efficacy and inter-student dynamics.
- Create an engaging Lego robotics project, rooted in constructionism, that inspires students to learn through hands-on creation and reflection.
- Reflect on the role of the teacher in a constructivist and constructionist classroom and how Robotics can be used in course material to meet required outcomes in various STEAM based curricula.

Why Robots?
For one thing, building robots can be fun! Learning about technology in a non-threatening and productive way can often be achieved when the students are creating projects they enjoy doing. Building your own robot and programming it to carry out a task can teach students various aspects of problem solving while simultaneously requiring them to master a number of mathematical and scientific concepts. Furthermore, the concept of a "robot" itself conjures up social and emotional images that beg questions such as, "What impact will robotic technology have in the working world?" or "Is it ethical to replace humans with robots?"

Constructionist Education
A further educational rationale for robot building comes from the research on how children learn, specifically the learning theories of *Constructivism* and *Constructionism* (Papert, 1980). Constructivism is both a theory for learning and a strategy for education whereby the learner actively builds representations of their knowledge. The roots of "constructivist" theories are found in the work of Jean Piaget, asserting that knowledge is not simply transmitted from teacher to student, but actively constructed in the mind of the learner. On the other hand, constructionists are more concrete in their approach to building knowledge and believe that either virtual action (manipulation of software objects) or real actions (manipulation of physical objects) is a significant step in the knowledge representation process. The designing and building of robotic systems is a problem-solving approach that can be viewed as a pragmatic application of constructionist theory. For example, the construction of a robotic solar power Land Rover vehicle of the type used in the NASA Mars space mission would help students to explain/solidify their conceptual understanding of the topic.

Thus, "children don't *get* ideas; they *make* ideas. Moreover, Constructionism suggests that the learners are particularly likely to make new ideas when they are actively engaged in making some type of external artifact – be it a robot, a poem, a sand castle, or a computer program – which they can reflect upon and share with others." (Kafai & Resnick, 1996, p. 1). As constructors of knowledge, students assume more responsibility for their learning and thus for constructing their own meaning.

Purpose
The purpose of this course is to introduce students to different perspectives of teaching with technology while emphasizing constructionist pedagogical strategies. The students will explore different aspects of learning through design and building of programmable robots using LEGO Spike® equipment and accompanying software.

Course Flow
The course will run for five consecutive days (Monday to Thursday from 8:00 am to 8:30 pm, and 8:00am to 5:00pm on Friday) with a brief lecture/discussion or introduction first thing in the morning on the first day, plus breaks for smaller presentations at various times are expected to occur alongside project work for the rest of the day. It should be noted that students will be heavily immersed in technology working on projects or activities for the majority of the course. The focus here is to prepare students on how to use the hardware and software in addition to thinking about how the technology can be applied in the classroom in a practical setting. At the end of the course, students taking this course will have appropriate knowledge and related skills, as well as resources such as lesson plans and other materials that they can use in preparing for teaching.

Students should budget their time wisely and it is strongly recommended that they do not plan for other evening activities during this course. Consider this course as a "technology immersion course" for a one-week period. There will often be reading to do in the evening or students may have to work late on a project they are doing. Furthermore, students will be required to work in collaborative groups and be encouraged to share their ideas with other students in the class.

Required Textbook(s)

There are no required texts for this course.

Additional Course Materials:
LEGO Education Spike Robotics kits (& spare parts), software, computer*, and learning resources are provided. A memory stick or cloud storage solution for saving files is advised.

***Students are <u>strongly encouraged</u> to bring their own laptop, if possible. All required software will be made available to the class, via eClass, prior to the beginning of classes.**

Course Evaluation

Item	Assessment	Weight	Date Due
Spike Tutorials and Unit Plans	Completion checklist	20%	XX
Spike Essential Trial	Completion checklist	5%	XX
Final Challenge	Write-up submission	25%	XX
Article Review*	Article Reviews	20%	XX
Teacher Prep	Lesson Plans or Unit Plans	30%	XX

*Note: The required number of Article Reviews and Lessons plans differs for EDCT 400 and 500 students, but the overall course weighting is the same.

Detailed descriptions of the assignments and marking criteria is available on the eClass course site.

Late Assignments
Assignments that are not received by their due date will be penalized 20% per day, until the day they are received.

Grading and Assessment
According to the University of Alberta Grading Policy, "Grades reflect judgements of student achievement made by instructors and must correspond to the associated descriptor. These judgements are based on a combination of absolute achievement and relative performance in a class." In this course, your work will be evaluated using the general grading descriptors established by the University, as well as the more detailed assessment criteria that will be provided for specific assignments. Your grade on each assignment will be in one of three formats: a descriptor (excellent, good, satisfactory, etc.), a letter (A, B, C, etc.), or a number. When necessary, descriptor and letter grades will be converted into numerical equivalents in order to weight them properly and average them into a final course grade. Conversions between descriptors, letters, and numbers will be made in accordance with the University's grading policy and the table provided. Your final course grade will be reported as letter grade. It will not be official until it has been approved by the Department Associate Chair/Chair and posted on Bear Tracks.

U of A Letter Grading System: Course Grades Obtained by Undergraduate Students

Descriptor	Letter	Points
Excellent	A+	4.0
	A	4.0
	A-	3.7
Good	B+	3.3
	B	3.0
	B-	2.7
Satisfactory	C+	2.3
	C	2.0
	C-	1.7
Poor	D+	1.3
Minimal Pass	D	1.0
Failure	F	0.0

Course Readings
All course readings can be found on the course eClass page.

Important Reminders

Grade Appeals for Undergraduate Students
Information on grade appeals can be obtained from the Education Student Services office (ED North 1-107).

Equity statement and inclusive language policy
The Faculty of Education is committed to providing an environment of equality and respect for all people within the university community, and to educating faculty, staff and students in developing teaching and learning contexts that are welcoming to all. In seeking to achieve a climate of respect and dignity, all staff and students must use inclusive language to create a classroom in which an individual's experience and views are treated with equal respect and value in relation to his/her gender, racial background, sexual orientation, and ethnic background. We are encouraged to use gender-neutral or gender-inclusive language and become more sensitive to the impact of devaluing language in order to create a thoughtful and respectful community.

Code of student behaviour
The University of Alberta is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Code of Student Behaviour (online at http://www.governance.ualberta.ca, listed under "Resources") and avoid any behaviour, which could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University.

Professional conduct
In addition to upholding the University of Alberta Code of Student Behaviour, students in the Faculty of Education are expected to conduct themselves according to the Alberta Teachers' Association Code of Professional Conduct (online at https://www.teachers.ab.ca/Pages/Home.aspx, listed under "The Teaching Profession"). While enrolled in the IPT or APT, students are also subject to the guidelines described in the Practicum Intervention Policy (online at http://www.governance.ualberta.ca, listed under "Resources").

Personal or academic difficulties (Undergraduate)
Students experiencing academic or personal difficulties may contact Education Student Services (ED North 1-107, email: educ.info@ualberta.ca, phone: 780-492-3659) for support services.

Personal or Academic Difficulties (Graduate)
Support is available within the University for students experiencing academic or personal difficulties. A list of resources can be found at the following link: https://www.ualberta.ca/current-students/index.html

Student Advising Services
Undergraduate students in the Faculty of Educaiton who have questions about their programs or planning their courses, should visit the Education Student Services Office (ED North 1-107 or educ.info@ualberta.ca). This office is open from 9am-3pm Monday to Friday, closed statuatory holidays and UofA closures. In addition to program planning, advisors in this office assess transfer credit, process Registration and Graduation Checks, and provide other student support services.

Student Accessibility Services
Students who require accommodations in this course due to a disability affecting mobility, vision, hearing, learning, or mental and physical health are advised to discuss their needs with Student Accessibility Services, 1-80 Students' Union Building (SUB), 780-492-3381, email: arrec@ualberta.ca.

Recording class lectures
Audio or video recording, digital or otherwise, of lectures, labs, seminars or any other teaching environment by students is allowed only with the prior written consent of the instructor or as a part of an approved accommodation plan. Student or instructor content, digital or otherwise, created and/or used within the context of the course is to be used solely for personal study, and is not to be used or distributed for any other purpose without prior written consent from the content author(s).

Undergraduate Academic Affairs Council - TQS Template for Course Outlines

This course is proposed to be a component of the Bachelor of Education program that prepares students for Interim Professional Certification by Alberta Education. This course prepares students to meet the Alberta Teaching Quality Standard:

Quality teaching occurs when the teacher's ongoing analysis of the context, and the teacher's decisions about which pedagogical knowledge and abilities to apply, result in optimum learning for all students.

The Alberta Teaching Quality Standard refers to a series of expected competencies:

1. **Fostering Effective Relationships:** A teacher builds positive and productive relationships with students, parents/guardians, peers and others in the school and local community to support student learning.

2. **Engaging in Career-Long Learning:** A teacher engages in career-long professional learning and ongoing critical reflection to improve teaching and learning.

3. **Demonstrating a Professional Body of Knowledge:** A teacher applies a current and comprehensive repertoire of effective planning, instruction, and assessment practices to meet the learning needs of every student.

4. **Establishing Inclusive Learning Environments:** A teacher establishes, promotes and sustains inclusive learning environments where diversity is embraced and every student is welcomed, cared for, respected and safe.

5. **Applying Foundational Knowledge about First Nations, Métis and Inuit:** A teacher develops and applies foundational knowledge about First Nations, Métis and Inuit for the benefit of all students.

6. **Adhering to Legal Frameworks and Policies:** A teacher demonstrates an understanding of and adherence to the legal frameworks and policies that provide the foundations for the Alberta education system.

The TQS document provides example indicators for each competency, https://education.alberta.ca/media/3739620/standardsdoc-tqs-_fa-web-2018-01-17.pdf. Please note that the indicators are for example purposes and should not be viewed as specific requirements.

New Course Submission

In regard to the Alberta Teaching Quality Standard, this course prepares students to meet the following competencies:

- indicate the degree to which the listed competencies are addressed in the proposed new course offering
- briefly outline how the course will intentionally prepare students to meet the competency
- not all courses are expected to address all competencies

Proposed Course Name: Robotics & Learning: Constructionism in Practice **Proposed Course Number: EDCT 470**

Overview of Specific Course Objectives:

General Outcome:
Explore curriculum enhancement through the integration of robotics as a tool for Constructivist and Constructionist learning.

Specific Outcomes
Students will:

- Examine how the tenets of constructivism and constructionism can be applied across various disciplines and grade levels to enhance student engagement and understanding.
- Evaluate the importance of tangible objects in the learning process which allow for iterative experimentation and growth.
- Review Lego robotics as a hands-on tool to integrate STEAM (Science, Technology, Engineering, the Arts, and Mathematics) concepts into the wider curriculum, enhancing lessons and making abstract concepts tangible and engaging for students.
- Analyze Lego robotics projects as an assessment tool, not just for subject-specific knowledge, but also to evaluate students' problem-solving abilities, teamwork, creativity, and perseverance, providing a more holistic view of a student's competencies.
- Review Lego robotics projects designed to promote a positive and interactive classroom environment, fostering peer-to-peer learning, mutual respect, and a sense of accomplishment, thereby improving overall student self-efficacy and inter-student dynamics.
- Create an engaging Lego robotics project, rooted in constructionism, that inspires students to learn through hands-on creation and reflection.
- Reflect on the role of the teacher in a constructivist and constructionist classroom and how Robotics can be used in course material to meet required outcomes in various STEAM based curricula.

Competency Rating: 1 = Not Covered 2 = Minimally Covered 3 = Moderately Covered 4 = Very Well Covered

Competencies	1	2	3	4	Briefly outline how competency is intended to be met
1. **Fostering Effective Relationships:** A teacher builds positive and productive relationships with students, parents/guardians, peers and others in the school and local community to support student learning.				**X**	Through project work and peer group collaboration, students learn how Lego Robotics can make learning enjoyable, and interactive—leading to positive teacher-student relationships. They learn how teachers can engage with students during robotics activities, provide guidance, and offer encouragement, creating a supportive learning environment and how parents and guardians can be involved in Lego Robotics showcase events and workshops, where they can interact and communicate while learning about their child's progress and achievements. Students will be ready, and strongly encouraged to engage with the learning community through the creation of school teams, partnering with local experts (often parents or teachers) or organizations that can provide mentorship opportunities and build community connections. As an example, many schools create Lego League challenge teams that compete against other teams at a school year-end event at NAIT.
2. **Engaging in Career-Long Learning:** A teacher engages in career-long professional learning and ongoing critical reflection to improve teaching and learning.				**X**	Given the rapid technological changes, students are encouraged to investigate, adapt and reflect on the pedagogical practices they learn in class. They learn about PD initiatives and online teacher communities that stay updated on new robotics kits, programming languages, and constructionist teaching and learning methods.
3. **Demonstrating a Professional Body of Knowledge:** A teacher applies a current and comprehensive repertoire of effective planning, instruction, and assessment practices to meet the learning needs of every student.				**X**	In this course, students will explore how the principles of constructivism/constructionism can be applied to instructional practices and assessment strategies in project-based learning environments, specifically with the use of robotics technology. The course will cover topics such as group project activities, reflections on academic readings, and the development of lesson or unit plans.
4. **Establishing Inclusive Learning Environments:** A teacher establishes, promotes and sustains inclusive learning environments where diversity is embraced and every student is welcomed, cared for, respected and safe.			**X**		Incorporating Lego Robotics in the classroom can provide an inclusive learning experience that caters to students with different abilities and learning styles. Educators can create a safe and welcoming environment that fosters respect for diversity and enables all students to contribute to robotics projects. Additionally, they can integrate various perspectives and cultural aspects into robotics challenges.
5. **Applying Foundational Knowledge about First Nations, Métis and Inuit:** A teacher develops and applies foundational knowledge about First Nations, Métis and Inuit for the benefit of all students.			**X**		Students are encouraged to integrate Indigenous perspectives and knowledge into Lego Robotics hands-on projects by incorporating themes, stories, or designs when they work on their lesson plans. We also examine how First Nations communities use Lego robotics to develop technology, computer science and computational thinking. For example, the FPDI Robotics Program has employed 26 Indigenous Youth Instructors, educating 1,200 youth participants from 93 communities (pdinc.ca/program/fpdi-robotics-program/). Students will also explore and connect with local indigenous leaders who are actively promoting and utilizing robotics in their teaching, such as the IndigeSTEAM robotics, FIRST Robotics tournament held in Alberta.
6. **Adhering to Legal Frameworks and Policies:** A teacher demonstrates an understanding of and adherence to the legal frameworks and policies that provide the foundations for the Alberta education system.			**X**		Students learn relevant frameworks and policies when using educational technology like Lego Robotics in schools, classrooms and student clubs. This includes ensuring student privacy and data protection, adhering to safety guidelines, and complying with copyright and intellectual property laws when using specific robotics materials or software.

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Course Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	Faculty of Education
Contact Person:	Lynn McGarvey
Level of change: (choose one only) [?]	• Undergraduate
	• Graduate
For which term will this change take effect?	Fall, 2024

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

The current title of EDEL 316 goes back several decades when most, if not all, 300-level EDELs had "communication" in their titles. Since that time, EDEL courses, except 316, updated their title and made minor modifications to their descriptions. The proposed title and description aligns it with other 300-level EDEL courses (see EDELs in the Calendar) and is similar to the EDSE 300-level major and minor courses in mathematics education (see EDSE 337 and EDSE 338).

Course Template

Current: ~~Removed language~~	**Proposed:** New language
EDEL 316 - ~~Communication through Mathematics Education~~ **Course Career** Undergraduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Education **Department** Education **Typically Offered** either term This course provides an introduction to the teaching and learning of mathematics in the elementary classroom. The focus will be on using curriculum, strategies, planning and resources to ~~meet student needs.~~ Prerequisite: EDU 100 and 210; pre/corequisite EDU 211. For students in the Elementary After Degree program: pre/corequisite EDU 210, 211, and 300. EDEL 316 is offered as part of Year 3 of the Elementary Program Route.	**EDEL 316 - Curriculum and Pedagogy in Elementary School Mathematics** **Course Career** Undergraduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Education **Department** Education **Typically Offered** either term This course provides an introduction to the teaching and learning of mathematics in the elementary classroom. The focus will be on using curriculum, strategies, planning and resources to support student learning. Prerequisite: EDU 100 and 210; pre/corequisite EDU 211. For students in the Elementary After Degree program: pre/corequisite EDU 210, 211, and 300. EDEL 316 is offered as part of Year 3 of the Elementary Program Route.

Reviewed/Approved by:

REQUIRED: Faculty Council (or delegate) and approval date. Faculty of Education, Undergraduate Academic Affairs Council (UAAC) Approved - October 19, 2023

OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates.

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Course Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	Education
Contact Person:	**Mike Carbonaro & Cathy Adams**
Level of change: (choose one only) [?]	☑ Undergraduate
	☐ Graduate
For which term will this change take effect?	Fall 2024

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

This title change is being made to better reflect the course's content and description and its role as a technology option course in both the undergraduate Education program and the Certificate in Computer Game Development. (https://www.ualberta.ca/media-technology-studies/programs/computer-game-development/index.html)
This course title change will also enable students and faculty to identify (find through searching), more efficiently, the course as an option in the Faculty of Education and the Certificate in Computer Game Development (run out of the Faculty of Arts).

This course has been running successfully with various modifications/updates since the mid-1990s. It provides Education students with the opportunity to develop their knowledge and skills in the area of technology integration to support and enhance teaching, learning and problem-solving. As part of the College of Social Sciences & Humanities, the Faculty of Education is contributing and sharing resources to support the Faculty of Arts offering their certificate. We have consulted with Dr. Sean Gouglas, the certificate coordinator in Certificate in Computer Game Development, and he fully supports this calendar name change request.

Course Template

Current: ~~Removed language~~	**Proposed:** New language
EDIT 486 - ~~Interactive Multimedia~~ **★ 3 (fi 6)(EITHER, 3-0-3)** **Faculty of Education** **This course emphasizes students as builders of video games as opposed to players of video games and addresses the pedagogy of using this process to teach K-12 students. Lectures will focus on educational theory, specifically, social constructivist and constructionist frameworks and their relevance to current learners and their perspectives on technology use. The lab components will explore various game development environments which are designed for K-12 students. Through the construction of video games, students will learn how to promote problem-solving skills and critical thinking in their**	**EDIT 486 - Digital Games in Education** **★ 3 (fi 6)(EITHER, 3-0-3)** **Faculty of Education** **This course emphasizes students as builders of video games as opposed to players of video games and addresses the pedagogy of using this process to teach K-12 students. Lectures will focus on educational theory, specifically, social constructivist and constructionist frameworks and their relevance to current learners and their perspectives on technology use. The lab components will explore various game development environments which are designed for K-12 students. Through the construction of video games, students will learn how to promote problem-solving skills and critical thinking in their**

own students. May contain alternate delivery sections; refer to the Tuition and Fees page in the University Regulations section of the Calendar.	**own students. May contain alternate delivery sections; refer to the Tuition and Fees page in the University Regulations section of the Calendar. Note: Students who have previously obtained credit for EDIT 486 ★ 3 (fi 6)(3-0-3) *Interactive Multimedia* cannot take this course for credit.**

Reviewed/Approved by:

REQUIRED: Faculty Council (or delegate) and approval date. Faculty of Education, Undergraduate Academic Affairs Council (UAAC) Approved - October 19, 2023
OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates.

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Program and Regulation Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	Faculty of Education
Contact Person:	Heather Kennedy-Plant or Jennifer Branch-Mueller
Level of change: (choose one only)	☑ Undergraduate
	☐ Graduate
Type of change request: (check all that apply)	☑ Program
	☐ Regulation
For which term is this intended to take effect?	Fall 2024
Does this proposal have corresponding course changes? (Should be submitted at the same time)	N/A

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

Native Studies notified that either NS 201 or NS 200 are open for our students to take for Category A: Aboriginal and Indigenous Histories & Cultures. NS 201 is not to do if NS 200 has been completed for credit. NS 201 has the same title, Indigenous | Canada: Looking Forward/Looking Back but is only offered online.

KSR has removed all PAC courses, update below to remove PAC from list of courses that can meet Physical and Health Education Element.

Calendar Copy

https://calendar.ualberta.ca/preview_program.php?catoid=39&poid=47823

Current Copy: ~~Removed language~~	**Proposed Copy:** New language
Generalist Elements Courses (42 units)	Generalist Elements Courses (42 units)
Notes: 1. Generalist Elements Courses should be taken in Years 1 and 2, and chosen from the seven areas below. 2. A maximum of 6 units in EDEL courses may be used to fulfill the Elements.	**Notes:** 1. Generalist Elements Courses should be taken in Years 1 and 2, and chosen from the seven areas below. 2. A maximum of 6 units in EDEL courses may be used to fulfill the Elements.

a. Aboriginal and Indigenous Histories and Culture (3 units) 3 units chosen from • ANTHR 150 - Race and Racism • ANTHR 207 - Introduction to Social and Cultural Anthropology • ANTHR 323 • ANTHR 350 - Kinship and Social Structure • ANTHR 385 - Topics in Social Cultural Anthropology • ANTHR 393 - Health and Healing • ANTHR 301 - Introduction to Ethnographic Methods • ANTHR 422 • ANTHR 424 - Visual Anthropology • ANTHR 436 • ANTHR 438 • HECOL 201 - Introduction to Material Culture • HECOL 462 • HIST 368 - Histories of Indigenous Peoples and Kanata until 1870 • HIST 369 - Histories of Indigenous Peoples and Kanata after 1870 • NS 110 - Historical Perspectives in Indigenous Studies • NS 111 - Contemporary Perspectives in Indigenous Studies • NS 152 - Introductory Cree • NS 200 - Indigenous | Canada: Looking Forward/Looking Back • NS 260 - Contemporary Indigenous Art • NS 300 - Traditional Cultural Foundations I • NS 314 - History of First Nations of Western Canada • NS 320 - Indigenous Politics and Diplomacy • POL S 327 - Indigenous Politics in Canada • SOC 100 - Introductory Sociology • SOC 367 … no further changes until…	a. Aboriginal and Indigenous Histories and Culture (3 units) 3 units chosen from • ANTHR 150 - Race and Racism • ANTHR 207 - Introduction to Social and Cultural Anthropology • ANTHR 323 • ANTHR 350 - Kinship and Social Structure • ANTHR 385 - Topics in Social Cultural Anthropology • ANTHR 393 - Health and Healing • ANTHR 301 - Introduction to Ethnographic Methods • ANTHR 422 • ANTHR 424 - Visual Anthropology • ANTHR 436 • ANTHR 438 • HECOL 201 - Introduction to Material Culture • HECOL 462 • HIST 368 - Histories of Indigenous Peoples and Kanata until 1870 • HIST 369 - Histories of Indigenous Peoples and Kanata after 1870 • NS 110 - Historical Perspectives in Indigenous Studies • NS 111 - Contemporary Perspectives in Indigenous Studies • NS 152 - Introductory Cree • NS 200 - Indigenous | Canada: Looking Forward/Looking Back • NS 201 - Indigenous | Canada: Looking Forward/Looking Back • NS 260 - Contemporary Indigenous Art • NS 300 - Traditional Cultural Foundations I • NS 314 - History of First Nations of Western Canada • NS 320 - Indigenous Politics and Diplomacy • POL S 327 - Indigenous Politics in Canada • SOC 100 - Introductory Sociology • SOC 367 … no further changes until…

f. Physical and Health Education (6 units) 3 units chosen from • DAC • EDEL 321 • KIN (KIN 293 recommended) • ~~PAC~~ 3 units chosen from • ANTHR 393 - Health and Healing • EDEL 345 - Introduction to Curriculum and Pedagogy in Elementary School Health Education • HECOL 200 • HECOL 210 - Intimate Relationships • HECOL 211 - Human Sexuality • HECOL 410 - Parent-Child Relationships • HE ED 110 - Introduction to Personal Health and Well-Being • HE ED 120 - Introduction to the Biological Aspects of Fitness to Health • SOC 271 - Introduction to the Family	f. Physical and Health Education (6 units) 3 units chosen from • DAC • EDEL 321 • KIN (KIN 293 recommended) 3 units chosen from • ANTHR 393 - Health and Healing • EDEL 345 - Introduction to Curriculum and Pedagogy in Elementary School Health Education • HECOL 200 • HECOL 210 - Intimate Relationships • HECOL 211 - Human Sexuality • HECOL 410 - Parent-Child Relationships • HE ED 110 - Introduction to Personal Health and Well-Being • HE ED 120 - Introduction to the Biological Aspects of Fitness to Health • SOC 271 - Introduction to the Family

Reviewed/Approved by:

REQUIRED: Faculty Council (or delegate) and approval date. Faculty of Education, Undergraduate Academic Affairs Council (UAAC) Approved - October 19, 2023
OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates.

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Program and Regulation Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	Education
Contact Person:	Doug Gleddie
Level of change: (choose one only)	☐ Undergraduate
	☑ Graduate
Type of change request: (check all that apply)	☑ Program
	☐ Regulation
For which term is this intended to take effect?	Fall 2024
Does this proposal have corresponding course changes? (Should be submitted at the same time)	No

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

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For the MEd degree, the program's	For the MEd degree, the program's

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Reviewed/Approved by:

REQUIRED: Faculty Council (or delegate) and approval date. **September 11, 2023 by the Faculty of Education Graduate Academic Affairs Council (GAAC).**
OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates.

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Program and Regulation Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	Education
Contact Person:	Doug Gleddie
Level of change: (choose one only)	☐ Undergraduate
	☑ Graduate
Type of change request: (check all that apply)	☑ Program
	☐ Regulation
For which term is this intended to take effect?	Fall 2024
Does this proposal have corresponding course changes? (Should be submitted at the same time)	No

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

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UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Course Changes

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Faculty (& Department or Academic Unit):	Faculty of Engineering, Department of Civil and Environmental Engineering
Contact Person:	Dr. Carlos Cruz-Noguez, Dr. Maricor Arlos, Dr. Zaher Hashisho
Level of change: (choose one only) [?]	• Undergraduate • Graduate
For which term will this change take effect?	Fall 2024

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

The Environmental Engineering group within the CEE currently offers the "ENVE 400 Advanced Topics in Environmental Engineering" course. This course can be taught by any professors based on their research and specific expertise. Since Fall 2019, we have offered ENVE 400 under the course topic "Environmental Water Quality Management".

Environmental Water Quality Management was first taught by Dr. Mohamed Gamal El-Din from 2019 to 2021 and was taken over by Dr. Maricor Arlos in Fall 2022. We expect Dr. Arlos to continue teaching this course unless otherwise presented by other teaching arrangements. Enrollment was 26 and ~15 in Fall 2022 and Fall 2021 respectively.

We proposed that the course topic “Environmental Water Quality Management” now be open to both undergraduate and graduate students as a course elective. We propose to name this course as “**CIVE 525 - Environmental Water Quality Management**”.

We foresee minimal impacts to the program structure as CIVE 525 will be an added course elective (see proposed copy below) within the undergrad and graduate course curriculum.

The course learning outcomes are also provided in addition to the items required by this form.

Course Template

Current: ~~Removed language~~	**Proposed:** New language
N/A since we are adding this new course	**Subject & Number:** CIV E 525 **Title:** Environmental Water Quality Management **Course Career** Graduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Engineering **Department** Civil & Environmental Eng **Typically Offered** first term **Description** Principles of water quality and systems analysis of rivers and lakes. Mathematical methods for modeling environmental systems. Application of models to generic

	substances within aquatic systems. Incorporating different mass transfer (advection-dispersion, diffusion, volatilization) and mass transformation (e.g., biodegradation, hydrolysis) processes in the mathematical model. Introduction to more complex environmental conditions such as dissolved oxygen, nutrients, and eutrophication. Prerequisite: ENV E 325; corequisite: ENV E 320

Reviewed/Approved by:

REQUIRED: Faculty Council (or delegate) and approval date. GPC: June 7, 2023 APC: June 21, 2023 ECC: October 24, 2023
OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates.

Course Description

Principles of water quality and systems analysis of rivers and lakes. Mathematical methods for modeling environmental systems. Application of models to generic substances within various systems (rivers, lakes). Incorporating different mass transfer (advection-dispersion, diffusion, volatilization) and mass transformation (e.g., biodegradation, hydrolysis) processes in the mathematical model. Introduction to more complex environmental conditions such as dissolved oxygen, nutrients, and eutrophication. Prerequisite: ENV E 325; co-requisite: ENV E 320

Student Learning Outcomes

1. Formulate a mathematical model from a conceptual problem statement and understand the basic issues with translating a conceptual model to a mathematical model (how and when to simplify, the impact and purpose of boundary and initial conditions).
2. Develop analytical and numerical solutions to water quality modeling problems based on first principles.
3. Identify and explain the bio-physical processes controlling dissolved oxygen, nutrients, phytoplankton, pathogenic bacteria, and other water quality constituents, and apply these processes within the modeling environment.
4. Apply models to evaluate scenarios relevant to pollution control, engineering interventions, and hydro-climatological variability
5. Develop a stronger working knowledge with existing water quality modeling software package which contains tools for mathematical analysis
6. Improve critical thinking and communication skills both in verbal and written format.

Relationship of Learning Outcomes and Graduate Attributes

Learning Outcome		Graduate Attribute	Instructional Level
1		Knowledge Base in Engineering Problem Analysis Impact of Engineering on Society and Environment	Developed
2		Knowledge Base in Engineering Problem Analysis	Developed
3		Knowledge Base in Engineering	Applied
4		Use of Engineering Tools Problem Analysis Individual and Team Work	Applied

		Investigation	
5		Use of Engineering Tools	Applied
6		Communication Skills	Applied

Assessments of Learning Outcomes

Learning Outcome		Assessments/Activities
1, 2, 3, 4, 5,		Assignments, Midterm (Written, Oral), & Final (Written) Exams
4,5,6		Midterm (Oral)
5,6		Field Trip: Canoeing the North Saskatchewan River.

Accreditation Units

AU Category	Linked to which learning outcome	Percentage of course content (see calculation below)
Math		
Natural Sciences		
Engineering Science	1-6	100
Engineering Design (requires PEng)		
Complementary studies		
Other		

Final course AUs

Total	Math	NS	ES	ED	CS	Other
			37.8			

Accreditation unit (AU) calculation – a category of AU that is less than 25% of the course cannot be reported for the course accreditation units.

1. Total Lecture hours = course lecture hours as per calendar description x 12.6 weeks = X
2. Total Seminar hours = course seminar hours as per calendar description x 12.6 weeks = Y
3. Total Lab hours = course lab hours as per calendar description x 12.6 weeks = Z

Total course hours = X+Y+Z = TCH
Total AUs in a course AU_{total}= 12.6 x (X+ ½ Y + ½ Z)
Number of hours (lecture, seminar, lab) spent on teaching and doing examples of accreditation category “i", is H_i
where subscript, i, is for the number total hours spent in course for either Math (M), Engineering Design (ED), Natural Sciences (NS), Engineering Science (ES), Complementary studies (CS), or Other (O)[1]
Percentage course content in AU category i, is: $\%_i = H_i/TCH$
Accreditation unit for category i, is: $A_i = AU_{total} \times \%_i$

[1] do not use other unless work experience, experiential learning etc – consult Associate Chair or Associate Dean

Proposed Grading criteria (subject to change pending Instructor course modification)

The breakdown of the assessments included in this course is found in the table below.

Component		Percentage
Assignments (Six total)		20%
Midterm (Oral)		15%
Midterm (Written)		25 %
Final Exam (Written)		40%
Total		100%

Letter Grade / Marking Scheme

The grades on this course will be based on the following scale. The Dean's Office provides a final oversight on all the grades but these are first approved by the Department Chair.

Numerical Grade		Letter Grade
≥94		A+
90 – 93		A
82 – 89		A-
76 – 81		B+
70 – 75		B
64 – 69		B-
60 – 63		C+
57 – 59		C
55 – 56		C-
52 – 54		D+
50 – 51		D
<50		F

Course Assessments

All types of assessments in this course are briefly described below. Description of how each assessment supports students' learning and how it relates to the course's learning outcomes are also provided. If you are new to these assessments, please reach out to the course instructor for more clarification.

Assignments

There will be approximately **6 assignments** which are to be handed in for marking. Selected problems on the assignment will be marked in detail and the rest will be marked for effort/completion. Solutions must be laid out properly, with all steps shown, answers underlined, and diagrams properly labeled. Solutions will be posted on eClass after the due date. The tentative deadlines for the assignments are shown below. Dates subject to the pace of the lectures:

Deliverable/Event		Tentative Dates
Assignment #1		
Assignment #2		
Assignment #3		
Assignment #4		
Assignment #5		
Assignment #6		

Problems should be done on engineering quadrile (graph) or other appropriate paper. Use standard size paper (8.5 x 11 in). Many problems will be done on a computer, and should be legible and appropriately formatted. Tables, figures, and graphs should be neatly drawn and/or labeled by computer. Explanatory notes should be provided as necessary. Be neat. Take pride in your work and its presentation. Details on "collaborating" and academic integrity policies to completing assignments are found in the "University Policy " section.

Midterm Exam (Oral)

Oral exam is effective in demonstrating your knowledge and mastery of this course. Most importantly, oral exam tests your **deep learning**. Deep learning is achievable and I am committed to teach you how to approach this better. Oral exam also improves your communication skills including presentation, speaking, and interpersonal skills. I generally look for concise, specific, and structured answers to the questions. The format for this exam is described below:

- In the beginning of Week 5, student will be provided with the following:
  - A list of questions that will be asked during the oral exam. These questions will have two levels of difficulty which assess your (1) knowledge, (2) comprehension, and (3) critical thinking/higher-order learning.
  - A sign-up sheet with time blocks to choose from 9:30 am – 5:30 pm on **DATE**.
  - Guidance on how to prepare for the Midterm oral exam.
- During the exam, you will do the following:
  - Randomly draw one question for each round of Q&A. There will be 2 rounds of questioning
  - I will give you 1 min to read your question and process it carefully.

- Student will be given 4 min to answer your question.
- Total oral exam time is ~10 min.

- I can record your oral exam but I will only do so after you submit the consent form (to follow a week before the oral exam). It is your right if you do not want to be recorded, but note that the recordings can be used for grade appeals. More information on Information and Privacy Policies at UofA is found here: https://www.ualberta.ca/information-and-privacy-office/photos-video-audio-recordings.html.
- See "Course Policy" section regarding oral exam attendance.
- Student response to the question will be graded using the rubric described below:

Criteria		Poor (10-12 points)	Developing (12-15 points)	Competent (16-17 points)	Proficient (18-20 points)
Understanding of Concepts		No grasp of the concepts and demonstrates incomplete knowledge of the topic by responding inaccurately and inappropriately to questions	Shows a superficial understanding of the topic but some mistakes in key concepts.	Can answer questions partially with some explanations.	Demonstrate full understanding of the concepts with explanations.
Communication of ideas		Uncomfortable to express ideas, the responses are difficult to understand	Somewhat comfortable to express ideas. The responses are somewhat understandable.	Express ideas comfortably, but need more work to make the ideas clearer.	Express ideas comfortably in a logical way and it is easy to understand.
Critical Thinking		Cannot make connections among ideas, concepts; lack of ability to compare or contrast, synthesize, or analyze issues or points of views.	Make connections among ideas, concepts in a limited way; some ability to compare or contrast, synthesize, or analyze issues or points of views.	Make connections among ideas, concepts in a good way; can somewhat compare or contrast, synthesize, or analyze issues or points of views.	Demonstrate the ability to make connections among different concepts, ideas; compare or contrast, synthesize, or analyze issues or points of views

Midterm Exam (Written)

The written aspect of the midterm exam takes place (in person) on **DATE**. See "Course Policy" section regarding mid-term exam attendance.

Final Exam (Written)

The final exam (written format [classical assessment]) will be online and will take place on **XX**. The exam is open-book and is cumulative (i.e., includes both pre- and post-midterm topics). Note though that 25% of the questions will be related to pre-midterm material. See “Course Policy” section regarding final exam attendance.

Recommended materials

- Recommended Book: Surface Water Quality Modeling, Chapra, Waveland Press, 1997. (Supplementary-Recommended) [formerly published by McGraw-Hill]

Laboratory Component

- None

Calendar / Course Outline

Lecture topics, activities, and assessment deadlines are outlined below. Use this as a guideline only and order may change depending on the progress of the course.

Topics	Estimated Number of 1.5h Lectures (~25)	Lecture Notes
Course Overview & Introduction	1	Introductory Lecture
Background, Introduction to Surface Water Quality Models, Assimilative Capacity, Review of Mass Balance, Reaction Kinetics, and Steady-State Conditions	3	Chapter 1
Model Representation for Completely Mixed Systems (e.g., Lakes), Contaminant Fate and Transport under different contaminant loading scenarios (Impulse, Step, Linear, Exponential, and Sinusoidal)	4	Chapter 2
Multicompartment Models: feed forward and feedback systems; water column-sediment interaction	3	Chapter 3
Lake-Estuary Systems (Diffusion-dominated)	3	Chapter 4
River Systems (Advection-dominated)	3	Chapter 5
Advective-dispersive System/ Mixing Conditions	3	Chapter 7
Full Water Quality Model Example 1: Dissolved Oxygen and Pathogens	3	Chapter 8
Full Water Quality Model Example 2: Microbe and Substrate Modeling (algal growth)	2	Chapter 9

Relationship to Other Courses Offered at the Graduate Level if any

Mass transfer, transport, and transformation processes are covered in other graduate courses, CIVE 525 is focused on contaminant fate and transport in surface water systems and there are currently no courses that offer this. More specifically, the course explains the origin and/or theoretical basis of the formulations and techniques in water quality modeling and therefore, has parallels with CHE 611 (Advanced Transport Phenomena) and CH E 610: Computational Transport Phenomena. However, CH E 611 focuses on applications of mass transport in fluid mechanics, non-Newtonian flow/diffusion and CH E 610 focuses on heat and mass transport in systems of chemical engineering applications (e.g., velocity, temperature profiles in reactors, turbulent flows etc) while CIV E 525 focuses on large scale systems such as lake and river water quality models.. This course also focuses on the **implementation** of numerical solutions within the water quality modeling context. Also, MEC E offers Colloidal Hydrodynamics (MEC E 637) but the applications are focused on colloid transport which have applications in water/wastewater treatment (coagulation, flocculation, sedimentation).

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Program and Regulation Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	Faculty of Engineering, Department of Civil and Environmental Engineering
Contact Person:	Dr. Carlos Cruz-Noguez, Dr. Maricor Arlos, Dr. Zaher Hashisho
Level of change: (choose one only)	• Undergraduate
	• Graduate
Type of change request: (check all that apply)	• Program
	• Regulation
For which term is this intended to take effect?	Fall 2024
Does this proposal have corresponding course changes? (Should be submitted at the same time)	Yes

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

The Environmental Engineering group within the CEE currently offers the "ENVE 400 Advanced Topics in Environmental Engineering" course. This course can be taught by any professors based on their research and specific expertise. Since Fall 2019, we have offered ENVE 400 under the course topic "Environmental Water Quality Management".

Environmental Water Quality Management was first taught by Dr. Mohamed Gamal El-Din from 2019 to 2021 and was taken over by Dr. Maricor Arlos in Fall 2022. We expect Dr. Arlos to continue teaching this course unless otherwise presented by other teaching arrangements. Enrollment was 26 and ~15 in Fall 2022 and Fall 2021 respectively.

We proposed that the course topic “Environmental Water Quality Management” now be open to both undergraduate and graduate students as a course elective. We propose to name this course as “**CIVE 525 - Environmental Water Quality Management**”.

We foresee minimal impacts to the program structure as CIVE 525 will be an added course elective within the undergrad and graduate course curriculum.

Calendar Copy

URL in current Calendar (or "New page")
https://calendar.ualberta.ca/preview_program.php?catoid=36&poid=42855&returnto=11335

Current Copy: ~~Removed language~~	**Proposed Copy:** New language
Bachelor of Science in Civil Engineering (ENV E option) **[..]** **Program Requirements** **[..]** **Year 4** **Fall Term 7** • CIV E 374 - Structural Design I • ENV E 320 - Environmental Hydrology • ENV E 421 - Municipal Systems • ENV E 423 - Principles of Air Quality Management and Control • ENV E 432 - Solid Waste Management One of • CIV E 524 - Environmental Biotechnology • CIV E 526 - Soil Remediation • ENV E 400 - Advanced Environmental Engineering I **[..]**	**Bachelor of Science in Civil Engineering (ENV E Option)** **[..]** **Program Requirements** **[..]** **Year 4** **Fall Term 7** • CIV E 374 - Structural Design I • ENV E 320 - Environmental Hydrology • ENV E 421 - Municipal Systems • ENV E 423 - Principles of Air Quality Management and Control • ENV E 432 - Solid Waste Management One of • CIV E 524 - Environmental Biotechnology • CIV E 526 - Soil Remediation • CIV E 525- Environmental Water Quality Management • ENV E 400 – Advanced Environmental Engineering I **[..]**

Reviewed/Approved by:

REQUIRED: Faculty Council (or delegate) and approval date. Engineering Faculty Academic Planning Committee (APC): Jun 21, 2023 Faculty of Engineering Executive Coordinating Committee (ECC): October 24, 2023
OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates. Civil and Environmental Engineering Academic Planning Committee: January 24, 2023

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Program and Regulation Changes

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Faculty (& Department or Academic Unit):	Faculty of Engineering, Department of Civil and Environmental Engineering
Contact Person:	Dr. Carlos Cruz-Noguez, Dr. Maricor Arlos, Dr. Zaher Hashisho
Level of change: (choose one only)	• Undergraduate
	• Graduate
Type of change request: (check all that apply)	• Program
	• Regulation
For which term is this intended to take effect?	Fall 2024
Does this proposal have corresponding course changes? (Should be submitted at the same time)	Yes

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Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

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Reviewed/Approved by:

REQUIRED: Faculty Council (or delegate) and approval date. Engineering Faculty Academic Planning Committee (APC): Jun 21, 2023 Faculty of Engineering Executive Coordinating Committee (ECC): XXX
OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates. Civil and Environmental Engineering Academic Planning Committee: January 24, 2023

UNIVERSITY OF ALBERTA

Calendar Change Request Form for Course Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	Engineering, Biomedical Engineering
Contact Person:	Maral Aminpour <aminpour@ualberta.ca>; Robert Burrell <rburrell@ualberta.ca>
Level of change (choose one only) [?]	• Graduate
For which term will this change take effect?	Fall 2024

Rationale

It is important for biomedical engineering graduate students to understand recent concepts in machine learning and how these concepts can be applied in the biomedical engineering field. The complexity of analysis and the enormous repository of data in healthcare means that machine learning will increasingly be applied with the field. For this purpose, we designed and developed "**Machine Learning for Biomedical Applications**" course. The proposed new course will cover a wide array of machine learning techniques with specific examples of applications to biomedical problems.

Although this course is primarily intended for graduate students in the Department of Biomedical Engineering (BME), it will also be available to qualified graduate students in **other engineering disciplines** and students from other faculties (for example, **Science and Medicine & Dentistry**), and to the interested undergraduate students with the permission of the instructor.

The proposed course development was funded by a grant from **AI4Society** (**Funding Amount**: $10,000, **Duration:** Feb. 10, 2022 – June 10, 2023, **PI**: Dr. Maral Aminpour, **Co-PI:** Dr. Robert Burrell, Dr. Russ Greiner, Dr. Jack Tuszynski). The full proposal is added in the supplementary section.

The course provides **theoretical insights and principles** illustrated with biomedical examples. We also provide implementations from scratch for several important concepts to reinforce and deepen the understanding of the machine learning techniques. Each section of the course is finished with **practical biomedical-related exercises**. The practical machine learning tools included in this course are by far the most popular in both academia and industry and should be a part of the skill set of every aspiring data scientist or deep learning practitioner in health and Biomedical Engineering field.

The proposed course is unique because the focus is on applying machine learning techniques to a wide variety of diagnostic and prognostic biomedical problems. Theory on machine learning techniques will be covered, but the emphasis will be on practical applications to important real-world problems in BME. Students will write Python codes to create and evaluate machine learning models on real health and biological data. There is no other course that covers the same broad set of machine learning methods and has the same applications-focus.

There are other AI and machine learning courses available across the university (see complementary courses section), but none cover the Biomedical Engineering and health related applications as the proposed course.

Course Template

****** New Course ******	**Proposed** **Subject & Number:** BME 677 **Title:** Machine Learning for Biomedical Applications **Course Career:** Graduate **Units:** 3 **Approved Hours:** 3-0-0 **Fee index:** 6 **Faculty:** Engineering **Department:** Biomedical Engineering **Typically Offered:** Either Term **Description:** Applications of machine learning tools to real-world problems in biomedical engineering including diagnostic and prognostic applications. An introduction to machine learning. Machine learning tools: regression and classification; manifold learning and dimensional reduction; decision trees and ensemble learning; unsupervised learning and clustering; feature selection and feature extraction; neural networks and deep learning. Biomedical applications: cancer, cardiovascular disease, diabetes, neurological diseases and infectious diseases.

Reviewed/Approved by:

REQUIRED: Approved by Faculty GPC on Dec 7, 2022. Approved by Faculty APC on Dec 14, 2022. Approved by Faculty Council (ECC) on Sep 26, 2023.
Other consultation groups, departments, or internal faculty approving bodies and approval dates.

Course description and justification

1. **Calendar description (as above)**

Applications of machine learning tools to real-world problems in biomedical engineering including diagnostic and prognostic applications. An introduction to machine learning. Machine learning tools: regression and classification; manifold learning and dimensional reduction; decision trees and ensemble learning; unsupervised learning and clustering; feature selection and feature extraction; neural networks and deep learning. Biomedical applications: cancer, cardiovascular disease, diabetes, neurological diseases and infectious diseases.

2. **Course Justification (as above)**

It is important for biomedical engineering graduate students to understand recent concepts in machine learning and how these concepts can be applied in the biomedical engineering field. The complexity of analysis and the enormous repository of data in healthcare means that machine learning will increasingly be applied with the field. For this purpose, we designed and developed "**Machine Learning for Biomedical Applications**" course. The proposed new course will cover a wide array of machine learning techniques with specific examples of applications to biomedical problems.

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and biological data. There is no other course that covers the same broad set of machine learning methods and has the same applications-focus.

There are other AI and machine learning courses available across the university (see complementary courses section), but none cover the Biomedical Engineering and health related applications as the proposed course.

Complementary courses: Complementary courses within the University are listed below, with explanations of how the proposed course is unique.

ECE 625 – Data Analysis and Knowledge Discovery
"Approaches, techniques and tools for data analysis and knowledge discovery. Introduction to machine learning, data mining, and the knowledge discovery process; data storage including database management systems, data warehousing, and OLAP; testing and verification methodologies; data preprocessing including missing data imputation and discretization; supervised learning including decision trees, Bayesian classification and networks, support vector machines, and ensemble methods; unsupervised learning methods including association mining and clustering; information retrieval."

This course is offered in the Department of Electrical and Computer Engineering. There is some overlap in machine learning methods covered this course, but there are also both additional and missing topics compared to the proposed course. This course does not cover topics specific to biomedical engineering including health data. Further, it is expected that students who do not have an undergraduate degree in electrical or computer engineering (or similar) would not have the required background to take this course.

ECE 626 – Advanced Neural Networks
"Introductory and advanced topics in neural networks and connectionist systems. Fast backpropagation techniques including Levenberg-Marquardt and conjugate-gradient algorithms. Regularization theory. Information-theoretic learning, statistical learning, dynamic programming, neurodynamics, complex-valued neural networks."

This course is offered in the Department of Electrical and Computer Engineering. This course is specific to neural networks and does not cover the broader set of machine learning topics outlined in the proposed course. This course does not cover topics specific to biomedical engineering including health data. Further, it is expected that students who do not have an undergraduate degree in electrical or computer engineering (or similar) would not have the required background to take this course.

MEC E 610 – Machine Learning Control for Engineering Applications

"Development of control-oriented dynamic models using machine learning techniques. Optimal, adaptive and model predictive control techniques that are solved using methods of machine learning including support vector machines, neural networks, reinforcement learning and other methods of machine learning. Applications in broad linear and nonlinear engineering systems."

This course is offered in the Department of Mechanical Engineering. This course is specific to subfield of machine learning control. It does not include biomedical engineering topics such as analysis of health data.

MEC E 694 – Applied Computational Intelligence for Engineers
"Introduction to intelligent agents and environments. Examples of application of computational intelligence in engineering. Solving problems by searching. Learning through optimization. Feature selection and dimension reduction for managing real-world data. Application of learning in classification and function approximation. Data clustering. Fuzzy logic and fuzzy inference systems."

This course is offered in the Department of Mechanical Engineering. There is some overlap, for example feature selection and dimension reduction, but most of the topics between this course and the proposed course are distinct. This course does not include biomedical engineering topics such as analysis of health data, handling big datasets, and AI techniques applied to health image data.

Department of Computing Science courses
The Department of Computing Science has many graduate courses listed in the calendar that cover artificial intelligence and machine learning (examples listed below). However, these appear to be special topics courses and do not have full course descriptions available in the calendar.

Examples include:

- CMPUT 622, 624, 626, 627, 628, 629 – Topics in Machine Learning
- CMPUT 650, 651, 653, 655, 656, 658, 659 – Topics in Artificial Intelligence

The courses offered in Department of Computing Science does not include specific practical applications in biomedical engineering field. AI courses in Department of Computing Science are designed for students with more solid coding background. These courses may be more advanced for BME students without hard core coding experiences.

3. Learning outcomes

In terms of the **learning outcomes,** by the end of the course the student will be able to:

i. Understand machine learning techniques, including regression and classification; manifold learning and dimensional reduction; decision trees and ensemble learning; unsupervised learning and clustering; feature selection and extraction; artificial neural networks and deep learning.
ii. Understand both the advantages and limitations of each technique with respect to biomedical problems, and know how to select appropriate techniques for specific biomedical problems, including diagnostic and prognostic tasks.
iii. Be able to train models in Python, Scikit-learn and PyTorch API; perform model selection, evaluation and troubleshooting; apply best practice implementation and generalisation to new data
iv. Critically analyse related recent literature on machine learning for BME applications; write reports and give oral presentations on machine learning topics.

6. Relation between learning outcome and graduate attributes

Not applicable

7. Textbook and Course Materials:

Recommended textbook:
Machine Learning for Biomedical Applications: With Scikit-Learn and PyTorch by Maria Deprez Emma C. Robinson; September 15, 2023. ISBN-10: 0128229047. ISBN-13: 978-0128229040.

Publisher description: "*Machine Learning for Biomedical Applications* presents machine learning techniques most commonly used in a biomedical setting. Avoiding a theoretical perspective, it provides a practical and interactive way of learning, where concepts are presented in short descriptions followed by solving simple examples using biomedical data. Interactive Python notebooks are provided with each chapter to complement the text and aid understanding."

Required software:
The course will require Python 3. Interactive Python (IPython) notebooks will be used. The following Python libraries will be used: NumPy, SciPy, Scikit-Learn, Matplotlib, Pandas and PyTorch. All software to be used is open source and freely available.

Other course materials:
A GitHub repository will contain all lecture presentation slides, tutorials, IPython notebooks, data files, and all other course files. The files will also be available on eClass.

8. course outline and schedule

Note: The course schedule might be subject to change.

Week (dates)	**Subject**	**Biomedical Applications**	**Deadlines**
1 (Sep 1–7)	Python programming boot camp		
2 (Sep 8–14)	Introduction to machine learning		
3 (Sep 15–21)	Regression	Predict neonatal brain growth	Group project topic approval Thu Sep 21
4 (Sep 22–28)	Classification	Diagnosis of heart failure	Assignment 1 due Mon Sep 25
5 (Sep 29–Oct 5)	Manifold learning and dimensional reduction	Analysis of functional magnetic resonance imaging (fMRI)	
6 (Oct 6–12)	Decision trees and ensemble learning	Predicting diabetic retinopathy; Identifying synergistic drug combinations	Assignment 2 due Mon Oct 9
7 (Oct 13–19)	Unsupervised learning and clustering	Breast cancer diagnosis; Classifying cancer subtypes	
8 (Oct 20–26)	Feature selection and extraction	Prediction of age at scan from volumes of brain structures of preterm babies.	Assignment 3 due Mon Oct 23
9 (Oct 27–Nov 2)	Artificial neural networks (ANNs)	Classification of tumors in chest/lung CT scans and differentiate between benign and malignant tumors	

10 (Nov 3–9)	Deep learning and convolutional neural networks (CNNs)	Detecting COVID-19 pneumonia from X-ray images	Assignment 4 due Mon Nov 6
11 (Nov 10–23)	*Additional topic selected by instructor*		
12 (Nov 24–30)	*Additional topic selected by instructor*		Assignment 5 due Mon Nov 27
13 (Dec 1–7)	Student project presentations		Group project due Thu Dec 7

Week 1: Python programming boot camp
A brief introduction to Python 3 for beginners, including Data types. Operations. Control flow. File I/O. Python packages and Modules : NumPy for linear algebra, Matplotlib for plotting and Pandas for data handling. An introduction Python Notebooks and provide instructions for installation of Anaconda software package.

Week 2: Introduction to machine learning
Basic machine learning concepts. Using the Scikit-Learn library. Training machine learning models: performance measures; overfitting and underfitting; training, testing and cross-validation.

Week 3: Regression
Multivariate linear regression; normal and gradient descent. Penalized linear regression; ridge and lasso regression; regularization. Non-linear regression; feature transformation; kernel trick.
Biomedical Application: prediction of neonatal brain growth (we demonstrate the problem of overfitting on example of prediction of age of a baby from brain volumes extracted from MRI scans and introduce of the kernel trick.)

Week 4: Classification
Linear classification; binary classification; multi-label classification. Support vector classification; linear support vector classification; non-linear support vector classification; kernel support vector classification.
Biomedical Application: diagnosis of heart failure. We demonstrate these concepts on an example of prediction of heart failure using the features extracted from cardiac MRI, ultrasound and ECG.

Week 5: Manifold learning and dimensional reduction
Principal component analysis (PCA). Independent component analysis (ICA). Non-linear manifold learning and Laplacian eigenmaps.

Biomedical Application: analysis of fMRI data. We show how reducing abdominal MRI to two dimensions allows us to extract the breathing cycle for correction of the motion artefacts.

Week 6: Decision trees and ensemble learning
Weak learners and decision stumps. Entropy, information gain and Gini index. Decision trees. Ensemble learning: voting, bagging, random forests and boosting.
Biomedical Application: predicting diabetic retinopathy using Decision trees and/or identifying synergistic drug combinations using RF.

Week 7: Unsupervised learning and clustering
Unsupervised learning. Clustering algorithms: K-means clustering and gaussian mixture model. Spectral clustering using Laplacian eigenmaps.
Biomedical Application: Diagnosing breast cancer from biopsy images

Week 8: Feature selection and extraction
How and why to select features. Feature selection methods: univariate, model-based and recursive feature elimination. Feature extraction.
Biomedical Application*:* Prediction of age at scan from volumes of brain structures of preterm babies (selection from 5 features)

Week 9: Artificial neural networks (ANNs)
Introduction to basic building blocks of neural networks, including the artificial neuron and single-layer perceptron. We cover activation functions, loss functions for regression and classification, and training of single layer neural network models. We cover training of neural networks using backpropagation. We provide a Pytorch tutorial and implement neural network regression and classification examples in Pytorch
Biomedical Application: Classification of tumors in chest/lung CT scans and differentiate between benign and malignant tumors using NN & Transfer Learning

Week 10: Deep learning and convolutional neural networks (CNNs)
Introduction to fully Connected Neural Networks: how multiple linear layers and non-linear activation functions are combined to create deep neural network architectures. We will describe a more advanced deep learning architecture, the convolutional neural network.

B*iomedical Application (deep learning):* We show a complete Pytorch deep learning solution for a real world biomedical problem for detecting COVID-19 pneumonia from X-ray images.
And/or
B*iomedical Application (CNN):* we will present an example of segmentation of neonatal brain MRI into multiple anatomical regions using U-Net architecture, while demonstrating how to handle large datasets in Py-Torch.)

Weeks 11–12: Additional topics selected by instructor
To be decided.

Week 13: Student project presentations
Time allocated for student project presentations.

9. **Expected and types of assessments and suggested grade weight**

Assignment	**Topics**	**Deadline**	**Percentage of Final Grade**
Assignment 1	Python and machine learning	Monday September 25 8:00 am	12%
Assignment 2	Regression and classification	Monday October 9 8:00 am	12%
Assignment 3	Manifold learning and dimensional reduction; Decision trees and ensemble learning	Monday October 23 8:00 am	12%
Assignment 4	Unsupervised learning, clustering, feature selection and feature extraction	Monday November 6 8:00 am	12%
Assignment 5	Neural networks and deep learning	Monday November 27 8:00 am	12%
Group project	*Selected by students*	Presentation: December 1–7 Report and source code: Thursday December 7 6:00 pm	40%

There will be five individual assignments and one group project.

Each individual assignment will correspond to topics covered in class lectures. There will be a total of five assignments with the deadlines listed in the course schedule. Each assignment will be submitted as an iPython notebook file (.ipynb). Detailed marking rubrics for the assignments will be provided on GitHub and eClass.

There will be a final group project due at the end of the course. A list of suggested topics is included in the syllabus. The groups and project topic must be approved by the instructor. Students must submit a project proposal to the instructor by the deadline in the course schedule. The project will require reading of relevant literature and the creation of Python code. The project will require three components to be submitted: (1) a presentation during the last week of classes; (2) a written report detailing the problem, the methods used, and a discussion of the results; and (3) an archive containing all Python source code and data files. Detailed requirements and marking rubrics for the final project will be provided on the course GitHub and eClass.
There will be no final exam.

Example projects:

1. Predict survival outcome in breast cancer patients using clustering
2. Classification goal is to predict whether the patient has 10-year risk of future coronary heart disease using logistic regression
3. Breast Cancer biopsy image analysis using a Convolutional Neural Network (CNN)
4. Diagnosis of Parkinson's using voice measurements
5. Urinary Tract Infection prediction from health record data
6. Analysis of COVID-19 transmission in South Korea
7. Predicting survival outcome in breast cancer patients based on their gene expression

Students can choose other topics for their projects after discussing it with the instructor and getting the approval of the instructor.

10. Lab components

None

11. Required resources

None

<u>Supplemental information</u>

AI4Society grant for Development of a Course on "Artificial Intelligence for Biomedical Engineers"

- **Title of the initiative:** Development of a Course on "Artificial Intelligence for Biomedical Engineers"
- **Description of the initiative:**

- The main objective of the proposed initiative is to develop a course on "Artificial Intelligence for Biomedical Engineers" under a proposed accelerated Master of Engineering (M.Eng.) Program in Biomedical Engineering (BME) currently under development by the Department of Biomedical Engineering.
- As mentioned above, the Department of Biomedical Engineering is proposing the establishment of an accelerated Master of Engineering (M.Eng.) Program in Biomedical Engineering (BME). Graduates of this program would be fully trained engineers but would also receive advanced biological training in BME with an emphasis on strengthening the link between the faculties of Medicine & Dentistry and Engineering. In addition, including a medical focus in the BME M.Eng. Program will facilitate the training of physicians who bring a unique engineering perspective to the problems they encounter in the field, both in individual cases and in the field of medicine as a whole.
- One of the aims of this program is to offer courses that confront the pressing challenges of modern Biomedical Engineering such as Artificial Intelligence (AI). AI in Biomedical Engineering focuses on applications of recent AI technologies that deliver promising solutions and improved technologies in the biomedical field. The complexity of the analysis and the enormous repository of data in healthcare means that AI will increasingly be applied within the field. AI algorithms can learn patterns from biomedical data sets in ways that are different and sometimes better from human cognition and provide insights on disease diagnosis and treatment by decoding previously hidden correlations among symptoms, vital signs, and disease.
- In this context, the goal of the proposed course is to introduce the application of AI tools to real-world problems in Biomedical Engineering. The emphasis of this course is on practical applications of AI in BME rather than theory, but with the recognition that it is impossible to be an intelligent practitioner without some appreciation of underlying theory. The introduction will cover an overview of a wide range of AI and machine-learning tools (covering tasks like clustering, regression, decision trees, random forests and artificial neural networks (ANN), and different subsets of ANN such as deep learning, etc.), biomedical data sets (imaging, omics data, patient records) and disease applications (including cancer, cardiovascular, diabetes, neurological, infectious diseases (COVID-19) and brain diseases). There will be hands-on tutorials and a design project.
- Although basic familiarity with Python will be required, extensive programming experience will not be a prerequisite. R code and documentation will also be provided for all lectures. A course outline will also be developed outlining the objectives, lectures, and student activities for each week. A website will be developed for the course containing the course syllabus and documentation.
- A GitHub repository will also be created containing the lecture presentation slides (PPT), hands-on tutorials (PDF and html), the codes used in the tutorials, a bootcamp for the coding language to be used (i.e., Python Bootcamp), and the data to be used in the hands-on tutorials and projects. The video recording of the lectures will also be made available in the GitHub repository in accordance with the hybrid course delivery guidelines of the University of Alberta.
- This course will be tailored to graduate students, although an interested undergraduate student could request permission from the instructor to take the course. This course will be designed for engineering students

interested in biomedical applications of AI and students interested in pursuing PhD studies with a BME specialization, an MD/PhD, MD or Dentistry. The course will target students both within and beyond the Faculty of Engineering and will be open to and useful for students across College of Natural and Applied Sciences disciplines with an interest in the computational field and health-related projects.

- It is expected that this course will equip BME engineers with an understanding of AI and its applications in the BME field. It should be noted that, while there are several universities in Canada with BME programs (18 Universities in Canada with undergraduate BME programs and 19 Universities in Canada with graduate degree programs in BME), only McGill offers an artificial intelligence course that is specifically designed for BME students ("Machine Learning for Biomedical Data": Link). The proposed course will establish the University of Alberta as a leader in AI education in BME.
- **Why there is a fit with AI4Society:**
- One of the key requirements of a BME M.Eng. Program at the Department of Biomedical Engineering is to develop current and relevant courses that ready students to enter the field. AI will be a fixture in the future of healthcare. Given the rapid developments within the AI field, there is an urgent need for highly trained personnel within the biomedical engineering field to provide expertise for this purpose. Our proposed course directly aligns with the mandate of the AI4Society, as it aims to "develop new materials" and "courses" and it has direct applications in a vertical sector described by the AI4Society (i.e., health). The proposed course is particularly aligned with two AI4Society themes: "Curriculum Development" and "Capacity Building" themes. The focus of this course is to apply AI on BME problems by exposing students to AI applications on BME, hands-on tutorials and a real-world BME design project, which makes it different from other courses offered at the University of Alberta as highlighted by AI4Society (https://ai4society.ca/#academics).
- **Name, affiliation, and contact information of the Principal Investigator:**
- Maral Aminpour, PhD, Industrial Professor, Department of Biomedical Engineering
- Donadeo Innovation Centre for Engineering 13-209, 9211 116 St NW Edmonton, Alberta Tel: 780-271-2827, aminpour@ualberta.ca
- **Names and affiliations of other team researchers:**
- Robert Burrell, PhD, Professor and Chair of the Department of Biomedical Engineering, Faculties of Engineering and Medicine & Dentistry; Professor and former Canada Research Chair in Nanostructured Biomaterials and Jim Sorensen Chair in Biomedical Engineering
- Russ Greiner, PhD, Professor, Department of Computing Science
- Jack A. Tuszyński, Professor, Department of Physics; Adjunct Professor, Department of Oncology; Adjunct Professor, Department of Biomedical Engineering; Member, Li Ka Shing Institute of Virology
- **Brief discussion of the suitability of the team:**
- The research team is composed of four experts with significant experience and track records: Dr. Aminpour is an expert in computational Biophysics and Biomedical Engineering tackling a variety of health-related problems. She has experience with AI in the field of protein classifications. Dr. Aminpour holds a "Graduate Teaching and Learning (GTL) Level II" certificate, with this program having involved 50 hours of formal classroom training, culminating with a project developing her own course. Dr. Robert Burrell is an

experienced biomedical engineer with a track record of commitment to education in this field. He previously prepared a draft "Proposal for an Accelerated Master of Engineering (M. Eng.) Program in Biomedical Engineering with a link to the Faculty of Medicine and Dentistry". Dr. Russ Greiner is an expert in artificial intelligence, bioinformatics, and machine learning. Dr. Jack A. Tuszyński is an expert in the computational biophysics and bioengineering fields.

- **Budget for the event:**
- A total of $10,000 is requested for the proposed project for six months. A total of two HQP will be trained as part of the proposed course development and the requested funding will be allocated to covering a portion of the salaries of these HQP. The funding will cover 20% time of a postdoctoral fellow for six months (20% × $50,000/12 months × 6 months = $5,000) and 50% time of a co-op student for six months (50% × $20,000/12 months × 6 months = $5,000). The remainder of the HQP stipends will be covered from other sources such as departmental funds. The team will also be pursuing other relevant funding opportunities as they become available.

On Mon, Nov 29, 2021 at 10:37 AM AI4Society Coordinator <ai4s@ualberta.ca> wrote:

Dear Maral,

Please meet Lindsay Baranowski, she's our financial advisor and will be in charge of moving the funds we promised to you for your project *Development of a Course on "Artificial Intelligence for Biomedical Engineers"* from our account to yours.

Lindsay, we agreed on supporting Maral Aminpour's research by giving her $10,000.00 towards this Course Development. Could you please guide us on how to make this happen?

Please notice this amount will have to be used before Dec 31st, 2022

In the meantime Maral, I have created a budget GSheet for keeping track of your expenses You and I will be in charge of keeping track of your expenses (this is for our internal control, Lindsay doesn't need to be included), we'll simply enter the values and descriptions on the green area/ I'll be happy to keep it up to date if you send me the expenses as they happen (invoices attached are appreciated, there is a folder there to toss them), or you can do it yourself.

Looking forward to seeing what you'll do with this!

--

Dr. Nicolás Arnáez, D.Mus., M.Mus., Lic.Mus.(Comp.) | AI4Society Project Coordinator | VPRI Signature Research Areas | University of Alberta | Edmonton AB | Join our Newsletter |

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Program and Regulation Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	Mechanical Engineering
Contact Person:	Alexandra Komrakova
Level of change: (choose one only)	•
	• Graduate
Type of change request: (check all that apply)	• Program
	•
For which term is this intended to take effect?	Fall 2024
Does this proposal have corresponding course changes? (Should be submitted at the same time)	No

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

A list of foundational courses in the current Calendar entry for the MSc program in MECE is outdated. Some of the courses have not been offered for several years. The latest version of the graduate program manual contains the most up-to-date list of the foundational courses. To minimize future Calendar updates when new courses are introduced to a list of the foundational courses, it is suggested to remove the list of courses from the Calendar entry and refer to the graduate program manual. The current and previous versions of the manual are available on the MECE website.

Calendar Copy

URL in current Calendar (or "New page")

https://calendar.ualberta.ca/preview_program.php?catoid=39&poid=47775&hl=%22Master+of+Science+%28Mechanical+Engineering%29%22&returnto=search

Master of Science (Mechanical Engineering)

Current Copy: ~~Removed language~~

Coursework

- Five 3-unit graduate-level courses which must be approved by the Graduate Coordinator and/or Thesis Supervisor(s)
  - ~~o~~ **One** course must be in a foundational area of

Proposed Copy: New language

Coursework

- Five 3-unit graduate-level courses which must be approved by the Graduate Coordinator and/or Thesis Supervisor(s)
  - o **One** course must be in a foundational area of

mechanical engineering ~~chosen from the following:~~ ~~▪ MEC E 615~~ ~~▪ MEC E 620~~ ~~▪ MEC E 630~~ ~~▪ MEC E 639~~ ~~▪ MEC E 640~~ ~~▪ MEC E 650~~ ~~▪ MEC E 663~~ ~~▪ MEC E 671~~ ~~▪ MEC E 673~~ ~~▪ MEC E 680~~ ~~▪ MEC E 681~~ ~~▪ MEC E 683~~ ~~▪ MEC E 690~~ o A maximum of **one** MEC E 700-level course and **one** MEC E 500-level course, **OR** a maximum of **two** MEC E 700-level courses and **no** MEC E 500-level courses can be credited towards the minimum course requirements o No reading courses can be credited towards the minimum course requirement ● Additional coursework may be required	mechanical engineering. A list of foundational courses can be found in the Graduate Program Manual for the Department of Mechanical Engineering. o A maximum of **one** MEC E 700-level course and **one** MEC E 500-level course, **OR** a maximum of **two** MEC E 700-level courses and **no** MEC E 500-level courses can be credited towards the minimum course requirements o No reading courses can be credited towards the minimum course requirement ● Additional coursework may be required

Reviewed/Approved by:

Reviewed by: Department GPC and APC REQUIRED: Approved by the MECE Department council on April 20, 2023 Approved by the Faculty of Engineering GPC on May 3, 2023 Approved by the Faculty of Engineering APC on May 10, 2023 Approved by the Faculty of Engineering ECC on October 24, 2023

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Course Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	Faculty of Medicine & Dentistry, Dental Assisting Program
Contact Person:	Meghan Rannells rannells@ualberta.ca Carla Clarke cclarke1@ualberta.ca
Level of change: (choose one only) [?]	☑ Undergraduate
	☐ Graduate
For which term will this change take effect?	Winter 2024

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

Correction of error in units and fee index for the DA 101 course. The full course unit weight of the Certificate in Dental Assisting program has been approved by the University of Alberta Board of Governors (June 17, 2022) to be 32 units. This correction will ensure alignment with that total course unit weight.

Course Template

Current: ~~Removed language~~	**Proposed:** New language
DA 101 **Foundations of Dental Assisting** **Course Career** Undergraduate **Units** ~~6~~ **Approved Hours** 6 WEEKS **Fee index** ~~12~~ **Faculty** Medicine and Dentistry **Department** Dentistry **Typically Offered** variable **Description** Foundations of Dental Assisting is the first course in a sequential structure of learning that introduces students to the dental profession and their role as a Dental Assistant. Foundational knowledge and skills will be developed in behavioral sciences, biomedical sciences, oral health sciences and dental assisting theory and practice streams. Students will be able to integrate learning from all four streams and understand the relevance of foundational learning to dental assisting. Students will be introduced to the Simulation Lab, Oral Health Clinic and have opportunities to apply their knowledge in both settings. Prerequisite: Consent of the Department.	**DA 101** **Foundations of Dental Assisting** **Course Career** Undergraduate **Units** 5 **Approved Hours** 6 WEEKS **Fee index** 10 **Faculty** Medicine and Dentistry **Department** Dentistry **Typically Offered** variable **Description** Foundations of Dental Assisting is the first course in a sequential structure of learning that introduces students to the dental profession and their role as a Dental Assistant. Foundational knowledge and skills will be developed in behavioral sciences, biomedical sciences, oral health sciences and dental assisting theory and practice streams. Students will be able to integrate learning from all four streams and understand the relevance of foundational learning to dental assisting. Students will be introduced to the Simulation Lab, Oral Health Clinic and have opportunities to apply their knowledge in both settings. Prerequisite: Consent of the Department.

Reviewed/Approved by:

FoMD Faculty Learning Committee (Faculty Council-delegated Approver) – April 8, 2022 - ***Revised/corrected - October 30, 2023***
OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates.

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Program and Regulation Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	Dental Hygiene, School of Dentistry, FoMD
Contact Person:	Meghan Rannells (rannells@ualberta.ca)
Level of change: (choose one only)	✔ Undergraduate
	• Graduate
Type of change request: (check all that apply)	✔ Program
	• Regulation
For which term is this intended to take effect?	Changes to take effect immediately Addition to Calendar for 2024/2025 Academic Year
Does this proposal have corresponding course changes? (Should be submitted at the same time)	Yes. Calendar Change Request Form for Course Changes (Dental Hygiene)

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

D HYG 361/362 Course Additions:
The BSc Dental Hygiene Program activities are scheduled across Fall and Winter Terms. Student learning and performance of clinical skills are interrupted for four months between the end of Winter term, and the beginning of Fall term. There is also a need for continued care of patients throughout the Spring and Summer terms while Dental Hygiene students are not currently scheduled.

The addition of a two-credit clinical course following Year 2 of the DH Program (D HYG 361) would create opportunities for a limited number of students that have successfully completed their second year in the program to continue their clinical experiences through the Spring and Summer terms; continuing their learning and clinical skills performance between terms. After successfully completing D HYG 361, students would then enroll in the reduced-hour clinical course D HYG 362 for the Fall and Winter terms of their third year in order to complete the remainder of their clinical learning requirements for Year 3.

This course addition and schedule modification would allow students to reduce their academic course load throughout their third year of the Program, promote continued development of clinical skills, and increase continued patient care at the Oral Health Clinic in the Kaye Edmonton Clinic.

D HYG 461/462 Course Additions:
For the same reasons presented above, proposed course additions for D HYG 461 and D HYG 462 have been included, impacting the schedule for the fourth year of the Program.

The addition of a two-credit clinical course following Year 3 of the DH Program (D HYG 461) would create opportunities for a limited number of students that have successfully completed their third year in the program to continue their clinical experiences through the Spring and Summer terms; continuing their learning and clinical skills performance between terms. After successfully completing D HYG 461, students would then enroll in the reduced-hour clinical course D HYG 462 for the Fall and Winter terms of their third year in order to complete the remainder of their clinical learning requirements for Year 3.

This course addition and schedule modification would allow students to reduce their academic course load throughout their third year of the Program, promote continued development of clinical skills, and increase continued patient care at the Oral Health Clinic in the Kaye Edmonton Clinic.

D HYG 260/360/460 Course Title Changes
This series of courses requires a simple modification to the titles. This series of courses should be changed to I, II and III. They are currently listed as II, III, and IV in the calendar. To remain in keeping with our other course series, the first offering (though it is a 200-level), should be listed as I.

Calendar Copy

https://calendar.ualberta.ca/preview_program.php?catoid=39&poid=47888&returnto=12341

Current Copy: ~~Removed language~~	**Proposed Copy:** New language

Bachelor of Science (Dental Hygiene)
 	
Bachelor of Science (Dental Hygiene) (one preprofessional year plus)
 	
Year 2
• D HYG 200 - Fundamentals of Human Anatomy and Physiology for the Dental Hygienist
• D HYG 240 - Oral Radiology I
• D HYG 251 - Anatomical Structures for Dental Hygiene Practice
• D HYG 255 - Oral Health Sciences I
• D HYG 256 - Oral Health Sciences II
• D HYG 260 - Dental Hygiene Theory and Practice ~~II~~
• D HYG 270 - Behavioural Sciences I
• D HYG 299 - Dental Hygiene Collaborative Practice I
• MMI 133 - Medical Microbiology for Health Care Professionals
• OBIOL 202 - Oral Biology I
• OBIOL 203 - Survey of Biochemistry
 	
Year 3
• D HYG 340 - Oral Radiology II
• D HYG 355 - Oral Health Sciences III
• D HYG 356 - Oral Health Sciences IV
• D HYG 360 - Dental Hygiene Theory and Practice ~~III~~
• D HYG 370 - Behavioural Sciences II
• D HYG 390 - Introduction to Research
• D HYG 399 - Dental Hygiene Collaborative Practice II
• OBIOL 302 - Oral Biology II
• OBIOL 305 - Pathology
• PMCOL 300 - Introduction to Pharmacology
	Bachelor of Science (Dental Hygiene)
	
	Bachelor of Science (Dental Hygiene) (one preprofessional year plus)
	
	Year 2
	• D HYG 200 - Fundamentals of Human Anatomy and Physiology for the Dental Hygienist
	• D HYG 240 - Oral Radiology I
	• D HYG 251 - Anatomical Structures for Dental Hygiene Practice
	• D HYG 255 - Oral Health Sciences I
	• D HYG 256 - Oral Health Sciences II
	• D HYG 260 - Dental Hygiene Theory and Practice I
	• D HYG 270 - Behavioural Sciences I
	• D HYG 299 - Dental Hygiene Collaborative Practice I
	• MMI 133 - Medical Microbiology for Health Care Professionals
	• OBIOL 202 - Oral Biology I
	• OBIOL 203 - Survey of Biochemistry
	
	Year 3
	• D HYG 340 - Oral Radiology II
	• D HYG 355 - Oral Health Sciences III
	• D HYG 356 - Oral Health Sciences IV
	• D HYG 360 - Dental Hygiene Theory and Practice II; **OR**
	  ○ D HYG 361 - Dental Hygiene Theory and Practice II Part A
	  ○ D HYG 362 - Dental Hygiene Theory and Practice II Part B
	• D HYG 370 - Behavioural Sciences II
	• D HYG 390 - Introduction to Research
	• D HYG 399 - Dental Hygiene Collaborative Practice II
	• OBIOL 302 - Oral Biology II
	• OBIOL 305 - Pathology
	• PMCOL 300 - Introduction to Pharmacology

Year 4 ● D HYG 429 - External Rotation ● D HYG 455 - Oral Health Sciences V ● D HYG 456 - Oral Health Sciences VI ● D HYG 460 - Dental Hygiene Theory and Practice ~~IV~~ ● D HYG 470 - Behavioural Sciences III ● D HYG 480 - Behavioural Sciences IV ● D HYG 490 - Evidence Informed Dental Hygiene Practice ● D HYG 499 - Dental Hygiene Collaborative Practice III	Year 4 ● D HYG 429 - External Rotation ● D HYG 455 - Oral Health Sciences V ● D HYG 456 - Oral Health Sciences VI ● D HYG 460 - Dental Hygiene Theory and Practice III; **OR** ○ D HYG 461 Dental Hygiene Theory and Practice III Part A ○ D HYG 462 Dental Hygiene Theory and Practice Part III Part B ● D HYG 470 - Behavioural Sciences III ● D HYG 480 - Behavioural Sciences IV ● D HYG 490 - Evidence Informed Dental Hygiene Practice ● D HYG 499 - Dental Hygiene Collaborative Practice III

Reviewed/Approved by:

REQUIRED:
FoMD Faculty Learning Committee (Faculty Council-delegated Approver) – Oct 6 2023
FoMD Faculty Council (for information/suggestions/challenges) – October 25, 2023

OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates.
Dental Hygiene Advisory Committee: consultation August 23, 2023, approval Sept 29, 2023

- Dental Hygiene Curriculum Committee: consultation June 21, 2023, Sept 20, 2023, approval Sept 20, 2023
- School of Dentistry Executive Committee: consultation Sept 18, 2023
- School of Dentistry Department Council: consultation and approval Sept 21, 2023
- Dental Hygiene Clinical Team: consultation Oct 4, 2023

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Course Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	Dental Hygiene, School of Dentistry, FoMD
Contact Person:	Meghan Rannells (rannells@ualberta.ca)
Level of change: (choose one only) [?]	• Undergraduate
	• Graduate
For which term will this change take effect?	Changes to take effect immediately Addition to Calendar for 2024/2025 Academic Year

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

D HYG 361/362 Course Additions:
The BSc Dental Hygiene Program activities are scheduled across Fall and Winter Terms. Student learning and performance of clinical skills are interrupted for four months between the end of Winter term, and the beginning of Fall term. There is also a need for continued care of patients throughout the Spring and Summer terms while Dental Hygiene students are not currently scheduled.

The addition of a two-credit clinical course following Year 2 of the DH Program (D HYG 361) would create opportunities for a limited number of students that have successfully completed their second year in the program to continue their clinical experiences through the Spring and Summer terms; continuing their learning and clinical skills performance between terms. After successfully completing D HYG 361, students would then enroll in the reduced-hour clinical course D HYG 362 for the Fall and Winter terms of their third year in order to complete the remainder of their clinical learning requirements for Year 3.

This course addition and schedule modification would allow students to reduce their academic course load throughout their third year of the Program, promote continued development of clinical skills, and increase continued patient care at the Oral Health Clinic in the Kaye Edmonton Clinic.

D HYG 461/462 Course Additions:
For the same reasons presented above, proposed course additions for D HYG 461 and D HYG 462 have been included, impacting the schedule for the fourth year of the Program.

The addition of a two-credit clinical course following Year 3 of the DH Program (D HYG 461) would create opportunities for a limited number of students that have successfully completed their third year in the program to continue their clinical experiences through the Spring and Summer terms; continuing their learning and clinical skills performance between terms. After successfully completing D HYG 461, students would then enroll in the reduced-hour clinical course D HYG 462 for the Fall and Winter terms of their third year in order to complete the remainder of their clinical learning requirements for Year 3.

This course addition and schedule modification would allow students to reduce their academic course load throughout their third year of the Program, promote continued development of clinical skills, and increase continued patient care at the Oral Health Clinic in the Kaye Edmonton Clinic.

D HYG 429 Course Description Changes:
D HYG 429 is currently offered as a 2-week rotation that students complete in either the Fall or Winter Term in the fourth year of the Dental Hygiene Program. There continues to be a need for patient care in remote northern communities during the Spring and Summer terms, and local communities have an extended period through the spring and summer months when there are no dental hygiene students on rotation. There is also a larger cohort being accepted to the Dental Hygiene Program than in previous years (46 > 42) which needs to be accommodated in scheduling these rotations.

Extending the term availability for students to attend this rotation will allow the program to offer the rotation to all students, in any term of the year once they have completed their third year of the Program. This calendar change proposes that the external rotation be available in the Spring and Summer terms between the third and fourth year of the Program, provided that students have successfully completed their third year, and have been promoted accordingly into the fourth year.

Additionally, a prerequisite course was not previously listed in the calendar. This course is offered in the fourth year of the dental hygiene program with the requirement that all students need to have successfully completed D HYG 360 (the third year clinical course) prior to enrolling in D HYG 429.

D HYG 260/360/460 Course Title Changes
This series of courses requires a simple modification to the titles. This series of courses should be changed to I, II and III. They are currently listed as II, III, and IV in the calendar. To remain in keeping with our other course series, the first offering (though it is a 200-level), should be listed as I.

Course Template

Current: ~~Removed language~~	**Proposed:** New language
NEW COURSE	**D HYG 361** **Dental Hygiene Theory and Practice II Part A** **Course Career** Undergraduate **Units** 2 **Approved Hours** 50 **Fee index** 4 **Faculty** Medicine and Dentistry **Department** Dentistry **Typically Offered** variable **Description** A clinical course that prepares students for delivering comprehensive care for patients with chronic and acute variances in oral health. Learning activities occur in the Oral Health Clinic. Students that complete D HYG 361 in Spring Term must enroll in D HYG 362 the following Fall/Winter. Prerequisite: D HYG 260.
NEW COURSE	**D HYG 362** **Dental Hygiene Theory and Practice II Part B** **Course Career** Undergraduate **Units** 8 **Approved Hours** 270 **Fee index** 16 **Faculty** Medicine and Dentistry **Department** Dentistry **Typically Offered** two term

	Description A clinical course that prepares students for delivering comprehensive care for patients with chronic and acute variances in oral health. The course includes delivery of local anesthesia. Learning activities occur in a simulated laboratory, the Oral Health Clinic and in alternative practice settings external to university campus. Restricted to students that completed D HYG 361 in Spring Term. Prerequisite: D HYG 361.
NEW COURSE	**D HYG 461** **Dental Hygiene Theory and Practice III Part A** **Course Career** Undergraduate **Units** 2 **Approved Hours** 50 **Fee index** 4 **Faculty** Medicine and Dentistry **Department** Dentistry **Typically Offered** variable **Description** A clinical course that prepares students for delivering comprehensive care for patients with chronic and acute variances in oral health. Learning activities occur in the Oral Health Clinic. Students that complete D HYG 461 in Spring Term must enroll in D HYG 462 the following Fall/Winter. Prerequisite: D HYG 360 or 362.
NEW COURSE	**D HYG 462** **Dental Hygiene Theory and Practice III Part B** **Course Career** Undergraduate **Units** 8 **Approved Hours** 280 **Fee index** 16 **Faculty** Medicine and Dentistry **Department** Dentistry **Typically Offered** two term **Description** A clinical course with increased practicum experiences in alternative settings with diverse individuals and population groups. Students will be scheduled in numerous external settings as well as onsite in the Oral Health Clinic. Restricted to students that completed D HYG 361 in Spring Term. Prerequisite: D HYG 361.

D HYG 429 **External Rotation** **Course Career** Undergraduate **Units** 2.5 **Approved Hours** 75 hours **Fee index** 5 **Faculty** Medicine and Dentistry **Department** Dentistry **Typically Offered** ~~two term~~ **Description** Each student will spend two weeks at an external placement. Students may provide health promotional programs including preventive dental hygiene therapies, classroom education and community interventions. This program aims to provide intensive exposure to dental hygiene practice both within and external to traditional dental practice settings.	**D HYG 429** **External Rotation** **Course Career** Undergraduate **Units** 2.5 **Approved Hours** 75 hours **Fee index** 5 **Faculty** Medicine and Dentistry **Department** Dentistry **Typically Offered** any term **Description** Each student will spend two weeks at an external placement. Students may provide health promotional programs including preventive dental hygiene therapies, classroom education and community interventions. This program aims to provide intensive exposure to dental hygiene practice both within and external to traditional dental practice settings. Prerequisite: D HYG 360
D HYG 260 **Dental Hygiene Theory and Practice ~~II~~** **Course Career** Undergraduate **Units** 6 **Approved Hours** 210 HOURS **Fee index** 12 **Faculty** Medicine and Dentistry **Department** Dentistry **Typically Offered** two term **Description** An introductory clinical course integrating the knowledge, attitudes, and skills of dental hygiene practice through simulated learning and patient care. May include external practicum observation and participation.	**D HYG 260** **Dental Hygiene Theory and Practice I** **Course Career** Undergraduate **Units** 6 **Approved Hours** 210 HOURS **Fee index** 12 **Faculty** Medicine and Dentistry **Department** Dentistry **Typically Offered** two term **Description** An introductory clinical course integrating the knowledge, attitudes, and skills of dental hygiene practice through simulated learning and patient care. May include external practicum observation and participation.
D HYG 360 **Dental Hygiene Theory and Practice ~~III~~** **Course Career** Undergraduate **Units** 10 **Approved Hours** 320 HOURS **Fee index** 20 **Faculty** Medicine and Dentistry **Department** Dentistry **Typically Offered** two term	**D HYG 360** **Dental Hygiene Theory and Practice II** **Course Career** Undergraduate **Units** 10 **Approved Hours** 320 HOURS **Fee index** 20 **Faculty** Medicine and Dentistry **Department** Dentistry **Typically Offered** two term

Description A clinical course that prepares students for delivering comprehensive care for patients with chronic and acute variances in oral health. The course includes delivery of local anesthesia. Learning activities occur in a simulated laboratory, the Oral Health Clinic and in alternative practice settings external to university campus. Prerequisite: D HYG 260.	**Description** A clinical course that prepares students for delivering comprehensive care for patients with chronic and acute variances in oral health. The course includes delivery of local anesthesia. Learning activities occur in a simulated laboratory, the Oral Health Clinic and in alternative practice settings external to university campus. Prerequisite: D HYG 260.
D HYG 460 **Dental Hygiene Theory and Practice ~~IV~~** **Course Career** Undergraduate **Units** 10 **Approved Hours** 330 HOURS **Fee index** 20 **Faculty** Medicine and Dentistry **Department** Dentistry **Typically Offered** two term **Description** A clinical course with increased practicum experiences in alternative settings with diverse individuals and population groups. Students will be scheduled in numerous external settings as well as onsite in the Oral Health Clinic. Prerequisite: D HYG 360.	**D HYG 460** **Dental Hygiene Theory and Practice III** **Course Career** Undergraduate **Units** 10 **Approved Hours** 330 HOURS **Fee index** 20 **Faculty** Medicine and Dentistry **Department** Dentistry **Typically Offered** two term **Description** A clinical course with increased practicum experiences in alternative settings with diverse individuals and population groups. Students will be scheduled in numerous external settings as well as onsite in the Oral Health Clinic. Prerequisite: D HYG 360.

Reviewed/Approved by:

REQUIRED:
FoMD Faculty Learning Committee (Faculty Council-delegated Approver) – Oct 6, 2023
FoMD Faculty Council (for information/suggestions/challenges) – October 25, 2023

OPTIONAL:

- Dental Hygiene Advisory Committee: consultation August 23, 2023, approval Sept 29, 2023
- Dental Hygiene Curriculum Committee: consultation June 21, 2023, Sept 20, 2023, approval Sept 20, 2023
- School of Dentistry Executive Committee: consultation Sept 18, 2023
- School of Dentistry Department Council: consultation and approval Sept 21, 2023
- Dental Hygiene Clinical Team: consultation Oct 4, 2023

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Course Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	Doctor of Dental Surgery, School of Dentistry, FoMD
Contact Person:	Meghan Rannells (rannells@ualberta.ca)
Level of change: (choose one only) [?]	• Undergraduate
	• Graduate
For which term will this change take effect?	Fall 2024

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

This section was inadvertently omitted when previous comprehensive calendar changes were approved. These changes are the result of the curriculum renewal which was implemented in 2019/2020. The proposed changes reflect the current number of weeks for each course.

Course Template

Current: ~~Removed language~~	**Proposed:** New language
DDS 513 **Patient Assessment I** **Course Career** Undergraduate **Units** 11 **Approved Hours** ~~9~~ WEEKS **Fee index** 22 **Faculty** Medicine and Dentistry **Department** Dentistry **Typically Offered** either term **Description** Patient Assessment I introduces the practices, standards and considerations that are integral to establishing a patient history. This course prepares students for initial interactions with patients and provides them opportunities to participate in a patient consultation. Open only to students registered in the DDS program.	**DDS 513** **Patient Assessment I** **Course Career** Undergraduate **Units** 11 **Approved Hours** 8 WEEKS **Fee index** 22 **Faculty** Medicine and Dentistry **Department** Dentistry **Typically Offered** either term **Description** Patient Assessment I introduces the practices, standards and considerations that are integral to establishing a patient history. This course prepares students for initial interactions with patients and provides them opportunities to participate in a patient consultation. Open only to students registered in the DDS program.
DDS 525 **Diagnosing and Managing Advanced Conditions II** **Course Career** Undergraduate **Units** 12 **Approved Hours** ~~7~~ WEEKS **Fee index** 24 **Faculty** Medicine and Dentistry **Department** Dentistry	**DDS 525** **Diagnosing and Managing Advanced Conditions II** **Course Career** Undergraduate **Units** 12 **Approved Hours** 9 WEEKS **Fee index** 24 **Faculty** Medicine and Dentistry **Department** Dentistry

Typically Offered either term **Description** Diagnosing and Managing Advanced Conditions II continues to develop knowledge of oral conditions and diseases. Treatment skill development extends to introduce treatments for more urgent and advanced conditions. Open only to students registered in the DDS program.	**Typically Offered** either term **Description** Diagnosing and Managing Advanced Conditions II continues to develop knowledge of oral conditions and diseases. Treatment skill development extends to introduce treatments for more urgent and advanced conditions. Open only to students registered in the DDS program.

Reviewed/Approved by:

REQUIRED: FoMD Faculty Learning Committee (Faculty Council-delegated Approver) – Oct 6, 2023 FoMD Faculty Council (for information/suggestions/challenges) – October 25, 2023
OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates. School of Dentistry Department Council: Approval September 21, 2023

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Course Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	Faculty of Medicine and Dentistry Laboratory Medicine and Pathology Medical Laboratory Science
Contact Person:	Roberta Martindale ram7@ualberta.ca Alt. Kim Thompson kathomps@ualberta.ca
Level of change: (choose one only) [?]	✔ Undergraduate
	• Graduate
For which term will this change take effect?	Fall 2024

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

The removal of the lab component of MLSCI 262 has resulted in MLSCI 262 and MLSCI 264 being the same course content, as MLSCI 264 was previously the Post Professional Degree Completion lecture only stream of year 2 Medical Laboratory Science clinical biochemistry. MLSCI 264 is now redundant and being removed as a result.
The addition of the prerequisite courses to MLSCI 262 is carried over from the previous MLSCI 264 course listing.

Course Template

Current: ~~Removed language~~	**Proposed:** New language
MLSCI 262 - Clinical Biochemistry **Course Career** Undergraduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Medicine and Dentistry **Department** Medical Laboratory Science **Typically Offered** first term **Description** This course considers how the analysis of samples from the body for various constituents can give insight into pathological processes. Included are the principles for tests routinely carried out in a clinical biochemistry laboratory, and the biological understanding of test results. Specific subjects considered are carbohydrates, renal function, blood proteins and electrolytes, and acid-base balance. ~~Restricted to Medical Laboratory Science students.~~	**MLSCI 262** - Clinical Biochemistry **Course Career** Undergraduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Medicine and Dentistry **Department** Medical Laboratory Science **Typically Offered** first term **Description** This course considers how the analysis of samples from the body for various constituents can give insight into pathological processes. Included are the principles for tests routinely carried out in a clinical biochemistry laboratory, and the biological understanding of test results. Specific subjects considered are carbohydrates, renal function, blood proteins and electrolytes, and acid-base balance. Prerequisites for non-Medical Laboratory Science students only: CHEM 101, 261 and BIOL 107 and consent of Division.

MLSCI 265 - Clinical Biochemistry **Course Career** Undergraduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Medicine and Dentistry **Department** Medical Laboratory Science **Typically Offered** second term Description This course considers how the analysis of samples from the body for various constituents can give insight into pathological processes. Included are the principles for tests routinely carried out in a clinical biochemistry laboratory, and the biological understanding of test results. Specific subjects considered are clinical enzymology, heme catabolism, liver function, toxicology and therapeutic drug monitoring, principles of immunoassays, blood lipids, porphyrins, endocrinology, gastric and GI function, fetal-placental function, and biochemical tumor markers. Prerequisites for non-Medical Laboratory Science students only: MLSCI 264. Credit granted for only one of MLSCI 263 or 265.	**MLSCI 265** - Clinical Biochemistry **Course Career** Undergraduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Medicine and Dentistry **Department** Medical Laboratory Science **Typically Offered** second term Description This course considers how the analysis of samples from the body for various constituents can give insight into pathological processes. Included are the principles for tests routinely carried out in a clinical biochemistry laboratory, and the biological understanding of test results. Specific subjects considered are clinical enzymology, heme catabolism, liver function, toxicology and therapeutic drug monitoring, principles of immunoassays, blood lipids, porphyrins, endocrinology, gastric and GI function, fetal-placental function, and biochemical tumor markers. Prerequisites for non-Medical Laboratory Science students only: MLSCI 262. Credit granted for only one of MLSCI 263 or 265.
~~MLSCI 264 - Clinical Biochemistry~~ ~~Course Career Undergraduate~~ ~~Units 3~~ ~~Approved Hours 3-0-0~~ ~~Fee index 6~~ ~~Faculty Medicine and Dentistry~~ ~~Department Medical Laboratory Science~~ ~~Typically Offered first term~~ ~~Description~~ ~~This course considers how the analysis of samples from the body for various constituents can give insight into pathological processes. Included are the principles for tests routinely carried out in a clinical biochemistry laboratory, and the biological understanding of test results. Specific subjects considered are carbohydrates, renal function, blood proteins and electrolytes, and acid-base balance. Prerequisites for non-Medical Laboratory Science students only: CHEM 101, 261, 263 and BIOL 107. Credit granted for only one of MLSCI 262 or 264.~~	Course deletion

Reviewed/Approved by:

REQUIRED: Faculty Council (or delegate) and approval date.
FoMD Faculty Learning Committee (Faculty Council-delegated Approver) – Sept 28, 2023
FoMD Faculty Council (for information/suggestions/challenges) – October 25, 2023

OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates.

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Course Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	FOMD (Physiology)
Contact Person:	Simon Gosgnach (gosgnach@ualberta.ca) Silvia Pagliardini (silviap@ualberta.ca) Emmanuelle Cordat (cordat@ualberta.ca)
Level of change: (choose one only) [?]	✔ **Undergraduate**
	• Graduate
For which term will this change take effect?	Fall 2024

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

Because of student number pressure and in preparation to the introduction of the PHYSL Major program, these courses will be restricted to PHYSL Honours students.

Course Template

Current: ~~Removed language~~	**Proposed:** New language
PHYSL 461 - Undergraduate Research Project **Course Career** Undergraduate **Units** 3 **Approved Hours** 0-0-6 **Fee index** 6 **Faculty** Medicine and Dentistry **Department** Physiology **Typically Offered** either term **Description** Individual study, open to undergraduate students who have identified a supervisor in the Department of Physiology. Co-~~supervisors from other Departments are permitted.~~ Students will spend one term in the laboratory of a faculty member and carry out a laboratory research project. Registration package and further information are available. Prerequisites: PHYSL 210 or PHYSL 212/214 and consent from the course coordinator.	**PHYSL 461 -** Undergraduate Research Project **Course Career** Undergraduate **Units** 3 **Approved Hours** 0-0-6 **Fee index** 6 **Faculty** Medicine and Dentistry **Department** Physiology **Typically Offered** either term **Description** Individual study, open to Physiology Honours undergraduate students who have identified a supervisor in the Department of Physiology. Co-supervision with Professors from other Departments is possible, provided that a supervisor from the department of Physiology is identified. Students will spend one term in the laboratory of a faculty member and carry out a laboratory physiology research project. Registration package and further information are available on the Physiology Department website. Prerequisites: PHYSL 210 or PHYSL 212/214 and consent from the course coordinator.

PHYSL 467 - Undergraduate Research Project **Course Career** Undergraduate **Units** 6 **Approved Hours** 0-0-6 **Fee index** 12 **Faculty** Medicine and Dentistry **Department** Physiology **Typically Offered** two term **Description** Individual study, open to undergraduate students who have identified a supervisor in the department of Physiology. Co-supervision with Professors from other Departments is possible, provided that a supervisor from the department of Physiology is identified. Students will spend two terms in the laboratory of a faculty member and carry out a laboratory research project. Prerequisites: PHYSL 210 or PHYSL 212/214 and consent from the course coordinator.	**PHYSL 467 -** Undergraduate Research Project **Course Career** Undergraduate **Units** 6 **Approved Hours** 0-0-6 **Fee index** 12 **Faculty** Medicine and Dentistry **Department** Physiology **Typically Offered** two term **Description** Individual study, open to Physiology Honours undergraduate students who have identified a supervisor in the Department of Physiology. Co-supervision with Professors from other Departments is possible, provided that a supervisor from the department of Physiology is identified. Students will spend two terms in the laboratory of a faculty member and carry out a laboratory physiology research project. Registration package and further information are available on the Physiology Department website. Prerequisites: PHYSL 210 or PHYSL 212/214 and consent from the course coordinator.
PHYSL 468 - Undergraduate Research Thesis I **Course Career** Undergraduate **Units** 6 **Approved Hours** 0-0-12 **Fee index** 12 **Faculty** Medicine and Dentistry **Department** Physiology **Typically Offered** either term **Description** Individual study, open to undergraduate students who have identified a supervisor in the Department of Physiology. Taken in conjunction with PHYSL 469, this 6-credit course is the first part of a 12-credit program in two terms resulting in an honours research thesis in physiology. Students will spend the Fall term in the laboratory of a supervisor and carry out a research project to be continued in the second term as PHYSL 469. Co-supervision with Professors from other Departments is possible, provided that a supervisor from the Department of Physiology is identified. Students will be evaluated on an oral presentation, a written research proposal and performance in the laboratory. Prerequisites: PHYSL 210 or PHYSL 212/214 and consent from the course coordinator.	**PHYSL 468 -** Undergraduate Research Thesis I **Course Career** Undergraduate **Units** 6 **Approved Hours** 0-0-12 **Fee index** 12 **Faculty** Medicine and Dentistry **Department** Physiology **Typically Offered** either term **Description** Individual study, open to Physiology Honours undergraduate students who have identified a supervisor in the Department of Physiology. Taken in conjunction with PHYSL 469, this 6-credit course is the first part of a 12-credit program in two terms resulting in an honours research thesis in physiology. Students will spend the Fall term in the laboratory of a supervisor and carry out a research project to be continued in the second term as PHYSL 469. Co-supervision with Professors from other Departments is possible, provided that a supervisor from the Department of Physiology is identified. Students will be evaluated on an oral presentation, a written research proposal and performance in the laboratory. Prerequisites: PHYSL 210 or PHYSL 212/214 and consent from the course coordinator.

Reviewed/Approved by:

REQUIRED: FoMD Faculty Learning Committee (Faculty Council-delegated Approver) – Sept 28, 2023 FoMD Faculty Council (for information/suggestions/challenges) – October 25, 2023
OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates.

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Program and Regulation Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	Faculty of Medicine & Dentistry, MD Program
Contact Person:	Dr. Laura Stovel, Assistant Dean Admissions, MD Program
Level of change: (choose one only)	☑ Undergraduate
	☐ Graduate
Type of change request: (check all that apply)	☐ Program
	☑ Regulation
For which term is this intended to take effect?	Upon approval *(proposed wording already in current Calendar on a temporary basis)*
Does this proposal have corresponding course changes? (Should be submitted at the same time)	No

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

The Faculty of Medicine & Dentistry (FoMD) received approval from the GFC Programs Committee on June 22, 2023 for a temporary revision to the admission regulations for Rural applicants to the Doctor of Medicine (MD) Program, increasing the existing 10 protected Rural seats to a total of 30 protected Rural seats for the admission cycle beginning July 1, 2023. The change was applied as addenda to the 2023-2024 Calendar, and is currently anticipated to revert back to 10 Rural seats in the 2024-2025 Calendar.

The Program would like this change to the protected Rural seats to remain in the Calendar instead of being temporary. This is in alignment with the Government of Alberta's initiative to increase the physician workforce, specifically in rural locations, and in the context of the recent increase in the overall number of seats in the MD Program.

With this request, we are proposing that the previously approved wording change to thirty positions remain for the 2024-2025 Calendar and onwards.

An additional editorial update is being made to correct the Admissions Committee title.

Calendar Copy

https://calendar.ualberta.ca/content.php?catoid=39&navoid=12306#doctor_of_medicine_md

Current Copy: ~~Removed language~~	**Proposed Copy:** New language

Rural Applicants The Faculty of Medicine and Dentistry may provide up to thirty positions within quota for the MD program to qualified Rural applicants over and above the Rural applicants who were admitted in the regular process. Candidates will meet normal minimum admission requirements as outlined in Doctor of Medicine (MD) and the approval by the ~~Faculty of Medicine and Dentistry~~ Admissions Committee.	**Rural Applicants** The Faculty of Medicine and Dentistry may provide up to thirty positions within quota for the MD program to qualified Rural applicants over and above the Rural applicants who were admitted in the regular process. Candidates will meet normal minimum admission requirements as outlined in Doctor of Medicine (MD) and the approval by the MD Admissions Committee.

Reviewed/Approved by:

REQUIRED: FoMD Faculty Learning Committee (FLC) - Faculty Council-delegated Approver - November 9, 2023
OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates.

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Program and Regulation Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	FoMD, Department of Oncology – Medical Physics Program
Contact Person:	Dr. Gino Fallone Jen Freund
Level of change: (choose one only)	• Undergraduate
	• Graduate
Type of change request: (check all that apply)	• Program
	• Regulation
For which term is this intended to take effect?	Early Implementation - Winter 2024
Does this proposal have corresponding course changes? (Should be submitted at the same time)	No

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

Clarifying the course requirements for PhD students in the Medical Physics program.

Calendar Copy

URL in current Calendar (or "New page")
https://calendar.ualberta.ca/preview_program.php?catoid=39&poid=47733&returnto=12424

Current Copy: ~~Removed language~~	**Proposed Copy:** New language
Doctor of Philosophy with specialization in Medical Physics (Oncology) Admission to the PhD is dependent on the recommendation of the Graduate Coordinating Committee.	**Doctor of Philosophy with specialization in Medical Physics (Oncology)** Admission to the PhD is dependent on the recommendation of the Graduate Coordinating Committee.
Program Requirements Students are required to complete a minimum of 6 units in coursework beyond the MSc requirements, and a thesis	**Program Requirements** Students are required to complete a minimum of 3 or 6 units in coursework beyond the MSc requirements, and a thesis; please see Coursework for specific requirements for each field of specialization.
Coursework	**Coursework**
• ~~Two~~ 3-unit course~~s~~ in area~~s~~ of advanced specialization ~~or elective~~, based on research interests and discussions with the supervisor and	• One 3-unit course in an area of advanced specialization, based on research interests and discussions with the student's supervisor and the

the Director of the Medical Physics program, chosen from the following: ~~o Magnetic Resonance Physics subspecialty~~ ~~ONCOL 690~~ o ~~Magnetic Resonance Physics subspecialty~~ ONCOL 691 o ~~Radiological and Nuclear Medical Physics subspecialty~~ ONCOL 692 o ~~Radiation Oncology Physics subspecialty~~ ONCOL 693 ~~o Elective~~ ~~PHYS 511~~ • Students entering the PhD in Medical Physics directly after an Honors BSc degree must also complete all required and elective coursework from Master of Science with specialization in Medical Physics (Oncology) program.	Director of the Medical Physics program, chosen from the following: o ONCOL 691 - Advanced Magnetic Resonance Physics o ONCOL 692 - Advanced Radiological and Nuclear Imaging Physics o ONCOL 693 - Advanced Radiotherapeutic Physics NOTE: Those in Magnetic Resonance Physics must take the following course, in addition to the one above: o ONCOL 690 - Biomedical Magnetic Resonance Methods and Applications • Students entering the PhD in Medical Physics directly after an Honors BSc degree must also complete all required and elective coursework from Master of Science with specialization in Medical Physics (Oncology) program.

Reviewed/Approved by:

FoMD Faculty Learning Committee (Faculty Council-delegated Approver) – July 11, 2023
Other internal approvals: Medical Physics Graduate Coordinating Committee – March 29, 2023 FoMD Graduate Programs Committee (GPC) – June 28, 2023

UNIVERSITY OF ALBERTA

Calendar Change Request Form for Course Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	**FoMD – Department of Pharmacology**
Contact Person:	Jennifer Beattie pmcol.gradadmin@ualberta.ca Elena Posse de Chaves elena.chaves@ualberta.ca
Level of change (choose one only) [?]	☐ Undergraduate ☒ Graduate
For which term will this change take effect?	Fall 2024

Rationale

The proposed course PMCOL 530 is a new graduate seminar course. Currently, the Department of Pharmacology does not offer a graduate-specific course with a focus on neuroscience – one of the areas of specialization in the department. This will be a discussion-based course integrating didactic lectures with group discussions of primary literature. Students will deepen their knowledge of neuropsychopharmacology, as well as develop skills in critical thinking, scientific literacy and communication. This course will be relevant to pharmacology graduate students, as well those in Neuroscience, Physiology, and Psychiatry.

Course Template

Current	**Proposed**
NEW COURSE	**Subject & Number** PMCOL 530 **Title** Neuropsychopharmacology **Course Career Graduate** **Units** 3 **Approved Hours** 0-3 -0 **Fee index** 6 **Faculty of Medicine and Dentistry** **Department of Pharmacology** **Typically Offered:** Fall (every other year) **Description** This three-credit course will focus on neuropsychopharmacology – the interdisciplinary science related to psychopharmacology (the study of the effects of drugs on the mind) and fundamental neuroscience. Topics covered will include: pain, sleep, anesthetics, hallucinogens, mood disorders, and substance use disorders. The

	focus will be on understanding drug mechanisms within the context of the cell, circuit, and whole organism. Lectures will be delivered by leaders in the area of neuropsychopharmacology, and will include both basic and clinical scientists across faculties at the University of Alberta. Prerequisite: Consent of the Department.

Reviewed/Approved by:

REQUIRED: FoMD Faculty Learning Committee (Faculty Council-delegated Approver) – Sept 28, 2023 FoMD Faculty Council (for information/suggestions/challenges) – October 25, 2023
Other consultation groups, departments, or internal faculty approving bodies and approval dates. Approved by FoMD Graduate Programs Committee – September 19, 2023 Approved by Department of Pharmacology Committee – May 30th 2023

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Course Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	Biological Sciences
Contact Person:	Viktoria Wagner
Level of change: (choose one only) [?]	• Undergraduate
	• Graduate
For which term will this change take effect?	Fall 2024

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

To streamline the course with another course in the department

Course Template

Current: ~~Removed language~~	**Proposed:** New language
Subject & Number BIOL 430 **Title** Statistical Design and Analysis in Biology **Course Career** **Units** ★ 3 (fi 6)(EITHER, 3-0-3) **Approved Hours** **Fee index** None **Faculty** Science **Department** Biological Sciences **Typically Offered** Fall term **Description** Emphasis is on the design of experiments and analysis of data collected from field and laboratory studies in Biology. Prerequisites: STAT ~~141 or~~ 151 or SCI 151 and a 300-level Biological Sciences course. Credit ~~cannot~~ be obtained ~~for~~ BIOL 430, 530 and REN R 480.	**Subject & Number** BIOL 430 **Title** Statistical Design and Analysis in Biology **Course Career** **Units** ★ 3 (fi 6)(EITHER, 3-0-3) **Approved Hours** **Fee index** None **Faculty** Science **Department** Biological Sciences **Typically Offered** Fall term **Description** Emphasis is on the design of experiments and analysis of data collected from field and laboratory studies in Biology. Prerequisites: STAT 151 or 161 or SCI 151, BIOL 330, and an additional 300-level Biological Sciences course; or consent of Department. Credit can be obtained in only one of BIOL 430, 530 and REN R 480.

Reviewed/Approved by:

REQUIRED: Faculty Council (or delegate) and approval date. Faculty of Science Undergraduate Programs Committee on October 6, 2023
OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates.

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Course Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	Biological Sciences, Faculty of Science
Contact Person:	Maya Evenden, bioacu@ualberta.ca
Level of change: (choose one only) [?]	• Undergraduate
	• Graduate
For which term will this change take effect?	Fall 2024

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

The Department of Biological Sciences is following the lead of removing calendar language associated with "consent of instructor" in favor of clearly outlining pre-requisite courses and program requirements. This eliminates the possibility of instructors choosing students based on an unconscious bias. Regular instructors in this course have been consulted in addition to members of the Department of Biological Sciences Course and Curriculum Committee.

- BIOL 315
- BIOL 310
- BIOL 391
- BIOL 421
- BIOL 343
- BOT 314
- ENT 392
- GENET 424
- IMIN 405
- MICRB 423
- ZOOL 442
- ZOOL 445

Course Template

Current: ~~Removed language~~	**Proposed:** New language
Subject & Number BIOL 315 **Title** Biology: An Historical Perspective **Course Career** Undergraduate **Units** 3.0 **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** Winter alternate years **Description** An outline of the scientific foundations of biological discovery. Students must have a sophisticated understanding of modern concepts in biology, be	**Subject & Number BIOL 315** **Title** Biology: An Historical Perspective **Course Career** Undergraduate **Units** 3.0 **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** Winter alternate years **Description** An outline of the scientific foundations of biological discovery. Students must have a sophisticated understanding of modern concepts in biology, be

prepared to write a major essay on a focused topic, deliver an oral presentation and participate actively in class discussion. Prerequisite: a third-year course in the biological sciences ~~or consent of instructor~~. Offered in alternate years.	prepared to write a major essay on a focused topic, deliver an oral presentation and participate actively in class discussion. Prerequisite: a third-year course in the biological sciences. Offered in alternate years.
Subject & Number BIOL 310 **Title** Biology of Aging **Course Career** Undergraduate **Units** 3.0 **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** Fall every year **Description** Biological aging is a complex process that involves the progressive deterioration of an organism over time. This course covers the aging process at the molecular, tissue and organismal levels. Topics for discussion include assessment of animal models of aging, mechanisms of aging, healthy aging, age-associated disease and interventions. Prerequisites: BIOL 201 or ZOOL 241 or 242 ~~or consent of instructor~~. Credit cannot be obtained for both BIOL 310 and 510.	**Subject & Number BIOL 310** **Title** Biology of Aging **Course Career** Undergraduate **Units** 3.0 **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** Fall every year **Description** Biological aging is a complex process that involves the progressive deterioration of an organism over time. This course covers the aging process at the molecular, tissue and organismal levels. Topics for discussion include assessment of animal models of aging, mechanisms of aging, healthy aging, age-associated disease and interventions. Prerequisites: BIOL 201 or ZOOL 241 or 242. Credit cannot be obtained for both BIOL 310 and 510.
Subject & Number BIOL 391 **Title** Techniques in Molecular Biology and Bioinformatics **Course Career** Undergraduate **Units** 3.0 **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** Either term **Description** A laboratory course introducing students to techniques in gene manipulation, protein expression and bioinformatics by following a gene through a thematic series of molecular manipulations. ~~Restricted to Honors and Specialization students in Biological Sciences and consent of instructor~~. Prerequisites: BIOL 207 and BIOCH 200. Not to be taken by students currently enrolled in GENET 420 or with credit	**Subject & Number BIOL 391** **Title** Techniques in Molecular Biology and Bioinformatics **Course Career** Undergraduate **Units** 3.0 **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** Either term **Description** A laboratory course introducing students to techniques in gene manipulation, protein expression and bioinformatics by following a gene through a thematic series of molecular manipulations. Prerequisites: BIOL 207 and BIOCH 200 or consent of Department. Not to be taken by students currently enrolled in GENET 420 or with credit in GENET

in GENET 420. Credit can be obtained for only one of BIOL 391, IMIN 391 or MMI 391.	420. Credit can be obtained for only one of BIOL 391, IMIN 391 or MMI 391.
Subject & Number BIOL 421 **Title** Molecular Systematics and Evolution **Course Career** Undergraduate **Units** 3.0 **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** Either **Description** Methods for inferring evolutionary trees and their applications to the fields of comparative biology, molecular evolution, and systematics. Topics to be covered include phylogenetic inference, molecular evolution integrated at the organismal and population level, and evolutionary developmental genetics. Labs emphasize practical experience in data analysis. Prerequisite: BIOL 335 ~~or consent of instructor~~. BIOL 380 or 392 recommended. Credit cannot be obtained for both BIOL 421 and BIOL 521. Offered in alternate years.	**Subject & Number BIOL 421** **Title** Molecular Systematics and Evolution **Course Career** Undergraduate **Units** 3.0 **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** Either **Description** Methods for inferring evolutionary trees and their applications to the fields of comparative biology, molecular evolution, and systematics. Topics to be covered include phylogenetic inference, molecular evolution integrated at the organismal and population level, and evolutionary developmental genetics. Labs emphasize practical experience in data analysis. Prerequisite: BIOL 335 or consent of Department. BIOL 380 or 392 recommended. Credit cannot be obtained for both BIOL 421 and BIOL 521. Offered in alternate years.
Subject & Number BIOL 343 **Title** Techniques for Macromolecular Characterization **Course Career** Undergraduate **Units** 3.0 **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** Either term **Description** Critical discussion and use of techniques for characterizing macromolecules from prokaryotic and eukaryotic systems. This course provides the theoretical and hands-on experience required to use classic and cutting-edge technologies to characterize the properties of these macromolecules. Prerequisite: BIOL 207 and ~~consent of instructor~~. Credit can only be obtained for one of BIOL 343 or 543 or MICRB 343 or 345.	**Subject & Number BIOL 343** **Title** Techniques for Macromolecular Characterization **Course Career** Undergraduate **Units** 3.0 **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** Either term **Description** Critical discussion and use of techniques for characterizing macromolecules from prokaryotic and eukaryotic systems. This course provides the theoretical and hands-on experience required to use classic and cutting-edge technologies to characterize the properties of these macromolecules. Prerequisite: BIOL 207, BIOL 391, and BIOCH 200, or consent of Department. Credit can only be obtained for one of BIOL 343 or 543 or

	MICRB 343 or 345.
Subject & Number BOT 314 **Title** Biology of Bryophytes **Course Career** Undergraduate **Units** 3.0 **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** First term **Description** Bryophytes (hornworts, liverworts and mosses) form a unique group of basal land plants that are pivotal for understanding evolution of life in terrestrial environments. This course covers the evolution, systematics and ecological diversity of bryophytes of the world, using morphological, molecular and developmental data. Prerequisite: BIOL 108 or SCI 100 and a 200-level Biology course (BOT 205 ~~or 210~~ recommended) ~~or consent of instructor~~. Offered in alternate years. This course requires payment of additional miscellaneous fees. Refer to the Fees Payment Guide in the University Regulations and Information for Students section of the Calendar.	**Subject & Number BOT 314** **Title** Biology of Bryophytes **Course Career** Undergraduate **Units** 3.0 **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** First term **Description** Bryophytes (hornworts, liverworts and mosses) form a unique group of basal land plants that are pivotal for understanding evolution of life in terrestrial environments. This course covers the evolution, systematics and ecological diversity of bryophytes of the world, using morphological, molecular and developmental data. Prerequisite: BIOL 108 or SCI 100 and a 200-level Biology course (BOT 205 recommended). Offered in alternate years. This course requires payment of additional miscellaneous fees. Refer to the Fees Payment Guide in the University Regulations and Information for Students section of the Calendar.
Subject & Number ENT 392 **Title** Medical and Veterinary Entomology **Course Career** Undergraduate **Units** 3.0 **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** Second term **Description** An account of the influence of arthropods on the health of humans and domestic animals, and the interactions between arthropod vectors and vertebrate pathogens. Prerequisite: ZOOL 250 or any Entomology course ~~or consent of instructor~~. Offered in alternate years	**Subject & Number ENT 392** **Title** Medical and Veterinary Entomology **Course Career** Undergraduate **Units** 3.0 **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** Second term **Description** An account of the influence of arthropods on the health of humans and domestic animals, and the interactions between arthropod vectors and vertebrate pathogens. Prerequisite: ZOOL 250 or any Entomology course. Offered in alternate years.

Subject & Number GENET 424 **Title** Ethical Issues in Genetics **Course Career** Undergraduate **Units** 3.0 **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** Winter **Description** A seminar and discussion course where students will use their existing knowledge of genetics to investigate, evaluate, and discuss how the field of genetics affects society. Students participate in classroom presentations, written submissions and discussions that may include medical research ethics, genetically modified organisms (GMOs), gene patenting, and other current topics. ~~Enrollment is limited and is by permission of the instructor(s)~~. Prerequisite: Any two GENET 300-level lecture courses.	**Subject & Number GENET 424** **Title** Ethical Issues in Genetics **Course Career** Undergraduate **Units** 3.0 **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** Winter **Description** A seminar and discussion course where students will use their existing knowledge of genetics to investigate, evaluate, and discuss how the field of genetics affects society. Students participate in classroom presentations, written submissions and discussions that may include medical research ethics, genetically modified organisms (GMOs), gene patenting, and other current topics. Prerequisite: Any two GENET 300-level lecture courses or consent of Department.
Subject & Number IMIN 405 **Title** Innate Immunity **Course Career** Undergraduate **Units** 3.0 **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** First term **Description** This course covers topics of innate immunity with emphasis on strategies for pathogen recognition, local and systemic activation of the innate immune response, and regulation of innate effector mechanisms. Innate defense strategies against pathogens as well as detection and elimination of tumors will also be covered. Lectures will be followed by active discussions of selected readings pertaining to current research in the subject area. Prerequisites: IMIN 371 ~~or consent of instructor~~. Credit cannot be obtained for both IMIN 405 and 505. (Offered jointly by the Departments of Biological Sciences and Medical Microbiology and Immunology). [Biological Sciences].	**Subject & Number IMIN 405** **Title** Innate Immunity **Course Career** Undergraduate **Units** 3.0 **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** First term **Description** This course covers topics of innate immunity with emphasis on strategies for pathogen recognition, local and systemic activation of the innate immune response, and regulation of innate effector mechanisms. Innate defense strategies against pathogens as well as detection and elimination of tumors will also be covered. Lectures will be followed by active discussions of selected readings pertaining to current research in the subject area. Prerequisites: IMIN 371. Credit cannot be obtained for both IMIN 405 and 505. (Offered jointly by the Departments of Biological Sciences and Medical Microbiology and Immunology). [Biological Sciences].

Subject & Number MICRB 423 **Title** Extreme Microbiology **Course Career** Undergraduate **Units** 3.0 **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** Second term **Description** This advanced microbiology course will cover selected topics of life in extreme environments, with particular emphasis on diversity, evolutionary and physiological adaptations, methodology for studying extreme environments, the effective limits of life, implications for biogeochemical cycling, and astrobiology. Examples of adaptation to specific environments will be the focus of student projects. Oral presentations required. Prerequisites: BIOL 322 or any 300 level MICRB course or consent of ~~instructor~~. Note: MICRB 423 and 523 cannot both be taken for credit.	**Subject & Number MICRB 423** **Title** Extreme Microbiology **Course Career** Undergraduate **Units** 3.0 **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** Second term **Description** This advanced microbiology course will cover selected topics of life in extreme environments, with particular emphasis on diversity, evolutionary and physiological adaptations, methodology for studying extreme environments, the effective limits of life, implications for biogeochemical cycling, and astrobiology. Examples of adaptation to specific environments will be the focus of student projects. Oral presentations required. Prerequisites: BIOL 322 or any 300 level MICRB course or consent of Department. Note: MICRB 423 and 523 cannot both be taken for credit.
Subject & Number ZOOL 442 **Title** Current Topics in Intercellular Communication **Course Career** Undergraduate **Units** 3.0 **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** Either term **Description** Discussion of selected topics in endocrinology, immunology, and neurobiology from molecular, cellular, and whole-animal perspectives. Evaluation of the primary literature and communication skills are emphasized. Prerequisite: ZOOL 342 or 343 or 352 or PMCOL 371 or consent of ~~instructor~~. Credit for this course may be obtained more than once. Offered in alternate years.	**Subject & Number ZOOL 442** **Title** Current Topics in Intercellular Communication **Course Career** Undergraduate **Units** 3.0 **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** Either term **Description** Discussion of selected topics in endocrinology, immunology, and neurobiology from molecular, cellular, and whole-animal perspectives. Evaluation of the primary literature and communication skills are emphasized. Prerequisite: ZOOL 342 or 343 or 352 or PMCOL 371 or consent of Department. Credit for this course may be obtained more than once. Offered in alternate years.

Subject & Number ZOOL 452 **Title** Topics in Parasitology **Course Career** Undergraduate **Units** 3.0 **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** Second term **Description** Experimental approaches to the study of parasitism, including topics on epidemiology, ecology, biochemistry, cell biology, genetics, molecular biology, pathology, and immunology of host-parasite relationships. Reading assignments emphasize experimental approaches to study eukaryotic host-parasite relationships. Prerequisite: ZOOL 352 or MMI 426 or consent of ~~instructor~~. Credit cannot be obtained for both ZOOL 452 and 552.	**Subject & Number ZOOL 452** **Title** Topics in Parasitology **Course Career** Undergraduate **Units** 3.0 **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** Second term **Description** Experimental approaches to the study of parasitism, including topics on epidemiology, ecology, biochemistry, cell biology, genetics, molecular biology, pathology, and immunology of host-parasite relationships. Reading assignments emphasize experimental approaches to study eukaryotic host-parasite relationships. Prerequisite: ZOOL 352 or MMI 426 or consent of Department. Credit cannot be obtained for both ZOOL 452 and 552.

Reviewed/Approved by:

REQUIRED: Faculty Council (or delegate) and approval date. Faculty of Science Undergraduate Programs Committee on October 6, 2023
OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates.

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Program and Regulation Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	Science, Biological Sciences
Contact Person:	Heather Proctor (hproctor@ualberta.ca), EEEB Advisor
Level of change: (choose one only)	• Undergraduate
	• Graduate
Type of change request: (check all that apply)	• Program: EEEB Major/Honors
	• BSc Renewal
For which term is this intended to take effect?	Fall 2024
Does this proposal have corresponding course changes? (Should be submitted at the same time)	no

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

It would be a challenge for EEEB Major/Honors students to fulfill the requirement of ★6 at 400-level from Lists C (Ecology & Environmental Biology) or D (Evolution & Systematics) because many of the courses currently at this level in the lists are (a) offered only every second year, (b) have stringent prerequisites, (c) are hard/expensive to get into because they are run at Bamfield, or (d) are hard to get into because the course enrolment cap is low for pedagogical/pragmatic reasons. The inclusion of four 400-level Zoology courses that are currently in List A (Biological Diversity) in both List A and List D will help EEEB students complete their program in a more timely fashion, and will reduce the need for advisors to apply for exceptions. The four courses are: Zool 405 (Biology of Fishes), 406 (Biology of Amphibians and Reptiles), 407 (Biology of Birds) and 408 (Biology of Mammals). They are relevant for List D because all include topics in systematics and evolution of the various vertebrate taxa. These courses should also be retained in List A.

Calendar Copy

URL in current Calendar (or "New page")
https://calendar.ualberta.ca/preview_program.php?catoid=39&poid=50426

Current Copy: ~~Removed language~~	**Proposed Copy:** New language
List D (Evolution & Systematics) BIOL 322 - Diversity and Evolution of Microbial Life BIOL 335 - Principles of Systematics BIOL 380 - Genetic Analysis of Populations BIOL 421 - Molecular Evolution and Systematics BIOL 495 - Special Topics in Biology (if appropriate topic) ENT 327 - Terrestrial Arthropod Diversity MA SC 402 - Special Topics in Marine Biology (if appropriate topic)	List D (Evolution & Systematics) BIOL 322 - Diversity and Evolution of Microbial Life BIOL 335 - Principles of Systematics BIOL 380 - Genetic Analysis of Populations BIOL 421 - Molecular Evolution and Systematics BIOL 495 - Special Topics in Biology (if appropriate topic) ENT 327 - Terrestrial Arthropod Diversity MA SC 402 - Special Topics in Marine Biology (if appropriate topic)

PALEO 414 - Paleontology PALEO 418 - Paleobiology of the Vertebrates I PALEO 419 - Paleobiology of the Vertebrates II ZOOL 325 - Comparative Anatomy of the Vertebrates ZOOL 350 - Biology and Evolution of Invertebrates	PALEO 414 - Paleontology PALEO 418 - Paleobiology of the Vertebrates I PALEO 419 - Paleobiology of the Vertebrates II ZOOL 325 - Comparative Anatomy of the Vertebrates ZOOL 350 - Biology and Evolution of Invertebrates ZOOL 405 - Biology of Fishes ZOOL 406 - Biology of Amphibians and Reptiles ZOOL 407 - Biology of Birds ZOOL 408 - Biology of Mammals

Reviewed/Approved by:

REQUIRED: Faculty Council (or delegate) and approval date. Faculty of Science Undergraduate Programs Committee on October 6, 2023
OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates. Discussed in an e-meeting including Heather Proctor, Brian Lanoil (other EEEB Advisor) and Maya Evenden (ACU) on 12 Jan 2023. All were in agreement that adding these courses to List D would be helpful to EEEB students.

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Course Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	Science (Physics)
Contact Person:	Erik Rosolowsky
Level of change: (choose one only) [?]	☑ Undergraduate
	☐ Graduate
For which term will this change take effect?	Fall 2024

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

This course creates the first year electricity and magnetism course that was envisioned as part of the BSc Renewal Program. The Department of Physics has significantly reorganized the course content in the first and second year of the programs to reduce the number of required courses required of students taking majors and minors in all our programs. Our program will now align better with other universities across Canada who typically teach this subject matter in the second semester of the first year.

Course Template

Current: ~~Removed language~~	**Proposed:** New language
	Subject & Number: PHYS 181 **Title: Relativity, Electricity and Magnetism** **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Physics **Typically Offered:** second term **Description:** This calculus-based course starts with the breakdown of the Galilean concepts of space and time near the speed of light, and an introduction to Einstein's Special Relativity including: time dilation, length contraction, Lorentz transformations, relativistic energy and momentum, relativistic Doppler effect and basic 4-vectors. The second part of the course covers introductory electromagnetism including: electric forces and fields, electric potential, capacitance, DC circuits, magnetic forces and fields, magnetic fields from currents, and Faraday's Law of electromagnetic induction. Prerequisite: PHYS 124 (see Note following) or 144 or EN PH 131. Corequisite: One of MATH 118 or 146. Credit may be obtained for only one of PHYS 181 or 230 or 281. Note: To proceed to PHYS 181 after taking PHYS 124, it is strongly recommended that a minimum grade of B- be achieved in PHYS 124.

Reviewed/Approved by:

REQUIRED: Faculty Council (or delegate) and approval date. Science Undergraduate Programs Committee on November 3, 2023
OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates.

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Course Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	Science (Physics)
Contact Person:	Erik Rosolowsky
Level of change: (choose one only) [?]	☑ Undergraduate
	☐ Graduate
For which term will this change take effect?	Fall 2024

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

This curriculum change incorporates several small changes to bring the Physics programs into alignment with the redesigned degrees under BSc renewal. A graphical summary of how topics are being rearranged is attached.

- PHYS 124 - Change the language to target the new PHYS 181 course
- PHYS 144 - Change content to remove relativity and expand course description. Remove reference to SCI100
- PHYS 208 - This course is similar to PHYS 271 but with fewer learning objectives. The change allows 208 to be "upgraded" by taking PHYS 271 since some degrees in the new programs only allow PHYS 271 for graduation.
- PHYS 230 - Change first year physics requirement to PHYS 144 since PHYS 181 covers the same material as this class. Ordinarily, Faculty of Science students do not take PHYS 230
- PHYS 234 - Revise course description to reflect modern course content.
- PHYS 244 - Revise course content consistent with renewal.
- PHYS 261 / 294 / 295 / 310 - Allow new PHYS 181 course to fulfill prerequisites.
- PHYS 271 - Revise course content consistent with renewal.
- PHYS 281 - This course has been revised out of Physics programs but will continue to be taught to support Engineering Physic
- PHYS 362 - Add PHYS 181 as a prerequisite, add Coherence theory and Fourier optics, which is now possible due to revisions in math curriculum.
- ASTRO 320 / 322 - Remove redundant prerequisites since the first year physics requirements are also required for PHYS 208 / 271.
- MA PH 451 - Add MATH 411, the honors version of an existing prerequisite MATH 311 as a suitable prerequisite.

We also cleaned up references to MATH courses that have changed numbers (MATH 215 to MATH 315) and removed references to courses no longer offered (MATH 113).

Course Template

Current: ~~Removed language~~	**Proposed:** New language
Subject & Number: PHYS 124 **Title: Particles and Waves** **Course Career: Undergraduate** **Units: 3** **Approved Hours: 3-0-3** **Fee index: 6** **Faculty: Science** **Department: Physics** **Typically Offered: either term** Algebra-based course primarily for students in life,	**Subject & Number:** PHYS 124 **Title: Particles and Waves** **Course Career: Undergraduate** **Units: 3** **Approved Hours: 3-0-3** **Fee index: 6** **Faculty: Science** **Department: Physics** **Typically Offered: either term** Algebra-based course primarily for students in life,

environmental, and medical sciences. It guides the student through two distinct types of motion: motion of matter (particles) and wave motion. Vectors, forces, bodies in equilibrium, review of kinematics and basic dynamics; conservation of momentum and energy; circular motion; vibrations; elastic waves in matter; sound; wave optics; black body radiation, photons, de Broglie waves. Examples relevant in environmental, life, and medical sciences will be emphasized. Prerequisites: Physics 20 or equivalent, Mathematics 30-1. Physics 30 is strongly recommended. Note: Credit may be obtained for only one of PHYS 124, 144, EN PH 131 ~~or SCI 100~~. Note: To proceed to PHYS ~~146~~ after taking PHYS 124, it is strongly recommended that a minimum grade of B- be achieved in PHYS 124.	environmental, and medical sciences. It guides the student through two distinct types of motion: motion of matter (particles) and wave motion. Vectors, forces, bodies in equilibrium, review of kinematics and basic dynamics; conservation of momentum and energy; circular motion; vibrations; elastic waves in matter; sound; wave optics; black body radiation, photons, de Broglie waves. Examples relevant in environmental, life, and medical sciences will be emphasized. Prerequisites: Physics 20 or equivalent, Mathematics 30-1. Physics 30 is strongly recommended. Note: Credit may be obtained for only one of PHYS 124, 144, or EN PH 131. Note: To proceed to PHYS 181 after taking PHYS 124, it is strongly recommended that a minimum grade of B- be achieved in PHYS 124.
Subject & Number: PHYS 144 **Title: Newtonian Mechanics and Relativity** **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Physics **Typically Offered:** first term **Description:** ~~A calculus based course for students majoring in the physical sciences. Newtonian mechanics, including kinematics, dynamics, conservation of momentum and energy, rotational motion and angular momentum; special relativistic kinematics and dynamics, including length contraction, time dilation, and the conservation of energy and momentum in special relativity.~~ Prerequisites: Mathematics 30-1 and Physics 30. Mathematics 31 is strongly recommended. Corequisites: MATH 117 or 144. ~~Note: MATH 113 or 114 is not acceptable as a co-requisite but may be used as a prerequisite in place of MATH 117 or 144.~~ Note: Credit may be obtained for only one of PHYS 124, 144, EN PH 131 ~~or SCI 100~~.	**Subject & Number:** PHYS 144 **Title: Newtonian Mechanics** **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Physics **Typically Offered:** first term **Description:** This calculus-based course introduces the fundamentals of classical mechanics: general kinematics, Newtonian dynamics, work-energy and energy conservation, impulse-momentum and momentum conservation, rotational kinematics and dynamics, rigid bodies, angular momentum and its conservation. The course concludes with a discussion of the elastic deformation of solids and simple fluid mechanics. Prerequisites: Mathematics 30-1 and Physics 30. Mathematics 31 is strongly recommended. Corequisites: MATH 117 or 144. Note: Credit may be obtained for only one of PHYS 124, 144 or EN PH 131.
Subject & Number: PHYS 208 **Title:** Aspects of Modern Physics **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-0 **Fee index:** 6 **Faculty:** Science **Department:** Physics	**Subject & Number:** PHYS 208 **Title:** Aspects of Modern Physics **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-0 **Fee index:** 6 **Faculty:** Science **Department:** Physics

Typically Offered: either term **Description:** Experimental evidence for limitations of classical physics; Einstein's special theory of relativity; length contraction; time dilation; twin paradox; equivalence of mass and energy; relativistic mass and momentum; the photo-electric effect, the Compton effect, X-ray production and electron diffraction; a discussion of the Heisenberg uncertainty principle and the ~~Schrodinger~~ equation including applications of one dimensional potential wells and barriers; tunnelling; the simple harmonic oscillator; atomic physics; hydrogen atom; periodic table. Prerequisites: one of PHYS 124, PHYS 144, or EN PH 131, and one of PHYS 126, PHYS 146, or PHYS 130; MATH ~~113 or~~ 114 or 134 or 144 or 154. ~~Credit may be obtained in only one of PHYS 208 or 271.~~	**Typically Offered:** either term **Description:** Experimental evidence for limitations of classical physics; Einstein's special theory of relativity; length contraction; time dilation; twin paradox; equivalence of mass and energy; relativistic mass and momentum; the photo-electric effect, the Compton effect, X-ray production and electron diffraction; a discussion of the Heisenberg uncertainty principle and the Schrödinger equation including applications of one dimensional potential wells and barriers; tunnelling; the simple harmonic oscillator; atomic physics; hydrogen atom; periodic table. Prerequisites: one of PHYS 124, PHYS 144, or EN PH 131, and one of PHYS 126, PHYS 146, 181, or PHYS 130; MATH 114 or 134 or 144 or 154. Note: This course may not be taken for credit if credit has already been obtained in PHYS 271.
Subject & Number: PHYS 230 **Title:** Electricity and Magnetism **Course Career:** Undergraduate **Units:** 3.8 **Approved Hours:** 3-0-3/2 **Fee index:** 6 **Faculty:** Science **Department:** Physics **Typically Offered:** either term Description Electric fields, Gauss' Law; electric potential; capacitance and dielectrics; electric current and resistance; magnetic fields, Ampere's Law; Faraday's Law; inductance; magnetic properties of matter. Prerequisites: PHYS 130 or 146, and MATH 100 or ~~113 or~~ 114 or 117. ~~Pre- or~~ corequisite: MATH 101 or 115 or 118. ~~For Science students only: SCI 100 may be used in lieu of PHYS 146, MATH 114 and 115.~~ Note: Restricted to Engineering students. Other students who take this course will receive *3.0. Credit ~~may~~ normally be obtained for only one of PHYS 230 or 281.	**Subject & Number:** PHYS 230 **Title:** Electricity and Magnetism **Course Career:** Undergraduate **Units:** 3.8 **Approved Hours:** 3-0-3/2 **Fee index:** 6 **Faculty:** Science **Department:** Physics **Typically Offered:** either term Description Electric fields, Gauss' Law; electric potential; capacitance and dielectrics; electric current and resistance; magnetic fields, Ampere's Law; Faraday's Law; inductance; magnetic properties of matter. Prerequisites: PHYS 130 or 144 or 146, and MATH 100 or 114 or 117 or 144. Corequisite: MATH 101 or 115 or 118. Note: Restricted to Engineering students. Other students who take this course will receive *3.0. Credit can normally be obtained for only one of PHYS 181, 230, or 281.
Subject & Number: PHYS 234 **Title:** Introductory Computational Physics **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Physics **Typically Offered:** either term	**Subject & Number:** PHYS 234 **Title:** Introductory Computational Physics **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Physics **Typically Offered:** either term

Description: ~~Algorithms for scientific data analysis: sorting methods, polynomial fitting, regression, interpolation, and Fourier analysis: techniques for solving physics and geophysics problems with selected topics from mechanics, waves, geometrical optics and ray tracing, electricity and magnetism, statistical physics, decay processes, quantum physics, signal processing. Prerequisites: one of PHYS 124, PHYS 144, or EN PH 131, and one of PHYS 126, PHYS 146, or PHYS 130; and MATH 100 or 113 or 114 or 117 or 144, and MATH 102 or 125 or 127. CMPUT 174 is recommended for students without prior programming experience.~~	**Description:** An introductory course on using computer based methods to solve physics problems, especially those that do not have analytical solutions or require great effort to find it. Examples of problems are drawn from mechanics, electricity and magnetism, modern physics, experimental physics, and data analysis. The course begins with an introduction to scientific programming. The topics that are covered include numerical differentiation and integration; vector geometry and linear algebra; solutions to ordinary differential equations including nonlinear equations and coupled systems of equations. Other topics will be selected from numerical methods and algorithms for analysis of physics data including root finding methods, interpolation, uncertainty estimates, an introduction to regression, Monte Carlo methods, common statistical distributions encountered in physics, Fourier analysis, signal processing and eigenvalue methods. Prerequisite: PHYS 146 or PHYS 181; MATH 118 or 146. Note: MA PH 251 or MATH 334 is a suggested corequisite.
Subject & Number: PHYS 244 **Title: Mechanics** **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-0 **Fee index:** 6 **Faculty:** Science **Department:** Physics **Typically Offered:** ~~either~~ term **Description:** ~~Particle dynamics; oscillating systems and normal modes; conservative forces and energy; introduction to Lagrangian and Hamiltonian dynamics; central forces; orbital motion and scattering.~~ Prerequisite: one of PHYS 124, PHYS 144, or EN PH 131, ~~and one of PHYS 126, PHYS 146, or PHYS 130~~. Corequisite: MATH 120 or 125 or 127 or 102 or equivalent, and MA PH 251, MATH 201, MATH 334, or MATH 336 or equivalent.	**Subject & Number:** PHYS 244 **Title: Classical Mechanics I** **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-0 **Fee index:** 6 **Faculty:** Science **Department:** Physics **Typically Offered:** first term **Description:** An intermediate course in classical mechanics, which covers several applications that are critical to a wide variety of different fields of physics including: simple, damped, and driven harmonic oscillators; coupled oscillators, conservative forces, and energy. The central part of the course introduces the calculus of variations and Lagrangian mechanics, including its application to the two-body, central force problem and Noether's theorem, which connects symmetries with conservation laws. Hamiltonian mechanics is also briefly introduced. The course concludes with the application of the linear wave equation to mechanical waves: the superposition principle, wave interference, and standing waves. Prerequisite: PHYS 124 or PHYS 144 or EN PH 131. Corequisites: MATH 102 or 125 or 127 or equivalent; MA PH 251 or MATH 201 or MATH 334 or MATH 336.

Subject and Number: PHYS 261 **Title:** Physics of Energy **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-0 **Fee index:** 6 **Faculty:** Science **Department:** Physics **Typically Offered:** either term **Description:** Energy in its various forms; conservation of energy; basic thermodynamics of ideal gases and phase changes; heat engines and refrigerators; consumption of energy resources; space heating and heat transfer; radioactivity; nuclear fission and nuclear power; alternative and renewable energy resources. Prerequisites: one of PHYS 124, PHYS 144, or EN PH 131, and one of PHYS 126, PHYS 146, or PHYS 130; and ~~MATH 113 or~~ 114 or 134 or 144 or 154.	**Subject and Number:** PHYS 261 **Title:** Physics of Energy **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-0 **Fee index:** 6 **Faculty:** Science **Department:** Physics **Typically Offered:** either term **Description:** Energy in its various forms; conservation of energy; basic thermodynamics of ideal gases and phase changes; heat engines and refrigerators; consumption of energy resources; space heating and heat transfer; radioactivity; nuclear fission and nuclear power; alternative and renewable energy resources. Prerequisites: one of PHYS 124, PHYS 144, or EN PH 131, and one of PHYS 126, PHYS 146, PHYS 181, or PHYS 130; and MATH 114 or 134 or 144 or 154.
Subject & Number: PHYS 271 **Title: Introduction to Modern Physics** **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-0 **Fee index:** 6 **Faculty:** Science **Department:** Physics **Typically Offered:** ~~either~~ term **Description:** ~~Experimental evidence for limitations of classical physics; review of special relativity: quantization of charge, light, and energy; blackbody radiation, photoelectric effect, Compton effect; models of the atom; wavelike properties of particles; the uncertainty principle, the Schrodinger Equation, the infinite and finite square well, the harmonic oscillator, tunneling; the hydrogen atom, orbital angular momentum and electron spin; spin and statistics; selected topics.~~ Prerequisite: one of PHYS 124, PHYS 144, or EN PH 131, ~~and one of PHYS 126, PHYS 146, or PHYS 130~~. ~~Pre- or~~ Corequisite: MATH 209 or ~~215~~ or 317 or MA PH 351 ~~equivalent~~. ~~Note: Credit may be obtained in only one of PHYS 208 or 271.~~	**Subject & Number:** PHYS 271 **Title: Introduction to Modern Physics** **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-0 **Fee index:** 6 **Faculty:** Science **Department:** Physics **Typically Offered:** second term **Description:** This course covers the emergence of modern physics through revisions to the Newtonian worldview and the development of quantum mechanics. The course starts with the discovery of the wave nature of light through diffraction and interferometry leading to the observation of lines in atomic spectra. The course then discusses the early experiments that lead to the discovery of the structure of matter and early quantum phenomena including: Rutherford scattering, quantization of charge and energy, Blackbody radiation, Compton scattering, Bohr atom and de Broglie wavelength. This is followed by an introduction to the Schrödinger equation and solutions to 1D problems including: infinite and finite square potential wells, the quantum harmonic oscillator and quantum tunneling, before discussing quantized angular momentum. The course then concludes with a tour of the exciting applications of modern physics in different fields with some possible examples including: semiconductors, superconductors, nuclear decays and

	reactions, the Standard Model, the Higgs boson, quantum information, supernovae and Black Holes, Dark Matter, the Big Bang and Gravitational Waves. Prerequisite: one of PHYS 124, PHYS 144, or EN PH 131. Corequisites: MA PH 251 or MATH 201 or MATH 334 or MATH 336 and one of MA PH 351 or MATH 209 or 315 or 317, and MATH 102 or 125 or 127
Subject & Number: PHYS 281 **Title: Electricity and Magnetism** **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-0 **Fee index:** 6 **Faculty:** Science **Department:** Physics **Typically Offered:** either term **Description:** Electric fields; Gauss' law; electric potential; capacitance and dielectrics; electric current and resistance; DC circuits; magnetic fields; Ampere's Law; Faraday's Law; inductance; magnetic properties of matter, AC circuits; Maxwell's equations; electromagnetic waves. Prerequisite: one of PHYS 124, PHYS 144, or EN PH 131, and one of PHYS 126, PHYS 146, or PHYS 130. Corequisite: MATH 209 or 214 or 217 or equivalent. Credit may normally be obtained for only one of PHYS 230 or 281.	**Subject & Number:** PHYS 281 **Title: Electricity and Magnetism** **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-0 **Fee index:** 6 **Faculty:** Science **Department:** Physics **Typically Offered:** either term **Description:** Electric fields; Gauss' law; electric potential; capacitance and dielectrics; electric current and resistance; DC circuits; magnetic fields; Ampere's Law; Faraday's Law; inductance; magnetic properties of matter, AC circuits; Maxwell's equations; electromagnetic waves. Prerequisite: one of PHYS 124, PHYS 144, or EN PH 131, and one of PHYS 126, PHYS 146, or PHYS 130. Corequisite: MATH 209 or 214 or 217 or equivalent. Credit may normally be obtained for only one of PHYS 181 or 230 or 281.
Subject & Number: PHYS 294 **Title:** General Physics Laboratory **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 0-0-6 **Fee index:** 6 **Faculty:** Science **Department:** Physics **Typically Offered:** either term **Description:** Introduction to experimental physics through select, classic experiments in physics from the 19th through 21st centuries performed using contemporary instrumentation when possible. Introduction to the statistical treatment of uncertainties, and analysis and graphing of experimental data with open-source scientific software. Skill development in written and oral presentation of laboratory results. Prerequisites: MATH 100 or ~~113 or~~ 114 or 117 or 134 or 144 or 154; one of	**Subject & Number:** PHYS 294 **Title:** General Physics Laboratory **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 0-0-6 **Fee index:** 6 **Faculty:** Science **Department:** Physics **Typically Offered:** either term **Description:** Introduction to experimental physics through select, classic experiments in physics from the 19th through 21st centuries performed using contemporary instrumentation when possible. Introduction to the statistical treatment of uncertainties, and analysis and graphing of experimental data with open-source scientific software. Skill development in written and oral presentation of laboratory results. Prerequisites: MATH 100 or 114 or 117 or 134 or 144 or 154; one of PHYS 124,

PHYS 124, PHYS 144, or EN PH 131; and one of PHYS 126, PHYS 146 or PHYS 130. Note: PHYS 294 will not count towards degree credit for ~~specialization or~~ Honors programs offered by the physics department (including physics, geophysics, astrophysics and mathematical physics). Students enrolled in ~~physics specialization or~~ Honors programs are required to take PHYS 295 instead.	PHYS 144, or EN PH 131; and one of PHYS 126, PHYS 146, PHYS 181 or PHYS 130. Note: PHYS 294 will not count towards degree credit for Honors programs offered by the physics department (including physics, geophysics, astrophysics and mathematical physics). Students enrolled in those Honors programs are required to take PHYS 295 instead.
Subject & Number: PHYS 295 **Title:** Experimental Physics I **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 0-0-6 **Fee index:** 6 **Faculty:** Science **Department:** Physics **Typically Offered:** either term **Description:** Contemporary methods of experimental physics with measurements from classical and modern physics. Analysis and graphing of experimental data using programming techniques. Estimation and statistical treatment of experimental uncertainties consistent with standard practice in physics. Planning and record keeping for experimental work, written presentation of laboratory results. Prerequisites: MATH 101 or 115 or 118 or 146, one of PHYS 124, PHYS 144, or EN PH 131; and one of PHYS 126, PHYS 146, or PHYS 130. Note: To proceed to PHYS 295 after taking PHYS 126 a minimum grade of B+ in PHYS 126 and some experience of computer programming are strongly recommended.	**Subject & Number:** PHYS 295 **Title:** Experimental Physics I **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 0-0-6 **Fee index:** 6 **Faculty:** Science **Department:** Physics **Typically Offered:** either term **Description:** Contemporary methods of experimental physics with measurements from classical and modern physics. Analysis and graphing of experimental data using programming techniques. Estimation and statistical treatment of experimental uncertainties consistent with standard practice in physics. Planning and record keeping for experimental work, written presentation of laboratory results. Prerequisites: MATH 101 or 115 or 118 or 146, one of PHYS 124, PHYS 144, or EN PH 131; and one of PHYS 126, PHYS 146, PHYS 181, or PHYS 130. Note: To proceed to PHYS 295 after taking PHYS 126 a minimum grade of B+ in PHYS 126 and some experience of computer programming are strongly recommended.
Subject & Number: PHYS 310 **Title:** Thermodynamics and Kinetic Theory **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-0 **Fee index:** 6 **Faculty:** Science **Department:** Physics **Typically Offered:** either term **Description:** Temperature: heat, work, and the first law of thermodynamics; entropy and the second law, enthalpy, Helmholtz and Gibbs free energy; thermodynamic equilibrium criteria; Maxwell's relations, phase transitions; elementary kinetic theory of gases. Prerequisites: one of PHYS 124, PHYS 144, or EN PH 131, and one of PHYS 126, PHYS 146, or PHYS 130. ~~Pre- or~~ corequisite: MATH	**Subject & Number:** PHYS 310 **Title:** Thermodynamics and Kinetic Theory **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-0 **Fee index:** 6 **Faculty:** Science **Department:** Physics **Typically Offered:** either term **Description:** Temperature: heat, work, and the first law of thermodynamics; entropy and the second law, enthalpy, Helmholtz and Gibbs free energy; thermodynamic equilibrium criteria; Maxwell's relations, phase transitions; elementary kinetic theory of gases. Prerequisites: one of PHYS 124, PHYS 144, or EN PH 131, and one of PHYS 126, PHYS 146, PHYS 181, or PHYS 130. Corequisite:

209 or 215 or 317 or MA PH 351 equivalent.	MATH 209 or 215 or 315 or 317 or MA PH 351 or equivalent.
PHYS 362 - Optics and Lasers **Course Career** Undergraduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Science **Department** Physics **Typically Offered** either term **Description** ~~Gaussian optics; optical instruments; matrix analysis of lens systems; aberrations; polarization; double- and multiple-beam interference; Fraunhofer and Fresnel diffraction; introduction to laser physics and applications; selected topics from contemporary optics.~~ Prerequisite: PHYS 230 or 281, and MATH 209 or 215 or 317 or MA PH 351.	**PHYS 362 - ~~Optics and Lasers~~ Optical Physics** **Course Career** Undergraduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Science **Department** Physics **Typically Offered** either term **Description** Electromagnetic waves; polarization and birefringence; dispersion of light in materials; Fresnel equations for reflection and transmission; multiple-beam interference; Fraunhofer and Fresnel diffraction; Fourier optics; coherence theory; optical imaging and instruments; introduction to laser physics, quantum optics, and selected current topics. Prerequisite: PHYS 181 or 230 or 281, and MATH 209 or 215 or 315 or 317 or MA PH 351.
Subject & Number: ASTRO 320 **Title:** Stellar Astrophysics I **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-0 **Fee index:** 6 **Faculty:** Science **Department:** Physics **Typically Offered:** either term Description: Application of physics to stellar formation and stellar evolution; theoretical models and observational comparisons of main sequence stars, white dwarf stars, neutron stars, supernovae, black holes; binary star systems, stellar atmospheres and stellar spectra. Prerequisites: MATH 115, 118, 136, 146 or 156~~; and one of PHYS 124, PHYS 144, or EN PH 131~~, and one of ~~PHYS 126, PHYS 146, or PHYS 130 and~~ PHYS 208 or 271. Previous knowledge of astronomy is advantageous.	**Subject & Number:** ASTRO 320 **Title:** Stellar Astrophysics I **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-0 **Fee index:** 6 **Faculty:** Science **Department:** Physics **Typically Offered:** either term Description: Application of physics to stellar formation and stellar evolution; theoretical models and observational comparisons of main sequence stars, white dwarf stars, neutron stars, supernovae, black holes; binary star systems, stellar atmospheres and stellar spectra. Prerequisites: MATH 115, 118, 136, 146 or 156 and one of PHYS 208 or 271. Previous knowledge of astronomy is advantageous
Subject & Number: ASTRO 322 **Title:** Galactic and Extragalactic Astrophysics **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-0 **Fee index:** 6 **Faculty:** Science **Department:** Physics	**Subject & Number:** ASTRO 322 **Title:** Galactic and Extragalactic Astrophysics **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-0 **Fee index:** 6 **Faculty:** Science **Department:** Physics

Typically Offered: either term Description: The interstellar medium and interstellar reddening; galactic structure; kinematics and dynamics of stars in galaxies; quasars; introduction of cosmology. Prerequisites: MATH 115, 118, 136, 146 or 156~~, and one of PHYS 124, PHYS 144, or EN PH 131, and~~ one of ~~PHYS 126, PHYS 146, or PHYS 130 and~~ PHYS 208 or 271. Previous knowledge of astronomy is advantageous.	**Typically Offered:** either term Description: The interstellar medium and interstellar reddening; galactic structure; kinematics and dynamics of stars in galaxies; quasars; introduction of cosmology. Prerequisites: MATH 115, 118, 136, 146 or 156, and one of PHYS 208 or 271. Previous knowledge of astronomy is advantageous.
Subject & Number: MA PH 451 **Title: Mathematical Methods for Physics II** **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-0 **Fee index:** 6 **Faculty:** Science **Department:** Physics **Typically Offered:** ~~either~~ term **Description:** Application to problems in physics of method of steepest descent, Fourier and Laplace transforms; boundary-value problems, integral equations, and Green's functions. Prerequisites: either MA PH 351 or both of MATH 311 and MATH 337.	**Subject & Number:** MA PH 451 **Title: Mathematical Methods for Physics II** **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-0 **Fee index:** 6 **Faculty:** Science **Department:** Physics **Typically Offered:** second term **Description:** Application to problems in physics of method of steepest descent, Fourier and Laplace transforms; boundary-value problems, integral equations, and Green's functions. Prerequisites: either MA PH 351 or both of MATH 337 and MATH 311 or MATH 411.

Reviewed/Approved by:

REQUIRED: Faculty Council (or delegate) and approval date. Science Undergraduate Programs Committee on November 3, 2023
OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates.

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Program and Regulation Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	Science (Physics)
Contact Person:	Erik Rosolowsky
Level of change: (choose one only)	☑ Undergraduate
	☐ Graduate
Type of change request: (check all that apply)	☑ Program
	☐ Regulation
For which term is this intended to take effect?	Fall 2024
Does this proposal have corresponding course changes? (Should be submitted at the same time)	No

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

This revision integrates the newly created first year electricity and magnetism course into the new programs of the BSc Renewal Program. The Department of Physics has significantly reorganized the course content in the first and second year of the programs to reduce the number of required courses required of students taking majors and minors in all our programs. Our program will now align better with other universities across Canada who typically teach this subject matter in the second semester of the first year. This curriculum revision replaces the old PHYS 146 with the new PHYS 181 in all our programs. Students who have taken PHYS 281, a standard course in our current program, will still be able to graduate in the new BSc programs.

The other revision is to the mathematics component of the program. The originally scheduled plan of using a condensed math course from the Faculty of Engineering MATH 102 to fulfill the linear algebra requirements faces programmatic challenges with Science students enrolling in Engineering courses. Thus, we revert to having students take the MATH 125/225 sequence as is currently implemented in our programs. We also add notes to indicate how students can fulfill the MA PH 251 and MA PH 351 program level requirements by taking MATH courses. Note a separate program revision proposes additional changes to the Honors in Mathematical Physics program.

Calendar Copy

https://calendar.ualberta.ca/preview_program.php?catoid=39&poid=50428

Current Copy: ~~Removed language~~	**Proposed Copy:** New language

Bachelor of Science Astrophysics Subject Area **[...]** **Requirements** Honors in Astrophysics (~~75~~ units) Major in Astrophysics (~~54~~ units) Minor in Astrophysics (24 units)	**Bachelor of Science Astrophysics Subject Area** **[...]** **Requirements** Honors in Astrophysics (78 units) Major in Astrophysics (57 units) Minor in Astrophysics (24 units)
Honors in Astrophysics Requirements **Foundation Courses** ~~MATH 102 - Applied Linear Algebra~~ MATH 144 - Calculus for the Mathematical and Physical Sciences I MATH 146 - Calculus for the Mathematical and Physical Sciences II PHYS 144 - Newtonian Mechanics and Relativity ~~PHYS 146 - Fluids and Waves~~ **[...]** **Senior Courses** ASTRO 320 - Stellar Astrophysics I ASTRO 322 - Galactic and Extragalactic Astrophysics MA PH 251 - Differential Equations for Physics MA PH 351 - Mathematical Methods for Physics I **[...]** **Notes:** ~~1~~ ASTRO 120 and ASTRO 122 are recommended as Science options. ~~2.~~ Not all 200-, 300-, and 400-level Physics courses are offered every year so students should plan accordingly. ~~3.~~ Students without a background in computer programming are strongly encouraged to take CMPUT 174 as one of their Science options in their first year.	**Honors in Astrophysics Requirements** **Foundation Courses** MATH 144 - Calculus for the Mathematical and Physical Sciences I MATH 146 - Calculus for the Mathematical and Physical Sciences II PHYS 144 - Newtonian Mechanics and Relativity PHYS 181 - Relativity, Electricity and Magnetism 3 units from: MATH 125 - Linear Algebra I MATH 127 - Honors Linear Algebra I **[...]** **Senior Courses** ASTRO 320 - Stellar Astrophysics I ASTRO 322 - Galactic and Extragalactic Astrophysics MA PH 251 - Differential Equations for Physics (see Note 1) MA PH 351 - Mathematical Methods for Physics I (see Note 2) 3 units from: MATH 225 - Linear Algebra II MATH 227 - Honors Linear Algebra II **[...]** Notes: 1. This requirement may also be fulfilled by completing one of MATH 334 or 336 and MATH 337. 2. This requirement may also be fulfilled by completing both MATH 315 and MATH 311. 3. ASTRO 120 and ASTRO 122 are recommended as Science options. 4. Not all 200-, 300-, and 400-level Physics courses are offered every year so students should plan accordingly. 5. Students without a background in computer programming are strongly encouraged to take CMPUT 174 as one of their Science options in their first year.

Major in Astrophysics Requirements **Foundation Courses** ~~MATH 102 - Applied Linear Algebra~~ MATH 144 - Calculus for the Mathematical and Physical Sciences I MATH 146 - Calculus for the Mathematical and Physical Sciences II PHYS 144 - Newtonian Mechanics and Relativity ~~PHYS 146 - Fluids and Waves~~ **[...]** **Senior Courses** ASTRO 320 - Stellar Astrophysics I ASTRO 322 - Galactic and Extragalactic Astrophysics MA PH 251 - Differential Equations for Physics MA PH 351 - Mathematical Methods for Physics I **[...]** **Notes:** ~~1.~~ Some courses appear in more than one requirement. Students may not use the same course to satisfy more than one requirement. ~~2.~~ ASTRO 120 and ASTRO 122 are recommended as Science options. ~~3.~~ Not all 200-, 300-, and 400-level Physics courses are offered every year so students should plan accordingly. ~~4.~~ Students without a background in computer programming are strongly encouraged to take CMPUT 174 as one of their Science options in their first year.	**Major in Astrophysics Requirements** **Foundation Courses** MATH 144 - Calculus for the Mathematical and Physical Sciences I MATH 146 - Calculus for the Mathematical and Physical Sciences II PHYS 144 - Newtonian Mechanics and Relativity PHYS 181 - Relativity, Electricity and Magnetism 3 units from: MATH 125 - Linear Algebra I MATH 127 - Honors Linear Algebra I **[...]** **Senior Courses** ASTRO 320 - Stellar Astrophysics I ASTRO 322 - Galactic and Extragalactic Astrophysics MA PH 251 - Differential Equations for Physics (see Note 1) MA PH 351 - Mathematical Methods for Physics I (see Note 2) 3 units from: MATH 225 - Linear Algebra II MATH 227 - Honors Linear Algebra II **[...]** Notes: 1. This requirement may also be fulfilled by completing both MATH 334 and MATH 337. 2. This requirement may also be fulfilled by completing both MATH 315 and MATH 311. 3. Some courses appear in more than one requirement. Students may not use the same course to satisfy more than one requirement. 4. ASTRO 120 and ASTRO 122 are recommended as Science options. 5. Not all 200-, 300-, and 400-level Physics courses are offered every year so students should plan accordingly. 6. Students without a background in computer programming are strongly encouraged to take CMPUT 174 as one of their Science options in their first year.

Minor in Astrophysics Requirements **Foundation Courses** ASTRO 120 - Astronomy of the Solar System 3 units from: ASTRO 101 - Black Holes ASTRO 122 - Astronomy of Stars and Galaxies 3 units from: PHYS 124 - Particles and Waves PHYS 144 - Newtonian Mechanics and Relativity 3 units from: PHYS 126 - Fluids, Fields, and Radiation ~~PHYS 146 - Fluids and Waves~~ **[...]**	**Minor in Astrophysics Requirements** **Foundation Courses** ASTRO 120 - Astronomy of the Solar System 3 units from: ASTRO 101 - Black Holes ASTRO 122 - Astronomy of Stars and Galaxies 3 units from: PHYS 124 - Particles and Waves PHYS 144 - Newtonian Mechanics and Relativity 3 units from: PHYS 126 - Fluids, Fields, and Radiation PHYS 181 - Relativity, Electricity and Magnetism **[...]**
https://calendar.ualberta.ca/preview_program.php?catoid=39&poid=50440	
Current Copy: ~~Removed language~~	**Proposed Copy:** New language
Honors in Geophysics Requirements **Foundation Courses** CHEM 101 - Introductory University Chemistry I CHEM 102 - Introductory University Chemistry II EAS 105 - The Dynamic Earth Through Time GEOPH 110 - Introduction to Earth and Planetary Physics (See Note 1) ~~MATH 102 - Applied Linear Algebra~~ MATH 144 - Calculus for the Mathematical and Physical Sciences I MATH 146 - Calculus for the Mathematical and Physical Sciences II PHYS 144 - Newtonian Mechanics and Relativity ~~PHYS 146 - Fluids and Waves~~ **[...]** **Senior Courses** **[...]** MA PH 251 - Differential Equations for Physics MA PH 351 - Mathematical Methods for Physics I	**Honors in Geophysics Requirements** **Foundation Courses** CHEM 101 - Introductory University Chemistry I CHEM 102 - Introductory University Chemistry II EAS 105 - The Dynamic Earth Through Time GEOPH 110 - Introduction to Earth and Planetary Physics (See Note 1) MATH 144 - Calculus for the Mathematical and Physical Sciences I MATH 146 - Calculus for the Mathematical and Physical Sciences II PHYS 144 - Newtonian Mechanics and Relativity PHYS 181 - Relativity, Electricity and Magnetism 3 units from: MATH 125 - Linear Algebra I MATH 127 - Honors Linear Algebra I **[...]** **Senior Courses** **[...]** MA PH 251 - Differential Equations for Physics (see Note 2) MA PH 351 - Mathematical Methods for Physics I (see Note 3) 3 units from:

[...] 15 units from: any of the following courses (with at least 6 units at the 400-level): [...] PHYS 420 - Computational Physics PHYS 467 - Fundamentals of Continuum Mechanics PHYS 481 - Electromagnetic Theory II ~~STAT 235 - Introductory Statistics for Engineering~~ **Notes** 1. Students entering the Honors Geophysics program after first year may take GEOPH 210 in lieu of GEOPH 110. However, students will not receive credit for both GEOPH 110 and GEOPH 210. ~~2.~~ Not all 200-, 300- and 400-level Physics courses are offered every year so students should plan accordingly. ~~3.~~ Students without a background in computer programming are strongly encouraged to take CMPUT 174 as one of their Science Options in their first year. ~~4.~~ Students in Geophysics will not have the formal prerequisites for many of the AREC, CH E, CIV E, CMPUT, EAS, ECE, MIN E, and PET E courses, and must request permission to register in those courses from the department offering the particular course. ~~5.~~ To fulfill the knowledge requirements for registration as a professional geoscientist (P. Geo.) through APEGA (Association of Professional Engineers and Geoscientists of Alberta), meet with an Geophysics program advisor to discuss appropriate course selections. Current syllabus and registration information is available from the Department of Physics or APEGA. Full information is available at www.apega.ca.	MATH 225 - Linear Algebra II MATH 227 - Honors Linear Algebra II **[...]** 15 units from: any of the following courses (with at least 6 units at the 400-level): [..] PHYS 420 - Computational Physics PHYS 467 - Fundamentals of Continuum Mechanics PHYS 481 - Electromagnetic Theory II STAT 151 - Introduction to Applied Statistics I STAT 161 - Introductory Statistics for Business and Economics **Notes** 1. Students entering the Honors Geophysics program after first year may take GEOPH 210 in lieu of GEOPH 110. However, students will not receive credit for both GEOPH 110 and GEOPH 210. 2. This requirement may also be fulfilled by completing both MATH 334 and MATH 337. 3. This requirement may also be fulfilled by completing both MATH 315 and MATH 311. 4. Not all 200-, 300- and 400-level Physics courses are offered every year so students should plan accordingly. 5. Students without a background in computer programming are strongly encouraged to take CMPUT 174 as one of their Science Options in their first year. 6. Students in Geophysics will not have the formal prerequisites for many of the AREC, CH E, CIV E, CMPUT, EAS, ECE, MIN E, and PET E courses, and must request permission to register in those courses from the department offering the particular course. 7. To fulfill the knowledge requirements for registration as a professional geoscientist (P. Geo.) through APEGA (Association of Professional Engineers and Geoscientists of Alberta), meet with an Geophysics program advisor to discuss appropriate course selections. Current syllabus and registration information is available from the Department of Physics or APEGA. Full information is available at www.apega.ca.

Major in Geophysics Requirements **Foundation Courses** CHEM 101 - Introductory University Chemistry I CHEM 102 - Introductory University Chemistry II EAS 105 - The Dynamic Earth Through Time GEOPH 110 - Introduction to Earth and Planetary Physics (See Note 1) ~~MATH 102 - Applied Linear Algebra~~ MATH 144 - Calculus for the Mathematical and Physical Sciences I MATH 146 - Calculus for the Mathematical and Physical Sciences II PHYS 144 - Newtonian Mechanics and Relativity ~~PHYS 146 - Fluids and Waves~~ **[...]** **Senior Courses** **[...]** MA PH 251 - Differential Equations for Physics MA PH 351 - Mathematical Methods for Physics I **[...]** **9 units from:** [...] PHYS 420 - Computational Physics PHYS 467 - Fundamentals of Continuum Mechanics PHYS 481 - Electromagnetic Theory II PHYS 499 - Undergraduate Research Project ~~STAT 235 - Introductory Statistics for Engineering~~ **Notes** 1. Students entering the Honors Geophysics program after first year may take GEOPH 210 in lieu of GEOPH 110. However, students will not receive credit for both GEOPH 110 and GEOPH 210. ~~2.~~ Not all 200-, 300- and 400-level Physics courses are offered every year so students should plan accordingly. ~~3.~~ Students without a background in computer programming are strongly encouraged to take	**Major in Geophysics Requirements** **Foundation Courses** CHEM 101 - Introductory University Chemistry I CHEM 102 - Introductory University Chemistry II EAS 105 - The Dynamic Earth Through Time GEOPH 110 - Introduction to Earth and Planetary Physics (See Note 1) MATH 144 - Calculus for the Mathematical and Physical Sciences I MATH 146 - Calculus for the Mathematical and Physical Sciences II PHYS 144 - Newtonian Mechanics and Relativity PHYS 181 - Relativity, Electricity and Magnetism 3 units from: MATH 125 - Linear Algebra I MATH 127 - Honors Linear Algebra I **[...]** **Senior Courses** **[...]** MA PH 251 - Differential Equations for Physics (see Note 2) MA PH 351 - Mathematical Methods for Physics I (see Note 3) 3 units from: MATH 225 - Linear Algebra II MATH 227 - Honors Linear Algebra II **[...]** **9 units from:** [...] PHYS 420 - Computational Physics PHYS 467 - Fundamentals of Continuum Mechanics PHYS 481 - Electromagnetic Theory II PHYS 499 - Undergraduate Research Project STAT 151 - Introduction to Applied Statistics I STAT 161 - Introductory Statistics for Business and Economics **Notes** 1. Students entering the Honors Geophysics program after first year may take GEOPH 210 in lieu of GEOPH 110. However, students will not receive credit for both GEOPH 110 and GEOPH 210. 2. This requirement may also be fulfilled by completing both MATH 334 and MATH 337. 3. This requirement may also be fulfilled by completing both MATH 315 and MATH 311.

CMPUT 174 as one of their Science Options in their first year. ~~4.~~ Students in Geophysics will not have the formal prerequisites for many of the AREC, CH E, CIV E, CMPUT, EAS, ECE, MIN E, and PET E courses, and must request permission to register in those courses from the department offering the particular course. ~~5.~~ To fulfill the knowledge requirements for registration as a professional geoscientist (P. Geo.) through APEGA (Association of Professional Engineers and Geoscientists of Alberta), meet with an Geophysics program advisor to discuss appropriate course selections. Current syllabus and registration information is available from the Department of Physics or APEGA. Full information is available at www.apega.ca.	4. Not all 200-, 300- and 400-level Physics courses are offered every year so students should plan accordingly. 5. Students without a background in computer programming are strongly encouraged to take CMPUT 174 as one of their Science Options in their first year. 6. Students in Geophysics will not have the formal prerequisites for many of the AREC, CH E, CIV E, CMPUT, EAS, ECE, MIN E, and PET E courses, and must request permission to register in those courses from the department offering the particular course. 7. To fulfill the knowledge requirements for registration as a professional geoscientist (P. Geo.) through APEGA (Association of Professional Engineers and Geoscientists of Alberta), meet with an Geophysics program advisor to discuss appropriate course selections. Current syllabus and registration information is available from the Department of Physics or APEGA. Full information is available at www.apega.ca.
Minor in Geophysics Requirements **Foundation Courses** 3 units from: GEOPH 110 - Introduction to Earth and Planetary Physics GEOPH 210 - Structure, Dynamics and Evolution of the Earth and Planetary Interiors 3 units from: PHYS 124 - Particles and Waves PHYS 144 - Newtonian Mechanics and Relativity 3 units from: PHYS 126 - Fluids, Fields, and Radiation ~~PHYS 146 - Fluids and Waves~~ **[...]**	**Minor in Geophysics Requirements** **Foundation Courses** 3 units from: GEOPH 110 - Introduction to Earth and Planetary Physics GEOPH 210 - Structure, Dynamics and Evolution of the Earth and Planetary Interiors 3 units from: PHYS 124 - Particles and Waves PHYS 144 - Newtonian Mechanics and Relativity 3 units from: PHYS 126 - Fluids, Fields, and Radiation PHYS 181 - Relativity, Electricity and Magnetism **[...]**
https://calendar.ualberta.ca/preview_program.php?catoid=39&poid=50451	
Current Copy: ~~Removed language~~	**Proposed Copy:** New language

Bachelor of Science Physics Subject Area **[...]** **Requirements** Honors in Physics (~~75~~ units) Major in Physics (~~54~~ units) Minor in Physics (24 units)	**Bachelor of Science Physics Subject Area** **[...]** **Requirements** Honors in Physics (78 units) Major in Physics (57 units) Minor in Physics (24 units)
Honors in Physics Requirements **Foundation Courses** ~~MATH 102 - Applied Linear Algebra~~ MATH 144 - Calculus for the Mathematical and Physical Sciences I MATH 146 - Calculus for the Mathematical and Physical Sciences II PHYS 144 - Newtonian Mechanics and Relativity ~~PHYS 146 - Fluids and Waves~~ **[...]** **Senior Courses:** MA PH 251 - Differential Equations for Physics MA PH 343 - Classical Mechanics II MA PH 351 - Mathematical Methods for Physics I **[...]** **6 units from:** any 400-level course with the following course designators: ASTRO (See Note ~~1~~) GEOPH (See Note ~~1~~) MA PH PHYS **Notes:** ~~1.~~ Students that take 3 units in a 400-level ASTRO or GEOPH course for this requirement will also be satisfying the Breadth from Within the Faculty of Science requirement. ~~2.~~ Not all 200-, 300- and 400-level Physics courses are offered every year so students should plan accordingly. ~~3.~~ Students interested in the Engineering Physics program should consult Engineering Physics of the Faculty of Engineering section.	**Honors in Physics Requirements** **Foundation Courses** MATH 144 - Calculus for the Mathematical and Physical Sciences I MATH 146 - Calculus for the Mathematical and Physical Sciences II PHYS 144 - Newtonian Mechanics and Relativity PHYS 181 - Relativity, Electricity and Magnetism 3 units from: MATH 125 - Linear Algebra I MATH 127 - Honors Linear Algebra I **[...]** **Senior Courses:** MA PH 251 - Differential Equations for Physics (see Note 1) MA PH 343 - Classical Mechanics II MA PH 351 - Mathematical Methods for Physics I (see Note 2) 3 units from: MATH 225 - Linear Algebra II MATH 227 - Honors Linear Algebra II **[...]** **6 units from:** any 400-level course with the following course designators: ASTRO (See Note 3) GEOPH (See Note 3) MA PH PHYS **Notes:** 1. This requirement may also be fulfilled by completing both MATH 334 and MATH 337. 2. This requirement may also be fulfilled by completing both MATH 315 and MATH 311. 3. Students who take 3 units in a 400-level ASTRO or GEOPH course for this requirement will also be satisfying 3 units toward the Breadth from Within the Faculty of Science requirement.

	4. Not all 200-, 300- and 400-level Physics courses are offered every year so students should plan accordingly. 5. Students interested in the Engineering Physics program should consult Engineering Physics of the Faculty of Engineering section.
Major in Physics Requirements **Foundation Courses** ~~MATH 102 - Applied Linear Algebra~~ MATH 144 - Calculus for the Mathematical and Physical Sciences I MATH 146 - Calculus for the Mathematical and Physical Sciences II PHYS 144 - Newtonian Mechanics and Relativity ~~PHYS 146 - Fluids and Waves~~ **[...]** **Senior Courses:** MA PH 251 - Differential Equations for Physics MA PH 351 - Mathematical Methods for Physics I **[...]** **Notes:** ~~1.~~ Not all 200-, 300- and 400-level Physics courses are offered every year so students should plan accordingly. ~~2.~~ Students interested in the Engineering Physics program should consult Engineering Physics of the Faculty of Engineering section.	**Major in Physics Requirements** **Foundation Courses** MATH 144 - Calculus for the Mathematical and Physical Sciences I MATH 146 - Calculus for the Mathematical and Physical Sciences II PHYS 144 - Newtonian Mechanics and Relativity PHYS 181 - Relativity, Electricity and Magnetism 3 units from: MATH 125 - Linear Algebra I MATH 127 - Honors Linear Algebra I **[...]** **Senior Courses:** MA PH 251 - Differential Equations for Physics (see Note 1) MA PH 343 - Classical Mechanics II MA PH 351 - Mathematical Methods for Physics I (see Note 2) **[...]** **Notes:** 1. This requirement may also be fulfilled by completing both MATH 334 and MATH 337. 2. This requirement may also be fulfilled by completing both MATH 315 and MATH 311. 3. Not all 200-, 300- and 400-level Physics courses are offered every year so students should plan accordingly. 4. Students interested in the Engineering Physics program should consult Engineering Physics of the Faculty of Engineering section.
Minor in Physics Requirements **Foundation Courses** 3 units from: PHYS 124 - Particles and Waves PHYS 144 - Newtonian Mechanics and Relativity 3 units from: PHYS 126 - Fluids, Fields, and Radiation	**Minor in Physics Requirements** **Foundation Courses** 3 units from: PHYS 124 - Particles and Waves PHYS 144 - Newtonian Mechanics and Relativity 3 units from: PHYS 126 - Fluids, Fields, and Radiation

~~PHYS 146 - Fluids and Waves~~	PHYS 181 - Relativity, Electricity and Magnetism

Reviewed/Approved by:

REQUIRED: Faculty Council (or delegate) and approval date. REQUIRED: Faculty Council (or delegate) and approval date. Science Undergraduate Programs Committee on November 3, 2023
OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates.

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Course Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	Science; Dept. of Physics
Contact Person:	Erik Rosolowsky (rosolowsky@ualberta.ca)
Level of change: (choose one only) [?]	☑ Undergraduate
	☐ Graduate
For which term will this change take effect?	Fall 2024

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

BSc renewal is eliminating the PHYS 281 (Electricity and Magnetism) course from Physics programs and moving most of this content into PHYS 181. This proposed change revises courses that use PHYS 281 as a pre- or corequisite to use other courses as prerequisites. The primary benefit is to simplify our prerequisite structure. PHYS 281 served as both a mathematical methods prerequisite (superseded by MA PH 351 or MATH 215) and as a content prerequisite with the electricity and magnetism now being taught in PHYS 181. Courses have been revised based on whether they need mathematical content (GEOPH 325, 326; PHYS 372) or science content (PHYS 297, 362). In some cases the PHYS 281 prerequisite was already redundant (GEOPH 424). PHYS 381 is an advanced E&M course and we retain the PHYS 281 and 230 since Faculty of Engineering students will still take these courses and then go on to 381. We have reorganized prerequisites to reflect the assumed preparation for the course (introductory E&M, differential equations and vector calculus).

Course Template

Current: ~~Removed language~~	**Proposed:** New language
GEOPH 325 - Geophysical Imaging of Earth's Interior **Course Career Undergraduate** **Units: 3** **Approved Hours: 3-0-3/2** **Fee index: 6** **Faculty: Science** **Department: Physics** **Typically Offered: Fall term** **Description** Theory of gravity, shape of the earth, nature of the geomagnetic field, magnetic, and electrical exploration methods; factors controlling density, resistivity, magnetic properties of rocks, and planetary studies; applications in environmental geophysics, continental dynamics, and mineral exploration; instrumentation. Analysis of gravitational, magnetic, and resistivity data. Prerequisite: ~~PHYS 281 or 230,~~ MATH 215 or 209 or 317 or MA PH 351.	**GEOPH 325 - Geophysical Imaging of Earth's Interior** **Course Career Undergraduate** **Units: 3** **Approved Hours: 3-0-3/2** **Fee index: 6** **Faculty: Science** **Department: Physics** **Typically Offered: Fall term** **Description** Theory of gravity, shape of the earth, nature of the geomagnetic field, magnetic, and electrical exploration methods; factors controlling density, resistivity, magnetic properties of rocks, and planetary studies; applications in environmental geophysics, continental dynamics, and mineral exploration; instrumentation. Analysis of gravitational, magnetic, and resistivity data. Prerequisite: MATH 215 or 209 or 315 or 317 or MA PH 351.

GEOPH 326 - Seismic Imaging of Earth's Interior **Course Career** Undergraduate **Units** 3 **Approved Hours** 3-0-3/2 **Fee index** 6 **Faculty** Science **Department** Physics **Typically Offered** either term **Description** Use of reflection and refraction seismology to image the Earth's interior, including application to environmental assessment, mineral and hydrocarbon exploration, geothermal energy, and tectonics; study of current technologies used to acquire, image, and interpret 2D and 3D data sets. Real data sets and computer assignments will be used to produce seismic images of the subsurface. Prerequisite: ~~PHYS 281 or 230,~~ MATH 215 or 209 or 317 or MA PH 351.	**GEOPH 326 - Seismic Imaging of Earth's Interior** **Course Career** Undergraduate **Units** 3 **Approved Hours** 3-0-3/2 **Fee index** 6 **Faculty** Science **Department** Physics **Typically Offered** either term **Description** Use of reflection and refraction seismology to image the Earth's interior, including application to environmental assessment, mineral and hydrocarbon exploration, geothermal energy, and tectonics; study of current technologies used to acquire, image, and interpret 2D and 3D data sets. Real data sets and computer assignments will be used to produce seismic images of the subsurface. Prerequisite: MATH 215 or 209 or 315 or 317 or MA PH 351.
GEOPH 424 - Electromagnetic Methods in Geophysics **Course Career** Undergraduate **Units** 3 **Approved Hours** 3-0-3/2 **Fee index** 6 **Faculty** Science **Department** Physics **Typically Offered** either term **Description** Theory and application of Maxwell's equations to geophysics; resistivity of rocks, electromagnetic exploration; magnetotellurics, frequency and time domain EM methods, forward and inverse techniques to image crustal and mantle structures. Analysis of EM data collected at field school. Pre- or corequisite: MATH 337. Prerequisites: PHYS ~~281 or 230,~~ 381, GEOPH 325.	**GEOPH 424 - Electromagnetic Methods in Geophysics** **Course Career** Undergraduate **Units** 3 **Approved Hours** 3-0-3/2 **Fee index** 6 **Faculty** Science **Department** Physics **Typically Offered** either term **Description** Theory and application of Maxwell's equations to geophysics; resistivity of rocks, electromagnetic exploration; magnetotellurics, frequency and time domain EM methods, forward and inverse techniques to image crustal and mantle structures. Analysis of EM data collected at field school. Pre- or corequisite: MATH 337. Prerequisites: PHYS 381, GEOPH 325.
PHYS 297 - Experimental Physics II **Course Career** Undergraduate **Units** 3 **Approved Hours** 0-0-6 **Fee index** 6 **Faculty** Science **Department** Physics **Typically Offered** either term	**PHYS 297 - Experimental Physics II** **Course Career** Undergraduate **Units** 3 **Approved Hours** 0-0-6 **Fee index** 6 **Faculty** Science **Department** Physics **Typically Offered** either term

Description Contemporary methods of experimental physics with measurements from classical and modern physics. This is a continuation of Experimental Physics I with application of more advanced techniques and more in-depth exploration of the selected physics topics. Prerequisite: PHYS 295. Corequisites: PHYS 271, ~~PHYS 281~~ and MATH 101 or 115 or 118 or 146.	**Description** Contemporary methods of experimental physics with measurements from classical and modern physics. This is a continuation of Experimental Physics I with application of more advanced techniques and more in-depth exploration of the selected physics topics. Prerequisite: PHYS 295. Corequisites: PHYS 271, and MATH 101 or 115 or 118 or 146.
PHYS 372 - Quantum Mechanics A **Course Career** Undergraduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Science **Department** Physics **Typically Offered** either term **Description** Origins of quantum mechanics; wave functions; Schrodinger equation and its application to one dimensional systems, postulates and physical interpretation of quantum mechanics; orbital angular momentum, central potentials and three-dimensional systems. Prerequisites: PHYS 271, ~~PHYS 230 or 281, MATH 225 or 227 (or 102)~~, MATH 334 or 201 or MA PH 251.	**PHYS 372 - Quantum Mechanics A** **Course Career** Undergraduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Science **Department** Physics **Typically Offered** either term **Description** Origins of quantum mechanics; wave functions; Schrodinger equation and its application to one dimensional systems, postulates and physical interpretation of quantum mechanics; orbital angular momentum, central potentials and three-dimensional systems. Prerequisites: PHYS 244, PHYS 271, MATH 334 or 201 or MA PH 251.
PHYS 381 - Electromagnetic Theory I **Course Career** Undergraduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Science **Department** Physics **Typically Offered** either term **Description** Review of scalar and vector fields; Gauss and Stokes theorems; curvilinear coordinates; Dirac delta function; electrostatic field and potential; electrostatic energy; conductors, capacitors; Laplace's equation; boundary value problems; methods of images; multipoles; electrostatic field in matter; polarization; displacement; linear dielectrics; magnetostatic field; Biot-Savart and Ampere's law; vector potential; magnetostatic field in matter; magnetization; linear and nonlinear magnetic media. Prerequisites: PHYS 230 or 281. ~~Pre- or corequisite: MATH 334 or 201 or MA PH 251, and MA PH~~	**PHYS 381 - Electromagnetic Theory I** **Course Career** Undergraduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Science **Department** Physics **Typically Offered** either term **Description** Review of scalar and vector fields; Gauss and Stokes theorems; curvilinear coordinates; Dirac delta function; electrostatic field and potential; electrostatic energy; conductors, capacitors; Laplace’s equation; boundary value problems; methods of images; multipoles; electrostatic field in matter; polarization; displacement; linear dielectrics; magnetostatic field; Biot-Savart and Ampere’s law; vector potential; magnetostatic field in matter; magnetization; linear and nonlinear magnetic media. Prerequisites: PHYS 181 or 230 or 281; MA PH 251 or MATH 201 or 337; MA PH 351 or MATH 209 or

~~351 or MATH 215 or MATH 317.~~	315 or 317

Reviewed/Approved by:

REQUIRED: Faculty Council (or delegate) and approval date. Science Undergraduate Programs Committee on November 3, 2023
OPTIONAL: N/A

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Course Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	Faculty of Science, Computing Science
Contact Person:	Ken Wong
Level of change: (choose one only) [?]	☑ Undergraduate
	☐ Graduate
For which term will this change take effect?	Fall 2024

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

These are course-level calendar changes.

Mass editorial changes:

1) Since students can always ask the Department for prerequisite waivers, language was removed wherever it appeared about requesting the consent of the instructor. The Department typically will know more context about the student than the instructor to decide on waivers, and should be approached first. Instructors may be consulted as needed.
2) To reduce student registration issues, MATH and STAT prerequisites were made more consistent, particularly for variants of the “Calculus I”, “Calculus II”, “Linear Algebra I”, “Probability & Statistics I” courses. Mentions of SCI 100, MATH 113, and STAT 141 were also removed, but SCI 151 was kept.

Exclusions:

3) ENCMP 100 is now similar enough to CMPUT 174 that it should be excluded wherever CMPUT 174 is excluded.
4) Due to transfer credits, a student might get credit for CMPUT 175 or 275, without 174 or 274. Courses that exclude 174 or 274 should also exclude 175 or 275.
5) CMPUT 429 should exclude ECE 311 due to similarity or overlap of the courses. The calendar entry for ECE 311 already excludes CMPUT 429.

Descriptions or prerequisites (mostly to make progression through programs easier or more flexible for students):

6) For CMPUT 206, the description was updated, and more explicit prerequisites are now used for clarity.
7) For CMPUT 272, ENCMP 100 is allowed as a prerequisite, which allows a Comp Eng student to take CMPUT 272 and still progress even if they fail CMPUT 274.
8) For CMPUT 307, alternative prerequisites to CMPUT 206 were added
9) For CMPUT 313, STAT prerequisites were changed to “Probability & Statistics I” courses, rather than “Probability & Statistics II” courses, which had unnecessarily blocked students from a CMPUT 3xx option.
10) For CMPUT 328, CMPUT 275 is allowed as a prerequisite besides CMPUT 175.
11) For CMPUT 382, Comp Eng “equivalent” courses are now allowed besides CMPUT 229 as a prerequisite.
12) For CMPUT 414, an alternative prerequisite CMPUT 328 was added.
13) For CMPUT 474, the prerequisite of CMPUT 229 or Comp Eng “equivalent” courses was unnecessary and removed, which had unnecessarily blocked students from a CMPUT 4xx option.
14) For CMPUT 495, successful completion of the course is now required for (pre-BSc renewal) Honors students.

Course Template

Current: ~~Removed language~~	**Proposed:** New language

Subject & Number: CMPUT 101 **Title:** Introduction to Computing **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** An introduction to fundamental concepts in computation, including state, abstraction, generalization, and representation. Introduction to algorithms, logic, number systems, circuits, and other topics in elementary computing science. This course cannot be taken for credit if credit has been obtained in CMPUT 114, 174, 274, or SCI 100. See Note (1) above.	**Subject & Number:** CMPUT 101 **Title:** Introduction to Computing **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** An introduction to fundamental concepts in computation, including state, abstraction, generalization, and representation. Introduction to algorithms, logic, number systems, circuits, and other topics in elementary computing science. This course cannot be taken for credit if credit has been obtained in CMPUT 114, 174, 175, 274, 275, or SCI 100, or ENCMP 100. See Note (1) above.
Subject & Number: CMPUT 174 **Title:** Introduction to the Foundations of Computation I **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** CMPUT 174 and 175 use a problem-driven approach to introduce the fundamental ideas of Computing Science. Emphasis is on the underlying process behind the solution, independent of programming language or style. Basic notions of state, control flow, data structures, recursion, modularization, and testing are introduced through solving simple problems in a variety of domains such as text analysis, map navigation, game search, simulation, and cryptography. Students learn to program by reading and modifying existing programs as well as writing new ones. No prior programming experience is necessary. Prerequisite: Math 30, 30-1, or 30-2. See Note (1) above. Credit cannot be obtained for CMPUT 174 if credit has already been obtained for CMPUT 274 or 275, except with permission of the Department.	**Subject & Number:** CMPUT 174 **Title:** Introduction to the Foundations of Computation I **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** CMPUT 174 and 175 use a problem-driven approach to introduce the fundamental ideas of Computing Science. Emphasis is on the underlying process behind the solution, independent of programming language or style. Basic notions of state, control flow, data structures, recursion, modularization, and testing are introduced through solving simple problems in a variety of domains such as text analysis, map navigation, game search, simulation, and cryptography. Students learn to program by reading and modifying existing programs as well as writing new ones. No prior programming experience is necessary. Prerequisite: Math 30, 30-1, or 30-2. See Note (1) above. Credit cannot be obtained for CMPUT 174 if credit has already been obtained for CMPUT 274, 275, or ENCMP 100, except with permission of the Department.

Subject & Number: CMPUT 191 **Title:** Introduction to Data Science **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** Introduction to data acquisition, basic data manipulation (cleaning, outlier detection), analysis (regression, clustering, classification), basic statistics and machine learning tools, information visualization to communicate information from data. Prerequisite: Math 30-1. This course cannot be taken for credit if credit has been obtained in CMPUT 174, 195, ~~or~~ 274.	**Subject & Number:** CMPUT 191 **Title:** Introduction to Data Science **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** Introduction to data acquisition, basic data manipulation (cleaning, outlier detection), analysis (regression, clustering, classification), basic statistics and machine learning tools, information visualization to communicate information from data. Prerequisite: Math 30-1. This course cannot be taken for credit if credit has been obtained in CMPUT 174, 175, 195, 274, 275, or ENCMP 100.
Subject & Number: CMPUT 195 **Title:** Introduction to Principles and Techniques of Data Science **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** This course introduces data science to students with prior computing experience. It covers the basics of data acquisition, manipulation, transformation, and cleaning, as well as data analysis (e.g., regression, clustering, classification) and visualization. Students learn principles and techniques of efficient data-driven communication and decision-making in various domains using industry-standard tools. Credit cannot be obtained for both CMPUT 191 and CMPUT 195. Prerequisite: CMPUT 174 or 274~~, or consent of the instructor~~.	**Subject & Number:** CMPUT 195 **Title:** Introduction to Principles and Techniques of Data Science **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** This course introduces data science to students with prior computing experience. It covers the basics of data acquisition, manipulation, transformation, and cleaning, as well as data analysis (e.g., regression, clustering, classification) and visualization. Students learn principles and techniques of efficient data-driven communication and decision-making in various domains using industry-standard tools. Credit cannot be obtained for both CMPUT 191 and CMPUT 195. Prerequisite: CMPUT 174 or 274.

Subject & Number: CMPUT 200 **Title:** Ethics of Data Science and Artificial Intelligence **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** This course focuses on ethics issues in Artificial Intelligence (AI) and Data Science (DS). The main themes are privacy, fairness/bias, and explainability in DS. The objectives are to learn how to identify and measure these aspects in outputs of algorithms, and how to build algorithms that correct for these issues. The course will follow a case-studies based approach, where we will examine these aspects by considering real-world case studies for each of these ethics issues. The concepts will be introduced through a humanities perspective by using case studies with an emphasis on a technical treatment including implementation work. Prerequisite: one of CMPUT 191 or ~~CMPUT~~ 195, or one of CMPUT 174 or ~~CMPUT~~ 274 and one of ~~STAT 141, STAT 151, STAT 235, STAT 265, SCI 151, MATH 181, or~~ CMPUT 267~~, or consent of the instructor~~.	**Subject & Number:** CMPUT 200 **Title:** Ethics of Data Science and Artificial Intelligence **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** This course focuses on ethics issues in Artificial Intelligence (AI) and Data Science (DS). The main themes are privacy, fairness/bias, and explainability in DS. The objectives are to learn how to identify and measure these aspects in outputs of algorithms, and how to build algorithms that correct for these issues. The course will follow a case-studies based approach, where we will examine these aspects by considering real-world case studies for each of these ethics issues. The concepts will be introduced through a humanities perspective by using case studies with an emphasis on a technical treatment including implementation work. Prerequisite: one of CMPUT 191 or 195, or one of CMPUT 174 or 274 and one of STAT 151, 161, 181, 235, 265, SCI 151, MATH 181, or CMPUT 267.
Subject & Number: CMPUT 204 **Title:** Algorithms I **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-1S-0 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** The first of two courses on algorithm design and analysis, with emphasis on fundamentals of searching, sorting, and graph algorithms. Examples include divide and conquer, dynamic programming, greedy methods, backtracking, and local search methods, together with analysis techniques to estimate program efficiency. Prerequisites: CMPUT 175 or 275 and CMPUT 272; one of MATH 100, ~~113,~~ 114, 117, 134, 144, 154~~, or SCI 100~~.	**Subject & Number:** CMPUT 204 **Title:** Algorithms I **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-1S-0 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** The first of two courses on algorithm design and analysis, with emphasis on fundamentals of searching, sorting, and graph algorithms. Examples include divide and conquer, dynamic programming, greedy methods, backtracking, and local search methods, together with analysis techniques to estimate program efficiency. Prerequisites: CMPUT 175 or 275, and CMPUT 272; and one of MATH 100, 114, 117, 134, 144, or 154.

Subject & Number: CMPUT 206 **Title:** Introduction to Digital Image Processing **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** An introduction to basic digital image processing theory, and the tools that make advanced image manipulation possible for ordinary users. Image processing is important in many applications: editing and processing photographs, special effects for movies, drawing animated characters starting with photographs, analyzing and enhancing remote imagery, and detecting suspects from surveillance cameras. ~~Image processing concepts are introduced using tools like Photoshop and GIMP. Exposure to simple image processing programming with Java and MATLAB. This course is preparation for more advanced courses in the Digital Media area.~~ Prerequisites: ~~Any introductory-level Computing Science course, plus knowledge of introductory-level MATH and STAT; or consent of the instructor or SCI 100. Open to students in the Faculty of Arts, Engineering and Sciences; others require consent of the instructor.~~	**Subject & Number:** CMPUT 206 **Title:** Introduction to Digital Image Processing **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** An introduction to basic digital image processing theory, and the tools that make advanced image manipulation possible for ordinary users. Image processing is important in many applications: editing and processing photographs, special effects for movies, drawing animated characters starting with photographs, analyzing and enhancing remote imagery, and detecting suspects from surveillance cameras. Image processing building blocks and fundamental algorithms of image processing operations are introduced using Python libraries. Prerequisites: one of CMPUT 101, 174, or 274; one of MATH 100, 114, 117, 134, 144, or 154; and one of STAT 151, 161, 181, 235, 265, SCI 151, or MATH 181.
Subject & Number: CMPUT 261 **Title:** Introduction to Artificial Intelligence **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** Introduction to artificial intelligence focusing on techniques for building intelligent software systems and agents. Topics include search and problem-solving techniques, knowledge representation and reasoning, reasoning and acting under uncertainty, machine learning and neural networks. Prerequisites: one of STAT ~~141,~~ 151, 235, ~~or~~ 265, ~~or~~ SCI 151. Corequisites: CMPUT 204 or 275. Credit cannot be obtained for CMPUT 261 if credit	**Subject & Number:** CMPUT 261 **Title:** Introduction to Artificial Intelligence **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** Introduction to artificial intelligence focusing on techniques for building intelligent software systems and agents. Topics include search and problem-solving techniques, knowledge representation and reasoning, reasoning and acting under uncertainty, machine learning and neural networks. Prerequisites: one of STAT 151, 161, 181, 235, 265, SCI 151, or MATH 181. Corequisites: CMPUT 204 or 275. Credit cannot be obtained for

has already been obtained for CMPUT 366, except with permission of the Department.	CMPUT 261 if credit has already been obtained for CMPUT 366, except with permission of the Department.
Subject & Number: CMPUT 272 **Title:** Formal Systems and Logic in Computing Science **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-3S-0 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** An introduction to the tools of set theory, logic, and induction, and their use in the practice of reasoning about algorithms and programs. Basic set theory; the notion of a function; counting; propositional and predicate logic and their proof systems; inductive definitions and proofs by induction; program specification and correctness. Prerequisites: CMPUT 101, 174, 175, 274, ~~or~~ SCI 100.	**Subject & Number:** CMPUT 272 **Title:** Formal Systems and Logic in Computing Science **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-3S-0 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** An introduction to the tools of set theory, logic, and induction, and their use in the practice of reasoning about algorithms and programs. Basic set theory; the notion of a function; counting; propositional and predicate logic and their proof systems; inductive definitions and proofs by induction; program specification and correctness. Prerequisites: CMPUT 101, 174, 175, 274, SCI 100, or ENCMP 100.
Subject & Number: CMPUT 303 **Title:** Algorithmics in Practice **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-0 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** This course is focused on algorithmic problems, where a solution involves properly understanding a written description, designing an efficient algorithm to solve the problem, and then correctly implementing the solution. Students will use previous knowledge in algorithms, data structures, and mathematical reasoning to solve problems in addition to learning new algorithms and data structures. Lectures are shared with CMPUT 403. Credit cannot be obtained for both CMPUT 303 and CMPUT 403. Prerequisites: ~~One of~~ CMPUT 201 or ~~CMPUT~~ 275, ~~CMPUT~~ 204.	**Subject & Number:** CMPUT 303 **Title:** Algorithmics in Practice **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-0 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** This course is focused on algorithmic problems, where a solution involves properly understanding a written description, designing an efficient algorithm to solve the problem, and then correctly implementing the solution. Students will use previous knowledge in algorithms, data structures, and mathematical reasoning to solve problems in addition to learning new algorithms and data structures. Lectures are shared with CMPUT 403. Credit cannot be obtained for both CMPUT 303 and CMPUT 403. Prerequisites: CMPUT 201 or 275, and 204.

Subject & Number: CMPUT 304 **Title:** Algorithms II **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-1S-0 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** The second course of a two-course sequence on algorithm design. Emphasis on principles of algorithm design. Categories of algorithms such as divide-and-conquer, greedy algorithms, dynamic programming; analysis of algorithms; limits of algorithm design; NP-completeness; heuristic algorithms. Prerequisites: CMPUT 204; one of STAT ~~141,~~ 151, 235 ~~or~~ 265 ~~or~~ SCI 151; one of MATH 225, 227, 228~~; or consent of the instructor~~.	**Subject & Number:** CMPUT 304 **Title:** Algorithms II **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-1S-0 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** The second course of a two-course sequence on algorithm design. Emphasis on principles of algorithm design. Categories of algorithms such as divide-and-conquer, greedy algorithms, dynamic programming; analysis of algorithms; limits of algorithm design; NP-completeness; heuristic algorithms. Prerequisites: CMPUT 204; one of STAT 151, 161, 181, 235, 265, SCI 151, or MATH 181; and one of MATH 225, 227, or 228.
Subject & Number: CMPUT 307 **Title:** 3D Modeling and Animation **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** An introductory course on the theory and applications of computer based 3D modeling and animation. The course will cover a selection of topics from overview of tools supporting modeling and animation, automatically generating 3D models, and animation of skeleton based models through algorithms and software. Applications of 3D modeling and animation in games, virtual/augmented environments, movies, and emerging video transmission algorithms will be discussed. Prerequisites: ~~one of CMPUT 206, 308, or 411; or consent of the instructor~~.	**Subject & Number:** CMPUT 307 **Title:** 3D Modeling and Animation **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** An introductory course on the theory and applications of computer based 3D modeling and animation. The course will cover a selection of topics from overview of tools supporting modeling and animation, automatically generating 3D models, and animation of skeleton based models through algorithms and software. Applications of 3D modeling and animation in games, virtual/augmented environments, movies, and emerging video transmission algorithms will be discussed. Prerequisites: CMPUT 206, or CMPUT 204 and one of MATH 225 or 227.

Subject & Number: CMPUT 308 **Title:** Video Processing and Applications **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** An introductory course in video data processing, with implementations in programming languages, like Python, C and MATLAB, using libraries like OpenCV. Topics in this course may include video capture, video compression, tracking, video content understanding, real-time video conferencing and surveillance. Time permitting, advanced topics like video mining, 3D modeling, and motion capture-based video coding, video-based 3D scene understanding could be discussed. Prerequisites: CMPUT 201~~,~~ 206~~,~~ MATH 125 or 127~~,~~ STAT 151 ~~or~~ 265~~, or consent of the instructor~~.	**Subject & Number:** CMPUT 308 **Title:** Video Processing and Applications **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** An introductory course in video data processing, with implementations in programming languages, like Python, C and MATLAB, using libraries like OpenCV. Topics in this course may include video capture, video compression, tracking, video content understanding, real-time video conferencing and surveillance. Time permitting, advanced topics like video mining, 3D modeling, and motion capture-based video coding, video-based 3D scene understanding could be discussed. Prerequisites: CMPUT 201 and 206; one of MATH 102, 125, or 127; and one of STAT 151, 161, 181, 235, 265, SCI 151, or MATH 181.
Subject & Number: CMPUT 312 **Title:** Introduction to Robotics and Mechatronics **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** Algorithms and software paradigms for robot programming; mathematical modeling of robot arms and rovers including kinematics, and an introduction to dynamics and control; sensors, motors and their modeling; basics of image processing and machine vision; vision-guided motion control. Prerequisite: CMPUT 275. Corequisite: CMPUT 340 or 418, or ECE 240. Students having CMPUT 174, 175, 201, 204 may seek ~~consent of the instructor~~.	**Subject & Number:** CMPUT 312 **Title:** Introduction to Robotics and Mechatronics **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** Algorithms and software paradigms for robot programming; mathematical modeling of robot arms and rovers including kinematics, and an introduction to dynamics and control; sensors, motors and their modeling; basics of image processing and machine vision; vision-guided motion control. Prerequisite: CMPUT 275. Corequisite: CMPUT 340 or 418, or ECE 240. Students having CMPUT 174, 175, 201, 204 may seek permission from the Department.

Subject & Number: CMPUT 313 **Title:** Computer Networks **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** Introduction to computer communication networks; protocols for error and flow control; wired and wireless medium access protocols; routing and congestion control; internet architecture and protocols; multimedia transmission; recent advances in networking. Prerequisites: CMPUT 201 and 204 or 275; one of CMPUT 229, E E 380 or ECE 212; and ~~STAT 252 or 266~~.	**Subject & Number:** CMPUT 313 **Title:** Computer Networks **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** Introduction to computer communication networks; protocols for error and flow control; wired and wireless medium access protocols; routing and congestion control; internet architecture and protocols; multimedia transmission; recent advances in networking. Prerequisites: CMPUT 201 and 204, or 275; one of CMPUT 229, E E 380, or ECE 212; and one of STAT 151, 161, 181, 235, 265, SCI 151, or MATH 181.
Subject & Number: CMPUT 325 **Title:** Non-Procedural Programming Languages **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** A study of the theory, run-time structure, and implementation of selected non-procedural programming languages. Languages will be selected from the domains of functional, and logic-based languages. Prerequisites: CMPUT 201 and 204 or 275; one of CMPUT 229, E E 380 or ECE 212~~,~~ and MATH 125.	**Subject & Number:** CMPUT 325 **Title:** Non-Procedural Programming Languages **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** A study of the theory, run-time structure, and implementation of selected non-procedural programming languages. Languages will be selected from the domains of functional, and logic-based languages. Prerequisites: CMPUT 201 and 204, or 275; one of CMPUT 229, E E 380, or ECE 212; and one of MATH 102, 125, or 127.
Subject & Number: CMPUT 328 **Title:** Visual Recognition **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science	**Subject & Number:** CMPUT 328 **Title:** Visual Recognition **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science

Typically Offered: either term **Description** Introduction to visual recognition to recognize objects and classify scenes or images automatically by a computer. Supervised and unsupervised machine learning principles and deep learning techniques will be utilized for visual recognition. Successful commercial systems based on visual recognition range from entertainment to serious scientific research: face detection and recognition on personal devices, social media. Prerequisites: CMPUT ~~115 or~~ 175; one of MATH 100, ~~113,~~ 114, 117, 134, 144, 154; MATH 125; STAT ~~141,~~ 151 ~~or~~ 235.	**Typically Offered:** either term **Description** Introduction to visual recognition to recognize objects and classify scenes or images automatically by a computer. Supervised and unsupervised machine learning principles and deep learning techniques will be utilized for visual recognition. Successful commercial systems based on visual recognition range from entertainment to serious scientific research: face detection and recognition on personal devices, social media. Prerequisites: CMPUT 175 or 275; one of MATH 100, 114, 117, 134, 144, or 154; one of MATH 102, 125, or 127; and one of STAT 151, 161, 181, 235, 265, SCI 151, or MATH 181.
Subject & Number: CMPUT 340 **Title:** Introduction to Numerical Methods **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-1S-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** Computer arithmetic and errors. The study of computational methods for solving problems in linear algebra, non-linear equations, optimization, interpolation and approximation, and integration. This course will provide a basic foundation in numerical methods that supports further study in machine learning; computer graphics, vision and multimedia; robotics; and other topics in Science and Engineering. Prerequisites: CMPUT 204 or 275; ~~MATH 125, 214~~; one of STAT ~~141,~~ 151, 235 ~~or~~ 265 ~~or~~ SCI 151.	**Subject & Number:** CMPUT 340 **Title:** Introduction to Numerical Methods **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-1S-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** Computer arithmetic and errors. The study of computational methods for solving problems in linear algebra, non-linear equations, optimization, interpolation and approximation, and integration. This course will provide a basic foundation in numerical methods that supports further study in machine learning; computer graphics, vision and multimedia; robotics; and other topics in Science and Engineering. Prerequisites: CMPUT 204 or 275; MATH 214 and one of MATH 102, 125, or 127; and one of STAT 151, 161, 181, 235, 265, SCI 151, or MATH 181.
Subject & Number: CMPUT 365 **Title:** Introduction to Reinforcement Learning **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-0 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term	**Subject & Number:** CMPUT 365 **Title:** Introduction to Reinforcement Learning **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-0 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term

Description This course provides an introduction to reinforcement learning, which focuses on the study and design of learning agents that interact with a complex, uncertain world to achieve a goal. The course will cover multi-armed bandits, Markov decision processes, reinforcement learning, planning, and function approximation (online supervised learning). The course will take an information-processing approach to the study of intelligence and briefly touch on perspectives from psychology, neuroscience, and philosophy. The course will use the University of Alberta MOOC on Reinforcement Learning. Any student who understands the material in this course will understand the foundations of much of modern probabilistic artificial intelligence (AI) and be prepared to take more advanced courses, or to apply AI tools and ideas to real-world problems. Prerequisites: CMPUT 175 or 275; one of CMPUT 267, 466, or STAT 265~~; or consent of the instructor~~.	**Description** This course provides an introduction to reinforcement learning, which focuses on the study and design of learning agents that interact with a complex, uncertain world to achieve a goal. The course will cover multi-armed bandits, Markov decision processes, reinforcement learning, planning, and function approximation (online supervised learning). The course will take an information-processing approach to the study of intelligence and briefly touch on perspectives from psychology, neuroscience, and philosophy. The course will use the University of Alberta MOOC on Reinforcement Learning. Any student who understands the material in this course will understand the foundations of much of modern probabilistic artificial intelligence (AI) and be prepared to take more advanced courses, or to apply AI tools and ideas to real-world problems. Prerequisites: CMPUT 175 or 275; one of CMPUT 267, 466, or STAT 265.
Subject & Number: CMPUT 382 **Title:** Introduction to GPU Programming **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** Graphics processing units (GPU) can be programmed like a coprocessor to solve non-graphics problems, including voice recognition, computational physics, convolutional neural networks, and machine learning. The many processing cores of a GPU support a high-degree of parallelism. Course topics include hardware architecture, algorithmic design, programming languages (e.g., CUDA, OpenCL), and principles of programming for GPUs for high performance. Prerequisites: CMPUT 201 or 275, and CMPUT 229.	**Subject & Number:** CMPUT 382 **Title:** Introduction to GPU Programming **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** Graphics processing units (GPU) can be programmed like a coprocessor to solve non-graphics problems, including voice recognition, computational physics, convolutional neural networks, and machine learning. The many processing cores of a GPU support a high-degree of parallelism. Course topics include hardware architecture, algorithmic design, programming languages (e.g., CUDA, OpenCL), and principles of programming for GPUs for high performance. Prerequisites: CMPUT 201 or 275, and one of CMPUT 229, E E 380, or ECE 212.

Subject & Number: CMPUT 403 **Title:** Algorithmics in Competitive Programming **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-1S-0 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** This course is focused on algorithmic problems that can be solved within at most several hours by well-prepared people, where a solution involves properly understanding a written description, designing an efficient algorithm to solve the problem, and then correctly implementing the solution. Students will use algorithms, data structures, and mathematical reasoning to solve problems. Lectures are shared with CMPUT 303. CMPUT 403 covers additional material relevant to advanced programming contests. Credit cannot be obtained for both CMPUT 303 and CMPUT 403. Prerequisites: ~~One of~~ CMPUT 201 or ~~CMPUT~~ 275, ~~CMPUT~~ 204, and any 300-level Computing Science course~~, or consent of the instructor~~.	**Subject & Number:** CMPUT 403 **Title:** Algorithmics in Competitive Programming **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-1S-0 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** This course is focused on algorithmic problems that can be solved within at most several hours by well-prepared people, where a solution involves properly understanding a written description, designing an efficient algorithm to solve the problem, and then correctly implementing the solution. Students will use algorithms, data structures, and mathematical reasoning to solve problems. Lectures are shared with CMPUT 303. CMPUT 403 covers additional material relevant to advanced programming contests. Credit cannot be obtained for both CMPUT 303 and CMPUT 403. Prerequisites: CMPUT 201 or 275, and 204, and any 300-level Computing Science course.
Subject & Number: CMPUT 404 **Title:** Web Applications and Architecture **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** Introduction to modern web architecture, from user-facing applications to machine-facing web-services. Topics include: the evolution of the Internet, relevant technologies and protocols, the architecture of modern web-based information systems, web data exchange and serialization, and service-oriented middleware. Prerequisites: CMPUT ~~301 and~~ 291~~, or consent of the instructor~~.	**Subject & Number:** CMPUT 404 **Title:** Web Applications and Architecture **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** Introduction to modern web architecture, from user-facing applications to machine-facing web-services. Topics include: the evolution of the Internet, relevant technologies and protocols, the architecture of modern web-based information systems, web data exchange and serialization, and service-oriented middleware. Prerequisites: CMPUT 291 and 301.

Subject & Number: CMPUT 414 **Title:** Introduction to Multimedia Technology **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** Introduction to basic principles and algorithms used in multimedia systems. Students obtain hands-on experience in issues relating to multimedia data representation, compression, processing, and animation. Topics will be selected from image and video coding and transmission, animation, human perceptual issues associated to multimedia technologies. Prerequisites: one of ~~CMPUT 306,~~ CMPUT 307 ~~or CMPUT 411, or consent of the instructor~~.	**Subject & Number:** CMPUT 414 **Title:** Introduction to Multimedia Technology **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** Introduction to basic principles and algorithms used in multimedia systems. Students obtain hands-on experience in issues relating to multimedia data representation, compression, processing, and animation. Topics will be selected from image and video coding and transmission, animation, human perceptual issues associated to multimedia technologies. Prerequisites: one of CMPUT 307, 328, or 411.
Subject & Number: CMPUT 415 **Title:** Compiler Design **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** Compilers, interpreters, lexical analysis, syntax analysis, syntax- directed translation, symbol tables, type checking, flow analysis, code generation, code optimization. Prerequisites: one of CMPUT 229, E E 380 or ECE 212, and ~~a~~ 300-level Computing Science course ~~or consent of the instructor~~.	**Subject & Number:** CMPUT 415 **Title:** Compiler Design **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** Compilers, interpreters, lexical analysis, syntax analysis, syntax- directed translation, symbol tables, type checking, flow analysis, code generation, code optimization. Prerequisites: one of CMPUT 229, E E 380, or ECE 212, and any 300-level Computing Science course.

Subject & Number: CMPUT 429 **Title:** Computer Systems and Architecture **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** A discussion of computer system design concepts with stress on modern ideas that have shaped the high-performance architecture of contemporary systems. Instruction sets, pipelining, instruction-level parallelism, register reuse, branch prediction, CPU control, cache-coherence, accelerators, and related concepts. Memory technologies, caches, I/O, high-performance networks. Prerequisites: CMPUT 201 or 275; one of CMPUT 229, E E 380 or ECE 212. Credit may be obtained in only one of CMPUT 429~~ or~~ CMPE 382.	**Subject & Number:** CMPUT 429 **Title:** Computer Systems and Architecture **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** A discussion of computer system design concepts with stress on modern ideas that have shaped the high-performance architecture of contemporary systems. Instruction sets, pipelining, instruction-level parallelism, register reuse, branch prediction, CPU control, cache-coherence, accelerators, and related concepts. Memory technologies, caches, I/O, high-performance networks. Prerequisites: CMPUT 201 or 275; and one of CMPUT 229, E E 380, or ECE 212. Credit may be obtained in only one of CMPUT 429, CMPE 382, or ECE 311.
Subject & Number: CMPUT 463 **Title:** Probabilistic Graphical Models **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** Probabilistic graphical models (PGMs; including Bayesian Belief Nets, Markov Random Fields, etc.) now contribute significantly to many areas, including expert systems, computer perception (vision and speech), natural language interpretation, automated decision making, and robotics. This course provides an introduction to this field, describing semantics, inference and learning, as well as practical applications of these systems. Programming assignments will include hands-on experiments with various reasoning systems. Prerequisites: one of CMPUT 340 or 418; one of STAT ~~141,~~ 151, 235 ~~or~~ 265 ~~or~~ SCI 151~~; or consent of the instructor~~.	**Subject & Number:** CMPUT 463 **Title:** Probabilistic Graphical Models **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-3 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** Probabilistic graphical models (PGMs; including Bayesian Belief Nets, Markov Random Fields, etc.) now contribute significantly to many areas, including expert systems, computer perception (vision and speech), natural language interpretation, automated decision making, and robotics. This course provides an introduction to this field, describing semantics, inference and learning, as well as practical applications of these systems. Programming assignments will include hands-on experiments with various reasoning systems. Prerequisites: one of CMPUT 340 or 418; and one of STAT 151, 161, 181, 235, 265, SCI 151, or MATH 181.

Subject & Number: CMPUT 474 **Title:** Formal Languages, Automata, and Computability **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-0 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** Formal grammars; relationship between grammars and automata; regular expressions; finite state machines; pushdown automata; Turing machines; computability; the halting problem; time and space complexity. Prerequisites: CMPUT 204~~, one of CMPUT 229, E E 380 or ECE 212~~ and one of MATH 225, 227, or 228~~ or consent of the instructor~~.	**Subject & Number:** CMPUT 474 **Title:** Formal Languages, Automata, and Computability **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-0 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** Formal grammars; relationship between grammars and automata; regular expressions; finite state machines; pushdown automata; Turing machines; computability; the halting problem; time and space complexity. Prerequisites: CMPUT 204 and one of MATH 225, 227, or 228.
Subject & Number: CMPUT 481 **Title:** Parallel and Distributed Systems **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-0 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** This course provides an undergraduate-level introduction to parallel programming, parallel and distributed systems, and high-performance computing in science and engineering. Both shared-memory parallel computers and distributed-memory multi computers (e.g., clusters) will be studied. Aspects of the practice of, and (some) research issues in, parallelism will be covered. There will be an emphasis on thread programming, data-parallel programming, and performance evaluation. Prerequisite: CMPUT 379~~, or consent of the instructor~~.	**Subject & Number:** CMPUT 481 **Title:** Parallel and Distributed Systems **Course Career:** Undergraduate **Units:** 3 **Approved Hours:** 3-0-0 **Fee index:** 6 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** This course provides an undergraduate-level introduction to parallel programming, parallel and distributed systems, and high-performance computing in science and engineering. Both shared-memory parallel computers and distributed-memory multi computers (e.g., clusters) will be studied. Aspects of the practice of, and (some) research issues in, parallelism will be covered. There will be an emphasis on thread programming, data-parallel programming, and performance evaluation. Prerequisite: CMPUT 379.

Subject & Number: CMPUT 495 **Title:** Honors Seminar **Course Career:** Undergraduate **Units:** 0 **Approved Hours:** 0-1S-0 **Fee index:** 1 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** This weekly seminar brings students, researchers, and practitioners together to examine a variety of topics, both foundational and leading edge. Content varies over successive offerings of the course. ~~Required~~ of all Honors Computing Science students during each Fall/Winter semester of their degree program. Prerequisite: Restricted to Honors Computing Science students~~, or consent of the instructor~~.	**Subject & Number:** CMPUT 495 **Title:** Honors Seminar **Course Career:** Undergraduate **Units:** 0 **Approved Hours:** 0-1S-0 **Fee index:** 1 **Faculty:** Science **Department:** Computing Science **Typically Offered:** either term **Description** This weekly seminar brings students, researchers, and practitioners together to examine a variety of topics, both foundational and leading edge. Content varies over successive offerings of the course. Successful completion required of all Honors Computing Science students during each Fall/Winter semester of their degree program. Prerequisite: Restricted to Honors Computing Science students, or permission of the Department.

Reviewed/Approved by:

REQUIRED: Faculty Council (or delegate) and approval date. Science Undergraduate Programs Committee on November 3, 2023
OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates. Department of Computing Science Council, September 29, 2023.

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Course Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	Faculty of Science, Department of Mathematical and Statistical Sciences
Contact Person:	Nicolas Guay, Associate Chair
Level of change: (choose one only) [?]	☑ Undergraduate
	☐ Graduate
For which term will this change take effect?	Fall 2024

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

It is better to make it more precise what a Calculus IV course is. Moreover, MATH 309 is a similar course for students in the Faculty of Engineering, so they should not be allowed to enroll in MATH 311 after successfully completing MATH 309.

Course Template

Current: ~~Removed language~~	**Proposed:** New language
Subject & Number MATH 311 **Title** Theory of Functions of a Complex Variable **Course Career** Undergraduate **Units** ★ 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Faculty of Science **Department** Mathematical and Statistical Sciences **Typically Offered** Either term **Description** Complex numbers. Complex series. Functions of a complex variable. Cauchy's theorem and contour integration. Residue Theorem and its applications. ~~Prerequisite or corequisite: A Calculus IV course.~~	**Subject & Number** MATH 311 **Title** Theory of Functions of a Complex Variable **Course Career** Undergraduate **Units** ★ 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Faculty of Science **Department** Mathematical and Statistical Sciences **Typically Offered** Either term **Description** Complex numbers. Complex series. Functions of a complex variable. Cauchy's theorem and contour integration. Residue Theorem and its applications. Corequisite: MATH 215 or MATH 315 or MATH 317 or MA PH 351. Note: This course may not be taken for credit if credit has already been obtained in MATH 309 or 411.

Reviewed/Approved by:

REQUIRED: Faculty Council (or delegate) and approval date. Science Undergraduate Programs Committee on November 3, 2023
OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates.

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Course Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	Science/Chemistry
Contact Person:	Chris Cairo, Christie McDermott
Level of change: (choose one only) [?]	• Undergraduate
	• Graduate
For which term will this change take effect?	Fall 2024

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

Course edits related to the renumbering of CHEM 243 □ CHEM 343 which is currently in place for Winter 2024.

Course Template

Current: ~~Removed language~~	**Proposed:** New language
CHEM 434 - X-ray Crystallography **Course Career Undergraduate** **Units 3** **Approved Hours 3-0-0** **Fee index 6** **Faculty Science** **Department Chemistry** **Typically Offered either term** **Description** An introduction to structure determination by single-crystal X-ray diffraction methods. Topics include X-ray diffraction, crystal symmetry, experimental methods, structure solution, refinement, crystallographic software, and interpretation of crystal structure data. Prerequisite: CHEM 243 and one 300-level CHEM course; or CHEM 333; or consent of the instructor.	**CHEM 434 - X-ray Crystallography** **Course Career Undergraduate** **Units 3** **Approved Hours 3-0-0** **Fee index 6** **Faculty Science** **Department Chemistry** **Typically Offered either term** **Description** An introduction to structure determination by single-crystal X-ray diffraction methods. Topics include X-ray diffraction, crystal symmetry, experimental methods, structure solution, refinement, crystallographic software, and interpretation of crystal structure data. Prerequisite: CHEM 243 and one 300-level CHEM course; or CHEM 343; or CHEM 333; or consent of the instructor.
CHEM 436 - Synthesis and Applications of Inorganic and Nano-materials **Course Career Undergraduate**	**CHEM 436 - Synthesis and Applications of Inorganic and Nano-materials**

Units 3
Approved Hours 3-0-0
Fee index 6
Faculty Science
Department Chemistry
Typically Offered either term

Description
Introduction to methods of synthesizing inorganic materials with control of atomic, meso- and micro-structure. Topics include sol-gel chemistry, chemical vapor deposition, solid state reactions, solid-state metathesis and high-temperature self-propagating reactions, template directed syntheses of micro and mesoporous materials, micelles and colloids, synthesis of nanoparticles and nanomaterials. Applications of these synthetic techniques to applications such as photonic materials, heterogeneous catalysts, magnetic data storage media, nanoelectronics, display technologies, alternative energy technologies, and composite materials will be discussed. Prerequisite: CHEM 243 and one 300-level CHEM course; or CHEM 333; or consent of the instructor.

CHEM 437 - Transition Metal Chemistry

Course Career Undergraduate
Units 3
Approved Hours 3-0-0
Fee index 6
Faculty Science
Department Chemistry
Typically Offered either term

Description
An introduction to organotransition metal chemistry. The course will deal with the synthesis, basic bonding, and reactivity of organotransition metal complexes. Topics to be covered include transition metal complexes of hydrides, phosphines, carbonyls, olefins, alkynes, polyolefins, cyclopentadienyl and related cyclic pi-ligands; metal-carbon sigma- and multiple bonds. The application of these complexes to homogeneous catalysis and to organic synthesis will be discussed when appropriate. Prerequisite: CHEM 243 and one 300-level CHEM course; or

Course Career Undergraduate
Units 3
Approved Hours 3-0-0
Fee index 6
Faculty Science
Department Chemistry
Typically Offered either term

Description
Introduction to methods of synthesizing inorganic materials with control of atomic, meso- and micro-structure. Topics include sol-gel chemistry, chemical vapor deposition, solid state reactions, solid-state metathesis and high-temperature self-propagating reactions, template directed syntheses of micro and mesoporous materials, micelles and colloids, synthesis of nanoparticles and nanomaterials. Applications of these synthetic techniques to applications such as photonic materials, heterogeneous catalysts, magnetic data storage media, nanoelectronics, display technologies, alternative energy technologies, and composite materials will be discussed. Prerequisite: CHEM 243 and one 300-level CHEM course; or CHEM 343; or CHEM 333; or consent of the instructor.

CHEM 437 - Transition Metal Chemistry

Course Career Undergraduate
Units 3
Approved Hours 3-0-0
Fee index 6
Faculty Science
Department Chemistry
Typically Offered either term

Description
An introduction to organotransition metal chemistry. The course will deal with the synthesis, basic bonding, and reactivity of organotransition metal complexes. Topics to be covered include transition metal complexes of hydrides, phosphines, carbonyls, olefins, alkynes, polyolefins, cyclopentadienyl and related cyclic pi-ligands; metal-carbon sigma- and multiple bonds. The application of these complexes to homogeneous catalysis and to organic synthesis

consent of the instructor. **CHEM 438 - Solid State Chemistry** **Course Career Undergraduate** **Units 3** **Approved Hours 3-0-0** **Fee index 6** **Faculty Science** **Department Chemistry** **Typically Offered either term** **Description** Introduction to the chemistry of extended inorganic solids. The topics covered include synthesis, symmetry, descriptive crystal chemistry, bonding, electronic band structures, characterization techniques, and phase diagrams. The correlation of structure with properties of electronic and magnetic materials will be discussed. Prerequisite: CHEM 243 and one 300-level CHEM course; or CHEM 333 or consent of the instructor.	will be discussed when appropriate. Prerequisite: CHEM 243 and one 300-level CHEM course; or CHEM 343; or consent of the instructor. **CHEM 438 - Solid State Chemistry** **Course Career Undergraduate** **Units 3** **Approved Hours 3-0-0** **Fee index 6** **Faculty Science** **Department Chemistry** **Typically Offered either term** **Description** Introduction to the chemistry of extended inorganic solids. The topics covered include synthesis, symmetry, descriptive crystal chemistry, bonding, electronic band structures, characterization techniques, and phase diagrams. The correlation of structure with properties of electronic and magnetic materials will be discussed. Prerequisite: CHEM 243 and one 300-level CHEM course; or CHEM 343; or CHEM 333; or consent of the instructor.

Reviewed/Approved by:

REQUIRED: Faculty Council (or delegate) and approval date. Science Undergraduate Programs Committee on November 3, 2023
OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates. Chemistry Department Council approved September 26, 2023.

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Course Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	Science/Chemistry
Contact Person:	Chris Cairo, Christie McDermott
Level of change: (choose one only) [?]	• Undergraduate
	• Graduate
For which term will this change take effect?	Fall 2024

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

Basic course description edits related to cleaning up prerequisites, MATH 154/156 series, new program titles.

Course Template

Current: ~~Removed language~~	**Proposed:** New language
CHEM 102 - Introductory University Chemistry II **Course Career Undergraduate** **Units 3** **Approved Hours 3-1S-3/2** **Fee index 6** **Faculty Science** **Department Chemistry** **Typically Offered either term** **Description** Rates of reactions, thermodynamics and equilibrium, electro-chemistry, modern applications of chemistry. Prerequisite: CHEM 101.	**CHEM 102 - Introductory University Chemistry II** **Course Career Undergraduate** **Units 3** **Approved Hours 3-1S-3/2** **Fee index 6** **Faculty Science** **Department Chemistry** **Typically Offered either term** **Description** Rates of reactions, thermodynamics and equilibrium, electro-chemistry, modern applications of chemistry. Prerequisite: CHEM 101 or 103.
CHEM 105 - Introductory University Chemistry II **Course Career Undergraduate** **Units 3.8** **Approved Hours 3-0-3/2** **Fee index 6** **Faculty Science** **Department Chemistry** **Typically Offered either term** **Description**	**CHEM 105 - Introductory University Chemistry II** **Course Career Undergraduate** **Units 3.8** **Approved Hours 3-0-3/2** **Fee index 6** **Faculty Science** **Department Chemistry** **Typically Offered either term** **Description**

Rates of reactions, thermodynamics and equilibrium, electrochemistry, modern applications of chemistry. Prerequisite: CHEM 103. Note: Restricted to Engineering students only. Other students who take this course will receive *3.0**.***	Rates of reactions, thermodynamics and equilibrium, electrochemistry, modern applications of chemistry. Prerequisite: CHEM 103 or 101. Note: Restricted to Engineering students only. Other students who take this course will receive *3.0**.***
CHEM 282 - Atomic and Molecular Structure **Course Career Undergraduate** **Units 3** **Approved Hours 3-0-4** **Fee index 6** **Faculty Science** **Department Chemistry** **Typically Offered second term** **Description** An introduction to the quantum view of nature with applications to atomic and molecular structure. Methods to describe the quantum world are introduced, used to describe the electronic structure of simple model systems, and applied to the hydrogen atom, many-electron atoms, simple diatomic molecules, and polyatomic molecules. The laboratory portion of the course consists of applications enriching and illustrating the lecture material, and incorporates the use of computers in predicting experimental results. Prerequisites: CHEM 102 or 105; one 200-level CHEM course; MATH 115 or 136 or 146; MATH 125; PHYS 124 or 144. ~~Corequisite: PHYS 146 if PHYS 144 presented as a prerequisite instead of PHYS 124.~~	**CHEM 282 - Atomic and Molecular Structure** **Course Career Undergraduate** **Units 3** **Approved Hours 3-0-4** **Fee index 6** **Faculty Science** **Department Chemistry** **Typically Offered second term** **Description** An introduction to the quantum view of nature with applications to atomic and molecular structure. Methods to describe the quantum world are introduced, used to describe the electronic structure of simple model systems, and applied to the hydrogen atom, many-electron atoms, simple diatomic molecules, and polyatomic molecules. The laboratory portion of the course consists of applications enriching and illustrating the lecture material, and incorporates the use of computers in predicting experimental results. Prerequisites: CHEM 102 or 105; one 200-level CHEM course; MATH 115 or 136 or 146 or 156; MATH 125; PHYS 124 or 144.
CHEM 300 - Introduction to Industrial Chemistry **Course Career Undergraduate** **Units 1.5** **Approved Hours 1.5-0-0** **Fee index 3** **Faculty Science**	**CHEM 300 - Introduction to Industrial Chemistry** **Course Career Undergraduate** **Units 1.5** **Approved Hours 1.5-0-0** **Fee index 3** **Faculty Science**

Department Chemistry **Typically Offered first term** **Description** A credit/no-credit course that introduces students to the practices, environment, concepts, and other issues associated with the industrial workplace. Course includes lectures by professionals from the local chemical industry, industrial tours, and professional skills development such as resume writing and interviewing. Normally taken after completion of a minimum of 60 but not more than 90 units of course weight in a program in the Department of Chemistry. ~~The course is offered for Chemistry Honors and Specialization students, and for General Science students with consent.~~ Prerequisite: ~~GPA of 2.3 or higher~~ and consent of Department.	**Department Chemistry** **Typically Offered first term** **Description** A credit/no-credit course that introduces students to the practices, environment, concepts, and other issues associated with the industrial workplace. Course includes lectures by professionals from the local chemical industry, industrial tours, and professional skills development such as resume writing and interviewing. Normally taken after completion of a minimum of 60 but not more than 90 units of course weight in a program in the Department of Chemistry. The course is offered for students in Chemistry Honors, Specialization, and Major Programs. Other students, contact the department for consent. Prerequisite: Satisfactory Standing and consent of Department.
CHEM 306 - Green Chemistry	**CHEM 306 - Green Chemistry**
Course Career Undergraduate **Units 3** **Approved Hours 3-0-0** **Fee index 6** **Faculty Science** **Department Chemistry** **Typically Offered either term** **Description** Introduction to green chemistry. The twelve principles and the metrics of green chemistry; Chemical wastes: their impact on health and the environment, and prevention; Green solvents and alternate methods that use safer chemicals; Catalysis and green catalysts; Renewable resources. Prerequisite: CHEM 263.	**Course Career Undergraduate** **Units 3** **Approved Hours 3-0-0** **Fee index 6** **Faculty Science** **Department Chemistry** **Typically Offered either term** **Description** Introduction to green chemistry. The twelve principles and the metrics of green chemistry; Chemical wastes: their impact on health and the environment, and prevention; Green solvents and alternate methods that use safer chemicals; Catalysis and green catalysts; Renewable resources. Prerequisite: CHEM 263. Students who have obtained credit for CHIM 340 cannot take CHEM 306 for credit.
CHEM 343 - Advanced Inorganic Chemistry	**CHEM 343 - Advanced Inorganic Chemistry**

Course Career Undergraduate **Units 3** **Approved Hours 3-0-3** **Fee index 6** **Faculty Science** **Department Chemistry** **Typically Offered either term** **Description** An extension of CHEM 241 with emphasis on the bonding, structure, and reactivity of transition-metal elements. The course will include applications in industrial, biochemical, environmental, and materials science. ~~For Chemistry Honors and Specialization students only~~, except by consent of Department. Prerequisites: CHEM 241 or consent of Department. Students who have obtained credit for CHEM 243 cannot take CHEM 343 for credit.	**Course Career Undergraduate** **Units 3** **Approved Hours 3-0-3** **Fee index 6** **Faculty Science** **Department Chemistry** **Typically Offered either term** **Description** An extension of CHEM 241 with emphasis on the bonding, structure, and reactivity of transition-metal elements. The course will include applications in industrial, biochemical, environmental, and materials science. For students in Chemistry Honors, Specialization, and Major Programs only, except by consent of Department. Prerequisites: CHEM 241 or consent of Department. Students who have obtained credit for CHEM 243 cannot take CHEM 343 for credit.
CHEM 351 - Introduction to Chemical Biology **Course Career** Undergraduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Science **Department** Chemistry **Typically Offered** either term **Description** Introduction to chemical strategies used to analyze and manipulate biochemical systems. Topics may include chemical synthesis of biopolymers, protein-small molecule interactions, chemoenzymatic synthesis, enzyme-inhibitor kinetics, assay design, characterization of bioorganic samples, and various chemical biology methods. Prerequisites: CHEM 263 and BIOCH 200.	**CHEM 351 - Introduction to Chemical Biology** **Course Career** Undergraduate **Units** 3 **Approved Hours** 3-0-0 **Fee index** 6 **Faculty** Science **Department** Chemistry **Typically Offered** either term **Description** Introduction to chemical strategies used to analyze and manipulate biochemical systems. Topics may include chemical synthesis of biopolymers, protein-small molecule interactions, chemoenzymatic synthesis, enzyme-inhibitor kinetics, assay design, characterization of bioorganic samples, and various chemical biology methods. Prerequisites: CHEM 263 or 265; BIOCH 200. Students who have obtained credit for CHEM 451 cannot take CHEM 351 for credit.

CHEM 361 - Organic Chemistry **Course Career Undergraduate** **Units 3** **Approved Hours 3-0-4** **Fee index 6** **Faculty Science** **Department Chemistry** **Typically Offered first term** **Description** Mechanisms and reactions of aromatic and aliphatic compounds. Prerequisites: CHEM 102; CHEM ~~163 or~~ 263 or CHEM 265 and 267.	**CHEM 361 - Organic Chemistry** **Course Career Undergraduate** **Units 3** **Approved Hours 3-0-4** **Fee index 6** **Faculty Science** **Department Chemistry** **Typically Offered first term** **Description** Mechanisms and reactions of aromatic and aliphatic compounds. Prerequisites: CHEM 102; CHEM 263, or CHEM 265 and 267.
CHEM 371 - Energetics of Chemical Reactions **Course Career Undergraduate** **Units 3** **Approved Hours 3-0-3** **Fee index 6** **Faculty Science** **Department Chemistry** **Typically Offered first term** **Description** A study of the implications of the laws of thermodynamics for transformations of matter including phase changes, chemical reactions, and biological processes. Topics include: thermochemistry; entropy change and spontaneity of processes; activity and chemical potential; chemical and phase equilibria; properties of solutions; simple one- and two-component phase diagrams. The conceptual development of thermodynamic principles from both macroscopic and molecular levels, and the application of these principles to systems of interest to chemists, biochemists, and engineers will be emphasized. Note: This course may not be taken for credit if credit has already been received in CHEM 271. Prerequisites: CHEM 102 or 105; MATH 101 or 115 or 136 or 146. Engineering	**CHEM 371 - Energetics of Chemical Reactions** **Course Career Undergraduate** **Units 3** **Approved Hours 3-0-3** **Fee index 6** **Faculty Science** **Department Chemistry** **Typically Offered first term** **Description** A study of the implications of the laws of thermodynamics for transformations of matter including phase changes, chemical reactions, and biological processes. Topics include: thermochemistry; entropy change and spontaneity of processes; activity and chemical potential; chemical and phase equilibria; properties of solutions; simple one- and two-component phase diagrams. The conceptual development of thermodynamic principles from both macroscopic and molecular levels, and the application of these principles to systems of interest to chemists, biochemists, and engineers will be emphasized. Note: This course may not be taken for credit if credit has already been received in CHEM 271. Prerequisites: CHEM 102 or 105; MATH 101 or 115 or 136 or 146 or 156.

students who take this course will receive *4.5.	Engineering students who take this course will receive *4.5.
CHEM 401 - Introduction to Chemical Research **Course Career Undergraduate** **Units 3** **Approved Hours 0-1S-8** **Fee index 6** **Faculty Science** **Department Chemistry** **Typically Offered either term** **Description** Introduction to methods of chemical research. Investigational work under the direction of a member of the Department. The results of the research will be submitted to the Department as a report and/or presentation which will be graded. ~~For students in the fourth year of Honors or Specialization Chemistry~~. Students should consult with the Course Coordinator four months prior to starting the course. Prerequisites: a 300-level CHEM course and consent of the Course Coordinator**.**	**CHEM 401 - Introduction to Chemical Research** **Course Career Undergraduate** **Units 3** **Approved Hours 0-1S-8** **Fee index 6** **Faculty Science** **Department Chemistry** **Typically Offered either term** **Description** Introduction to methods of chemical research. Investigational work under the direction of a member of the Department. The results of the research will be submitted to the Department as a report and/or presentation which will be graded. For students in the fourth year of Chemistry Honors, Specialization, or Major Programs. Students should consult with the Course Coordinator four months prior to starting the course. Prerequisites: a 300-level CHEM course, minimum GPA of 3.0 on all courses credited to the degree to date, and consent of the Course Coordinator. Students who have credit in CHEM 499 cannot take CHEM 401 for credit.
CHEM 499 - Advanced Chemical Research and Training **Course Career Undergraduate** **Units 6** **Approved Hours 0-1S-10** **Fee index 12** **Faculty Science** **Department Chemistry** **Typically Offered two term** Description An advanced, two-term, research placement course	**CHEM 499 - Advanced Chemical Research and Training** **Course Career Undergraduate** **Units 6** **Approved Hours 0-1S-10** **Fee index 12** **Faculty Science** **Department Chemistry** **Typically Offered two term** Description An advanced, two-term, research placement course

where students complete chemical-based exploratory research under the direction of a faculty member of the Department. Research, professional development and seminar components are involved, preparing undergraduates to further build strong chemical foundations to succeed in graduate, industry, or professional school programs. Prerequisites: 4th-year standing in a Chemistry Honors or Chemistry Major program, two 300-level Chemistry courses, minimum GPA of 3.0~~0~~, consent of instructor.	where students complete chemical-based exploratory research under the direction of a faculty member of the Department. Research, professional development and seminar components are involved, preparing undergraduates to further build strong chemical foundations to succeed in graduate, industry, or professional school programs. Prerequisites: 4th-year standing in a Chemistry Honors, Specialization, or Major program, two 300-level CHEM courses, minimum GPA of 3.0 on all CHEM courses credited to the degree to date, and consent of instructor. Students who have credit in CHEM 401 cannot take CHEM 499 for credit.

Reviewed/Approved by:

REQUIRED: Faculty Council (or delegate) and approval date. Science Undergraduate Programs Committee on November 3, 2023
OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates. Chemistry Department Council approved September 26, 2023.

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Course Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	Biological Sciences, Faculty of Science
Contact Person:	Corwin Sullivan
Level of change: (choose one only) [?]	• **Undergraduate**
	• Graduate
For which term will this change take effect?	Fall 2024

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

Confusing wording for pre-requisites.

Course Template

Current: ~~Removed language~~	**Proposed:** New language
Subject & Number BIOL 341 **Title Ecotoxicology** **Course Career** **Units** ★ 3 (fi 6)(EITHER, 3-0-0) **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** Fall term **Description** An overview of the adverse effects of chemicals or physical agents on biological systems in an ecological context. This course takes a multidisciplinary approach to understanding biological effects and their assessment. Prerequisites: BIOL 208~~,~~ ZOOL 241~~,~~ or PHYSL 210, or 212 or 214 and CHEM ~~164 or~~ 261~~,~~ ~~or instructor consent.~~	**Subject & Number BIOL 341** **Title Ecotoxicology** **Course Career** **Units**★ 3 (fi 6)(EITHER, 3-0-0) **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** Fall term **Description** An overview of the adverse effects of chemicals or physical agents on biological systems in an ecological context. This course takes a multidisciplinary approach to understanding biological effects and their assessment. Prerequisites: BIOL 208; ZOOL 241 or PHYSL 210 or 212 or 214; and CHEM 261.

Reviewed/Approved by:

REQUIRED: Faculty Council (or delegate) and approval date. Science Undergraduate Programs Committee on November 3, 2023

OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates.

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Course Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	Biological Sciences, Faculty of Science
Contact Person:	Corwin Sullivan, bioacu@ualberta.ca
Level of change: (choose one only) [?]	• Undergraduate
	• Graduate
For which term will this change take effect?	

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

The Department of Biological Sciences is following the lead of removing calendar language associated with “consent of instructor” in favor of clearly outlining pre-requisite courses and program requirements. This eliminates the possibility of instructors choosing students based on an unconscious bias. Regular instructors in these courses have been consulted in addition to members of the Department of Biological Sciences Course and Curriculum Committee.

- BIOL 384
- BIOL 392
- BIOL 409
- BIOL 440
- BOT 411

Course Template

Current: ~~Removed language~~	**Proposed:** New language
Subject & Number BIOL 384 **Title** Global Change and Ecosystems **Course Career** Undergraduate **Units** 3.0 **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** Every winter term **Description** Ecological impacts of climate change and large-scale human activities on terrestrial and aquatic ecosystems. The focus of this course is to learn to write brief technical summaries of current environment issues, in a fashion that can be understood by an educated citizen. Topics such as climate change, water management projects, invasion of exotic species and national parks management are presented as the forum to evaluate options, trade-offs and solutions to environmental social issues. Prerequisites: BIOL 208 ~~or consent of Instructor.~~ BOT 205 recommended.	**Subject & Number BIOL 384** **Title** Global Change and Ecosystems **Course Career** Undergraduate **Units** 3.0 **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** Every winter term **Description** Ecological impacts of climate change and large-scale human activities on terrestrial and aquatic ecosystems. The focus of this course is to learn to write brief technical summaries of current environment issues, in a fashion that can be understood by an educated citizen. Topics such as climate change, water management projects, invasion of exotic species and national parks management are presented as the forum to evaluate options, trade-offs and solutions to environmental social issues. Prerequisites: BIOL 208; BOT 205 recommended.

Course Template

Current: ~~Removed language~~	**Proposed:** New language
Subject & Number BIOL 392 **Title** Lab Techniques in Molecular Ecology and Systematics **Course Career** Undergraduate **Units** 3.0 **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** Second term **Description** A laboratory course introducing students to current molecular biology techniques and associated analyses used to study population genetics, systematics, and evolutionary biology in natural populations. Students will develop microsatellite marker systems and use them to examine the genetic structure of a natural population. A comparative bioinformatic approach will be used to generate sequence data to investigate the use of single nucleotide polymorphisms in candidate gene analysis and in phylogenetic inference. Prerequisite: BIOL 207~~,~~ 208 ~~and consent of instructor~~, corequisite: BIOL 380. Note: BIOL 392 and 592 cannot both be taken for credit.	**Subject & Number BIOL 392** **Title** Lab Techniques in Molecular Ecology and Systematics **Course Career** Undergraduate **Units** 3.0 **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** Second term **Description** A laboratory course introducing students to current molecular biology techniques and associated analyses used to study population genetics, systematics, and evolutionary biology in natural populations. Students will develop microsatellite marker systems and use them to examine the genetic structure of a natural population. A comparative bioinformatic approach will be used to generate sequence data to investigate the use of single nucleotide polymorphisms in candidate gene analysis and in phylogenetic inference. Prerequisite: BIOL 207 and BIOL 208. Corequisite: BIOL 380. Note: BIOL 392 and 592 cannot both be taken for credit.

Course Template

Current: ~~Removed language~~	**Proposed:** New language
Subject & Number BIOL 409 **Title** Zoonoses **Course Career** Undergraduate **Units** 3.0 **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** First term **Description** This course will examine the biology of zoonotic agents and the implication of host-pathogen interactions to disease susceptibility and resistance. Students will apply these basic concepts towards the understanding of issues governing pathogenesis, pathology, epidemiology, control and surveillance of zoonotic diseases. Focus will be placed on zoonotic agents currently having a significant impact on animal and public health. Lectures will be followed by active discussion of selected readings. Prerequisites: one of IMIN 200, ZOOL 352, ZOOL 354, ENT 392 ~~or consent of instructor~~. Credit cannot be obtained for both BIOL 409 and BIOL 509.	**Subject & Number BIOL 409** **Title** Zoonoses **Course Career** Undergraduate **Units** 3.0 **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** First term **Description** This course will examine the biology of zoonotic agents and the implication of host-pathogen interactions to disease susceptibility and resistance. Students will apply these basic concepts towards the understanding of issues governing pathogenesis, pathology, epidemiology, control and surveillance of zoonotic diseases. Focus will be placed on zoonotic agents currently having a significant impact on animal and public health. Lectures will be followed by active discussion of selected readings. Prerequisites: one of IMIN 200, ZOOL 352, ZOOL 354, or ENT 392. Credit cannot be obtained for both BIOL 409 and BIOL 509.

Course Template

Current: ~~Removed language~~	**Proposed:** New language
Subject & Number BIOL 440 **Title** Watershed Ecohydrology **Course Career** Undergraduate **Units** 3.0 **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** Second term **Description** The course will introduce students to theory and techniques employed in the analysis of physical, hydrological, chemical, and ecological properties of ecosystems using a watershed (catchment) approach. Focus will be on landscape interactions or linkages between upland, wetland/riparian, and surface-water in the study of the natural ecohydrologic function and response to disturbance of watershed ecosystems. Emphasis will be placed on Boreal Alberta. Topics are covered through reading the literature and group discussions. Prerequisite: BIOL 333 ~~or~~ 340 ~~or~~ 364 ~~or~~ EAS 223 ~~or~~ REN R 350, or consent of ~~instructor~~. Credit cannot be obtained for both BIOL 440 and 540.	**Subject & Number BIOL 440** **Title** Watershed Ecohydrology **Course Career** Undergraduate **Units** 3.0 **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** Second term **Description** The course will introduce students to theory and techniques employed in the analysis of physical, hydrological, chemical, and ecological properties of ecosystems using a watershed (catchment) approach. Focus will be on landscape interactions or linkages between upland, wetland/riparian, and surface-water in the study of the natural ecohydrologic function and response to disturbance of watershed ecosystems. Emphasis will be placed on Boreal Alberta. Topics are covered through reading the literature and group discussions. Prerequisite: One of BIOL 333, 340, 364, EAS 223, REN R 350, or consent of the Department. Credit cannot be obtained for both BIOL 440 and 540.

Course Template

Current: ~~Removed language~~	**Proposed:** New language

Subject & Number BOT 411 **Title** Paleobotany **Course Career** Undergraduate **Units** 3.0 **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** Second term **Description** The fossil record of plants as it relates to the evolutionary history of existing groups. Prerequisite: ~~A 300-level Biological or Earth Sciences course and BOT 205 or 210~~ ~~or consent of Instructor~~. Offered in alternate years.	**Subject & Number BOT 411** **Title** Paleobotany **Course Career** Undergraduate **Units** 3.0 **Approved Hours** **Fee index** **Faculty** Science **Department** Biological Sciences **Typically Offered** Second term **Description** The fossil record of plants as it relates to the evolutionary history of existing groups. Prerequisite: BOT 205 and a 300-level Biological Sciences course. Offered in alternate years.

Reviewed/Approved by:

REQUIRED: Faculty Council (or delegate) and approval date. Science Undergraduate Programs Committee on November 3, 2023
OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates.

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Program and Regulation Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	Faculty of Science
Contact Person:	Gerda de Vries, Associate Dean Undergraduate Jocelyn Hall, Associate Dean Undergraduate
Level of change: (choose one only)	☑ Undergraduate
	☐ Graduate
Type of change request: (check all that apply)	☑ Program
	☐ Regulation
For which term is this intended to take effect?	Fall 2024
Does this proposal have corresponding course changes? (Should be submitted at the same time)	No

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

We inadvertently omitted the ONCOL course designator from the Applied Sciences list.

Calendar Copy

URL in current Calendar (or "New page")
https://calendar.ualberta.ca/preview_program.php?catoid=39&poid=50420

Current Copy: ~~Removed language~~	**Proposed Copy:** New language
Breadth from Outside the Faculty of Science Course Lists for Bachelor of Science (Major and Honors) **Applied Sciences:**	**Breadth from Outside the Faculty of Science Course Lists for Bachelor of Science (Major and Honors)** **Applied Sciences:**

• INT D 280 - The Mountain World: Introduction to Interdisciplinary Mountain Studies
• any course with the following course designators:
  ○ AFNS
  ○ ANAT
  ○ AN SC
  ○ BIOEN
  ○ CH E (see Note 1)
  ○ CIV E (see Note 1)
  ○ CME (see Note 1)
  ○ ECE (see Note 1)
  ○ ENG M (see Note 1)
  ○ ENSC
  ○ ENV E (see Note 1)
  ○ FOREC
  ○ HECOL
  ○ HE ED
  ○ KIN (excluding KIN 100, KIN 101, KIN 109, and KIN 391)
  ○ KRLS
  ○ MAT E (see Note 1)
  ○ MEC E (see Note 1)
  ○ MIN E (see Note 1)
  ○ NU FS
  ○ NUTR
  ○ PET E (see Note 1)
  ○ PL SC (excluding PL SC 221)
  ○ REN R
  ○ RLS
  ○ SPH
  ○ SUST
	• INT D 280 - The Mountain World: Introduction to Interdisciplinary Mountain Studies
	• any course with the following course designators:
	  ○ AFNS
	  ○ ANAT
	  ○ AN SC
	  ○ BIOEN
	  ○ CH E (see Note 1)
	  ○ CIV E (see Note 1)
	  ○ CME (see Note 1)
	  ○ ECE (see Note 1)
	  ○ ENG M (see Note 1)
	  ○ ENSC
	  ○ ENV E (see Note 1)
	  ○ FOREC
	  ○ HECOL
	  ○ HE ED
	  ○ KIN (excluding KIN 100, KIN 101, KIN 109, and KIN 391)
	  ○ KRLS
	  ○ MAT E (see Note 1)
	  ○ MEC E (see Note 1)
	  ○ MIN E (see Note 1)
	  ○ NU FS
	  ○ NUTR
	  ○ ONCOL
	  ○ PET E (see Note 1)
	  ○ PL SC (excluding PL SC 221)
	  ○ REN R
	  ○ RLS
	  ○ SPH
	  ○ SUST

Reviewed/Approved by:

REQUIRED: Faculty Council (or delegate) and approval date. Science Undergraduate Programs Committee on November 3, 2023
OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates.

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Program and Regulation Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	Pharmacy & Pharmaceutical Sciences
Contact Person:	Arno Siraki
Level of change: (choose one only)	• Undergraduate
	• Graduate
Type of change request: (check all that apply)	• Program
	• Regulation
For which term is this intended to take effect?	ALL
Does this proposal have corresponding course changes? (Should be submitted at the same time)	No

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

The candidacy exam procedures for doctoral students was modified and approved by the Faculty of Pharmacy & Pharmaceutical Sciences' Faculty Council on May 16, 2023. The proposed calendar changes reflect the procedural change of how candidacy exams are carried out in the faculty.

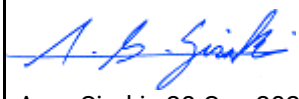
Calendar Copy

URL in current Calendar (or "New page")
https://calendar.ualberta.ca/preview_program.php?catoid=39&poid=47679&returnto=12424#:~:text=the%20thesis%20defense.-,Candidacy%20Exam,-Students%20must%20pass

Current Copy: ~~Removed language~~	**Proposed Copy:** New language
Candidacy Exam Students must pass ~~a~~ candidacy exam after all coursework is completed and before the end of the third year of their program. ~~Format and content of the candidacy examination is at the discretion of the supervisory committee~~.	Candidacy Exam Students must pass an oral candidacy exam based on a written research proposal or grant application. The exam will take place after all coursework is completed and before the end of the third year of their program.

Reviewed/Approved by:

REQUIRED: Faculty Council (or delegate) and approval date.



Arno Siraki 28-Sep-2023

OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates.

GPST - Oct. 23, 2023
FGSR Council - Nov. 8, 2023

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Program and Regulation Changes
See the Calendar Guide for tips on how to complete this form.

2024/2025 Calendar Changes

Undergraduate Program Changes

Faculty (& Department or Academic Unit):	ALES
Contact Person:	Dr. Nat Kav (nat@ualberta.ca), Stephanie Dickie (sdickie@ualberta.ca)
Level of change: (choose one only)	☑ Undergraduate
	☐ Graduate
Type of change request: (check all that apply)	☑ Program
	☐ Regulation
For which term is this intended to take effect?	Fall 2024/Winter 2025
Does this proposal have corresponding course changes? (Should be submitted at the same time)	

AH020 Admission Requirements

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

Additional note to admission requirements for transfer students, generalization of category 3 options, Option of Math 30-1 or 30-2.

Calendar Copy

URL in current Calendar (or "New page"):
https://calendar.ualberta.ca/content.php?catoid=36&navoid=11293#bsc-in-forestry

BSc in Forestry **High School Applicants** **Subject Requirements** 1. English Language Arts 30-1 ~~2. Chemistry 30~~ ~~3. Biology 30~~ ~~4. Mathematics 30-1~~	**BSc in Forestry** **High School Applicants** **Subject Requirements** 1. English Language Arts 30-1 2. Math 30-1 OR 30-2

5. Subject from Group A, B, C or Macroeconomics 30 and Microeconomics 30, or a minimum of five credits in Career and Technology subjects at the Advanced level from the following strands: Agriculture, Foods, Forestry, or Wildlife. **Nonmatriculated Applicants** **Subject Requirements** ~~1. Chemistry 30~~ 2. Mathematics 30-1 ~~3. Biology 30~~	3. Two of: Biology 30, Chemistry 30, Math 31, Physics 30, 5+ CTS Credits in Ag, Comp Sci, Foods, Forestry, or Wildlife 4. Subject from Group A, B, C or Macroeconomics 30 and Microeconomics 30, or a minimum of five credits in Career and Technology subjects at the Advanced level from the following strands: Agriculture, Foods, Forestry, or Wildlife. **Nonmatriculated Applicants** **Subject Requirements** 1. Mathematics 30-1 or Mathematics 30-2

Reviewed/Approved by:

Approved by ALES ACC September 22, 2023
Proposed by Nadir Erbilgin (RENR Department Chair) and Brad Pinno (Chair of the ENCS/Forestry Program committee (Sep. 1, 2023), approved by RENR Department Council (Sep. 1, 2023).

FINAL ITEM NO. 6

Decision X **Discussion** ☐ **Information** ☐

ITEM OBJECTIVE: Articulate policy around calendar sections that outline the End of Program Registration and Maintenance of Registration for Course-based students (similar language is already included for thesis-based programs).

DATE	December 7, 2023
TO	GFC Programs Committee
RESPONSIBLE PORTFOLIO	Faculty of Graduate & Postdoctoral Studies (GPS)

MOTION:
THAT the GFC Programs Committee approve the changes to calendar additions for Course-based Maintenance of Registration and end of program registration patterns for course-based students, for implementation upon final approval, and inclusion in the 2024-2025 *University Calendar*.

EXECUTIVE SUMMARY:

This change clarifies existing rules for end-of-program registration for course-based master's students. Its substance is implied by the first paragraph under "maintenance of registration," but a number of situations have arisen in which graduate coordinators were unaware that students who do not finish a capstone over the summer need to register in the subsequent year. The new language under "Maintenance of Registration" makes this explicit, and the addition of a paragraph on end-of-program deadlines for course based programs, to match existing language pertaining to thesis-based programs, provides additional clarity (the absence of such a paragraph has occasionally been taken a sign that no such deadlines exist for course-based students).

The pieces are not new policy, and have always been in effect, but are not currently articulated as clearly as the similar policy for thesis-based programs.

Supporting Materials:

1. Calendar Change Request - FGSR CBM Maintenance of Registration (with Council amends)

SCHEDULE A:

GOVERNANCE OUTLINE

FINAL ITEM NO. 6

Engagement and Routing

Approval Route:

GPST - March 27, 2023
PRC - May 11, 2023
FGSR Council - May 31, 2023 (Discussion)
GPST - October 23, 2023
FGSR Council - November 8, 2023
Programs Committee - December 7, 2023 (Anticipated)
GFC - TBD

UNIVERSITY OF ALBERTA

Calendar Change Request Form
for Program and Regulation Changes

See the Calendar Guide for tips on how to complete this form.

Faculty (& Department or Academic Unit):	FGSR
Contact Person:	Andrea Riewe /
Level of change: (choose one only)	• Undergraduate
	• Graduate
Type of change request: (check all that apply)	• Program
	• Regulation
For which term is this intended to take effect?	
Does this proposal have corresponding course changes? (Should be submitted at the same time)	

Rationale

Things to consider (maximum 500 words): Why is this being changed; How will it benefit students/department/unit; How is this comparable to similar programs (internal or external); Historical context; Impacts to administration or program structure; Consultation with stakeholders

These changes revise existing rules with respect to graduate certificate admissions and maintenance of registration, with the intention of (1) redefining the graduate certificate as a more prominent and inclusive pathway into graduate studies; (2) encouraging programs to build “ladders” from certificates to Master’s degrees; and (3) creating flexibility for students and programs in no longer requiring that students maintain registration by taking at least one three-credit course per year. At present, University regulations treat graduate certificates as being similar to PhDs in most respects, including the steps required for admission and the satour Calendar OWe know that those t setting programs and making .
At this point our Calendar has treated graduate certificates like it does PhDs. ru 3(
Barriers. Working group.
, reflecting developments across other U15 institutions

ab

Calendar Copy

URL in current Calendar (or “New page”)
Maintenance of Registration: https://calendar.ualberta.ca/content.php?catoid=36&navoid=11205#maintenance-of-registration

Current Copy: ~~Removed language~~	**Proposed Copy:** New language

## Maintenance of Registration **Course-based Programs:** In order to keep their program active, students in course-based degree programs must register in and successfully complete a minimum of 3 units of course weight of coursework for at least one term in each September to August period. Other registration patterns for students in exceptional circumstances will be considered by the Faculty of Graduate Studies and Research. Students who fail to keep the program active as described above will be considered to have withdrawn from their program. [...]	## Maintenance of Registration **Course-based Programs:** In order to keep their program active, students in course-based degree programs must register in and successfully complete a minimum of 3 units of course weight of coursework for at least one term in each September to August period. Other registration patterns for students in exceptional circumstances will be considered by the Faculty of Graduate Studies and Research. Students who fail to keep the program active as described above will be considered to have withdrawn from their program. If a student has an outstanding grade (ie. an incomplete Capstone), with a grade extension that falls past the last day for Departments to submit a Report of Completion for course-based masters programs to the FGSR to ensure graduation at Fall Convocation, and there was no registration in the Fall term, then the student is considered withdrawn from the program. [...]
## End-of-Program Registration Deadlines for ~~Thesis-based~~ Students [NEW]	## End-of-Program Registration Deadlines for Graduate Students **Course-Based Programs:** Course-based students must be registered in and successfully complete a minimum of 3 units of course weight of coursework for at least one term in each September to August period until they have completed all the requirements for their program. (See: Maintenance of Registration <Link>) NOTE: If a student has an outstanding grade (ie. an incomplete Capstone), with a grade extension that falls past the last day for Departments to submit a Report of Completion for course-based masters programs to the FGSR to ensure graduation at Fall Convocation, and there was no registration in the Fall term, then the student is considered withdrawn from the program. (See: Maintenance of Registration <Link>)

Reviewed/Approved by:

REQUIRED: GPST - March 27, 2023 PRC - May 11, 2023
OPTIONAL: Other internal faculty approving bodies, consultation groups, or departments, and approval dates.