

**UNIVERSITY COUNCIL
ACADEMIC PROGRAMS COMMITTEE
REPORT FOR INFORMATION**

PRESENTED BY: Alison Oates, chair, Academic Programs Committee

DATE OF MEETING: January 27, 2022

SUBJECT: Change to upper year requirements for the Bachelor of Science in Engineering Programs

COUNCIL ACTION: For Information Only

SUMMARY:

At its meeting of December 15, 2021, the Academic Programs Committee approved changes to the upper year requirements for the programs leading to a Bachelor of Science in Engineering. These changes were precipitated by the introduction of the redesigned common first year in the College of Engineering, which was previously approved by University Council.

The Academic Programs Committee recognised that these change will help align learning outcomes in the upper years of the BE programs, will help to ensure students' course loads are move evenly spread across the years, and will ensure that the BE programs continue to be vibrant and innovative

ATTACHMENTS:

1. Revisions to BE Years 2, 3, and 4



UNIVERSITY OF
SASKATCHEWAN

Proposal for Academic or Curricular Change

PROPOSAL IDENTIFICATION

Title of proposal: Revisions to the BE Years 2, 3 and 4

Degree(s): Bachelor of Science in Engineering (B.E.)

Field(s) of Specialization: Chemical, Civil, Computer, Electrical, Environmental, Geological,
Mechanical Engineering and Engineering Physics

Degree College: College of Engineering

Contact person(s) (name, telephone, fax, e-mail):

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Proposed date of implementation: 202205

Proposal Document

1. Academic justification:

The extensive changes to the Common First Year program were approved last year. Our new Common First Year, dubbed Re-Engineered, is unique in Canada, with its modular courses, just-in-time learning and consistent schedule to build better school/life balance.

The College's 2018-2025 Strategic Plan has four strategic pillars and many aspirations (long-term aims) and commitments (strategic initiatives to be pursued to advance one or more of our aspirations). Under the Strategic Pillar: Teaching and Learning, implementation a revised first-year engineering program was listed as a commitment. It is intended to support the aspiration to "offer exceptional academic programs that distinguish our graduates as well-rounded leaders whose technical, professional, and people skills create positive change in the world." Comprehensive changes to the upper years (years 2 to 4) in all of our programs also "embrace continuous program improvement to enhance learning outcomes and ensure relevance for our external stakeholders", including our accrediting body.

Similar to the changes to first year, changes to the upper years in all of our programs, are linked to the University Plan particularly through the "Courageous Curiosity" and "Boundless Collaboration" sections of the framework. All of these changes to the Bachelor of Science in Engineering programs at USask are useful additions to the University because they are designed to enhance student learning and experiences, and to enhance the reputation of the College and the University with its unique structure and design objectives. They are also aimed to increase student enrollment (Appendix C offers details on the enrollment to the College after just one admission cycle since these changes were initiated).

2. Admissions

College admission

The College of Engineering offers direct entry into the Bachelor of Science in Engineering program. High school, home-based learners, post-secondary, and special (mature) applicants can apply for admission into an common (undeclared) first year of engineering studies. Students are then required to apply into one of eight upper-year majors in the Winter term of their first year of engineering studies. Admission to the majors offered at the College of Engineering is determined through a competitive process based on admission into major average, student preference and capacity.

The proposed changes to the upper years do not suggest or require changing any aspects of College admission policies, procedures, or criteria.

Admission into Major

The approved redesign of the common first year program did, however, lead to changes in the admission into major requirements.

According to the old departmental program admission policy, the following eight courses have been used to generate a program admission average and rank prospective students for admission into the eight engineering programs: CHEM 114, GE 111, GE 121, GE 124, GE 125, MATH 123, MATH 124,

and PHYS 155. This set of eight courses has been replaced with new courses (Appendix A - Design of a New First Year Engineering Program at the University of Saskatchewan (Catalogue Entry)).

Admission into each of the undergraduate majors offered by the College of Engineering, established in the **Admission into Major** policy is still competitive in nature. Admission into major average is now based on the highest weighted average based on any combination of courses from the new first year curriculum that adds up to at least 18 credit units (and no longer a set of prescribed courses). Following the receipt of all applications to the engineering majors, the College of Engineering will rank undergraduate applications on the basis of student preference and “admission into major average” from highest to lowest average until quotas for majors are reached.

3. Description of the program

The overall curricular objectives of the Bachelor of Science in Engineering degree programs have not changed. Under the motto “Engage. Practice. Learn”, the College creates a tightknit community of faculty and students. Our class sizes remain our comparative advantage, which allows students to use equipment and software early on in their training. With the emphasis on hands-on experience and a number of extracurricular options offered, our students get top-quality training that, according to our alumni, translates into significant advantage in the workplace.

The following degree programs are currently offered at the College of Engineering:

- Chemical Engineering
 - o Chemical Engineering with Biochemical Option
 - o Chemical Engineering with Mineral Processing Option
 - o Chemical Engineering with Petroleum Option
- Civil Engineering
- Computer Engineering
- Electrical Engineering
- Engineering Physics
- Environmental Engineering
- Geological Engineering
 - o Geological Engineering with Mining Engineering Option
- Mechanical Engineering
 - o Mechanical Engineering with Mining Option.

All degree programs have a Common First Year, as well as the ability to enhance the experience with certificate programs (Certificate in Professional Communication and/or Certificate in Technological Innovation), and to gain practical experience through the Engineering Co-operative Internship Program option.

All of the proposed changes to the upper years of our programs (including the changes to the General Engineering courses) are intended to support the continuous improvement of the quality of engineering education offered at the College of Engineering, as well as the alignment of the redesigned Common First Year with the knowledge, skills and experiences our students get in years 2, 3 and 4.

A significant amount of research, consultation, thought and iteration has gone into the process of redesigning the Common First Year program for the College of Engineering, with the intent to better prepare students both technically and holistically, and provide them with better bridging for the

transition to their major. The changes to the upper years have been prepared with the same quality, care and academic rigor in mind.

Our students will have several courses in their Common First Year that will help them make an educated decision about which major, and ultimately which career, to choose; examples include GE 112.1 Engineering Discipline Experience and Discipline Bridge Courses (CMPT 146.3 Principles of Computer Science for Engineers, ME 113.3 Engineering Analysis I, CHE 113.3 Unit Operations in Chemical Process Engineering or CE 271.2 Spring Surveying Camp).

As is the case now, transfer students will be able to enter our degree programs from other programs in our or other academic institutions. The majority of internal and external transfer students transfer into our Common First Year, and then choose a major. For students who have enough credit units to transfer into upper years, there have been several updates to the transfer credit process to ease their transfer into programs; these include a new transfer credit policy and procedure and the use of special placeholder course that will allow the completion of missing modules of the first year course, while continuing with the upper year courses.

The College is also planning to develop several articulation agreements to facilitate the transfer of students into our programs.

The proposed changes to the upper years of our programs incorporate aspects of all five of the Learning Pursuits from the University Learning Charter, especially the pursuit of knowledge and the pursuit of skills and practices. These are intertwined to ensure that students at the time of their graduation possess all twelve of the graduate attributes required by the Canadian Engineering Accreditation Board. These twelve graduate attributes, from a knowledge base for engineers to lifelong learning, form an important component of the accreditation process, and the College tracks progress and attainment of these twelve graduate attributes.

All eight Bachelor of Engineering programs at the University of Saskatchewan are accredited by the Canadian Engineering Accreditation Board. Accreditation standards prescribe curriculum content, minimum accreditation units (AU)¹ for each curriculum component (mathematics, natural sciences, engineering science, engineering design and complementary studies) as well as the program minimum (1850 AU). New calculations of the accreditation units in each program have been conducted to ensure that the proposed changes (to all years) still allow each program to meet the requirements.

¹Accreditation units (AU) are defined on an hourly basis for an activity which is granted academic credit and for which the associated number of hours corresponds to the actual contact time between the student and the faculty member or designated alternates, responsible for delivering the program: one hour of lecture (corresponds to 50 minutes of activity) = 1 AU, one hour of laboratory or scheduled tutorial = 0.5 AU.
Engineers Canada, 2020 Accreditation Criteria and Procedures

Table 1: AU count with the old and new first year and upper year changes (the minimum required by CEAB is 1850 AUs)

<i>Program</i>	Old AU count (based on the old first year)	New AU count (redesigned first year and submitted upper-year program changes)
<i>Chemical Engineering</i>	2005	1962
<i>Civil Engineering</i>	2056	2102
<i>Computer Engineering</i>	1894	1997
<i>Electrical Engineering</i>	1953	2043
<i>Engineering Physics</i>	2135	2063
<i>Environmental Engineering</i>	2125	2045
<i>Geological Engineering</i>	2167	2214
<i>Mechanical Engineering</i>	1991	2081
<i>Common First Year</i>	543	611, 646 or 647 (depending on the selected program)

Summary of Changes (per major)

a) Chemical Engineering (CHE)

Program Changes

- § **Remove CHE 431.1** (Seminar) as a required course in the CHE major.
 - o The purpose of this course was to facilitate practice of technical presentations before an audience of peers. This course is now redundant since students have ample opportunity for practice in CHE 333.2 (lab 1), CHE 414.2 (lab 2), CHE 424.2 (lab 3), CHE 326.3 (Plant Design Project) and CHE 495.6 (Capstone).
- § **Remove Elective A** –Science Elective as a required course in the CHE major.
 - o After a student completes the new first year, the student will have the sufficient natural science material without Elective A. Thus, Elective A is unnecessary in the regular CHE program.
- § **Remove an Elective B** – Technical Elective from the CHE major (a reduction in the number of Elective B courses from 3 to 2).
 - o Historically, at the culmination of the CHE degree, students were expected to take two Elective B courses (during the final year of studies). A third Elective B was added with the introduction of the CHE options in the 2000s (then Biochemical, Biotechnology and Petroleum, now Biochemical, Petroleum and Mineral Processing) to allow for each to have specialized suite of courses with a nominal number of extra courses over the base degree.
CBE is in the process of revisiting and recasting the options and would like to reduce the number of Elective B courses for those students not in an option, to further distinguish between those who pursue an option and those who do not.

- § **Remove CMPT 113.3** Introduction to Computer Science for Engineers from the Chemical Engineering curriculum.
 - o With the advent of the new first year curriculum, this course will no longer be a required course.

Option replacement- Bioprocessing Option to replace Biochemical Option (separate Curricular Change Proposal)

With predictions that the bioeconomy will continue to grow, the Bioprocessing Option was proposed and developed with a course list and sequence including one existing, one modified, and four new courses. The option will be unique for the College of Engineering, complement existing programming, and fit well with the University of Saskatchewan goals and areas of the desired pre-eminence. In addition, the four new courses of the option add more choices to the Group A Elective and Group B Elective lists. No new students will be admitted into the Biochemical Option after 202305. Students who are currently enrolled in Biochemical Option will be able to complete the option or switch to Bioprocessing Option.

These changes will result in the change in number of credit units in Chemical Engineering:

Table 2: Chemical Engineering Credit Units Count

YEAR	OLD	NEW
1	34	44
2	36	27
3	35	35
4	35	31
TOTAL	140	137

Course Changes

- § **Change the pre-requisite for CHE 210.3** from (CHEM 115.3 and MATH 223.3 (taken)), to (CHEM 115.3 and MATH 223.3 (taken) or CHEM 146.3 and MATH 223.3 (taken)).
- § **Change the pre-requisite for CHE 220.3** from (CHEM 115.3), to (CHEM 115.3 or CHEM 146.3 and GE 163.3).

b) Civil Engineering (CE)

Program Changes

- § **Add GEOL 121.3** Earth Processes to the first term of second year of the CE program.
 - o The 3-credit science elective in first year, which is currently recommended to be GEOL 121.3 for CE and GEOE students, is being dropped in the new first-year program and replaced with a general science course that contains four modules of different topics. GEOL 121.3 is a prerequisite for GEOE 218, which is a core course in the CE program.
- § **Move GEOE 218.3** Engineering Geology to the second term of second year of the CE program.

- o GEOL 121.3 needs to be moved to first term of second year to accommodate the changes to the first-year program. GEOE 218.3, for which GEOL 121.3 is a prerequisite, then needs to be moved from first to second in second year (in place of CMPT 141).
- § **Remove CMPT 141.3** Introduction to Computer Science from second term of second year from the CE program.
 - o Programming course CMPT 142.3 is being added to first year. It replaces CMPT 141.3.
- § **Create new course CE 213.3** Mechanics of Materials and add into second term of second year of CE program (New course creation form and course outlines can be found in Appendix D).
- § **Delete GE 213.3** from the second term of second year of the CE program starting in 2022-2023 and add course CE 213.3 Mechanics of Materials in its place.
 - o GE 213 has two sections for second year students in all disciplines in the College. Mechanical Engineering teaches GE 213 in Term 1 and Civil Engineering is responsible for GE 213 in Term 2. Mechanical Engineering teaches GE 213 with less content, and the missing content is required by civil engineering students for their later structural engineering courses. The Term 1 course is therefore no longer appropriate for civil engineering students. The civil engineering structural engineering group also wants more flexibility to control the content of the course for sequencing.
- § Change Senior Humanities or Social Science elective in Term 2 of Third Year of the CE Program to a **Humanities or Social Science elective**.
 - o The elective list would combine the Junior Humanities or Social Science elective list from the previous first year with our current Senior Humanities or Social Science elective list.

These changes will result in the change in number of credit units in Civil Engineering:

Table 3: Civil Engineering Credit Units Count

YEAR	OLD	NEW
1	34	41
2	38	36
3	36	36
4	36	36
TOTAL	144	149

Course Changes

- § **Renumber CE 271.2** Spring Surveying Camp to CE 171.2 Spring Surveying Camp.
 - o CE 271.2 is moving to first year in 2021-2022 and should be appropriately numbered to match its timing in the program.
- § **Change the prerequisites for CE 271.2** (will be 171.2) Spring Surveying Camp from (CE 201 or CE 202) to (GE 133 Engineering Communication II or CE 201 or CE 202 or ENVE 201).

- o The change will be included in the new Catalogue (starting in 2022/23), but should take effect immediately (to accommodate current first year students).
- § **Change the prerequisite for CE 212.3** Civil Engineering Materials from CHEM 114.3 (taken) to CHEM 146.3 (taken).
 - o The new first year program will start in 2021-2022 and the first-year students will take CHEM 146.3 as their chemistry course. A prerequisite change for CE 212.3 needs to take effect for the year 2022-2023.
- § **Change the prerequisite for CE 202.3** Spatial Analysis and Engineering Drawings from GE 121.3 Engineering Design to GE 133.2 Engineering Communication 2.
 - o A prerequisite change for CE 202.3 needs to take effect for the year 2022-2023 to accommodate the changes to the first-year program. Engineering Communication 2 includes the first-year modules "Technical Communication II and III," "CAD," and "Research".
- § **Change the prerequisite for CE 225.3** Fluid Mechanics from GE 125.3 Engineering Mechanics II and MATH 223.3 (taken) to GE 123.3 Engineering Mechanics II (Statics) and MATH 223.3 (taken).
 - o The new first year program will start in 2021-2022 and the first-year students will take GE 123.3 as their statics course. It is statics that is needed for CE 225.3, not dynamics. The prerequisite change for CE 225.3 needs to take effect for the year 2022-2023.
- § **Change the prerequisite for GEOE 218.3** Engineering Geology from GEOL 121.3 pre- or co-requisite to GEOL 121.3 prerequisite starting the year 2022-2023.
 - o The change from GEOL 121.3 pre- or co-requisite to prerequisite is only to ensure students take GEOL 121.3 in Term 1 in the second year CE program.
- § **Change the prerequisites of CE 295.3** Design Project from CE 202.3 and 33 credit units from the (EN Four Year Common Core and CE Program Core) and prerequisite or corequisite of GE 213.3 and RCM 300.3 to the prerequisites of CE 202.3 and CE 212.3 and pre- or co-requisites of (CE 213.3 or GE 213.3), GEOE 218.3, and RCM 200.3 for the year 2022-2023.
 - o RCM 300.3 has been renumbered to RCM 200.3. GEOE 218.3 should be a prerequisite for the GEOE projects in CE 295. The credit unit reference was removed to reduce complexity and for clarity. CE 213 is the new course created to replace GE 213 in the CGEE department.
- § **Change the prerequisites for CE 318.3** Applied Engineering Mathematics from CMPT 113.3 (taken) or CMPT 141.3 (taken), CE 225.3 (taken), GE 213.3 (taken), and MATH 224.3 (taken) to CMPT 142.3 (taken), CE 225.3 (taken), GE 213.3 (taken), and MATH 224.3 (taken).
 - o CMPT 142.3 replaces CMPT 141.3 in the first-year program in 2021-2022.
- § **Change the prerequisites of CE 327.3** Municipal Engineering from CHEM 114.3 and CE 315.3 (taken) to CHEM 146.3 and CE 315.3.
 - o CHEM 146.3 replaces CHEM 114.3 in the first-year program in 2021- 2022. CE 315.3 has material that is important to CE 327.3; the CE 315.3 pre-requisite should be more than for sequencing (i.e. taken).
- § **Change the prerequisites of CE 329.3** Transportation Engineering I from Prerequisites: CE 271.2 (taken) and GE 210.3 (taken) to Prerequisites: CE 171.2, GE 210.3, and CE 202.3.
 - o CE 171.2 (renumbering of CE 271) will be taken in first year and will have a means to "upgrade" the final grade at the end of the course, as is the case for the other engineering

courses in first year. No taken requirement is needed. CE 329.3 requires GE 210.3 content to a higher degree than provided by a taken prerequisite. CE 202.3 includes important Civil 3D training and is soon to include GIS, and these are both important tools for CE 329.3.

- § **Change the prerequisites of CE 495.6** Capstone Design Project from Prerequisites: CE 295 and CE 318, Pre- or co-requisites: GE 348, CE 320, and 12 credit units from (W,G,S electives) To Pre-requisites: CE 295, CE 318, CE 320, GE 348, CE 327 (taken), CE 330 (taken), CE 329 (taken), CE 319 (taken), CE 321 (taken) and Pre- or Co-requisites: 9 credit units from (W,G,S electives), CE 467.

c) Computer Engineering (CME)

Program Changes

- § **Delete CMPT 141.3** Introduction to Computer Science from the first term of second year of the CME program starting in 2022-2023.
- § **Add course CMPT 270.3** Developing Object-Oriented Systems in the first term of second year of the CME program starting in 2022-2023.
 - o New revised program due to the changes in new first year. CMPT 146 and MATH 134 satisfy the prerequisites for CMPT 270.3.
- § **Delete CMPT 145.3** Principles of Computer Science from the second term of second year of the CME program starting in 2022-2023.
 - o CMPT 145.3 is redundant with the new first year course CMPT 146.3.
- § **Add course CMPT 280.3** Data Structures & Algorithms in the second term of second year of the CME program starting in 2022-2023.
- § **Delete EP 202.3** Electric and Magnetic Fields and Circuits from the first term of second year of the CME program starting in 2022-2023.
 - o The materials in EP 202 have been effectively integrated or replaced into new first year curriculum.
- § **Add course CMPT 214.3** Programming Principles and Practice in the first term of second year of the CME program starting in 2022-2023.
 - o CMPT 146 satisfies the prerequisite for CMPT 214 (verified with Computer Science).
- § **Delete CMPT 214.3** Programming Principles and Practice from the first term of third year of the CME program starting in 2022-2023.
- § **Move EE 232.3** Digital Electronics to the first term of second year from the second term of second year starting in 2022-23.
- § **Move EE 221.3** Analog Electronics to the second term of second year from the first term of second year starting in 2022-23.
- § **Move RCM 200.3** Effective Professional Communication to first term of third year from second term of third year starting in 2022-2023.
- § **Add CMPT 332.3** Operating Systems Concepts in the second term of third year of CME program starting in 2022-2023.
 - o CMPT 332 teaches fundamental concepts of operating systems and will become a core course in the CME program. CMPT 280 and CME 331 satisfy as the prerequisites for CMPT 332. We have received confirmation from Computer Science that a new section of

CMPT 332 will be offered in Winter 2024 and 2025 terms. Future offerings will depend on course outcomes and enrollments

The following motions will apply to the **Software Focus Area only** of CME program.

- § **Delete CMPT 270.3** Developing Object-Oriented Systems from the first term of third year of the CME program (Software Focus Area) starting in 2022-2023.
 - o CMPT 270 has been moved to second year from 2022-23.
- § **Delete CMPT 280.3** Data Structures & Algorithms from the second term of third year of the CME program (Software Focus Area) starting in 2022-2023.
 - o CMPT 280 has been moved to second year from 2022-23.
- § Delete all courses (CMPT 332, CMPT 370, CMPT 350, CMPT 432, CMPT 434, CMPT 436 and CMPT 470) from the fourth year of the Software Focus Area of CME program starting in 2022-2023.
 - o These courses have been reorganized in the revised program (Software Focus Area only in CME).
- § **Add CMPT 370.3** Intermediate Software Engineering in the first term of third year in Software Focus Area of CME program starting in 2022-2023.
 - o CMPT 280 satisfies as the prerequisites for CMPT 370.
- § **Add the following courses in the list of electives in third year** (in first or second term, depending on the offering) in Software Focus Area of CME program starting in 2022-2023.
 - CMPT 318.3 Data Analytics
 - CMPT 353.3 Full Stack Web Programming
 - CMPT 381.3 Implementation of Graphical User Interfaces
 - Students will choose **only one (3 credits) from the list.**
 - o New revised program due to the changes in new first year. CMPT 318 is a new course starting in 2022-23 (confirmation received from Computer Science). CMPT 270 and EE 216 satisfy as the prerequisites for CMPT 318. CMPT 280 satisfies as the prerequisites for CMPT 353. CMPT 270 satisfies as the prerequisites for CMPT 381. This list of elective courses will offer the students with a choice to pick one from two pathways, depending on their course load and career choice. One pathway leads to conventional topics in Computer Engineering like, Operating systems, Programming, Networks and Security. Another pathway leads to practical applications in Computer Engineering like, Machine learning, Image processing, Deep learning, Human computer interaction, etc. These courses are not term specific (i.e. offered in Term 1 or Term 2). Therefore, students can take them whenever the courses become available (so they will be listed as Term 1 or Term 2).

Computer Engineering Program

for students entering in 2021 or later

First Year

Intro to Eng I GE 102 Eng Discipline GE 112 Eng Mechanics GE 122	Design I GE 142 Electrical Circuits I GE 152 Intro to Comp Sci Eng CMPT 142	Eng Comm I GE 132 Eng Math I MATH 133 Atom & Nuclei PHYS 152	Eng Chemistry CHEM 142 Eng Geology GEOL 102 Eng Nature BIOL 102
Intro to Eng II GE 103 Eng Mechanics II GE 123 Eng Comm II GE 133	Design II GE 143 Electrical Circuits II GE 153 Process Eng GE 163	Eng Chemistry CHEM 146 Eng Math II MATH 134	Electromagnetism Waves PHYS 156 Computer Sci and Eng CMPT 146

Second Year

Prog. Principles and Practice CMPT 214 3L-2P	Digital Electronics EE 232 3L-3P alt.	Discrete Time Signals and Sys. EE 265 3L-1.5P	Safety and Stewardship EE 205 1L	Object-Oriented Systems CMPT 270 3L-1.5T	Calculus III for Engineers MATH 223 3L-1P
Prob., Stat. and Num. Methods EE 216 3L-1.5P	Analog Electronics EE 221 3L-3P alt.	Analog Signals and Systems EP 214 3L-2P	Materials and Heat Transport EE 271 3L-0.5T	Data Structures & Algorithms CMPT 280 3L-1.5T	Calculus IV for Engineers MATH 224 3L-1P

Third Year

Focus Area A Course I	Focus Area B/C Course I	Logic Design Using FPGAs CME 341 3L-3P	Microprocessor Embedded Sys. CME 331 3L-3P alt.	Professional Commun. RCM 200 3L	x
Focus Area A Course II	Focus Area A Course III	Focus Area B/C Course II	Science Elective 3L-3P	Engineering Economics GE 348 3L	Operating Systems CMPT 332

Fourth Year

Focus Area A Course IV	Focus Area A Course V	Focus Area B/C Course III	Focus Area B/C Course IV	Capstone Design Project CME 495 6P	Humanities or Social Science Elective 3L
Focus Area A Course VI	Focus Area B/C Course V	Engineering in Society GE 449 3L	Complementary Studies Elective 3L		x

Focus Areas (must choose Digital Systems (A), and DSP (B) or Software (C))

Digital Systems (A)

Third Year

VLSI SoC CME 342 3L-3P alt.	
Real Time Computing CME 332 3L-3P alt.	Network Arch CME 334 3L-3P alt.

Fourth Year

Digital Systems Architecture CME 433 3L-3P alt.	Verification of Digital Systems CME 435 3L-3P alt.
Design of Comp Systems CME 466 3L-3P	

DSP Applications (B)

Third Year

Digital Signal Processing EE 362 3L-3P alt.

Finite Precision Arithmetic EE 365 3L-3P alt.

Fourth Year

Digital Filter Design EE 461 3L-3P alt.	Digital Communication EE 456 3L-3P alt.
Design of a DSP System EE 465 3L-3P	

Software (C)

Third Year

Soft Engineering CMPT 370 3L/1.5P	Choose <u>one</u> from: List 1 / List 2 / Mix
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List 1 Data Analytics CMPT 318	List 2 Web Program CMPT 353 or Graphical UI CMPT 381
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Fourth Year

Embedded ML CME 465 3L-3P	Choose <u>any two</u> from: List 1 / List 2 / Mix
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List 1 Machine Learn CMPT 423 Mobile Cloud CMPT 436 HCI CMPT 481 Image Pro CMPT 487 Deep Learning CMPT 489	List 2 Adv OS CMPT 432 Comp Network CMPT 434 Comp Security CMPT 438 Adv Soft Eng CMPT 470
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- § **Add the following courses in the list of electives in fourth year** (in first or second term, depending on the offering) in Software Focus Area of CME program starting in 2022-2023.

CMPT 423.3 Machine Learning
 CMPT 436.3 Mobile and Cloud Computing
 CMPT 481.3 Human Computer Interaction
 CMPT 487.3 Image Processing and Computer Vision
 CMPT 489.3 Deep Learning
 CMPT 432.3 Advanced Operating Systems Concepts
 CMPT 434.3 Computer Networks
 CMPT 438.3 Introduction to Computer Security
 CMPT 470.3 Advanced Software Engineering

Students will choose **any two courses (6 credits) from the list.**

- o New revised program due to the changes in new first year. CMPT 318 and EE216 satisfy as the prerequisites for CMPT 423. CMPT 332 or CMPT 370 satisfy as the prerequisites for CMPT 436. CMPT 370 or CMPT 381 satisfy as the prerequisites for CMPT 481. EE 216 and CMPT 318 satisfy as prerequisites for CMPT 487. EE 216 and CMPT 318 satisfy as prerequisites for CMPT 489. CMPT 332 satisfies as prerequisites for CMPT 432 and CMPT 434. CMPT 332 and CMPT 434 satisfy as prerequisites for CMPT 438. CMPT 214 and CMPT 370 satisfy as prerequisites for CMPT 470.

This list of courses will offer the students with a choice to pick one from two pathways, depending on their course load and career choice. One pathway leads to conventional topics in Computer Engineering like, Operating systems, Programming, Networks and Security. Another pathway leads to practical applications in Computer Engineering like, Machine learning, Image processing, Deep learning, Human computer interaction, etc.

These courses are not term specific (i.e. offered in Term 1 or Term 2). Therefore, students can take them whenever the courses become available (so they will be listed as Term 1 or Term 2).

- § **Create new course CME 465.3 Embedded Machine Learning** in the first term of fourth year in the Software Focus Area of CME program starting in 2022-2023.

- o Due the evolution in artificial intelligence, machine learning (ML) algorithms are being applied in many applications these days. Conventional ML courses teach fundamental algorithms and software implementation of ML. However, many applications will require efficient hardware deployment of ML algorithms. This course will focus on efficient hardware implementation ML algorithms which will be unique to Computer Engineering program. Students from Computer Science may also enrol in this course. A new course proposal and course outline is attached in Appendix D. The first offering will take place in Fall 2024.

These changes will result in the change in number of credit units in Computer Engineering:

Table 4: Computer Engineering Credit Units Count

YEAR	OLD	NEW
1	34	44
2	34	34
3	33	33
4	33	33
TOTAL	134	144

Course Changes

- § **Change the prerequisites for CME 331.3** Microprocessor Based Embedded Systems from Prerequisite(s): CMPT 116 or CMPT 141; and EE 232 to Prerequisite(s): (CMPT 214 or CMPT 116 or CMPT 141) and EE 232.
- § **Change the prerequisites for CME 341.3** Logic Design Using FPGAs from Prerequisite(s): CMPT 116 or CMPT 141; and EE 232 to Prerequisite(s): (CMPT 214 (taken) or CMPT 116 or CMPT 141) and EE 232.
- § **Change the prerequisites for CME 332.3** Real Time Computing from Prerequisite(s): (CMPT 115 or CMPT 117 or CMPT 145); CME 331; and CME 341 (taken) to Prerequisite(s): CME 331 and CME 341 (taken).

d) Electrical Engineering (EE)

Program Changes

- § **Remove CMPT 116.3** Computing I from Y2T1 of the EE program.
- § **Add CMPT 214.3** Programming Principles and Practice to Y2T1 of the EE program. Computation is part of nearly all electronic systems today, and our graduates need instruction in computer programming that goes beyond the introductory level. CMPT 146 satisfies the pre-requisite for CMPT 214.
- § **Move EE 232.3** Digital Electronics from Y2T2 to Y2T1.
- § **Move EE 221.3** Analog Electronics from Y2T1 to Y2T2.
 - o Students typically have less difficulty with digital electronics than analog electronics. Also, this ordering parallels the signals and systems courses in Y2.
- § **Remove EE 444.3** (In the Power and Energy Stream) from the EE program beginning 2022-2023.
 - o Since renewable energy such as wind & solar PVs will be a significant source of electricity in the future, EE 444 which covers topics on conventional generators and motors, is being replaced by a new EE 448 -- renewable energy course
- § **Move EE 442.3** (In the Power and Energy Stream) from Term 2 to Term 1 beginning 2022-2023.
 - o EE 442 covers broader topics related to power system operation, control and protection. Because it covers broader topics it is appropriate to move it to Term 1.
- § **Create EE 448.3** Renewable Energy and Power Systems and inserted into the Power and Energy Stream of the EE program beginning the second/winter term of 2022-2023.
 - o Since renewable energy such as wind & solar PVs will be a significant source of electricity in the future, EE 448 -- renewable energy course is being added to the power & energy stream. New course creation form and course syllabus have been added in Appendix D.

These changes will result in the change in number of credit units in Electrical Engineering:

Table 5: Electrical Engineering Credit Units Count

YEAR	OLD	NEW
1	34	44
2	34	34
3	33	33
4	33	33
TOTAL	134	144

Course Changes

- § **Change the prerequisites for EE 265.3** Discrete Time Signals and Systems from Prerequisite(s): MATH 123 and MATH 124, Prerequisite(s) or Corequisite(s): CMPT 116 or CMPT 141, Note: Students with credit for EE 351 will not receive credit for this course, to Prerequisite(s): ((GE 152 and MATH 134) or (MATH 123 and MATH 124)) and (CMPT 142 or CMPT 116 or CMPT 141).
- § **Change the prerequisites for EE 271.3** Materials and Heat Transport in Electrical Engineering from Prerequisite(s): CHEM 114 and PHYS 155 (taken) to Pre-requisite(s): (CHEM 146 or CHEM 114) and (PHYS 156 (taken) or PHYS 155 (taken)).
- § **Change the prerequisites for EE 216.3** Probability Statistics and Numerical Methods from Prerequisite(s) MATH 123 and MATH 124 to Prerequisite(s) MATH 134 or (MATH 123 and MATH 124).
- § **Change the prerequisites for EE 241.3** Introduction to Electric Power Systems from Prerequisite(s): MATH 123 and MATH 124 and EP 202, Note: Students with credit for EE 212 will not receive credit for this course, to Pre-requisite(s): (MATH 134 or (MATH 123 and MATH 124)) and (GE 153 or EP 202).
- § **Change the prerequisites for EE 468.3** Design of a Computer Vision System from Prerequisite(s): EE 466 and EE 467 to Prerequisite(s): EE 467.
- § **Change the prerequisites for EE 232.3** Digital Electronics from Prerequisite(s): EE 221 to Prerequisite(s): GE 152 or EE 221.
- § **Change the prerequisites for EE 221.3** Analog Electronics from Prerequisite(s) or Corequisite(s): EP 202 to Prerequisite(s) or Corequisite(s): GE 153 or EP 202.
- § Moved that EE 441.3 be made a **pre-requisite for EE 448.3**.

e) Engineering Physics (EP)

Program Changes

- § **Remove CMPT 116.3** from the required course for the EP program.
 - o The computer class CMPT 116 is taken by all EP students in T1 of the second year. The class is not available anymore.
- § **Move EP 370.3** class to Year 2 Term 1 (from T1 in Year 3).
 - o Thermodynamics class EP 370 used to be given in T1 of year 2. Because of overload, it was moved to year 3. The EP program is now overloaded in year 3. Since free the time slot is available now from dropped CMPT 116 class, it can be allocated for the thermodynamics class. The class content has not changed in the past and will not change in EP 270 (renumbered EP 370).
- § **Move EE 232.3** Digital Electronics from Y2T2 to Y2T1.
- § **Move EE 221.3** Analog Electronics from Y2T1 to Y2T2.

These changes will result in the change in number of credit units in Engineering Physics:

Table 6: Engineering Physics Credit Units Count

YEAR	OLD	NEW
1	34	44
2	37	37
3	37	34
4	36	36
TOTAL	144	151

Course Changes (*went through the College of Arts & Science approval process*)

f) Environmental Engineering (ENVE)

Program Changes

- § **Add GEOL 121.3** Earth Processes to the first term of second year of the ENVE program.
 - o The ENVE students will need GEOL 121.3 as a prerequisite for GEOE 218.3, which is a core course in the ENVE program.
- § **Move GEOE 218.3** Engineering Geology to the second term of second year of the ENVE program.
 - o GEOL 121.3 is now in term 1 of second year. GEOE 218.3 can be moved from Term 1 to Term 2 in second year in place of CMPT 141.3.
- § **Remove CMPT 141.3** from second year Term 2 from the ENVE program.
 - o Programming course CMPT 142.3 is being added to first year. It replaces CMPT 141.3.
- § **Remove CHEM 115.3** General Chemistry II as a requirement from the ENVE program.

- o Currently, students in the ENVE program must complete BIOL 120.3 The Nature of Life, CHEM 115.3 General Chemistry II Chemical Processes and GEOL 121.3 Earth Processes by the end of Year 2. However, all engineering students will take now CHEM146.3 General Chemistry for Engineers in first year, which has equivalency to CHEM 115.3.
- § Make (keep) **BIOL120.3** program requirement to be taken in the ENVE second year (T1 or T2)
- § **Add a Jr. Humanities/Social Science elective** to the ENVE second year (T1 or T2).
 - o This elective was dropped from the new first year program but will now fit in the ENVE second year because CHEM 115.3 is no longer required.
- § **Delete GE 213.3** from the second term of second year of the ENVE program starting in 2022-2023 and **add course CE 213.3** Mechanics of Materials in its place.

These changes will result in the change in number of credit units in Environmental Engineering:

Table 7: Environmental Engineering Credit Units Count

YEAR	OLD	NEW
1	34	41
2	38	36
3	36	36
4	36	36
TOTAL	144	149

Course Changes

- § **Replace CE 271.2**, Spring Surveying Camp, with CE 171.2.
 - o The CE program is renumbering CE 271.2 as CE 171.2 since this surveying course is now at the end of first year.
- § **Change the prerequisite for ENVE 201.3** Principles of Environmental Engineering from EN First Year Common Core and (BIOL 120 and CHEM 115) or (BIOL 120 and GEOL 121) or (CHEM 115 and GEOL 121)] or EN Two Year Common Core to Prerequisite EN First Year Common Core or EN Two Year Common Core and to add restriction to ENVE students. "Approval of department" restriction to be used for non-ENVE students.
 - o CHEM 115 will no longer be required with the new first year program, GEOL 121 will be in Y2T1, and BIOL 120 will be in Y2T1/2. Students in the new first year program will get more exposure to these sciences through the Natural Science series (4 CU) and CHEM 146.3.

g) Geological Engineering (GEOE)

Program Changes

- § **Add GEOL 121.3** Earth Processes to the first term of second year of the GEOE program.
 - o The 3-credit science elective in first year, which is currently recommended to be GEOL 121.3 for CE and GEOE students, is being dropped in the new first-year program and replaced with a general science course that contains four modules of different topics.

GEOL 121.3 is a prerequisite for GEOE 218.3, which is a course core in the GEOE program.

- § **Move GEOE 218.3** Engineering Geology to the second term of second year of the GEOE program.
 - o GEOL 121.3 needs to be moved to Term 1 of second year to accommodate the changes to the first-year program. GEOE 218.3, for which GEOL 121.3 is a prerequisite, then needs to be moved from Term 1 to Term 2 in second year (in place of CMPT 141.3).
- § **Remove CMPT 141.3** from second year Term 2 from the GEOE program.
 - o Programming course CMPT 142.3 is being added to first year. It replaces CMPT 141.3.
- § **Delete GE 213.3** from the second term of second year of the GEOE program starting in 2022-2023 and **add course CE 213.3** Mechanics of Materials in its place.
- § **Change the 3-credit senior humanities elective to a junior humanities elective** in the second year of the GEOE program (term 1 or 2).
 - o Student will no longer take a Junior Social Science or Humanities elective in first year. The students will not have the pre-requisites required to take many of the senior humanities elective without a junior humanities course.

These changes will result in the change in number of credit units in Geological Engineering:

Table 8: Geological Engineering Credit Units Count

YEAR	OLD	NEW
1	34	41
2	38	36
3	42	42
4	33	33
TOTAL	147	152

Course Changes

- § **Change the prerequisite of GEOE 218.3** Engineering Geology from GEOL 121.3 pre- or co-requisite to GEOL 121.3 prerequisite.
 - o This was considered under the CE program.
- § **Replace CE 271.2**, Spring Surveying Camp, with CE 171.2 for the year GEOE program.

h) Mechanical Engineering (ME)

Program Changes

- § **Remove EE 204.3** Basic Electronics and Electrical Power from the Mechanical Engineering B.E. program.
- § **Remove CMPT 141.3** Introduction to Computer Science from the Mechanical Engineering B.E. program.

- § **Remove ME 251.3** Engineering Analysis I from the Mechanical Engineering B.E. program.
- § **Add GE 210.3** Probability and Statistics to the Fall Term of the second year Mechanical Engineering B.E. program.
- § **Add a 3-cu Junior Humanities or Social Science Elective** to be taken in either term of the second year Mechanical Engineering B.E. program.
- § **Add a 3-cu Science Elective** to be taken in either term of the second year Mechanical Engineering B.E. program.
- § **Remove a 3-cu Science Elective** from the third year of the Mechanical Engineering B.E. program.

These changes will result in the change in number of credit units in Mechanical:

Table 9: Mechanical Engineering Credit Units Count

YEAR	OLD	NEW
1	34	44
2	36	36
3	39	36
4	36	36
TOTAL	145	152

Course Changes

- § **Delete ME 251.3** Engineering Analysis I.
- § **Remove the tutorial sections of ME 229.3** Mechanical Engineering Design.
- § **Prerequisite/corequisite change in ME 215.3** Fluid Mechanics I due to first year redesign: From Prerequisite(s): MATH 223.3 (taken) Prerequisite(s) or Corequisite(s): GE 125.3, To: Prerequisite(s): MATH 223.3 (taken) Prerequisite(s) or Corequisite(s): GE 125.3 or GE 123.3.
- § **Prerequisite/corequisite change in ME 226.3** Mechanics III due to first year redesign: From Prerequisite(s): GE 125.3 and MATH 223.3 (taken), To: Prerequisite(s): (GE 125.3 or GE 123.3), GE 152.1, and MATH 223.3 (taken).
- § **Prerequisite/corequisite change in ME 227.3** Thermodynamics I due to first year redesign: From Prerequisites: CHEM 114.3 and MATH 124.3 (taken), To Prerequisites: (CHEM 114.3 or CHEM 146.3) and [MATH 124.3 (taken) or MATH 134.3 (taken)].
- § **Prerequisite/corequisite change in ME 229.3** Introduction to Mechanical Engineering Design due to first year redesign, From Prerequisite(s): GE 121.3, GE 125.3 (taken), and ME 214.3 (taken), To Prerequisite(s): (GE 121.3 or GE 143.2), [GE 125.3 (taken) or GE 123.3 (taken)], ME 113.3, and ME 214.3 (taken).

- § **Prerequisite/corequisite change in ME 313.3** Mechanics of Materials I due to first year redesign, From Prerequisite(s): GE 111.3 (taken), GE 213.3 (taken), and MATH 223.3 (taken), To Prerequisite(s): [GE 111.3 (taken) or MATH 134.3 (taken)], GE 213.3 (taken), and MATH 223.3 (taken).
- § **Prerequisite/corequisite change in ME 314.3** Machine Design I due to first year redesign, From Prerequisite(s): ME 313.3 (taken), ME 226.3, ME 251.3 (taken), ME 324.3 (taken), and MATH 224.3 (taken), To Prerequisite(s): ME 313.3 (taken), ME 226.3, [ME 251 or (ME 113.3 (taken) and GE 210.3 (taken))], ME 324.3 (taken), and MATH 224.3 (taken).
- § **Prerequisite/corequisite change in ME 321.3** Engineering Analysis II due to first year redesign, From Prerequisite(s): ME 251.3 (taken) and MATH 224.3 (taken), To Prerequisite(s): [ME 251.3 or (ME 113.3 (taken) and GE 210.3 (taken))] and MATH 224.3 (taken).
- § **Prerequisite/corequisite change in ME 352.3** Engineering Analysis III due to first year redesign, From Prerequisite(s): ME 226, ME 251 (taken) and MATH 224 (taken), To Prerequisite(s): ME 226, [ME 251 (taken) or ME 113 (taken)], and MATH 224 (taken).

Changes to the Mining Option (separate Curricular Change Proposal)

As a result of the first-year program redesign, ME students in the Mining Option can no longer take Earth Processes (GEOL 121.3) in the first year. GEOL 121 is a prerequisite for some of the required upper-year courses in the Mining Option. There is, therefore, a need to introduce GEOL 121.3 to the second year stream of courses for ME students in the Mining Option. There is also a need to remove the third-year science electives in the Mining Option to keep the total number of credit units the same as for other ME students. The list of required internship courses also needs to be updated since the Engineering Co-op Internship Program (ECIP) has replaced the Engineering Professional Internship Program (EPIP). With these changes, the total number of credit units for a student in the Mining Option will be one more credit unit when compared to student not enrolled in the Mining Option. The extra one credit unit comes from ECIP 200.1, which every student enrolled in the Co-op program must take.

i) General Engineering (GE)

- § **Delete course GE 101.1** Introduction to the Engineering Profession.
- § **Delete course GE 111.3** Engineering Problem Solving.
- § **Delete course GE 121.3** Engineering Design.
- § **Delete course GE 124.3** Engineering Mechanics I.
- § **Delete course GE 125.3** Engineering Mechanics II.
- § **Delete course EE 204.3** Basic Electronics and Electrical Power.
- § **Change the prerequisite for GE 210.3** Probability and Statistics from Prerequisite(s): MATH 124.3 (taken), to MATH 124.3 (taken) or MATH 133.4.
- § **Change the prerequisite GE 213.3** Mechanics of Materials from Prerequisite(s): GE 125.3 (taken) to GE 123.3 or GE 124.3.

- § Change the **EN Year Two Common Core** due to overhaul of the common first year.
- § Change the **EN Year Three Common Core** due to overhaul of the common first year.
- § Change the **EN Year Four Common Core** due to overhaul of the common first year.

4. Consultation

The College of Engineering consulted various stakeholders and governing bodies as part of the endorsement process for the changes to the new first year. Proposed changes to the upper years are continuation of the process of making our Engineering programs some of the most effective, innovative and comprehensive in Canada.

Within the College, there were consultations with the faculty, staff and students in various forms. Each year the College of Engineering conducts the exit survey where it asks its graduating students about their experiences and recommendations. Graduands comment on the programs strengths, curricula as well as areas for improvement. The exit surveys have been, and will continue to be used for program evaluation and continual improvement. Here are some of the student comments from the survey conducted in May 2021:

‘I don’t think anything should necessarily be removed, as all of the classes I took taught important concepts to know as a future engineer.’

‘I don’t think anything should be removed, improvements to the existing program would be sufficient.’

‘Due to so many classes over a regular 4 year program. I think some of the elective classes (some humanities) could be removed to make it more manageable.’

‘The expectation of drafting abilities should also be eliminated, as there are whole programs dedicated to that field. Several courses penalized me for not being skilled in AutoCAD, when this should not be a reasonable expectation.’

Given that the proposal for curricular change affects other academic units on campus, several departments in the College of Arts and Science were consulted as part of the development of this proposal.

The Office of the University Registrar was consulted as a part of the proposal approval process. In particular, a Consultation with the Registrar form was drafted and signed on date November 23, 2021). This process involved consultation extensive team, including the University Registrar, the Senior Coordinator of Academic Programs and Catalogue, and a Functional Analyst from Student Information Systems.

The Governance Office was consulted during the development of this proposal. In particular, the Academic Governance and Hearings Advisor was consulted to confirm approval timelines and details of the process of this proposal.

This proposal is now being submitted to the Academic Programs Committee of Council and all other relevant governing bodies for subsequent review and approval.

5. Budget

No significant changes in the budget of the College or any department are required for the changes in the upper years.

The projected increase in the first year students was confirmed by the most recent first year enrolment number (presented in Appendix C). It is anticipated that this increase in the new first year students will continue to translate into increased number of students in the upper years; still, the numbers are expected to be manageable within current resources. Also, a number of our senior courses have capacity for increased enrolment.

Further, changes to and deletion of many General Engineering courses along with the setup of a dedicated team (of five) first year instructors, will lead to some changes in the teaching assignments in the Departments. The Departments will now have to devote resources only to several senior General Engineering classes remaining.

The approved changes to the first year curriculum and the proposed changes to the upper years will result in changes to total number of credit units in each program (increase of credit units in all programs except for Chemical Engineering. The total tuition charged per student in each program and the effective tuition revenue for all eight engineering programs is summarized in Table 11 below:

Table 11: Tuition total per student and tuition total revenue per program

PROGRAM	Total tuition per student				Effective Tuition Revenue*	
	Current Program	New Program	Change	% Change	Total	Change (New – Current)
CHE	\$ 33,444	\$ 32,602	\$ (843)	-2.5%	\$ 3,251,369	\$9,589
CE	\$ 34,610	\$ 35,738	\$ 1,128	3.3%	\$ 5,424,287	\$297,730
CME	\$ 32,093	\$ 33,466	\$ 1,373	4.3%	\$ 2,570,819	\$167,828
EE	\$ 32,086	\$ 34,192	\$ 2,106	6.6%	\$ 3,566,962	\$305,615
EP	\$ 34,427	\$ 36,040	\$ 1,613	4.7%	\$ 1,646,769	\$112,211
ENVE	\$ 34,325	\$ 35,578	\$ 1,253	3.7%	\$ 1,117,266	\$65,446
GEOE	\$ 35,172	\$ 36,299	\$ 1,128	3.2%	\$ 1,212,056	\$65,470
ME	\$ 34,761	\$ 36,317	\$ 1,556	4.5%	\$ 6,896,481	\$469,952
					\$25,686,009.00	\$1,493,841.00

**Note: Effective tuition revenue is based on the participation factors based on the 5-year average, as well as the upper year attrition*

College Statement

Following the departmental approvals, these curricular changes were discussed and approved on meetings of the Undergraduate Academics Programs Committee of the College held on:

November 11, 2020,

March 8, 2021,

April 14, 2021,

May 10 2021,

June 14, 2021,

September 9, 2021,

October 10, 2021 and

November 8, 2021.

The proposal was presented to the Faculty Council on meeting held November 17, 2021.

The College of Engineering support the presented changes.

Bruce Sparling, Ph.D., P.Eng., FCSCE

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College of Engineering

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Catalogue Entry

Chemical Engineering (137 credit units)

Bachelor of Science in Engineering (B.E.) - Chemical Engineering

Year 1 (41-44 credit units)

All Engineering programs have a common first year.

Note: Students in the Chemical Engineering Undergraduate Program cannot use ENVE 201 as a substitute for CHEM 242.

Year 2 (36 27 credit units)

Fall Term

- CHE 220.3 Introduction to Process Engineering
- CHEM 242.3 Thermodynamics and Kinetics (~~if CHEM 115.3 General Chemistry-II Chemical Processes has not been taken, it must be taken in this term.~~)
- CHEM 250.3 Introduction to Organic Chemistry
- ~~EE 204.3 Basic Electronics and Electrical Power~~
- GE 213.3 Mechanics of Materials
- MATH 223.3 Calculus III for Engineers

Winter Term

- ~~3 credit units Group A Elective (students must take CHEM 242.3 Thermodynamics and Kinetics if it has not been taken in Fall Term)~~
- CHE 210.3 Fluid Mechanics I
- CHE 223.3 Chemical Thermodynamics
- CHEM 221.3 Analytical Chemistry I or BMSC 240.3 Laboratory Techniques
- ~~CMPT 113.3~~
- MATH 224.3 Calculus IV for Engineers

Year 3 (**32 - 35** credit units)

Fall Term

- [CHE 323.3](#) Chemical Engineering Thermodynamics
- [CHE 325.3](#) Process Engineering and Design I
- [CHE 470.0](#) Industrial Site Visitation
- [CHEM 231.3](#) Inorganic Chemistry I
- [GE 210.3](#) Probability and Statistics

Winter Term

- [CHE 315.3](#) Equilibrium Stage Operations
- [CHE 322.3](#) Mathematical Modelling
- [CHE 324.3](#) Heat Transfer
- [CHE 326.3](#) Plant Design Project
- [CHE 333.2](#) Chemical Engineering Laboratory I

Fall Term or Winter Term

- 3 credit units Complementary Studies Elective (over year 3 or year 4)
- [GE 348.3](#) Engineering Economics
- [RCM 200.3](#) Engineering Professional Communication

Year 4 (**35 - 38 31- 34** credit units)

Fall Term

- [CHE 411.3](#) Chemical Reaction Engineering
- [CHE 414.2](#) Chemical Engineering Laboratory II
- [CHE 421.3](#) Mass Transfer
- [CHE 423.3](#) Process Dynamics and Control

Winter Term

- 3 credit units Group B Elective or a 400-level approved Technical Elective from another Department
- [CHE 424.2](#) Chemical Engineering Laboratory III
- [GE 449.3](#) Engineering in Society

Fall Term or Winter Term

- 3 credit units Senior Humanities or Social Science Elective
- **6 3** credit units Group B Elective (over year 3 or year 4)
- ~~[CHE 431.1](#)~~ Seminar

Fall Term and Winter Term

Choose 6 credit units from the following:

- [CHE 495.6](#) Process Engineering and Design II
- [GE 495.6](#) Technological Innovation Capstone Design Project

Elective Lists

Please consult an Academic Advisor. Some electives offered by other departments are given in alternate years.

Group A Elective List

- BIOC 300.3
- [BMIS 310.3](#) Proteins and Enzymes
- [BIOL 120.3](#) The Nature of Life or [GEOL 121.3](#) Earth Processes
- [BMSC 200.3](#) Biomolecules (formerly BIOC 200.3)
- [CHE 364.3](#) Petrochemical Engineering
- [CHEM 255.3](#) Bio Organic Chemistry
- [CHEM 322.3](#) Analytical Chemistry II
- [CHEM 344.3](#) Introductory Chemical Quantum Mechanics
- [CHEM 375.3](#) Environmental Chemistry
- [CHEM 377.3](#) Industrial Chemistry
- [CMPT 145.3](#) Principles of Computer Science
- [CMPT 215.3](#) Introduction to Computer Organization and Architecture
- [FABS 212.3](#) Agrifood and Resources Microbiology
- [ME 214.3](#) Introduction to Materials and Manufacturing
- [ME 324.3](#) Engineering Materials

Group B Elective List

- CHE 320.3
- [CHE 369.3](#) Fundamentals of Mineral Processing and Hydrometallurgy
- [CHE 453.3](#) Corrosion Engineering
- [CHE 454.3](#) Design of Industrial Waste Treatment Systems
- [CHE 460.3](#) Oil and Natural Gas Upgrading
- [CHE 461.3](#) Introduction to Biochemical Engineering
- [CHE 464.3](#) Petroleum Production Engineering
- [CHE 469.3](#) Industrial Mineral Processing
- [GEOE 377.3](#) Fundamentals of Mining and Mineral Processing
- [GEOE 466.3](#) Petroleum Geomechanics
- [ME 478.3](#) Introduction to Fire Protection Engineering

Note: Some Group B electives are offered in alternating years while others are offered annually. Consult with a faculty advisor to determine the availability of specific electives.

Complementary Studies Elective

- [ANTH — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [ARBC — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [ARCH — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [ARTH — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [CHIN — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [CLAS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [CMRS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [COMM- 100-Level](#)
- [COMM 201.3](#) Introduction to Financial Accounting
- [COMM 203.3](#) Introduction to Finance
- [COMM 204.3](#) Introduction to Marketing
- [COMM 205.3](#) Introduction to Operations Management
- [COMM 210.3](#) Introduction to Management Accounting
- [COMM 211.3](#) Human Resource Management
- [COMM 229.3](#) **Personal Financial Management**
- [COMM 304.3](#) Introduction to Business Law
- [COMM 306.3](#) Ethics and Strategic Decision Making
- [COMM 308.3](#) Cost Management Systems
- [COMM 321.3](#) Corporate Financial Reporting I
- [COMM 323.3](#) Corporate Financial Reporting II
- [COMM 329.3](#)
- [COMM 337.3](#) Business Information and Accounting Systems
- [COMM 340.3](#) Introduction to International Business
- [COMM 342.3](#) Organization Structure and Design
- [COMM 343.3](#) Recruitment Selection and Engagement
- [COMM 345.3](#) Business and Public Policy
- [COMM 346.3](#) Technology Commercialization
- [COMM 347.3](#) Indigenous Business in Canada
- [COMM 348.3](#) Leadership
- [COMM 349.3](#) Introduction to Entrepreneurship
- [COMM 352.3](#) Marketing Strategy
- [COMM 354.3](#) Consumer Behaviour
- [COMM 357.3](#) Marketing Research
- [CREE — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [ECON 111.3](#) Introductory Microeconomics
- [ECON 114.3](#) Introductory Macroeconomics
- [ECON 211.3](#) Intermediate Microeconomics
- [ECON 214.3](#) Intermediate Macroeconomics
- [ECON 221.3](#) Women and the Economy
- [ECON 223.3](#) Labour Economics
- [ECON 227.3](#) Wage Determination
- [ECON 234.3](#) Economics of Health Care
- [ECON 254.3](#) International Trading System
- [ECON 256.3](#) International Monetary System
- [ECON 270.3](#) Development in Non Industrialized Countries
- [ECON 275.3](#) Economics of Natural Resources
- [ECON 277.3](#) Economics of the Environment
- [ECON 280.3](#) Classical Economics
- [ENG — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [FREN — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [GEOG 130.3](#) Environment Health and Planning

- [GEOG 202.3](#) Regional Geography of Canada
- [GEOG 204.3](#) Geography of the Prairie Region
- [GEOG 208.3](#) World Regional Development
- [GEOG 240.3](#) Sustainable Cities and Regions
- [GEOG 280.3](#) Environmental Geography
- [GERM — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [GRK — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [HEB — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [HIST — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [HNDI — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [INDG — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [IS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [JPNS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [LATN — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [LING — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [LIT — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [MUS 101.3](#) Fundamentals of Music
- [PHIL 120.3](#) Knowledge Mind and Existence
- [PHIL 121.3](#) Introduction to World Philosophies
- [PHIL 133.3](#) Introduction to Ethics and Values
- [PHIL 140.3](#) Critical Thinking
- [PHIL 202.3](#) Philosophy of Religion
- [PHIL 206.3](#) Early Modern Philosophy
- [PHIL 208.3](#) Ancient Philosophy Pre-Socratic to Plato
- [PHIL 209.3](#) Ancient Philosophy Aristotle to Plotinus
- [PHIL 210.3](#) Medieval Philosophy I From Rome to Baghdad and Paris
- [PHIL 218.3](#) Existentialism
- [PHIL 219.3](#) Phenomenology
- [PHIL 224.3](#) Philosophy of Sexuality
- [PHIL 226.3](#) Environmental Philosophy
- [PHIL 227.3](#) Feminist Philosophy
- [PHIL 227.3](#) Feminist Philosophy
- [PHIL 231.3](#) Moral Problems
- [PHIL 233.3](#) Ethical Theory
- [PHIL 234.3](#) Biomedical Ethics
- [PHIL 235.3](#) Business and Professional Ethics
- [PHIL 236.3](#) Ethics and Technology
- [PHIL 237.3](#) Law and Morality
- [PHIL 238.3](#) Ethical Issues in Scientific Research
- [PHIL 251.3](#) Philosophy of Science
- [PHIL 262.3](#) Social and Political Philosophy
- [PHIL 265.3](#) Decision and Choice Theory
- [PHIL 271.3](#) Aesthetics and Philosophy of Art
- [PHIL 281.3](#) Theory of Knowledge
- [PHIL 285.3](#) Persons Minds and Bodies
- [PHIL 292.3](#) Metaphysics Reality Existence and Change
- [PHIL 294.3](#) Philosophy of Human Nature
- [PHIL 296.3](#)
- [POLS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [PSY — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [RCM — 400-Level](#)
- [RLST — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [RUSS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [SNSK — 100-Level, 200-Level, 300-Level, 400-Level](#)

- [SOC — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [SPAN — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [UKR — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [WGST — 100-Level, 200-Level, 300-Level, 400-Level](#)
- ~~Exception: CLAS 104 cannot be used to meet the Complementary Studies Elective Requirements of the program.~~
- **Exception:** COMM 121.3 is restricted to Edwards School of Business students.

Senior Humanities or Social Science Elective

- [ANTH — 200-Level, 300-Level, 400-Level](#)
- [ARCH — 200-Level, 300-Level, 400-Level](#)
- [CLAS — 200-Level, 300-Level, 400-Level](#)
- [ECON — 200-Level, 300-Level, 400-Level](#)
- [ENG — 200-Level, 300-Level, 400-Level](#)
- [GEOG 202.3](#) Regional Geography of Canada
- [GEOG 204.3](#) Geography of the Prairie Region
- [GEOG 208.3](#) World Regional Development
- [GEOG 240.3](#) Sustainable Cities and Regions
- [GEOG 280.3](#) Environmental Geography
- [HIST — 200-Level, 300-Level, 400-Level](#)
- [INDG — 200-Level, 300-Level, 400-Level](#)
- [IS — 200-Level, 300-Level, 400-Level](#)
- [PHIL — 200-Level, 300-Level, 400-Level](#)
- [POLS — 200-Level, 300-Level, 400-Level](#)
- [PSY — 200-Level, 300-Level, 400-Level](#)
- [RLST — 200-Level, 300-Level, 400-Level](#)
- [SOC — 200-Level, 300-Level, 400-Level](#)
- [WGST — 200-Level, 300-Level, 400-Level](#)
- **Exception:** ECON 204 cannot be used to meet the Complementary Studies, Senior Humanities or Social Science elective requirements of the program.
- **Exception:** PSY 233 and PSY 236 cannot be used to meet the Complementary Studies, Senior Humanities or Social Science elective requirements of the program.
- **Exception:** PHIL 241 cannot be used to meet the Senior Humanities or Social Science elective requirements of the program.
- **Exception:** SOC 225 cannot be used to meet the Complementary Studies, Senior Humanities or Social Science elective requirements of the program.
- **Note:** The following Engineering courses will also satisfy the Humanities/Social Science elective requirement: RCM 400, RCM 401, RCM 402, RCM 403, RCM 404, RCM 405, RCM 406, RCM 407, RCM 408, RCM 409, RCM 410, and RCM 495.

Civil Engineering (149 credit units)

Bachelor of Science in Engineering (B.E.) - Civil Engineering

Year 1 (41-44 credit units)

All Engineering programs have a [common](#) first year.

Year 2 (38 36 credit units)

Fall Term

- [CE 202.3](#) Spatial Analysis and Engineering Drawings
- [CE 212.3](#) Civil Engineering Materials
- [GE 210.3](#) Probability and Statistics
- [GEOL 121.3](#) Earth Processes
- [MATH 223.3](#) Calculus III for Engineers

If ~~GEOL 121~~ is not taken as the science elective in Year 1, it must be taken in Fall Term of Year 2.

Winter Term

- [CE 225.3](#) Fluid Mechanics
- [CE 295.3](#) Design Project
- ~~[CMPT 141.3](#) Introduction to Computer Science~~
- [GE 213.3](#) [CE 213.3](#) Mechanics of Materials
- [GEOE 218.3](#) Engineering Geology
- [MATH 224.3](#) Calculus IV for Engineers

Fall Term or Winter Term

- 3 credit units Science Elective [List 1](#) or [List 2](#)
- [RCM 200.3](#) Engineering Professional Communication

Spring Term

- ~~[CE 271.2](#) Spring Surveying Camp~~

Year 3 (36 credit units)

Fall Term

- [CE 315.3](#) Fluid Mechanics and Hydraulics
- [CE 317.3](#) Structural Analysis
- [CE 318.3](#) Applied Engineering Mathematics
- [CE 320.3](#) Project Engineering
- [CE 328.3](#) Fundamentals of Soil Mechanics
- [GE 348.3](#) Engineering Economics

Winter Term

- [CE 319.3](#) Hydrology
- [CE 321.3](#) Structural Systems and Materials
- [CE 327.3](#) Municipal Engineering
- [CE 329.3](#) Transportation Engineering I
- [CE 330.3](#) Geotechnical Engineering
- 3 credit units ~~Senior~~ Humanities or Social Science Elective

Year 4 (36 credit units)

Fall Term and Winter Term

- [CE 495.6](#) Capstone Design Project

Fall Term or Winter Term

27 credit units (9 courses)

- 3 credit units CE Elective Courses (Group G)
- 3 credit units CE Elective Courses (Group P)
- 3 credit units CE Elective Courses (Group S)
- 3 credit units CE Elective Courses (Group W)
- 12 additional credit units CE Elective courses (Groups W, G, or S)
- 3 additional credit units CE Elective courses (Groups W, G, S, P, or R)

Winter Term

- [GE 449.3](#) Engineering in Society

Electives

Science Elective

If **GEOL 121.3** Earth Processes is not taken as the science elective in Year 1, it must be taken in Fall Term of Year 2.

List 1

- **BIOL 120.3** The Nature of Life
- **CHEM 115.3** General Chemistry II Chemical Processes
- **GEOL 121.3** Earth Processes
- **PHYS 125.3** Physics and Technology

List 2

- **ASTR 213.3** Astronomical Photometry
- **ASTR 214.3** Astronomical Spectroscopy
- **CHEM 221.3** Analytical Chemistry I
- **CHEM 231.3** Inorganic Chemistry I
- **CHEM 242.3** Thermodynamics and Kinetics
- **CHEM 250.3** Introduction to Organic Chemistry
- **EVSC 203.3** Sampling and Laboratory Analysis
- **EVSC 210.3** Environmental Physics
- **GEOG 120.3** Introduction to Global Environmental Systems
- **GEOL 224.3** Mineralogy
- **GEOL 245.3** Introduction to Sedimentary Rocks
- **GEOL 258.3** Structural Geology

CE Elective Courses

CE electives are offered subject to minimum enrolment and staffing considerations. Civil Engineering students are required to complete 27 credit units from Groups W, G, S, P, or R:

W: Water and Municipal Engineering

- **CE 415.3** Structures for Water Management
- **CE 464.3** Water Resources Engineering
- **ENVE 414.3** Water and Wastewater Engineering
- **GEOE 375.3** Engineering Hydrogeology

G: Soil, Pavement and Geotechnical Engineering

- **CE 417.3** Pavement Materials and Design
- **CE 466.3** Geotechnical Modelling
- **CE 468.3** Environmental Geotechnics
- **GEOE 315.3** Rock Mechanics

S: Structural Engineering

- [CE 418.3](#) Design in Reinforced Concrete
- [CE 463.3](#) Advanced Structural Analysis
- [CE 470.3](#) Design in Structural Steel
- [CE 474.3](#) Design in Masonry

P: Projects and Planning

- [CE 421.3](#) Engineering Project Management
- [CE 467.3](#) Transportation Engineering II
- [ENVE 381.3](#) Sustainability and Environmental Assessment
- [GE 496.3](#) Technological Innovation Design Project

R: Related Courses

- [ME 478.3](#) Introduction to Fire Protection Engineering
- [PLAN 341.3](#) Urban Planning
- [PLAN 350.3](#) Transportation Planning and Geography
- [RCM — 400-Level](#)

Senior Humanities or Social Science Elective

- [ANTH 111.3](#) One World Many Peoples Introduction to Cultural Anthropology One World Many Peoples Introduction to Cultural Anthropology
- [ARCH 112.3](#) The Human Journey Introduction to Archaeology and Biological Anthropology The Human Journey Introduction to Archaeology and Biological Anthropology
- [ARCH 116.3](#) Introduction to Near Eastern and Classical Archaeology Introduction to Near Eastern and Classical Archaeology
CLAS 104.
- [CLAS 110.3](#) Greek Civilization Greek Civilization
- [CLAS 111.3](#) Roman Civilization Roman Civilization
- [CMRS 110.3](#) The Graeco Roman Tradition Evolution and Reception The Graeco Roman Tradition Evolution and Reception
- [CMRS 111.3](#) Medieval and Renaissance Civilization Medieval and Renaissance Civilization
- [ECON 111.3](#) Introductory Microeconomics Introductory Microeconomics
- [ECON 114.3](#) Introductory Macroeconomics Introductory Macroeconomics
- [GEOG 130.3](#) Environment Health and Planning Environment Health and Planning
- [HIST 110.3](#)
- [HIST 111.3](#)
- [HIST 115.3](#) History Matters Ideas and Culture History Matters Ideas and Culture
- [HIST 121.3](#)
- [HIST 122.3](#)
- [HIST 125.3](#) History Matters Indigenous Colonial and Post Colonial Histories History Matters Indigenous Colonial and Post Colonial Histories
- [HIST 135.3](#) History Matters Gender Sex and Society History Matters Gender Sex and Society
- [HIST 145.3](#) History Matters War Violence and Politics History Matters War Violence and Politics
- [HIST 155.3](#) History Matters Science and Environment History Matters Science and Environment
- [HIST 165.3](#) History Matters Health and Society History Matters Health and Society
- [HIST 175.3](#) History Matters Identities and Communities in Transition History Matters Identities and Communities in Transition
- [INDG 107.3](#) Introduction to Canadian Indigenous Studies Introduction to Canadian Indigenous Studies
- [LING 111.3](#) Structure of Language Structure of Language

- **LING 112.3** Dynamics of Language Dynamics of Language
- **PHIL 120.3** Knowledge Mind and Existence Knowledge Mind and Existence
- **PHIL 133.3** Introduction to Ethics and Values Introduction to Ethics and Values
- **PHIL 140.3** Critical Thinking Critical Thinking
- **POLS 111.3** Democratic Citizenship in Canada Democratic Citizenship in Canada
- **POLS 112.3** Justice and Injustice in Politics and Law Justice and Injustice in Politics and Law
- **PSY 120.3** Biological and Cognitive Bases of Psychology Biological and Cognitive Bases of Psychology
- **PSY 121.3** Social Clinical Cultural and Developmental Bases of Psychology Social Clinical Cultural and Developmental Bases of Psychology
- **SOC 111.3** Foundations in Sociology Society Structure Process Foundations in Sociology Society Structure Process
- **SOC 112.3** Foundations in Sociology Social Construction of Everyday Life Foundations in Sociology Social Construction of Everyday Life
- **WGST 112.3** Introduction to Womens and Gender Studies Introduction to Womens and Gender Studies

- **ANTH — 200-Level, 300-Level, 400-Level**
- **ARCH — 200-Level, 300-Level, 400-Level**
- **CLAS — 200-Level, 300-Level, 400-Level**
- **ECON — 200-Level, 300-Level, 400-Level**
- **ENG — 200-Level, 300-Level, 400-Level**
- **GEOG 202.3** Regional Geography of Canada
- **GEOG 204.3** Geography of the Prairie Region
- **GEOG 208.3** World Regional Development
- **GEOG 240.3** Sustainable Cities and Regions
- **GEOG 280.3** Environmental Geography
- **HIST — 200-Level, 300-Level, 400-Level**
- **INDG — 200-Level, 300-Level, 400-Level**
- **IS — 200-Level, 300-Level, 400-Level**
- **PHIL — 200-Level, 300-Level, 400-Level**
- **POLS — 200-Level, 300-Level, 400-Level**
- **PSY — 200-Level, 300-Level, 400-Level**
- **RLST — 200-Level, 300-Level, 400-Level**
- **SOC — 200-Level, 300-Level, 400-Level**
- **WGST — 200-Level, 300-Level, 400-Level**

- **Exception:** ECON 204 cannot be used to meet the Complementary Studies, Senior Humanities or Social Science elective requirements of the program.
- **Exception:** PSY 233 and PSY 236 cannot be used to meet the Complementary Studies, Senior Humanities or Social Science elective requirements of the program.
- **Exception:** PHIL 241 cannot be used to meet the Senior Humanities or Social Science elective requirements of the program.
- **Exception:** SOC 225 cannot be used to meet the Complementary Studies, Senior Humanities or Social Science elective requirements of the program.
- **Note:** The following Engineering courses will also satisfy the Humanities/Social Science elective requirement: RCM 400, RCM 401, RCM 402, RCM 403, RCM 404, RCM 405, RCM 406, RCM 407, RCM 408, RCM 409, RCM 410, and RCM 4

Computer Engineering (144 credit units)

Bachelor of Science in Engineering (B.E.) - Computer Engineering

Year 1 (41-44 credit units)

All Engineering programs have a common first year.

Year 2 (34 credit units)

Fall Term

- ~~CMPT 141.3 Introduction to Computer Science~~
- EE 205.1 Safety and Stewardship in Electrical and Computer Engineering
- EE 232.3 Digital Electronics
- EE 265.3 Discrete Time Signals and Systems
- ~~EP 202.3 Electric and Magnetic Fields and Circuits~~
- MATH 223.3 Calculus III for Engineers
- CMPT 270.3 Developing Object-Oriented Systems
- CMPT 214.3 Programming Principles and Practice

Winter Term

- ~~CMPT 145.3 Principles of Computer Science~~
- EE 216.3 Probability Statistics and Numerical Methods
- EE 271.3 Materials and Heat Transport in Electrical Engineering
- EP 214.3 Analog Signals and Systems
- MATH 224.3 Calculus IV for Engineers
- EE 221.3 Analog Electronics
- CMPT 280.3 Data Structures and Algorithms

Year 3 (33 credit units)

Focus Areas – Students must complete the Digital Systems Focus Area and one of the Digital Signal Processing and Applications Focus Area or Computer Software Focus Area.

Fall Term

- CME 331.3 Microprocessor Based Embedded Systems
- CME 341.3 Logic Design Using FPGAs
- CMPT 214.3 Programming Principles and Practice
- RCM 200.3 Engineering Professional Communication

- 3 credit units Digital Systems Focus Area
- 3 credit units Second Focus Area
- 3 credit units Science Elective List 1 or List 2

Winter Term

- [CME 334.3](#) Network Architecture and Protocols
- [GE 348.3](#) Engineering Economics
- 3 credit units Digital Systems Focus Area
- 3 credit units Second Focus Area

Year 4 (33 credit units)

Fall Term

- 3 credit units Senior Humanities/Social Elective
- 6 credit units Digital Systems Focus Area
- 6 credit units Second Focus Area

Winter Term

- [GE 449.3](#) Engineering in Society
- 3 credit units Digital Systems Focus Area
- 3 credit units Second Focus Area
- 3 credit units Complementary Studies Elective

Fall Term and Winter Term

6 credit units from the following:

- [CME 495.6](#) Capstone Design Project
- [GE 495.6](#) Technological Innovation Capstone Design Project

Focus Areas

Focus Areas – Students must complete Digital Systems Focus Area and one of the Digital Signal Processing and Applications Focus Area or Computer Software Focus Area.

Digital Systems

Year 3 - Fall Term

- [CME 342.3](#) Introduction to Digital Integrated Circuits and System on Chip

Year 3 - Winter Term

- [CME 332.3](#) Real Time Computing

Year 4 - Fall Term

- [CME 433.3](#) Digital Systems Architecture
- [CME 435.3](#) Verification of Digital Systems

Year 4 - Winter Term

- [CME 466.3](#) Design of an Advanced Digital System

Digital Signal Processing and Applications

Year 3 - Fall Term

- [EE 362.3](#) Digital Signal Processing

Year 3 - Winter Term

- [EE 365.3](#) Algorithms and Circuits with Finite Precision Arithmetics

Or, if choosing two-dimensional image processing/computer visions courses:

- [EE 466.3](#) Image Processing

Year 4 - Fall Term

- [EE 456.3](#) Digital Communication
- [EE 461.3](#) Digital Filter Design

Or, if choosing two-dimensional image processing/computer visions courses:

- [EE 467.3](#) Computer Vision

Year 4 - Winter Term

- [EE 465.3](#) Design of a DSP System

Or, if choosing two-dimensional image processing/computer visions courses:

- [EE 468.3](#) Design of a Computer Vision System

Computer Software

Year 3 - Fall Term

- ~~CMPT 270.3~~ Developing Object-Oriented Systems
- CMPT 370.3 Intermediate Software Engineering

Year 3 – Fall or Winter Term

- ~~CMPT 280.3~~ Intermediate Data Structures and Algorithms
- 3 credit unit Group B Elective (choose from List B1 or B2)

Year 4 - Fall Term

- CME 465.3 Embedded Machine Learning

Year 4 - Fall or Winter Term

- 6 credit units Group C Elective (choose from List C1 or C2)

Year 4 – Winter Term

- ~~3 credit units Group C Elective~~

Group B Electives

- ~~CMPT 332.3~~ Operating Systems Concepts
- ~~CMPT 350.3~~ Web Programming
- ~~CMPT 370.3~~ Intermediate Software Engineering
- List B1
- CMPT 318.3 Data Analytics
- List B2
- CMPT 353.3 Full Stack Web Programming
- CMPT 381.3 Implementation of Graphical User Interfaces

Group C Electives

- ~~CMPT 432.3~~ Advanced Operating Systems Concepts
- ~~CMPT 434.3~~ Computer Networks
- ~~CMPT 436.3~~ Mobile and Cloud Computing
- ~~CMPT 470.3~~ Advanced Software Engineering
- List C1
- CMPT 423.3 Machine Learning
- CMPT 436.3 Mobile and Cloud Computing
- CMPT 481.3 Human Computer Interaction
- CMPT 487.3 Image Processing and Computer Vision
- CMPT 489.3 Deep Learning
- List C2

- CMPT 432.3 Advanced Operating Systems Concepts
- CMPT 434.3 Computer Networks
- CMPT 438.3 Introduction to Computer Security
- CMPT 470.3 Advanced Software Engineerin

Electives

Science Elective

List 1

- [BIOL 120.3](#) The Nature of Life
- [CHEM 115.3](#) General Chemistry II Chemical Processes
- [GEOL 121.3](#) Earth Processes
- [PHYS 125.3](#) Physics and Technology

List 2

- [ASTR 213.3](#) Astronomical Photometry
- [ASTR 214.3](#) Astronomical Spectroscopy
- [CHEM 221.3](#) Analytical Chemistry I
- [CHEM 231.3](#) Inorganic Chemistry I
- [CHEM 242.3](#) Thermodynamics and Kinetics
- [CHEM 250.3](#) Introduction to Organic Chemistry
- [EVSC 203.3](#) Sampling and Laboratory Analysis
- [EVSC 210.3](#) Environmental Physics
- [GEOG 120.3](#) Introduction to Global Environmental Systems
- [GEOL 224.3](#) Mineralogy
- [GEOL 245.3](#) Introduction to Sedimentary Rocks
- [GEOL 258.3](#) Structural Geology

Complementary Studies Elective

- [ANTH — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [ARBC — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [ARCH — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [ARTH — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [CHIN — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [CLAS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [CMRS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [COMM- 100-Level](#)
- [COMM 201.3](#) Introduction to Financial Accounting
- [COMM 203.3](#) Introduction to Finance
- [COMM 204.3](#) Introduction to Marketing
- [COMM 205.3](#) Introduction to Operations Management
- [COMM 210.3](#) Introduction to Management Accounting
- [COMM 211.3](#) Human Resource Management
- [COMM 229.3](#) Personal Financial Management

- [COMM 304.3](#) Introduction to Business Law
- [COMM 306.3](#) Ethics and Strategic Decision Making
- [COMM 308.3](#) Cost Management Systems
- [COMM 321.3](#) Corporate Financial Reporting I
- [COMM 323.3](#) Corporate Financial Reporting II
- [COMM 329.3](#)
- [COMM 337.3](#) Business Information and Accounting Systems
- [COMM 340.3](#) Introduction to International Business
- [COMM 342.3](#) Organization Structure and Design
- [COMM 343.3](#) Recruitment Selection and Engagement
- [COMM 345.3](#) Business and Public Policy
- [COMM 346.3](#) Technology Commercialization
- [COMM 347.3](#) Indigenous Business in Canada
- [COMM 348.3](#) Leadership
- [COMM 349.3](#) Introduction to Entrepreneurship
- [COMM 352.3](#) Marketing Strategy
- [COMM 354.3](#) Consumer Behaviour
- [COMM 357.3](#) Marketing Research
- [CREE — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [ECON 111.3](#) Introductory Microeconomics
- [ECON 114.3](#) Introductory Macroeconomics
- [ECON 211.3](#) Intermediate Microeconomics
- [ECON 214.3](#) Intermediate Macroeconomics
- [ECON 221.3](#) Women and the Economy
- [ECON 223.3](#) Labour Economics
- [ECON 227.3](#) Wage Determination
- [ECON 234.3](#) Economics of Health Care
- [ECON 254.3](#) International Trading System
- [ECON 256.3](#) International Monetary System
- [ECON 270.3](#) Development in Non Industrialized Countries
- [ECON 275.3](#) Economics of Natural Resources
- [ECON 277.3](#) Economics of the Environment
- [ECON 280.3](#) Classical Economics
- [ENG — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [FREN — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [GEOG 130.3](#) Environment Health and Planning
- [GEOG 202.3](#) Regional Geography of Canada
- [GEOG 204.3](#) Geography of the Prairie Region
- [GEOG 208.3](#) World Regional Development
- [GEOG 240.3](#) Sustainable Cities and Regions
- [GEOG 280.3](#) Environmental Geography
- [GERM — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [GRK — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [HEB — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [HIST — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [HNDI — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [INDG — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [IS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [JPNS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [LATN — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [LING — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [LIT — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [MUS 101.3](#) Fundamentals of Music
- [PHIL 120.3](#) Knowledge Mind and Existence

- [PHIL 121.3](#) Introduction to World Philosophies
- [PHIL 133.3](#) Introduction to Ethics and Values
- [PHIL 140.3](#) Critical Thinking
- [PHIL 202.3](#) Philosophy of Religion
- [PHIL 206.3](#) Early Modern Philosophy
- [PHIL 208.3](#) Ancient Philosophy Pre-Socratic to Plato
- [PHIL 209.3](#) Ancient Philosophy Aristotle to Plotinus
- [PHIL 210.3](#) Medieval Philosophy I From Rome to Baghdad and Paris
- [PHIL 218.3](#) Existentialism
- [PHIL 219.3](#) Phenomenology
- [PHIL 224.3](#) Philosophy of Sexuality
- [PHIL 226.3](#) Environmental Philosophy
- [PHIL 227.3](#) Feminist Philosophy
- [PHIL 227.3](#) Feminist Philosophy
- [PHIL 231.3](#) Moral Problems
- [PHIL 233.3](#) Ethical Theory
- [PHIL 234.3](#) Biomedical Ethics
- [PHIL 235.3](#) Business and Professional Ethics
- [PHIL 236.3](#) Ethics and Technology
- [PHIL 237.3](#) Law and Morality
- [PHIL 238.3](#) Ethical Issues in Scientific Research
- [PHIL 251.3](#) Philosophy of Science
- [PHIL 262.3](#) Social and Political Philosophy
- [PHIL 265.3](#) Decision and Choice Theory
- [PHIL 271.3](#) Aesthetics and Philosophy of Art
- [PHIL 281.3](#) Theory of Knowledge
- [PHIL 285.3](#) Persons Minds and Bodies
- [PHIL 292.3](#) Metaphysics Reality Existence and Change
- [PHIL 294.3](#) Philosophy of Human Nature
- PHIL 296.3
- [POLS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [PSY — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [RCM — 400-Level](#)
- [RLST — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [RUSS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [SNSK — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [SOC — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [SPAN — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [UKR — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [WGST — 100-Level, 200-Level, 300-Level, 400-Level](#)
- ~~Exception: CLAS 104 cannot be used to meet the Complementary Studies Elective Requirements of the program.~~
- **Exception:** COMM 121.3 is restricted to Edwards School of Business students.
- **Note:** Special Topics courses cannot be used to meet a Complementary Studies Elective Requirement (any course ending in 98 or 99).

Senior Humanities or Social Science Elective

- [ANTH — 200-Level, 300-Level, 400-Level](#)
- [ARCH — 200-Level, 300-Level, 400-Level](#)
- [CLAS — 200-Level, 300-Level, 400-Level](#)
- [ECON — 200-Level, 300-Level, 400-Level](#)
- [ENG — 200-Level, 300-Level, 400-Level](#)

- [GEOG 202.3](#) Regional Geography of Canada
 - [GEOG 204.3](#) Geography of the Prairie Region
 - [GEOG 208.3](#) World Regional Development
 - [GEOG 240.3](#) Sustainable Cities and Regions
 - [GEOG 280.3](#) Environmental Geography
 - [HIST — 200-Level, 300-Level, 400-Level](#)
 - [INDG — 200-Level, 300-Level, 400-Level](#)
 - [IS — 200-Level, 300-Level, 400-Level](#)
 - [PHIL — 200-Level, 300-Level, 400-Level](#)
 - [POLS — 200-Level, 300-Level, 400-Level](#)
 - [PSY — 200-Level, 300-Level, 400-Level](#)
 - [RLST — 200-Level, 300-Level, 400-Level](#)
 - [SOC — 200-Level, 300-Level, 400-Level](#)
 - [WGST — 200-Level, 300-Level, 400-Level](#)
- **Exception:** ECON 204 cannot be used to meet the Complementary Studies, Senior Humanities or Social Science elective requirements of the program.
 - **Exception:** PSY 233 and PSY 236 cannot be used to meet the Complementary Studies, Senior Humanities or Social Science elective requirements of the program.
 - **Exception:** PHIL 241 cannot be used to meet the Senior Humanities or Social Science elective requirements of the program.
 - **Exception:** SOC 225 cannot be used to meet the Complementary Studies, Senior Humanities or Social Science elective requirements of the program.
 - **Note:** The following Engineering courses will also satisfy the Humanities/Social Science elective requirement: RCM 400, RCM 401, RCM 402, RCM 403, RCM 404, RCM 405, RCM 406, RCM 407, RCM 408, RCM 409, RCM 410, and RCM 495.

Electrical Engineering (144 credit units)

Bachelor of Science in Engineering (B.E.) - Electrical Engineering

Year 1 (41-44 credit units)

All Engineering programs have a [common](#) first year.

Year 2 (34 credit units)

Fall Term

- ~~CMPT 116.3 Computing I~~
- [EE 205.1](#) Safety and Stewardship in Electrical and Computer Engineering
- [EE 265.3](#) Discrete Time Signals and Systems
- [EP 202.3](#) Electric and Magnetic Fields and Circuits
- [MATH 223.3](#) Calculus III for Engineers
- [EE 232.3](#) Digital Electronics
- CMPT 214.3 Programming Principles and Practice

Winter Term

- [EE 216.3](#) Probability Statistics and Numerical Methods
- [EE 241.3](#) Introduction to Electric Power Systems
- [EE 271.3](#) Materials and Heat Transport in Electrical Engineering
- [EP 214.3](#) Analog Signals and Systems
- [MATH 224.3](#) Calculus IV for Engineers
- [EE 221.3](#) Analog Electronics

Year 3 (33 credit units)

Focus Areas – Students must complete two focus areas from Power and Energy; Digital Signal Processing and Applications; or Sensors, Circuits and Devices.

Fall Term

- 6 credit units First Focus Area
- 6 credit units Second Focus Area
- [CME 331.3](#) Microprocessor Based Embedded Systems
- [GE 348.3](#) Engineering Economics

Winter Term

- 3 credit units First Focus Area
- 3 credit units Science Elective List 1 or List 2
- 3 credit units Second Focus Area
- [EE 382.3](#) Control Systems
- [RCM 200.3](#) Engineering Professional Communication

Year 4 (33 credit units)

Focus Areas – Students must complete two focus areas from Power and Energy; Digital Signal Processing and Applications; or Sensors, Circuits and Devices.

Fall Term

- 3 credit units Senior Humanities/Social Elective
- 6 credit units First Focus Area
- 6 credit units Second Focus Area

Winter Term

- 3 credit units Complementary Studies Elective
- 3 credit units First Focus Area
- 3 credit units Second Focus Area
- [GE 449.3](#) Engineering in Society

Fall Term and Winter Term

- [EE 495.6](#) Senior Design Project

Focus Areas

Power and Energy

Year 3 - Fall Term

- [EE 341.3](#) Electric Machines Fundamentals
- [EE 343.3](#) Power Electronics

Year 3 - Winter Term

- [EE 342.3](#) Transmission of Electrical Energy

Year 4 - Fall Term

- [EE 441.3](#) Power Systems Analysis
- ~~[EE 444.3](#) Advanced Analysis of Electric Machines and Drive Systems~~
- [EE 442.3](#) Power Systems Operation and Control

Year 4 - Winter Term

- [EE 448.3](#) Renewable Energy and Power Systems

Digital Signal Processing and Applications

Year 3 - Fall Term

- [CME 341.3](#) Logic Design Using FPGAs
- [EE 362.3](#) Digital Signal Processing

Year 3 - Winter Term

- [EE 365.3](#) Algorithms and Circuits with Finite Precision Arithmetics

Or, if choosing two-dimensional image processing/computer visions courses:

- [EE 466.3](#) Image Processing

Year 4 - Fall Term

- [EE 456.3](#) Digital Communication
- [EE 461.3](#) Digital Filter Design

Or, if choosing two-dimensional image processing/computer visions courses:

- [EE 467.3](#) Computer Vision

Year 4 - Winter Term

- [EE 465.3](#) Design of a DSP System

Or, if choosing two-dimensional image processing/computer visions courses:

- [EE 468.3](#) Design of a Computer Vision System

Sensors, Circuits and Devices

Year 3 - Fall Term

- [EE 301.3](#) Electricity Magnetism and Fields
- [EE 321.3](#) Advanced Analog Electronics and Instrumentation

Year 3 - Winter Term

- [EE 322.3](#) Microwave and RF Circuits

Year 4 - Fall Term

- [EE 471.3](#) Introduction to Micro and Nanotechnology
- [EE 473.3](#) Electronic Devices

Year 4 - Winter Term

- [EE 472.3](#) Optoelectronics and Photonics

Electives

Science Elective

List 1

- [BIOL 120.3](#) The Nature of Life
- [CHEM 115.3](#) General Chemistry II Chemical Processes
- [GEOL 121.3](#) Earth Processes
- [PHYS 125.3](#) Physics and Technology

List 2

- [ASTR 213.3](#) Astronomical Photometry
- [ASTR 214.3](#) Astronomical Spectroscopy
- [CHEM 221.3](#) Analytical Chemistry I
- [CHEM 231.3](#) Inorganic Chemistry I
- [CHEM 242.3](#) Thermodynamics and Kinetics
- [CHEM 250.3](#) Introduction to Organic Chemistry
- [EVSC 203.3](#) Sampling and Laboratory Analysis
- [EVSC 210.3](#) Environmental Physics
- [GEOG 120.3](#) Introduction to Global Environmental Systems
- [GEOL 224.3](#) Mineralogy
- [GEOL 245.3](#) Introduction to Sedimentary Rocks
- [GEOL 258.3](#) Structural Geology

Complementary Studies Elective

- [ANTH — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [ARBC — 100-Level, 200-Level, 300-Level, 400-Level](#)

- [ARCH — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [ARTH — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [CHIN — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [CLAS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [CMRS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- **COMM- 100-Level**
- [COMM 201.3](#) Introduction to Financial Accounting
- [COMM 203.3](#) Introduction to Finance
- [COMM 204.3](#) Introduction to Marketing
- [COMM 205.3](#) Introduction to Operations Management
- [COMM 210.3](#) Introduction to Management Accounting
- [COMM 211.3](#) Human Resource Management
- **COMM 229.3 Personal Financial Management**
- [COMM 304.3](#) Introduction to Business Law
- [COMM 306.3](#) Ethics and Strategic Decision Making
- [COMM 308.3](#) Cost Management Systems
- [COMM 321.3](#) Corporate Financial Reporting I
- [COMM 323.3](#) Corporate Financial Reporting II
- COMM 329.3
- [COMM 337.3](#) Business Information and Accounting Systems
- [COMM 340.3](#) Introduction to International Business
- [COMM 342.3](#) Organization Structure and Design
- [COMM 343.3](#) Recruitment Selection and Engagement
- [COMM 345.3](#) Business and Public Policy
- [COMM 346.3](#) Technology Commercialization
- [COMM 347.3](#) Indigenous Business in Canada
- [COMM 348.3](#) Leadership
- [COMM 349.3](#) Introduction to Entrepreneurship
- [COMM 352.3](#) Marketing Strategy
- [COMM 354.3](#) Consumer Behaviour
- [COMM 357.3](#) Marketing Research
- [CREE — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [ECON 111.3](#) Introductory Microeconomics
- [ECON 114.3](#) Introductory Macroeconomics
- [ECON 211.3](#) Intermediate Microeconomics
- [ECON 214.3](#) Intermediate Macroeconomics
- [ECON 221.3](#) Women and the Economy
- [ECON 223.3](#) Labour Economics
- [ECON 227.3](#) Wage Determination
- [ECON 234.3](#) Economics of Health Care
- [ECON 254.3](#) International Trading System
- [ECON 256.3](#) International Monetary System
- [ECON 270.3](#) Development in Non Industrialized Countries
- [ECON 275.3](#) Economics of Natural Resources
- [ECON 277.3](#) Economics of the Environment
- [ECON 280.3](#) Classical Economics
- [ENG — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [FREN — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [GEOG 130.3](#) Environment Health and Planning
- [GEOG 202.3](#) Regional Geography of Canada
- [GEOG 204.3](#) Geography of the Prairie Region
- [GEOG 208.3](#) World Regional Development
- [GEOG 240.3](#) Sustainable Cities and Regions
- [GEOG 280.3](#) Environmental Geography

- [GERM — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [GRK — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [HEB — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [HIST — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [HNDI — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [INDG — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [IS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [JPNS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [LATN — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [LING — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [LIT — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [MUS 101.3](#) Fundamentals of Music
- [PHIL 120.3](#) Knowledge Mind and Existence
- [PHIL 121.3](#) Introduction to World Philosophies
- [PHIL 133.3](#) Introduction to Ethics and Values
- [PHIL 140.3](#) Critical Thinking
- [PHIL 202.3](#) Philosophy of Religion
- [PHIL 206.3](#) Early Modern Philosophy
- [PHIL 208.3](#) Ancient Philosophy Pre-Socratic to Plato
- [PHIL 209.3](#) Ancient Philosophy Aristotle to Plotinus
- [PHIL 210.3](#) Medieval Philosophy I From Rome to Baghdad and Paris
- [PHIL 218.3](#) Existentialism
- [PHIL 219.3](#) Phenomenology
- [PHIL 224.3](#) Philosophy of Sexuality
- [PHIL 226.3](#) Environmental Philosophy
- [PHIL 227.3](#) Feminist Philosophy
- [PHIL 227.3](#) Feminist Philosophy
- [PHIL 231.3](#) Moral Problems
- [PHIL 233.3](#) Ethical Theory
- [PHIL 234.3](#) Biomedical Ethics
- [PHIL 235.3](#) Business and Professional Ethics
- [PHIL 236.3](#) Ethics and Technology
- [PHIL 237.3](#) Law and Morality
- [PHIL 238.3](#) Ethical Issues in Scientific Research
- [PHIL 251.3](#) Philosophy of Science
- [PHIL 262.3](#) Social and Political Philosophy
- [PHIL 265.3](#) Decision and Choice Theory
- [PHIL 271.3](#) Aesthetics and Philosophy of Art
- [PHIL 281.3](#) Theory of Knowledge
- [PHIL 285.3](#) Persons Minds and Bodies
- [PHIL 292.3](#) Metaphysics Reality Existence and Change
- [PHIL 294.3](#) Philosophy of Human Nature
- [PHIL 296.3](#)
- [POLS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [PSY — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [RCM — 400-Level](#)
- [RLST — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [RUSS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [SNSK — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [SOC — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [SPAN — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [UKR — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [WGST — 100-Level, 200-Level, 300-Level, 400-Level](#)

- ~~**Exception:** CLAS 104 cannot be used to meet the Complementary Studies Elective Requirements of the program.~~
- **Exception:** COMM 121.3 is restricted to Edwards School of Business students.
- **Note:** Special Topics courses cannot be used to meet a Complementary Studies Elective Requirement (any course ending in 98 or 99).

Senior Humanities or Social Science Elective

- ANTH — 200-Level, 300-Level, 400-Level
- ARCH — 200-Level, 300-Level, 400-Level
- CLAS — 200-Level, 300-Level, 400-Level
- ECON — 200-Level, 300-Level, 400-Level
- ENG — 200-Level, 300-Level, 400-Level
- GEOG 202.3 Regional Geography of Canada
- GEOG 204.3 Geography of the Prairie Region
- GEOG 208.3 World Regional Development
- GEOG 240.3 Sustainable Cities and Regions
- GEOG 280.3 Environmental Geography
- HIST — 200-Level, 300-Level, 400-Level
- INDG — 200-Level, 300-Level, 400-Level
- IS — 200-Level, 300-Level, 400-Level
- PHIL — 200-Level, 300-Level, 400-Level
- POLS — 200-Level, 300-Level, 400-Level
- PSY — 200-Level, 300-Level, 400-Level
- RLST — 200-Level, 300-Level, 400-Level
- SOC — 200-Level, 300-Level, 400-Level
- WGST — 200-Level, 300-Level, 400-Level
- **Exception:** ECON 204 cannot be used to meet the Complementary Studies, Senior Humanities or Social Science elective requirements of the program.
- **Exception:** PSY 233 and PSY 236 cannot be used to meet the Complementary Studies, Senior Humanities or Social Science elective requirements of the program.
- **Exception:** PHIL 241 cannot be used to meet the Senior Humanities or Social Science elective requirements of the program.
- **Exception:** SOC 225 cannot be used to meet the Complementary Studies, Senior Humanities or Social Science elective requirements of the program.
- **Note:** The following Engineering courses will also satisfy the Humanities/Social Science elective requirement: RCM 400, RCM 401, RCM 402, RCM 403, RCM 404, RCM 405, RCM 406, RCM 407, RCM 408, RCM 409, RCM 410, and RCM 495.

Engineering Physics (151 credit units)

Bachelor of Science in Engineering (B.E.) - Engineering Physics

Year 1 (41-44 credit units)

All Engineering programs have a common first year.

Year 2 (37 credit units)

Fall Term

- ~~CMPT 116.3 Computing I~~
- EP 202.3 Electric and Magnetic Fields and Circuits
- EP 253.1 Modern Physics Laboratory I
- MATH 223.3 Calculus III for Engineers
- PHYS 252.3 Foundations of Modern Physics
- RCM 200.3 Engineering Professional Communication
- EE 232.3 Digital Electronics
- EP 370.3 270.3 Heat Kinetic Theory and Thermodynamics

Winter Term

- EP 214.3 Analog Signals and Systems
- EP 228.3 Computer Tools for Engineering Physics
- MATH 224.3 Calculus IV for Engineers
- PHYS 223.3 Mechanics I
- STAT 241.3 Probability Theory
- EE 221.3 Analog Electronics

Year 3 (~~37~~ 34 credit units)

Fall Term

- EE 321.3 Advanced Analog Electronics and Instrumentation
- EP 353.2 Modern Physics Laboratory II
- PHYS 356.3 Intermediate Electromagnetism
- PHYS 383.3 Quantum Mechanics I
- MATH 331.3 Applied Differential Equations
- 3 credit units of Engineering Physics Requirements

Winter Term

- [EP 317.3](#) Applied Physics of Materials
- [EP 320.3](#) Discrete Linear Systems and Control Theory
- [EP 325.3](#) Optical Systems Design
- [EP 354.2](#) Modern Physics Laboratory III
- [PHYS 323.3](#) Mechanics II
- 3 credit units of Engineering Physics Requirements

Year 4 (36 credit units)

Fall Term

- [EP 413.3](#) Instrumentation and Design
- [EP 417.3](#) Advanced Materials Science with Applications
- [EP 421.3](#) Advanced Optics
- [GE 348.3](#) Engineering Economics
- [PHYS 456.3](#) Electricity and Magnetism II
- 3 credit units of Engineering Physics Requirements

Winter Term

- [GE 449.3](#) Engineering in Society
- [EP 428.3](#) Computational Engineering Physics
- 6 credit units of Engineering Physics Requirements

Fall Term and Winter Term

- [EP 495.6](#) Capstone Design Project
- [PHYS 490.0](#) Physics Seminars

Engineering Physics Requirements

Engineering Science or Engineering Design List

3 credit units from the following list:

- [CE 317.3](#) Structural Analysis
- [CME 331.3](#) Microprocessor Based Embedded Systems
- [CME 341.3](#) Logic Design Using FPGAs
- [CME 342.3](#) Introduction to Digital Integrated Circuits and System on Chip
- [EE 241.3](#) Introduction to Electric Power Systems
- [EE 322.3](#) Microwave and RF Circuits
- [EE 341.3](#) Electric Machines Fundamentals

- [EE 342.3](#) Transmission of Electrical Energy
- [EE 343.3](#) Power Electronics
- [EE 442.3](#) Power Systems Operation and Control
- [EE 471.3](#) Introduction to Micro and Nanotechnology
- [EE 472.3](#) Optoelectronics and Photonics
- [ENVE 201.3](#) Principles of Environmental Engineering
- [EP 440.3](#) Space Systems Design
- [GE 213.3](#) Mechanics of Materials
- [GEOE 377.3](#) Fundamentals of Mining and Mineral Processing
- or any other approved elective

Senior Science Requirement

6 credit units from the Engineering Science or Engineering Design list, or CMPT, CHEM, GEOL courses at 200 level or higher, or PHYS, ASTR, MATH, STAT courses at 300 level or higher, or any other approved elective. At least 3 credit units must be at 400 level.

Complementary Studies Elective (3 credit units)

- [ANTH — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [ARBC — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [ARCH — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [ARTH — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [CHIN — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [CLAS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [CMRS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [COMM- 100-Level](#)
- [COMM 201.3](#) Introduction to Financial Accounting
- [COMM 203.3](#) Introduction to Finance
- [COMM 204.3](#) Introduction to Marketing
- [COMM 205.3](#) Introduction to Operations Management
- [COMM 210.3](#) Introduction to Management Accounting
- [COMM 211.3](#) Human Resource Management
- [COMM 229.3](#) **Personal Financial Management**
- [COMM 304.3](#) Introduction to Business Law
- [COMM 306.3](#) Ethics and Strategic Decision Making
- [COMM 308.3](#) Cost Management Systems
- [COMM 321.3](#) Corporate Financial Reporting I
- [COMM 323.3](#) Corporate Financial Reporting II
- [COMM 329.3](#)
- [COMM 337.3](#) Business Information and Accounting Systems
- [COMM 340.3](#) Introduction to International Business
- [COMM 342.3](#) Organization Structure and Design
- [COMM 343.3](#) Recruitment Selection and Engagement
- [COMM 345.3](#) Business and Public Policy
- [COMM 346.3](#) Technology Commercialization
- [COMM 347.3](#) Indigenous Business in Canada
- [COMM 348.3](#) Leadership
- [COMM 349.3](#) Introduction to Entrepreneurship
- [COMM 352.3](#) Marketing Strategy
- [COMM 354.3](#) Consumer Behaviour

- [COMM 357.3](#) Marketing Research
- [CREE — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [ECON 111.3](#) Introductory Microeconomics
- [ECON 114.3](#) Introductory Macroeconomics
- [ECON 211.3](#) Intermediate Microeconomics
- [ECON 214.3](#) Intermediate Macroeconomics
- [ECON 221.3](#) Women and the Economy
- [ECON 223.3](#) Labour Economics
- [ECON 227.3](#) Wage Determination
- [ECON 234.3](#) Economics of Health Care
- [ECON 254.3](#) International Trading System
- [ECON 256.3](#) International Monetary System
- [ECON 270.3](#) Development in Non Industrialized Countries
- [ECON 275.3](#) Economics of Natural Resources
- [ECON 277.3](#) Economics of the Environment
- [ECON 280.3](#) Classical Economics
- [ENG — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [FREN — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [GEOG 130.3](#) Environment Health and Planning
- [GEOG 202.3](#) Regional Geography of Canada
- [GEOG 204.3](#) Geography of the Prairie Region
- [GEOG 208.3](#) World Regional Development
- [GEOG 240.3](#) Sustainable Cities and Regions
- [GEOG 280.3](#) Environmental Geography
- [GERM — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [GRK — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [HEB — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [HIST — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [HNDI — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [INDG — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [IS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [JPNS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [LATN — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [LING — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [LIT — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [MUS 101.3](#) Fundamentals of Music
- [PHIL 120.3](#) Knowledge Mind and Existence
- [PHIL 121.3](#) Introduction to World Philosophies
- [PHIL 133.3](#) Introduction to Ethics and Values
- [PHIL 140.3](#) Critical Thinking
- [PHIL 202.3](#) Philosophy of Religion
- [PHIL 206.3](#) Early Modern Philosophy
- [PHIL 208.3](#) Ancient Philosophy Pre-Socratic to Plato
- [PHIL 209.3](#) Ancient Philosophy Aristotle to Plotinus
- [PHIL 210.3](#) Medieval Philosophy I From Rome to Baghdad and Paris
- [PHIL 218.3](#) Existentialism
- [PHIL 219.3](#) Phenomenology
- [PHIL 224.3](#) Philosophy of Sexuality
- [PHIL 226.3](#) Environmental Philosophy
- [PHIL 227.3](#) Feminist Philosophy
- [PHIL 227.3](#) Feminist Philosophy
- [PHIL 231.3](#) Moral Problems
- [PHIL 233.3](#) Ethical Theory
- [PHIL 234.3](#) Biomedical Ethics

- [PHIL 235.3](#) Business and Professional Ethics
- [PHIL 236.3](#) Ethics and Technology
- [PHIL 237.3](#) Law and Morality
- [PHIL 238.3](#) Ethical Issues in Scientific Research
- [PHIL 251.3](#) Philosophy of Science
- [PHIL 262.3](#) Social and Political Philosophy
- [PHIL 265.3](#) Decision and Choice Theory
- [PHIL 271.3](#) Aesthetics and Philosophy of Art
- [PHIL 281.3](#) Theory of Knowledge
- [PHIL 285.3](#) Persons Minds and Bodies
- [PHIL 292.3](#) Metaphysics Reality Existence and Change
- [PHIL 294.3](#) Philosophy of Human Nature
- [PHIL 296.3](#)
- [POLS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [PSY — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [RCM — 400-Level](#)
- [RLST — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [RUSS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [SNSK — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [SOC — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [SPAN — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [UKR — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [WGST — 100-Level, 200-Level, 300-Level, 400-Level](#)
- ~~Exception: CLAS 104 cannot be used to meet the Complementary Studies Elective Requirements of the program.~~
- ~~Exception: COMM 121.3 is restricted to Edwards School of Business students.~~
- Note: Special Topics courses cannot be used to meet a Complementary Studies Elective Requirement (any course ending in 98 or 99).

Senior Humanities or Social Science Elective (3 credit units)

- [ANTH — 200-Level, 300-Level, 400-Level](#)
- [ARCH — 200-Level, 300-Level, 400-Level](#)
- [CLAS — 200-Level, 300-Level, 400-Level](#)
- [ECON — 200-Level, 300-Level, 400-Level](#)
- [ENG — 200-Level, 300-Level, 400-Level](#)
- [GEOG 202.3](#) Regional Geography of Canada
- [GEOG 204.3](#) Geography of the Prairie Region
- [GEOG 208.3](#) World Regional Development
- [GEOG 240.3](#) Sustainable Cities and Regions
- [GEOG 280.3](#) Environmental Geography
- [HIST — 200-Level, 300-Level, 400-Level](#)
- [INDG — 200-Level, 300-Level, 400-Level](#)
- [IS — 200-Level, 300-Level, 400-Level](#)
- [PHIL — 200-Level, 300-Level, 400-Level](#)
- [POLS — 200-Level, 300-Level, 400-Level](#)
- [PSY — 200-Level, 300-Level, 400-Level](#)
- [RLST — 200-Level, 300-Level, 400-Level](#)
- [SOC — 200-Level, 300-Level, 400-Level](#)
- [WGST — 200-Level, 300-Level, 400-Level](#)

- **Exception:** ECON 204 cannot be used to meet the Complementary Studies, Senior Humanities or Social Science elective requirements of the program.
- **Exception:** PSY 233 and PSY 236 cannot be used to meet the Complementary Studies, Senior Humanities or Social Science elective requirements of the program.
- **Exception:** PHIL 241 cannot be used to meet the Senior Humanities or Social Science elective requirements of the program.
- **Exception:** SOC 225 cannot be used to meet the Complementary Studies, Senior Humanities or Social Science elective requirements of the program.
- **Note:** The following Engineering courses will also satisfy the Humanities/Social Science elective requirement: RCM 400, RCM 401, RCM 402, RCM 403, RCM 404, RCM 405, RCM 406, RCM 407, RCM 408, RCM 409, RCM 410, and RCM 495.

Environmental Engineering (149 credit units)

Bachelor of Science in Engineering (B.E.) - Environmental Engineering

Year 1 (41-44 credit units)

All Engineering programs have a common first year.

Year 2 (38 36 credit units)

Fall Term

- CE 212.3 Civil Engineering Materials
- ENVE 201.3 Principles of Environmental Engineering
- GE 210.3 Probability and Statistics
- GEOL 121.3 Earth Processes
- MATH 223.3 Calculus III for Engineers

Winter Term

- CHE 210.3 Fluid Mechanics I
- ~~CMPT 141.3~~ Introduction to Computer Science
- ENVE 212.3 Physical Principles of Plant Biosystems
- ~~GE 213.3~~ CE 213.3 Mechanics of Materials
- GEOE 218.3 Engineering Geology
- MATH 224.3 Calculus IV for Engineers

~~Spring Term~~

- ~~CE 271.2~~ Spring Surveying Camp (may be completed in year 2 or year 3)

Fall Term or Winter Term

~~Choose 6 credit units from the following:~~

- BIOL 120.3 The Nature of Life
- 3 credit units Junior Humanities or Social Science Elective
- ~~CHEM 115.3~~ General Chemistry II Chemical Processes
- ~~GEOL 121.3~~ Earth Processes

Students must complete ~~BIOL 120.3~~ The Nature of Life, ~~CHEM 115.3~~ General Chemistry II Chemical Processes and ~~GEOL 121.3~~ Earth Processes by the end of Year 2

Year 3 (36 credit units)

Fall Term

- [CE 202.3](#) Spatial Analysis and Engineering Drawings
- [CE 315.3](#) Fluid Mechanics and Hydraulics
- [CE 318.3](#) Applied Engineering Mathematics
- [CE 328.3](#) Fundamentals of Soil Mechanics
- [CHEM 250.3](#) Introduction to Organic Chemistry
- [RCM 200.3](#) Engineering Professional Communication

Winter Term

- [CE 319.3](#) Hydrology
- [CE 327.3](#) Municipal Engineering
- [CHE 223.3](#) Chemical Thermodynamics
- [ENVE 381.3](#) Sustainability and Environmental Assessment
- [ENVE 395.3](#) Environmental Engineering Design Project
- [GE 348.3](#) Engineering Economics

Year 4 (36 credit units)

Fall Term

- [CE 320.3](#) Project Engineering
- [CHE 454.3](#) Design of Industrial Waste Treatment Systems
- [ENVE 482.3](#) Solid Waste Engineering and Management

Fall Term and Winter Term

- [ENVE 495.6](#) Capstone Design Project

Fall Term or Winter Term

- 3 credit units Complementary Studies Elective
- 3 credit units Environmental Engineering Electives (Group A or B)
- 3 credit units Environmental Science Elective
- 3 credit units Senior Humanities or Social Science Elective
- 6 credit units Environmental Engineering Electives (Group A)
- [GE 449.3](#) Engineering in Society

Electives

Science Elective

All Science Electives must be taken in year 1 and year 2.

- ~~BIOL 120.3~~ The Nature of Life
- ~~CHEM 115.3~~ General Chemistry II Chemical Processes
- ~~GEOL 121.3~~ Earth Processes

Environmental Science Elective

- [BMSC 240.3](#) Laboratory Techniques
- [CHEM 221.3](#) Analytical Chemistry I
- [EVSC 420.3](#) Environmental Fate and Transport of Toxic Substances
- [EVSC 421.3](#) Contaminated Site Management and Remediation
- [FABS 212.3](#) Agrifood and Resources Microbiology
- [GEOL 413.3](#) Aqueous Geochemistry
- [TOX 301.3](#) Environmental Toxicology

Environmental Engineering Elective

Environmental Engineering Elective (Group A)

- [ENVE 414.3](#) Water and Wastewater Engineering
- [ENVE 432.3](#) Land Management and Reclamation
- [ENVE 478.3](#) Contaminated Site Remediation Engineering

Environmental Engineering Elective (Group B)

- [CE 415.3](#) Structures for Water Management
- [CE 464.3](#) Water Resources Engineering
- [CE 468.3](#) Environmental Geotechnics
- [CHE 461.3](#) Introduction to Biochemical Engineering
- [GEOE 375.3](#) Engineering Hydrogeology

Complementary Studies Elective

- [ANTH — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [ARBC — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [ARCH — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [ARTH — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [CHIN — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [CLAS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [CMRS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [COMM- 100-Level](#)
- [COMM 201.3](#) Introduction to Financial Accounting

- [COMM 203.3](#) Introduction to Finance
- [COMM 204.3](#) Introduction to Marketing
- [COMM 205.3](#) Introduction to Operations Management
- [COMM 210.3](#) Introduction to Management Accounting
- [COMM 211.3](#) Human Resource Management
- [COMM 229.3](#) **Personal Financial Management**
- [COMM 304.3](#) Introduction to Business Law
- [COMM 306.3](#) Ethics and Strategic Decision Making
- [COMM 308.3](#) Cost Management Systems
- [COMM 321.3](#) Corporate Financial Reporting I
- [COMM 323.3](#) Corporate Financial Reporting II
- [COMM 329.3](#)
- [COMM 337.3](#) Business Information and Accounting Systems
- [COMM 340.3](#) Introduction to International Business
- [COMM 342.3](#) Organization Structure and Design
- [COMM 343.3](#) Recruitment Selection and Engagement
- [COMM 345.3](#) Business and Public Policy
- [COMM 346.3](#) Technology Commercialization
- [COMM 347.3](#) Indigenous Business in Canada
- [COMM 348.3](#) Leadership
- [COMM 349.3](#) Introduction to Entrepreneurship
- [COMM 352.3](#) Marketing Strategy
- [COMM 354.3](#) Consumer Behaviour
- [COMM 357.3](#) Marketing Research
- [CREE — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [ECON 111.3](#) Introductory Microeconomics
- [ECON 114.3](#) Introductory Macroeconomics
- [ECON 211.3](#) Intermediate Microeconomics
- [ECON 214.3](#) Intermediate Macroeconomics
- [ECON 221.3](#) Women and the Economy
- [ECON 223.3](#) Labour Economics
- [ECON 227.3](#) Wage Determination
- [ECON 234.3](#) Economics of Health Care
- [ECON 254.3](#) International Trading System
- [ECON 256.3](#) International Monetary System
- [ECON 270.3](#) Development in Non Industrialized Countries
- [ECON 275.3](#) Economics of Natural Resources
- [ECON 277.3](#) Economics of the Environment
- [ECON 280.3](#) Classical Economics
- [ENG — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [FREN — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [GEOG 130.3](#) Environment Health and Planning
- [GEOG 202.3](#) Regional Geography of Canada
- [GEOG 204.3](#) Geography of the Prairie Region
- [GEOG 208.3](#) World Regional Development
- [GEOG 240.3](#) Sustainable Cities and Regions
- [GEOG 280.3](#) Environmental Geography
- [GERM — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [GRK — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [HEB — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [HIST — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [HNDI — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [INDG — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [IS — 100-Level, 200-Level, 300-Level, 400-Level](#)

- [JPNS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [LATN — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [LING — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [LIT — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [MUS 101.3](#) Fundamentals of Music
- [PHIL 120.3](#) Knowledge Mind and Existence
- [PHIL 121.3](#) Introduction to World Philosophies
- [PHIL 133.3](#) Introduction to Ethics and Values
- [PHIL 140.3](#) Critical Thinking
- [PHIL 202.3](#) Philosophy of Religion
- [PHIL 206.3](#) Early Modern Philosophy
- [PHIL 208.3](#) Ancient Philosophy Pre-Socratic to Plato
- [PHIL 209.3](#) Ancient Philosophy Aristotle to Plotinus
- [PHIL 210.3](#) Medieval Philosophy I From Rome to Baghdad and Paris
- [PHIL 218.3](#) Existentialism
- [PHIL 219.3](#) Phenomenology
- [PHIL 224.3](#) Philosophy of Sexuality
- [PHIL 226.3](#) Environmental Philosophy
- [PHIL 227.3](#) Feminist Philosophy
- [PHIL 227.3](#) Feminist Philosophy
- [PHIL 231.3](#) Moral Problems
- [PHIL 233.3](#) Ethical Theory
- [PHIL 234.3](#) Biomedical Ethics
- [PHIL 235.3](#) Business and Professional Ethics
- [PHIL 236.3](#) Ethics and Technology
- [PHIL 237.3](#) Law and Morality
- [PHIL 238.3](#) Ethical Issues in Scientific Research
- [PHIL 251.3](#) Philosophy of Science
- [PHIL 262.3](#) Social and Political Philosophy
- [PHIL 265.3](#) Decision and Choice Theory
- [PHIL 271.3](#) Aesthetics and Philosophy of Art
- [PHIL 281.3](#) Theory of Knowledge
- [PHIL 285.3](#) Persons Minds and Bodies
- [PHIL 292.3](#) Metaphysics Reality Existence and Change
- [PHIL 294.3](#) Philosophy of Human Nature
- PHIL 296.3
- [POLS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [PSY — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [RCM — 400-Level](#)
- [RLST — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [RUSS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [SNSK — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [SOC — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [SPAN — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [UKR — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [WGST — 100-Level, 200-Level, 300-Level, 400-Level](#)
- **Exception:** CLAS 104 cannot be used to meet the Complementary Studies Elective Requirements of the program.
- **Exception:** COMM 121.3 is restricted to Edwards School of Business students.
- **Note:** Special Topics courses cannot be used to meet a Complementary Studies Elective Requirement (any course ending in 98 or 99).

Junior Humanities or Social Science Elective

- **ANTH 111.3** One World Many Peoples Introduction to Cultural Anthropology One World Many Peoples Introduction to Cultural Anthropology
- **ARCH 112.3** The Human Journey Introduction to Archaeology and Biological Anthropology The Human Journey Introduction to Archaeology and Biological Anthropology
- **ARCH 116.3** Introduction to Near Eastern and Classical Archaeology Introduction to Near Eastern and Classical Archaeology
- **CLAS 104.3** Classical Myths
- **CLAS 110.3** Greek Civilization Greek Civilization
- **CLAS 111.3** Roman Civilization Roman Civilization
- **CMRS 110.3** The Graeco Roman Tradition Evolution and Reception The Graeco Roman Tradition Evolution and Reception
- **CMRS 111.3** Medieval and Renaissance Civilization Medieval and Renaissance Civilization
- **ECON 111.3** Introductory Microeconomics Introductory Microeconomics
- **ECON 114.3** Introductory Macroeconomics Introductory Macroeconomics
- **GEOG 130.3** Environment Health and Planning Environment Health and Planning
- HIST 110.3
- HIST 111.3
- **HIST 115.3** History Matters Ideas and Culture History Matters Ideas and Culture
- HIST 121.3
- HIST 122.3
- **HIST 125.3** History Matters Indigenous Colonial and Post Colonial Histories History Matters Indigenous Colonial and Post Colonial Histories
- **HIST 135.3** History Matters Gender Sex and Society History Matters Gender Sex and Society
- **HIST 145.3** History Matters War Violence and Politics History Matters War Violence and Politics
- **HIST 155.3** History Matters Science and Environment History Matters Science and Environment
- **HIST 165.3** History Matters Health and Society History Matters Health and Society
- **HIST 175.3** History Matters Identities and Communities in Transition History Matters Identities and Communities in Transition
- **INDG 107.3** Introduction to Canadian Indigenous Studies Introduction to Canadian Indigenous Studies
- **LING 111.3** Structure of Language Structure of Language
- **LING 112.3** Dynamics of Language Dynamics of Language
- **PHIL 120.3** Knowledge Mind and Existence Knowledge Mind and Existence
- **PHIL 133.3** Introduction to Ethics and Values Introduction to Ethics and Values
- **PHIL 140.3** Critical Thinking Critical Thinking
- **POLS 111.3** Democratic Citizenship in Canada Democratic Citizenship in Canada
- **POLS 112.3** Justice and Injustice in Politics and Law Justice and Injustice in Politics and Law
- **PSY 120.3** Biological and Cognitive Bases of Psychology Biological and Cognitive Bases of Psychology
- **PSY 121.3** Social Clinical Cultural and Developmental Bases of Psychology Social Clinical Cultural and Developmental Bases of Psychology
- **PSY 122.3** Process
- **SOC 112.3** Foundations in Sociology Social Construction of Everyday Life Foundations in Sociology Social Construction of Everyday Life
- **WGST 112.3** Introduction to Womens and Gender Studies Introduction to Womens and Gender Studies

Senior Humanities or Social Science Elective

- [ANTH — 200-Level, 300-Level, 400-Level](#)
- [ARCH — 200-Level, 300-Level, 400-Level](#)
- [CLAS — 200-Level, 300-Level, 400-Level](#)
- [ECON — 200-Level, 300-Level, 400-Level](#)
- [ENG — 200-Level, 300-Level, 400-Level](#)

- [GEOG 202.3](#) Regional Geography of Canada
 - [GEOG 204.3](#) Geography of the Prairie Region
 - [GEOG 208.3](#) World Regional Development
 - [GEOG 240.3](#) Sustainable Cities and Regions
 - [GEOG 280.3](#) Environmental Geography
 - [HIST — 200-Level, 300-Level, 400-Level](#)
 - [INDG — 200-Level, 300-Level, 400-Level](#)
 - [IS — 200-Level, 300-Level, 400-Level](#)
 - [PHIL — 200-Level, 300-Level, 400-Level](#)
 - [POLS — 200-Level, 300-Level, 400-Level](#)
 - [PSY — 200-Level, 300-Level, 400-Level](#)
 - [RLST — 200-Level, 300-Level, 400-Level](#)
 - [SOC — 200-Level, 300-Level, 400-Level](#)
 - [WGST — 200-Level, 300-Level, 400-Level](#)
- **Exception:** ECON 204 cannot be used to meet the Complementary Studies, Senior Humanities or Social Science elective requirements of the program.
 - **Exception:** PSY 233 and PSY 236 cannot be used to meet the Complementary Studies, Senior Humanities or Social Science elective requirements of the program.
 - **Exception:** PHIL 241 cannot be used to meet the Senior Humanities or Social Science elective requirements of the program.
 - **Exception:** SOC 225 cannot be used to meet the Complementary Studies, Senior Humanities or Social Science elective requirements of the program.
 - **Note:** The following Engineering courses will also satisfy the Humanities/Social Science elective requirement: RCM 400, RCM 401, RCM 402, RCM 403, RCM 404, RCM 405, RCM 406, RCM 407, RCM 408, RCM 409, RCM 410, and RCM 495.

Geological Engineering (152 credit units)

Bachelor of Science in Engineering (B.E.) - Geological Engineering

Year 1 (41-44 credit units)

All Engineering programs have a common first year.

Year 2 (38 36 credit units)

Fall Term

- [CE 202.3](#) Spatial Analysis and Engineering Drawings
- [CE 212.3](#) Civil Engineering Materials
- [GE 210.3](#) Probability and Statistics
- [GEOL 121.3](#) Earth Processes
- [MATH 223.3](#) Calculus III for Engineers

If ~~GEOL 121~~ is not taken as the science elective in Year 1, it must be taken in Fall Term of Year 2.

Winter Term

- [CE 225.3](#) Fluid Mechanics
- [CE 295.3](#) Design Project
- ~~[CMPT 141.3](#) Introduction to Computer Science~~
- [GE 213.3](#) [CE 213.3](#) Mechanics of Materials
- [GEOE 218.3](#) Engineering Geology
- [MATH 224.3](#) Calculus IV for Engineers

Fall Term or Winter Term

- [RCM 200.3](#) Engineering Professional Communication
- 3 credit units ~~Senior~~ [Junior](#) Humanities or Social Science Elective

Spring Term

- ~~[CE 271.2](#) Spring Surveying Camp~~

Year 3 (**39 42** credit units)

Fall Term

- [CE 318.3](#) Applied Engineering Mathematics
- [CE 328.3](#) Fundamentals of Soil Mechanics
- [GEOL 224.3](#) Mineralogy
- [GEOL 245.3](#) Introduction to Sedimentary Rocks
- [GEOL 258.3](#) Structural Geology

Winter Term

- [CE 319.3](#) Hydrology
- [CE 330.3](#) Geotechnical Engineering
- [GEOE 315.3](#) Rock Mechanics
- [GEOE 375.3](#) Engineering Hydrogeology
- [GEOL 226.3](#) Introductory Petrology
- 3 credit units Group B Elective

Fall Term or Winter Term

- [GE 348.3](#) Engineering Economics
- 3 credit units Group A Elective

Spring Term

- [GEOE 378.3](#) Engineering Geological Mapping

Year 4 (**36 33** credit units)

Fall Term

- [CE 320.3](#) Project Engineering
- [GE 449.3](#) Engineering in Society
- [GEOE 412.3](#) Reservoir Mechanics
- [GEOE 414.3](#) Rock Mechanics Design

Winter Term

- [GEOE 466.3](#) Petroleum Geomechanics

Fall Term and Winter Term

- [GEOE 495.6](#) Capstone Design Project

Fall Term or Winter Term

- 3 credit units Group A or C Elective
- 9 credit units Group C Elective

Electives

Note: All electives may not be given every year. Check with the appropriate department or in the online Course Offerings.

Group Electives

Group A

- [CHEM 377.3](#) Industrial Chemistry
- [GEOG 335.3](#) Glacial Geomorphology
- [GEOL 229.3](#) Introductory Geochemistry
- [GEOL 282.3](#) Earth Physics
- [GEOL 334.3](#) Gravity Magnetism Electromagnetic and Radiation Methods
- [GEOL 335.3](#) Seismology and Ground Penetrating Radar Methods
- [GEOL 358.3](#)
- [GEOL 413.3](#) Aqueous Geochemistry
- [GEOL 463.3](#) Petroleum Geology
- [GEOL 465.3](#) Mineral Deposits
- [GEOL 482.3](#) Electrical Methods in Geophysical Prospecting
- [GEOL 483.3](#) Seismology

Group B

- [GEOL 334.3](#) Gravity Magnetism Electromagnetic and Radiation Methods
- [GEOL 335.3](#) Seismology and Ground Penetrating Radar Methods
- [GEOL 384.3](#) Introduction to Applied Geophysics

Group C

- [CE 466.3](#) Geotechnical Modelling
- [CE 468.3](#) Environmental Geotechnics
- [CHE 464.3](#) Petroleum Production Engineering
- [ENVE 381.3](#) Sustainability and Environmental Assessment
- [ENVE 478.3](#) Contaminated Site Remediation Engineering
- [GEOE 377.3](#) Fundamentals of Mining and Mineral Processing
- [GEOE 380.3](#) Mine Ventilation
- [GEOE 430.3](#) Drill Blast and Excavate
- [GEOE 431.3](#) Mine Design

Junior Humanities or Social Science Elective

- **ANTH 111.3** One World Many Peoples Introduction to Cultural Anthropology One World Many Peoples Introduction to Cultural Anthropology
- **ARCH 112.3** The Human Journey Introduction to Archaeology and Biological Anthropology The Human Journey Introduction to Archaeology and Biological Anthropology
- **ARCH 116.3** Introduction to Near Eastern and Classical Archaeology Introduction to Near Eastern and Classical Archaeology
- **CLAS 104.3** Classical Myths
- **CLAS 110.3** Greek Civilization Greek Civilization
- **CLAS 111.3** Roman Civilization Roman Civilization
- **CMRS 110.3** The Graeco Roman Tradition Evolution and Reception The Graeco Roman Tradition Evolution and Reception
- **CMRS 111.3** Medieval and Renaissance Civilization Medieval and Renaissance Civilization
- **ECON 111.3** Introductory Microeconomics Introductory Microeconomics
- **ECON 114.3** Introductory Macroeconomics Introductory Macroeconomics
- **GEOG 130.3** Environment Health and Planning Environment Health and Planning
- HIST 110.3
- HIST 111.3
- **HIST 115.3** History Matters Ideas and Culture History Matters Ideas and Culture
- HIST 121.3
- HIST 122.3
- **HIST 125.3** History Matters Indigenous Colonial and Post Colonial Histories History Matters Indigenous Colonial and Post Colonial Histories
- **HIST 135.3** History Matters Gender Sex and Society History Matters Gender Sex and Society
- **HIST 145.3** History Matters War Violence and Politics History Matters War Violence and Politics
- **HIST 155.3** History Matters Science and Environment History Matters Science and Environment
- **HIST 165.3** History Matters Health and Society History Matters Health and Society
- **HIST 175.3** History Matters Identities and Communities in Transition History Matters Identities and Communities in Transition
- **INDG 107.3** Introduction to Canadian Indigenous Studies Introduction to Canadian Indigenous Studies
- **LING 111.3** Structure of Language Structure of Language
- **LING 112.3** Dynamics of Language Dynamics of Language
- **PHIL 120.3** Knowledge Mind and Existence Knowledge Mind and Existence
- **PHIL 133.3** Introduction to Ethics and Values Introduction to Ethics and Values
- **PHIL 140.3** Critical Thinking Critical Thinking
- **POLS 111.3** Democratic Citizenship in Canada Democratic Citizenship in Canada
- **POLS 112.3** Justice and Injustice in Politics and Law Justice and Injustice in Politics and Law
- **PSY 120.3** Biological and Cognitive Bases of Psychology Biological and Cognitive Bases of Psychology
- **PSY 121.3** Social Clinical Cultural and Developmental Bases of Psychology Social Clinical Cultural and Developmental Bases of Psychology
- **PSY 122.3** Psychological Processes Psychological Processes
- **SOC 112.3** Foundations in Sociology Social Construction of Everyday Life Foundations in Sociology Social Construction of Everyday Life
- **WGST 112.3** Introduction to Womens and Gender Studies Introduction to Womens and Gender Studies

Senior Humanities or Social Science Elective

- ~~ANTH — 200-Level, 300-Level, 400-Level~~
- ~~ARCH — 200-Level, 300-Level, 400-Level~~
- ~~CLAS — 200-Level, 300-Level, 400-Level~~
- ~~ECON — 200-Level, 300-Level, 400-Level~~

- ~~ENG — 200-Level, 300-Level, 400-Level~~
- ~~GEOG 202.3 Regional Geography of Canada~~
- ~~GEOG 204.3 Geography of the Prairie Region~~
- ~~GEOG 208.3 World Regional Development~~
- ~~GEOG 240.3 Sustainable Cities and Regions~~
- ~~GEOG 280.3 Environmental Geography~~
- ~~HIST — 200-Level, 300-Level, 400-Level~~
- ~~INDG — 200-Level, 300-Level, 400-Level~~
- ~~IS — 200-Level, 300-Level, 400-Level~~
- ~~PHIL — 200-Level, 300-Level, 400-Level~~
- ~~POLS — 200-Level, 300-Level, 400-Level~~
- ~~PSY — 200-Level, 300-Level, 400-Level~~
- ~~RLST — 200-Level, 300-Level, 400-Level~~
- ~~SOC — 200-Level, 300-Level, 400-Level~~
- ~~WGST — 200-Level, 300-Level, 400-Level~~

- ~~**Exception:** ECON 204 cannot be used to meet the Complementary Studies, Senior Humanities or Social Science elective requirements of the program.~~
- ~~**Exception:** PSY 233 and PSY 236 cannot be used to meet the Complementary Studies, Senior Humanities or Social Science elective requirements of the program.~~
- ~~**Exception:** PHIL 241 cannot be used to meet the Senior Humanities or Social Science elective requirements of the program.~~
- ~~**Exception:** SOC 225 cannot be used to meet the Complementary Studies, Senior Humanities or Social Science elective requirements of the program.~~
- ~~**Note:** The following Engineering courses will also satisfy the Humanities/Social Science elective requirement: RCM 400, RCM 401, RCM 402, RCM 403, RCM 404, RCM 405, RCM 406, RCM 407, RCM 408, RCM 409, RCM 410, and RCM 495.~~

Mechanical Engineering (152 credit units)

Bachelor of Science in Engineering (B.E.) - Mechanical Engineering

Year 1 (41-44 credit units)

All Engineering programs have a common first year.

Year 2 (36 credit units)

Fall Term

- ~~CMPT 141.3~~ Introduction to Computer Science
- ~~EE 204.3~~ Basic Electronics and Electrical Power
- **GE 210.3** Probability and Statistics
- **GE 213.3** Mechanics of Materials
- **MATH 223.3** Calculus III for Engineers
- **ME 214.3** Introduction to Materials and Manufacturing
- **ME 227.3** Thermodynamics I

Winter Term

- **MATH 224.3** Calculus IV for Engineers
- **ME 215.3** Fluid Mechanics I
- **ME 226.3** Mechanics III
- **ME 229.3** Introduction to Mechanical Engineering Design
- ~~ME 251.3~~ Engineering Analysis I
- **RCM 200.3** Engineering Professional Communication

Fall or Winter Term

- 3 credit units Junior Humanities or Social Science Elective
- 3 credit units Science Elective

Year 3 (39 36 credit units)

Fall Term

- **ME 313.3** Mechanics of Materials I
- **ME 321.3** Engineering Analysis II
- **ME 324.3** Engineering Materials

- [ME 327.3](#) Heat Transfer
- [ME 330.3](#) Manufacturing Processes

Winter Term

- [ME 314.3](#) Machine Design I
- [ME 323.3](#) Mechanics of Materials II
- [ME 328.3](#) Mechanical Engineering Laboratory I
- [ME 329.3](#) Collaborative Design and Manufacturing
- [ME 335.3](#) Fluid Mechanics II
- [ME 352.3](#) Engineering Analysis III

Fall Term or Winter Term

- [GE 348.3](#) Engineering Economics
- ~~3 credit units Science Elective List 1 or List 2~~

Year 4 (36 credit units)

Fall Term

- [ME 417.3](#) Thermodynamics II
- [ME 418.3](#) Mechanical Engineering Laboratory II
- [ME 431.3](#) Control Systems

Winter Term

- [GE 449.3](#) Engineering in Society

Fall Term and Winter Term

Choose 6 credit units from the following:

- [GE 495.6](#) Technological Innovation Capstone Design Project (Department permission required)
- [ME 495.6](#) Industrial Design Project

Fall Term or Winter Term

- 12 credit units Technical and Design Electives (of which 6 credit units must be from the Design Elective list)
- 3 credit units Complementary Studies Elective
- 3 credit units Senior Humanities or Social Science Elective

Electives

Science Elective

List 1

- [BIOL 120.3](#) The Nature of Life
- [CHEM 115.3](#) General Chemistry II Chemical Processes
- [GEOL 121.3](#) Earth Processes
- [PHYS 125.3](#) Physics and Technology

List 2

- [ASTR 213.3](#) Astronomical Photometry
- [ASTR 214.3](#) Astronomical Spectroscopy
- [CHEM 221.3](#) Analytical Chemistry I
- [CHEM 231.3](#) Inorganic Chemistry I
- [CHEM 242.3](#) Thermodynamics and Kinetics
- [CHEM 250.3](#) Introduction to Organic Chemistry
- [EVSC 203.3](#) Sampling and Laboratory Analysis
- [EVSC 210.3](#) Environmental Physics
- [GEOG 120.3](#) Introduction to Global Environmental Systems
- [GEOL 224.3](#) Mineralogy
- [GEOL 245.3](#) Introduction to Sedimentary Rocks
- [GEOL 258.3](#) Structural Geology

Technical Electives

Department Technical Electives are offered in alternating calendar years, subject to minimum enrolment limits and staffing considerations. Consult the current Course Offerings to determine the availability of specific electives.

Term 1

- [GEOE 377.3](#) Fundamentals of Mining and Mineral Processing
- [GEOE 466.3](#) Petroleum Geomechanics

Term 2

- [BLE 313.3](#) Instrumentation
- [CHE 464.3](#) Petroleum Production Engineering
- [EE 471.3](#) Introduction to Micro and Nanotechnology
- [GEOE 380.3](#) Mine Ventilation
- [ME 460.3](#) Automation and Robotics in Manufacturing
- ME 461.3
- ME 463.3
- ME 472.3
- [ME 475.3](#) Introduction to Mechatronics

- [ME 477.3](#) Engineering Materials II
- [ME 478.3](#) Introduction to Fire Protection Engineering

Term 1 or Term 2

- [CHE 453.3](#) Corrosion Engineering
- [ME 450.3](#) Finite Element Analysis
- [ME 462.3](#) Structure and Properties of Polycrystalline Materials
- [ME 471.3](#) Introduction to Aerodynamics
- [ME 473.3](#) Introduction to Computational Fluid Dynamics
- [ME 476.3](#) Multiphase Flow and Heat Transfer
- approved senior course(s) from science or engineering

Design Electives

Design Electives are offered subject to minimum enrolment limits and staffing considerations. Consult the current Course Offerings to determine the availability of specific electives. Students must take a minimum of 6 credit units from the list of Design Electives.

Term 1

- [ME 496.3](#) Machine Design II

Term 2

- [ME 490.3](#) Design of Fluid Power Circuits
- [ME 492.3](#) Materials in Engineering Design

Term 1 and Term 2

- [GE 496.3](#) Technological Innovation Design Project
- [ME 494.3](#) Off Highway Equipment Design

Term 1 or Term 2

- [ME 491.3](#) Thermal Systems Design
- [ME 493.3](#) Advanced Mechanical Design
- [ME 497.3](#) Acoustics and Vibrations in Design

Junior Humanities or Social Science Elective

- [ANTH 111.3](#) One World Many Peoples Introduction to Cultural Anthropology One World Many Peoples Introduction to Cultural Anthropology
- [ARCH 112.3](#) The Human Journey Introduction to Archaeology and Biological Anthropology The Human Journey Introduction to Archaeology and Biological Anthropology
- [ARCH 116.3](#) Introduction to Near Eastern and Classical Archaeology Introduction to Near Eastern and Classical Archaeology
[CLAS 104.3](#) Classical Myths
- [CLAS 110.3](#) Greek Civilization Greek Civilization
- [CLAS 111.3](#) Roman Civilization Roman Civilization

- **CMRS 110.3** The Graeco Roman Tradition Evolution and Reception The Graeco Roman Tradition Evolution and Reception
- **CMRS 111.3** Medieval and Renaissance Civilization Medieval and Renaissance Civilization
- **ECON 111.3** Introductory Microeconomics Introductory Microeconomics
- **ECON 114.3** Introductory Macroeconomics Introductory Macroeconomics
- **GEOG 130.3** Environment Health and Planning Environment Health and Planning
- HIST 110.3
- HIST 111.3
- **HIST 115.3** History Matters Ideas and Culture History Matters Ideas and Culture
- HIST 121.3
- HIST 122.3
- **HIST 125.3** History Matters Indigenous Colonial and Post Colonial Histories History Matters Indigenous Colonial and Post Colonial Histories
- **HIST 135.3** History Matters Gender Sex and Society History Matters Gender Sex and Society
- **HIST 145.3** History Matters War Violence and Politics History Matters War Violence and Politics
- **HIST 155.3** History Matters Science and Environment History Matters Science and Environment
- **HIST 165.3** History Matters Health and Society History Matters Health and Society
- **HIST 175.3** History Matters Identities and Communities in Transition History Matters Identities and Communities in Transition
- **INDG 107.3** Introduction to Canadian Indigenous Studies Introduction to Canadian Indigenous Studies
- **LING 111.3** Structure of Language Structure of Language
- **LING 112.3** Dynamics of Language Dynamics of Language
- **PHIL 120.3** Knowledge Mind and Existence Knowledge Mind and Existence
- **PHIL 133.3** Introduction to Ethics and Values Introduction to Ethics and Values
- **PHIL 140.3** Critical Thinking Critical Thinking
- **POLS 111.3** Democratic Citizenship in Canada Democratic Citizenship in Canada
- **POLS 112.3** Justice and Injustice in Politics and Law Justice and Injustice in Politics and Law
- **PSY 120.3** Biological and Cognitive Bases of Psychology Biological and Cognitive Bases of Psychology
- **PSY 121.3** Social Clinical Cultural and Developmental Bases of Psychology Social Clinical Cultural and Developmental Bases of Psychology
- **SOC 111.3** Foundations in Sociology Society Structure Process Foundations in Sociology Society Structure Process
- **SOC 112.3** Foundations in Sociology Social Construction of Everyday Life Foundations in Sociology Social Construction of Everyday Life
- **WGST 112.3** Introduction to Womens and Gender Studies Introduction to Womens and Gender Studies

Senior Humanities or Social Science Elective

- **ANTH — 200-Level, 300-Level, 400-Level**
- **ARCH — 200-Level, 300-Level, 400-Level**
- **CLAS — 200-Level, 300-Level, 400-Level**
- **ECON — 200-Level, 300-Level, 400-Level**
- **ENG — 200-Level, 300-Level, 400-Level**
- **GEOG 202.3** Regional Geography of Canada
- **GEOG 204.3** Geography of the Prairie Region
- **GEOG 208.3** World Regional Development
- **GEOG 240.3** Sustainable Cities and Regions
- **GEOG 280.3** Environmental Geography
- **HIST — 200-Level, 300-Level, 400-Level**
- **INDG — 200-Level, 300-Level, 400-Level**
- **IS — 200-Level, 300-Level, 400-Level**
- **PHIL — 200-Level, 300-Level, 400-Level**
- **POLS — 200-Level, 300-Level, 400-Level**
- **PSY — 200-Level, 300-Level, 400-Level**

- [RLST — 200-Level, 300-Level, 400-Level](#)
- [SOC — 200-Level, 300-Level, 400-Level](#)
- [WGST — 200-Level, 300-Level, 400-Level](#)
- **Exception:** ECON 204 cannot be used to meet the Complementary Studies, Senior Humanities or Social Science elective requirements of the program.
- **Exception:** PSY 233 and PSY 236 cannot be used to meet the Complementary Studies, Senior Humanities or Social Science elective requirements of the program.
- **Exception:** PHIL 241 cannot be used to meet the Senior Humanities or Social Science elective requirements of the program.
- **Exception:** SOC 225 cannot be used to meet the Complementary Studies, Senior Humanities or Social Science elective requirements of the program.
- **Note:** The following Engineering courses will also satisfy the Humanities/Social Science elective requirement: RCM 400, RCM 401, RCM 402, RCM 403, RCM 404, RCM 405, RCM 406, RCM 407, RCM 408, RCM 409, RCM 410, and RCM 495.

Complementary Studies Elective

- [ANTH — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [ARBC — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [ARCH — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [ARTH — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [CHIN — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [CLAS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [CMRS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- **COMM- 100-Level**
- **COMM 201.3** Introduction to Financial Accounting
- **COMM 203.3** Introduction to Finance
- **COMM 204.3** Introduction to Marketing
- **COMM 205.3** Introduction to Operations Management
- **COMM 210.3** Introduction to Management Accounting
- **COMM 211.3** Human Resource Management
- **COMM 229.3 Personal Financial Management**
- **COMM 304.3** Introduction to Business Law
- **COMM 306.3** Ethics and Strategic Decision Making
- **COMM 308.3** Cost Management Systems
- **COMM 321.3** Corporate Financial Reporting I
- **COMM 323.3** Corporate Financial Reporting II
- **COMM 329.3**
- **COMM 337.3** Business Information and Accounting Systems
- **COMM 340.3** Introduction to International Business
- **COMM 342.3** Organization Structure and Design
- **COMM 343.3** Recruitment Selection and Engagement
- **COMM 345.3** Business and Public Policy
- **COMM 346.3** Technology Commercialization
- **COMM 347.3** Indigenous Business in Canada
- **COMM 348.3** Leadership
- **COMM 349.3** Introduction to Entrepreneurship
- **COMM 352.3** Marketing Strategy
- **COMM 354.3** Consumer Behaviour
- **COMM 357.3** Marketing Research
- [CREE — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [ECON 111.3](#) Introductory Microeconomics

- [ECON 114.3](#) Introductory Macroeconomics
- [ECON 211.3](#) Intermediate Microeconomics
- [ECON 214.3](#) Intermediate Macroeconomics
- [ECON 221.3](#) Women and the Economy
- [ECON 223.3](#) Labour Economics
- [ECON 227.3](#) Wage Determination
- [ECON 234.3](#) Economics of Health Care
- [ECON 254.3](#) International Trading System
- [ECON 256.3](#) International Monetary System
- [ECON 270.3](#) Development in Non Industrialized Countries
- [ECON 275.3](#) Economics of Natural Resources
- [ECON 277.3](#) Economics of the Environment
- [ECON 280.3](#) Classical Economics
- [ENG — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [FREN — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [GEOG 130.3](#) Environment Health and Planning
- [GEOG 202.3](#) Regional Geography of Canada
- [GEOG 204.3](#) Geography of the Prairie Region
- [GEOG 208.3](#) World Regional Development
- [GEOG 240.3](#) Sustainable Cities and Regions
- [GEOG 280.3](#) Environmental Geography
- [GERM — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [GRK — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [HEB — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [HIST — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [HNDI — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [INDG — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [IS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [JPNS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [LATN — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [LING — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [LIT — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [MUS 101.3](#) Fundamentals of Music
- [PHIL 120.3](#) Knowledge Mind and Existence
- [PHIL 121.3](#) Introduction to World Philosophies
- [PHIL 133.3](#) Introduction to Ethics and Values
- [PHIL 140.3](#) Critical Thinking
- [PHIL 202.3](#) Philosophy of Religion
- [PHIL 206.3](#) Early Modern Philosophy
- [PHIL 208.3](#) Ancient Philosophy Pre-Socratic to Plato
- [PHIL 209.3](#) Ancient Philosophy Aristotle to Plotinus
- [PHIL 210.3](#) Medieval Philosophy I From Rome to Baghdad and Paris
- [PHIL 218.3](#) Existentialism
- [PHIL 219.3](#) Phenomenology
- [PHIL 224.3](#) Philosophy of Sexuality
- [PHIL 226.3](#) Environmental Philosophy
- [PHIL 227.3](#) Feminist Philosophy
- [PHIL 227.3](#) Feminist Philosophy
- [PHIL 231.3](#) Moral Problems
- [PHIL 233.3](#) Ethical Theory
- [PHIL 234.3](#) Biomedical Ethics
- [PHIL 235.3](#) Business and Professional Ethics
- [PHIL 236.3](#) Ethics and Technology
- [PHIL 237.3](#) Law and Morality

- [PHIL 238.3](#) Ethical Issues in Scientific Research
- [PHIL 251.3](#) Philosophy of Science
- [PHIL 262.3](#) Social and Political Philosophy
- [PHIL 265.3](#) Decision and Choice Theory
- [PHIL 271.3](#) Aesthetics and Philosophy of Art
- [PHIL 281.3](#) Theory of Knowledge
- [PHIL 285.3](#) Persons Minds and Bodies
- [PHIL 292.3](#) Metaphysics Reality Existence and Change
- [PHIL 294.3](#) Philosophy of Human Nature
- [PHIL 296.3](#)
- [POLS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [PSY — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [RCM — 400-Level](#)
- [RLST — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [RUSS — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [SNSK — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [SOC — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [SPAN — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [UKR — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [WGST — 100-Level, 200-Level, 300-Level, 400-Level](#)
- ~~**Exception:** CLAS 104 cannot be used to meet the Complementary Studies Elective Requirements of the program.~~
- **Exception:** COMM 121.3 is restricted to Edwards School of Business students.
- **Note:** Special Topics courses cannot be used to meet a Complementary Studies Elective Requirement (any course ending in 98 or 99).

Prerequisite & Corequisite Legend

Prerequisite and Corequisite Legend

Courses in the College of Engineering use the following terms in prerequisite and corequisite listings:

Engineering First Year Common Core Courses

B.E. students are required to complete a common first-year of undeclared studies. This is known as the first-year common core.

Engineering Two Year Common Core

- ~~BIOL 120.3~~ The Nature of Life or ~~CHEM 115.3~~ General Chemistry II Chemical Processes or ~~GEOL 121.3~~ Earth Processes or ~~PHYS 125.3~~ Physics and Technology
 - ~~CHEM 114.3~~
 - ~~COMM 101.3~~ Introduction to Business or ~~COMM 102.3~~ Introduction to Business Management or ~~COMM 201.3~~ Introduction to Financial Accounting or ~~COMM 105.3~~ Introduction to Organizational Behaviour or ~~COMM 204.3~~ Introduction to Marketing or ~~COMM 205.3~~ Introduction to Operations Management or ~~COMM 206.3~~ or ~~COMM 210.3~~ Introduction to Management Accounting or ~~COMM 304.3~~ Introduction to Business Law
 - ~~GE 101.1~~ Introduction to the Engineering Profession
 - ~~GE 111.3~~ Engineering Problem Solving
 - ~~GE 121.3~~ Engineering Design
 - ~~GE 124.3~~ Engineering Mechanics I
 - ~~GE 125.3~~ Engineering Mechanics II
 - ~~MATH 123.3~~
 - ~~MATH 124.3~~
 - ~~MATH 223.3~~ Calculus III for Engineers
 - ~~MATH 224.3~~ Calculus IV for Engineers
 - ~~PHYS 155.3~~ Introduction to Electricity and Magnetism
-
- GE 102.2 Introduction to Engineering I
 - GE 112.1 Engineering Discipline Experience
 - GE 122.2 Engineering Mechanics I
 - GE 132.1 Engineering Communications I
 - GE 142.2 Design I
 - GE 152.1 Electrical Circuits I
 - CMPT 142.3 Introduction to Computer Science for Engineers
 - MATH 133.4 Engineering Mathematics I
 - **Natural Science Series:**
Students must complete all of the following courses:

- o **PHYS 152.1** Introduction to Atoms and Nuclei for Engineering
- o **CHEM 142.1** Global Impact of Chemistry for Engineering
- o **GEOL 102.1** Introduction to Geology for Engineering
- o **BIOL 102.1** Nature for Engineering
- **GE 103.1** Introduction to Engineering II
- **GE 123.3** Engineering Mechanics II
- **GE 133.2** Engineering Communication II
- **GE 153.2** Electrical Circuits II
- **GE 163.2** Process Engineering
- **CHEM 146.3** General Chemistry for Engineering
- **MATH 134.3** Engineering Mathematics II
- **PHYS 156.3** Electromagnetism and Waves for Engineering
- **MATH 223.3** Calculus III for Engineers
- **MATH 224.3** Calculus IV for Engineers

Engineering Three Year Common Core

- ~~**BIOL 120.3** The Nature of Life or **CHEM 115.3** General Chemistry II Chemical Processes or **GEOL 121.3** Earth Processes or **PHYS 125.3** Physics and Technology~~
- ~~CHEM 114.3~~
- ~~**COMM 101.3** Introduction to Business or **COMM 102.3** Introduction to Business Management or **COMM 201.3** Introduction to Financial Accounting or **COMM 105.3** Introduction to Organizational Behaviour or **COMM 204.3** Introduction to Marketing or **COMM 205.3** Introduction to Operations Management or COMM 206.3 or **COMM 210.3** Introduction to Management Accounting or **COMM 304.3** Introduction to Business Law~~
- ~~**GE 101.1** Introduction to the Engineering Profession~~
- ~~**GE 111.3** Engineering Problem Solving~~
- ~~**GE 121.3** Engineering Design~~
- ~~**GE 124.3** Engineering Mechanics I~~
- ~~**GE 125.3** Engineering Mechanics II~~
- ~~MATH 123.3~~
- ~~MATH 124.3~~
- ~~**MATH 223.3** Calculus III for Engineers~~
- ~~**MATH 224.3** Calculus IV for Engineers~~
- ~~**PHYS 155.3** Introduction to Electricity and Magnetism~~
- ~~**RCM 200.3** Effective Professional Communication~~

- **GE 102.2** Introduction to Engineering I
- **GE 112.1** Engineering Discipline Experience
- **GE 122.2** Engineering Mechanics I
- **GE 132.1** Engineering Communications I
- **GE 142.2** Design I
- **GE 152.1** Electrical Circuits I
- **CMPT 142.3** Introduction to Computer Science for Engineers
- **MATH 133.4** Engineering Mathematics I
- **Natural Science Series:**

Students must complete all of the following courses:

- o **PHYS 152.1** Introduction to Atoms and Nuclei for Engineering
- o **CHEM 142.1** Global Impact of Chemistry for Engineering

- o **GEOL 102.1** Introduction to Geology for Engineering
- o **BIOL 102.1** Nature for Engineering
- **GE 103.1** Introduction to Engineering II
- **GE 123.3** Engineering Mechanics II
- **GE 133.2** Engineering Communication II
- **GE 153.2** Electrical Circuits II
- **GE 163.2** Process Engineering
- **CHEM 146.3** General Chemistry for Engineering
- **MATH 134.3** Engineering Mathematics II
- **PHYS 156.3** Electromagnetism and Waves for Engineering
- **MATH 223.3** Calculus III for Engineers
- **MATH 224.3** Calculus IV for Engineers
- **RCM 200.3** Effective Professional Communication

Engineering Four Year Common Core

- ~~**BIOL 120.3** The Nature of Life or **CHEM 115.3** General Chemistry II Chemical Processes or **GEOL 121.3** Earth Processes or **PHYS 125.3** Physics and Technology~~
- ~~CHEM 114.3~~
- ~~**COMM 101.3** Introduction to Business or **COMM 102.3** Introduction to Business Management or **COMM 201.3** Introduction to Financial Accounting or **COMM 105.3** Introduction to Organizational Behaviour or **COMM 204.3** Introduction to Marketing or **COMM 205.3** Introduction to Operations Management or **COMM 206.3** or **COMM 210.3** Introduction to Management Accounting or **COMM 304.3** Introduction to Business Law~~
- ~~**GE 101.1** Introduction to the Engineering Profession~~
- ~~**GE 111.3** Engineering Problem Solving~~
- ~~**GE 121.3** Engineering Design~~
- ~~**GE 124.3** Engineering Mechanics I~~
- ~~**GE 125.3** Engineering Mechanics II~~
- ~~**GE 348.3** Engineering Economics~~
- ~~**GE 449.3** Engineering in Society~~
- ~~MATH 123.3~~
- ~~MATH 124.3~~
- ~~**MATH 223.3** Calculus III for Engineers~~
- ~~**MATH 224.3** Calculus IV for Engineers~~
- ~~**PHYS 155.3** Introduction to Electricity and Magnetism~~
- ~~**RCM 300.3** Effective Professional Communication~~

- **GE 102.2** Introduction to Engineering I
- **GE 112.1** Engineering Discipline Experience
- **GE 122.2** Engineering Mechanics I
- **GE 132.1** Engineering Communications I
- **GE 142.2** Design I
- **GE 152.1** Electrical Circuits I
- **CMPT 142.3** Introduction to Computer Science for Engineers
- **MATH 133.4** Engineering Mathematics I
- **Natural Science Series:**
Students must complete all of the following courses:
 - o **PHYS 152.1** Introduction to Atoms and Nuclei for Engineering
 - o **CHEM 142.1** Global Impact of Chemistry for Engineering

- o **GEOL 102.1** Introduction to Geology for Engineering
- o **BIOL 102.1** Nature for Engineering
- **GE 103.1** Introduction to Engineering II
- **GE 123.3** Engineering Mechanics II
- **GE 133.2** Engineering Communication II
- **GE 153.2** Electrical Circuits II
- **GE 163.2** Process Engineering
- **CHEM 146.3** General Chemistry for Engineering
- **MATH 134.3** Engineering Mathematics II
- **PHYS 156.3** Electromagnetism and Waves for Engineering
- **MATH 223.3** Calculus III for Engineers
- **MATH 224.3** Calculus IV for Engineers
- **RCM 200.3** Effective Professional Communication
- **GE 348.3** Engineering Economics
- **GE 449.3** Engineering in Society

CE Program Core

- **CE 202.3** Spatial Analysis and Engineering Drawings
- **CE 212.3** Civil Engineering Materials
- **CE 213.3** Civil Engineering Materials
- **CE 225.3** Fluid Mechanics
- ~~**CE 271.2** Spring Surveying Camp~~
- **CE 295.3** Design Project
- **CE 315.3** Fluid Mechanics and Hydraulics
- **CE 317.3** Structural Analysis
- **CE 318.3** Applied Engineering Mathematics
- **CE 319.3** Hydrology
- **CE 320.3** Project Engineering
- **CE 321.3** Structural Systems and Materials
- **CE 327.3** Municipal Engineering
- **CE 328.3** Fundamentals of Soil Mechanics
- **CE 329.3** Transportation Engineering I
- **CE 330.3** Geotechnical Engineering
- **CE 495.6** Capstone Design Project
- ~~**CMPT 113.3** or **CMPT 141.3** Introduction to Computer Science~~
- **GE 210.3** Probability and Statistics
- ~~**GE 213.3** Mechanics of Materials~~
- **GEOE 218.3** Engineering Geology
- **GEOL 121.3** Earth Processes

CHE Program Core

- **CHE 210.3** Fluid Mechanics I
- **CHE 220.3** Introduction to Process Engineering
- **CHE 223.3** Chemical Thermodynamics
- **CHE 315.3** Equilibrium Stage Operations
- **CHE 322.3** Mathematical Modelling
- **CHE 323.3** Chemical Engineering Thermodynamics

- [CHE 324.3](#) Heat Transfer
- [CHE 325.3](#) Process Engineering and Design I
- [CHE 326.3](#) Plant Design Project
- [CHE 332.3](#)
- [CHE 333.2](#) Chemical Engineering Laboratory I
- [CHE 411.3](#) Chemical Reaction Engineering
- [CHE 414.2](#) Chemical Engineering Laboratory II
- [CHE 421.3](#) Mass Transfer
- [CHE 423.3](#) Process Dynamics and Control
- [CHE 424.2](#) Chemical Engineering Laboratory III
- ~~[CHE 431.1](#) Seminar~~
- [CHE 470.0](#) Industrial Site Visitation
- [CHE 495.6](#) Process Engineering and Design II
- ~~[CHEM 115.3](#) General Chemistry II Chemical Processes~~
- [CHEM 242.3](#) Thermodynamics and Kinetics
- [CHEM 250.3](#) Introduction to Organic Chemistry
- ~~[CMPT 113.3](#) or [CMPT 141.3](#) Introduction to Computer Science~~
- [GE 210.3](#) Probability and Statistics
- [GE 213.3](#) Mechanics of Materials

CME Program Core

- [CME 331.3](#) Microprocessor Based Embedded Systems
- [CME 341.3](#) Logic Design Using FPGAs
- ~~[CMPT 116.3](#) Computing I or [CMPT 141.3](#) Introduction to Computer Science~~
- ~~[CMPT 117.3](#) or [CMPT 145.3](#) Principles of Computer Science~~
- [CMPT 214.3](#) Programming Principles and Practice
- [EE 205.1](#) Safety and Stewardship in Electrical and Computer Engineering
- [EE 216.3](#) Probability Statistics and Numerical Methods
- [EE 221.3](#) Analog Electronics
- [EE 232.3](#) Digital Electronics
- [EE 265.3](#) Discrete Time Signals and Systems
- [EE 271.3](#) Materials and Heat Transport in Electrical Engineering
- ~~[EP 202.3](#) Electric and Magnetic Fields and Circuits~~
- [EP 214.3](#) Analog Signals and Systems
- [GE 348.3](#) Engineering Economics
- [RCM 300.3](#) [200.3](#) Effective Professional Communication

EE Program Core

- [CME 331.3](#) Microprocessor Based Embedded Systems
- ~~[CMPT 116.3](#) Computing I or [CMPT 141.3](#) Introduction to Computer Science~~
- [EE 205.1](#) Safety and Stewardship in Electrical and Computer Engineering
- [EE 216.3](#) Probability Statistics and Numerical Methods
- [EE 221.3](#) Analog Electronics
- [EE 232.3](#) Digital Electronics
- [EE 241.3](#) Introduction to Electric Power Systems
- [EE 265.3](#) Discrete Time Signals and Systems
- [EE 271.3](#) Materials and Heat Transport in Electrical Engineering

- **EE 382.3** Control Systems
- **EP 202.3** Electric and Magnetic Fields and Circuits
- **EP 214.3** Analog Signals and Systems
- **GE 348.3** Engineering Economics
- **RCM 300.3 200.3** Effective Professional Communication

ENVE Program Core

- ~~**BIOL 120.3** The Nature of Life~~
- ~~**BLE 311.3**~~
- ~~**BLE 312.3** or **EE 204.3** Basic Electronics and Electrical Power~~
- ~~**BLE 313.3** Instrumentation~~
- **CE 202.3** Spatial Analysis and Engineering Drawings
- ~~**CE 271.2** Spring Surveying Camp~~
- **CE 315.3** Fluid Mechanics and Hydraulics
- **CE 319.3** Hydrology
- **CE 320.3** Project Engineering
- **CE 320.3** Project Engineering
- **CE 327.3** Municipal Engineering
- **CE 328.3** Fundamentals of Soil Mechanics
- **CE 468.3** Environmental Geotechnics
- **CHE 210.3** Fluid Mechanics I
- **CHE 223.3** Chemical Thermodynamics
- **CHE 454.3** Design of Industrial Waste Treatment Systems
- ~~**CHEM 115.3** General Chemistry II Chemical Processes~~
- **CHEM 242.3** Thermodynamics and Kinetics
- **CHEM 250.3** Introduction to Organic Chemistry
- ~~**CMPT 113.3**~~
- ~~**CMPT 113.3** or **CMPT 141.3** Introduction to Computer Science~~
- **ENVE 495.6** Capstone Design Project
- **GE 210.3** Probability and Statistics
- ~~**GE 213.3** Mechanics of Materials~~
- ~~**CE 213.3** Civil Engineering Materials~~
- **GEOE 218.3** Engineering Geology
- **GEOL 121.3** Earth Processes
- ~~**TOX 301.3** Environmental Toxicology or **EVSC 421.3** Contaminated Site Management and Remediation~~

EP Program Core

- ~~**CMPT 116.3** Computing I or **CMPT 141.3** Introduction to Computer Science~~
- **EE 221.3** Analog Electronics
- **EE 232.3** Digital Electronics
- **EE 321.3** Advanced Analog Electronics and Instrumentation
- **EP 225.3** or **EP 325.3** Optical Systems Design
- ~~**EP 229.3** or **EE 202.3**~~
- **EP 317.3** Applied Physics of Materials
- **EP 320.3** Discrete Linear Systems and Control Theory
- **EP 370.3 270.3** Heat Kinetic Theory and Thermodynamics
- **EP 413.3** Instrumentation and Design

- ~~EP 414.3~~
- [EP 421.3](#) Advanced Optics
- [EP 495.6](#) Capstone Design Project
- [GE 210.3](#) Probability and Statistics
- [MATH 331.3](#) Applied Differential Equations
- [PHYS 252.3](#) Foundations of Modern Physics
- [PHYS 356.3](#) Intermediate Electromagnetism
- [PHYS 383.3](#) Quantum Mechanics I
- [PHYS 404.3](#) Techniques of Experimental Physics
- [PHYS 490.0](#) Physics Seminars

GEOE Program Core

- [CE 202.3](#) Spatial Analysis and Engineering Drawings
- [CE 212.3](#) Civil Engineering Materials
- [CE 225.3](#) Fluid Mechanics
- ~~CE 271.2 Spring Surveying Camp~~
- [CE 295.3](#) Design Project
- [CE 318.3](#) Applied Engineering Mathematics
- [CE 319.3](#) Hydrology
- [CE 320.3](#) Project Engineering
- [CE 328.3](#) Fundamentals of Soil Mechanics
- [CE 330.3](#) Geotechnical Engineering
- ~~CMPT 113.3 or CMPT 141.3 Introduction to Computer Science~~
- [GE 210.3](#) Probability and Statistics
- ~~GE 213.3 Mechanics of Materials~~
- ~~CE 213.3 Civil Engineering Materials~~
- [GEOE 218.3](#) Engineering Geology
- [GEOE 315.3](#) Rock Mechanics
- [GEOE 375.3](#) Engineering Hydrogeology
- [GEOE 378.3](#) Engineering Geological Mapping
- [GEOE 412.3](#) Reservoir Mechanics
- [GEOE 414.3](#) Rock Mechanics Design
- [GEOE 466.3](#) Petroleum Geomechanics
- [GEOE 495.6](#) Capstone Design Project
- [GEOL 121.3](#) Earth Processes
- [GEOL 224.3](#) Mineralogy
- [GEOL 226.3](#) Introductory Petrology
- [GEOL 245.3](#) Introduction to Sedimentary Rocks
- [GEOL 258.3](#) Structural Geology

ME Program Core

- ~~CMPT 141.3 Introduction to Computer Science~~
- ~~EE 204.3 Basic Electronics and Electrical Power~~
- [GE 213.3](#) Mechanics of Materials
- [ME 214.3](#) Introduction to Materials and Manufacturing
- [ME 215.3](#) Fluid Mechanics I
- [ME 226.3](#) Mechanics III

- [ME 227.3](#) Thermodynamics I
- [ME 229.3](#) Introduction to Mechanical Engineering Design
- ~~[ME 251.3](#) Engineering Analysis I~~
- [ME 313.3](#) Mechanics of Materials I
- [ME 314.3](#) Machine Design I
- [ME 321.3](#) Engineering Analysis II
- [ME 323.3](#) Mechanics of Materials II
- [ME 324.3](#) Engineering Materials
- [ME 327.3](#) Heat Transfer
- [ME 328.3](#) Mechanical Engineering Laboratory I
- [ME 329.3](#) Collaborative Design and Manufacturing
- [ME 330.3](#) Manufacturing Processes
- [ME 335.3](#) Fluid Mechanics II
- [ME 352.3](#) Engineering Analysis III
- [ME 417.3](#) Thermodynamics II
- [ME 418.3](#) Mechanical Engineering Laboratory II
- [ME 431.3](#) Control Systems
- [ME 495.6](#) Industrial Design Project

Science Elective

- ~~[BIOL 120.3](#) The Nature of Life or [CHEM 115.3](#) General Chemistry II Chemical Processes or [GEOL 121.3](#) Earth Processes or [PHYS 125.3](#) Physics and Technology~~

EN Senior Courses

- BLE 200 - 499
- CE 200 - 499
- CHE 200 - 499
- CHEM 200 - 499
- CME 200 - 499
- CMPT 200-499
- EE 200 - 499
- EP 200 - 499
- ENVE 200 - 499
- GEOE 200 - 499
- GEOL 200 - 499
- ME 200 - 499
- PHYS 200 - 499

RCM Non-EN Alternatives

- [ANTH — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [ARTH — 100-Level, 200-Level, 300-Level, 400-Level](#)
- [CLAS 110.3](#) Greek Civilization
- [CLAS 111.3](#) Roman Civilization

- [**CLAS 203.3**](#) Advanced Medical Terminology
- [**CLAS 220.3**](#) Daily Life in Ancient Greece and Rome
- [**CLAS 225.3**](#) Women in Antiquity
- [**CLAS 228.3**](#) Epic
- [**CLAS 240.3**](#) Ancient Art and Architecture I Bronze Age to Classical Greece
- [**CLAS 242.3**](#) Ancient Art and Architecture II Graeco Roman World
- CLAS 252.3
- CLAS 259.3
- [**CLAS 298.3**](#) Special Topics
- [**CLAS 299.3**](#) Special Topics
- [**CLAS 398.3**](#) Special Topics
- [**CLAS 399.3**](#) Special Topics
- [**CLAS 499.6**](#) Special Topics
- CLAS Select 100, 200, 300, or 400-level:
- [**CMRS — 100-Level, 200-Level, 300-Level, 400-Level**](#)
- [**DRAM — 100-Level, 200-Level, 300-Level, 400-Level**](#)
- [**ENG — 100-Level, 200-Level, 300-Level, 400-Level**](#)
- [**HIST — 100-Level, 200-Level, 300-Level, 400-Level**](#)
- [**INDG — 100-Level, 200-Level, 300-Level, 400-Level**](#)
- [**IS — 100-Level, 200-Level, 300-Level, 400-Level**](#)
- [**LING — 100-Level, 200-Level, 300-Level, 400-Level**](#)
- [**PHIL — 100-Level, 200-Level, 300-Level, 400-Level**](#)
- [**POLS — 100-Level, 200-Level, 300-Level, 400-Level**](#)
- [**PSY — 100-Level, 200-Level, 300-Level, 400-Level**](#)
- [**RLST — 100-Level, 200-Level, 300-Level, 400-Level**](#)
- [**SOC — 100-Level, 200-Level, 300-Level, 400-Level**](#)
- [**WGST — 100-Level, 200-Level, 300-Level, 400-Level**](#)

Appendices

Appendix A - Design of a New First Year Engineering Program at the University of Saskatchewan (Catalogue Entry)

Engineering First Year

First-Year Common Core

All undergraduate students admitted to the College of Engineering are required to complete a common first-year of undeclared studies (known as the first-year common core).

The first year curriculum features a modular structure, with well-integrated content across courses to reinforce program learning objectives and develop the skills and attitudes that will promote student success. A competency-based assessment approach, supported by daily help sessions, provides students with multiple opportunities to demonstrate mastery of fundamental concepts. Near the end of the Winter Term in first year, students will select a major and will be placed in the appropriate bridging courses to facilitate their transition into the upper year programs.

Prospective students who begin their studies in a college other than the College of Engineering are encouraged to consult an Academic Advisor within the Engineering Student Centre on a regular basis to plan their program of study, choose courses (including electives), and monitor their academic progress.

Year 1 (41-44 credit units)

Year 1 will range from a total of 41 to 44 credit units, depending upon which major field of study is chosen.

Fall Term

*The start and end dates of the courses vary, as the duration of the courses varies from 4 to 12 weeks.

- [GE 102.2](#) Introduction to Engineering I
- [GE 112.1](#) Engineering Discipline Experience
- [GE 122.2](#) Engineering Mechanics I
- [GE 132.1](#) Engineering Communications I
- [GE 142.2](#) Design I
- [GE 152.1](#) Electrical Circuits I
- [CMPT 142.3](#) Introduction to Computer Science for Engineers
- [MATH 133.4](#) Engineering Mathematics I

- **Natural Science Series:**

Students must complete all of the following courses:

- o [PHYS 152.1](#) Introduction to Atoms and Nuclei for Engineering
- o [CHEM 142.1](#) Global Impact of Chemistry for Engineering
- o [GEOL 102.1](#) Introduction to Geology for Engineering
- o [BIOL 102.1](#) Nature for Engineering

Winter Term

* The start and end dates of the courses vary, as the duration of the courses varies from 4 to 12 weeks.

- [GE 103.1](#) Introduction to Engineering II
- [GE 123.3](#) Engineering Mechanics II
- [GE 133.2](#) Engineering Communication II
- [GE 143.2](#) Design II (Please note: This course is not taken by students entering Civil, Geological and Environmental Engineering majors.)
- [GE 153.2](#) Electrical Circuits II
- [GE 163.2](#) Process Engineering
- [CHEM 146.3](#) General Chemistry for Engineering
- [MATH 134.3](#) Engineering Mathematics II
- [PHYS 156.3](#) Electromagnetism and Waves for Engineering

Discipline Bridge Course:

Course selection depends upon the major field of study chosen.

- [CMPT 146.3](#) Principles of Computer Science for Engineers (Computer and Electrical Engineering, and Engineering Physics)
- [ME 113.3](#) Engineering Analysis I (Mechanical Engineering)
- [CHE 113.3](#) Unit Operations in Chemical Process Engineering (Chemical Engineering)
- [CE 271.2](#) Spring Surveying Camp (Civil, Geological and Environmental Engineering)

Appendix B – Approvals in the College of Engineering



UNDERGRADUATE ACADEMIC PROGRAMS COMMITTEE

MEETING MINUTES

November 9, 2020, 1:30 PM– 2:30 PM

WebEx Meeting

(Password: UAPC)

CHAIR: B. Sparling

PRESENT: A. Odeshi, T. Cao, R. Evitts, K. Mazurek, D. Klymyshyn, W. Helgason, K. Wahid, D. Milne, C. Owen, A. Bourassa, D. Gaudet, A. Pajic

REGRETS:

GUESTS:

SECRETARY: A. Galambos

AGENDA ITEM		SUPPORTING DOCUMENTATION
1	Comments from the Chair – B. Sparling	
2	Approval of Agenda – B. Sparling MOTION: To approve the agenda of November 9, 2020, as circulated. Item added: Undergraduate degree completion timeframe policy (information item) Motion: D. Milne Seconded: A. Bourassa Negative votes: 0 Abstentions: 0 CARRIED	
3	Approval of Consent Agenda – B. Sparling	
4	Approval of Prior Minutes – B. Sparling a) MOTION: To approve the minutes from October 13, 2020 as circulated. Amendment made: Item 6.c. Wording changed from communications textbook to communication textbook. Motion: K. Wahid Seconded: A. Odeshi Negative votes: 0 Abstentions: 0 CARRIED	
5	New Business a) MOTION: To change the prerequisites for EE 362 be changed from Prerequisite(s): EP 214 and EE 265 Prerequisite(s) or Corequisite(s): CME 341 To Prerequisite(s): EP 214 and EE 265 Rationale: Material in CME 341 (HDL programming) was originally thought	

	to be required to support laboratory content involving programmable hardware to be used in EE 362. The laboratories do not require this hardware, and therefore the CME 341 as prerequisite or corequisite is not required. CME 341 corequisite causes some scheduling conflicts with students needing this course, removing this corequisite will remedy this issue. Motion: D. Klymyshyn Seconded: A. Bourassa Negative votes: 0 Abstentions: 0 CARRIED	
b)	MOTION: To remove CHE 431.1 (Seminar) as a required course in the CHE major. Rationale: The purpose of this course was to facilitate practice of technical presentations before an audience of peers. This course is now redundant since students have ample opportunity for practice in CHE 333.2 (lab 1), CHE 414.2 (lab 2), CHE 424.2 (lab 3), CHE 326.3 (Plant Design Project) and CHE 495.6 (Capstone). CHE 431.1 will be offered in 2021-2022. This change will affect the number of credit units in the CHE program in the 2022-2023 catalogue, A. Pajic will follow up with R. Evitts. Motion: R. Evitts Seconded: T. Cao Negative votes: 0 Abstentions: 0 CARRIED	
c)	MOTION: To remove Elective A – Science Elective as a required course in the CHE major. Rationale: • Chem 115.3 is currently a requirement in the CHE major. • Chem 242.3 is currently a requirement in the CHE major. • Chem 115.3 is the prerequisite for Chem 242.3 • The new first year will be the be the prerequisite for Chem 242.3 Current process: If a student takes Chem 115.3 in first year, they take Chem 242.3 in year 2 (either term) and an Elective A. If a student does not take Chem 115.3 in first year they will have taken the Elective A in first year (e.g. GEOE 121.3). They then take Chem 115.3 in Y2T1 followed by Chem 242.3 in Y2T2. New process for new first year: After a student completes the new first year, the student will have the prerequisite for Chem 242.3. Hence, Elective A is unnecessary. (CHE students will have more than sufficient natural science material without Elective A).	

	This change will affect the number of credit units in the CHE program in the 2022-2023 catalogue, A. Pajic will follow up with R. Evitts. Motion: R. Evitts Seconded: A. Bourassa Negative votes: 0 Abstentions: 0 CARRIED d) MOTION: To remove an Elective B – Technical Elective from the CHE major (a reduction in the number of Elective B courses from 3 to 2). Rationale: Historically, at the culmination of the CHE degree, students were expected to take two Elective B courses (during the final year of studies). A third Elective B was added with the introduction of the CHE options in the 2000s (then Biochemical, Biotechnology and Petroleum, now Biochemical, Petroleum and Mineral Processing) to allow for each to have specialized suite of courses with a nominal number of extra courses over the base degree. CBE is in the process of revisiting and recasting the options and would like to reduce the number of Elective B courses for those students not in an option, to further distinguish between those who pursue an option and those who do not. There is no design content in these technical electives. This change will create a permanent reduction in the number of credit units in the CHE program in the 2022-2023 catalogue, A. Pajic will follow up with R. Evitts. Motion: R. Evitts Seconded: A. Odeshi Negative votes: 0 Abstentions: 0 CARRIED e) MOTION: To change the course description for CHE 411.3 from the current: An examination of the principles of applied chemical kinetics and their use in chemical reactor design and chemical plant operation. Both homogeneous and heterogeneous kinetics, including catalysis, are considered. The new course description would be as follows: An examination of the principles of both fundamental and applied chemical reactions and kinetics, and their applications in chemical reactor design and chemical plant operation. Both homogeneous and heterogeneous kinetics, including catalysis, are considered for safe design and operations of chemical reactors. Motion: R. Evitts Seconded: D. Klymyshyn	
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	Negative votes: 0 Abstentions: 0 CARRIED f) MOTION: That UAPC approves the Department of Mechanical Engineering's request to register ME 496.3 Machine Design II as a permanent design elective, effective September 2021. Rationale: ME department offered Machine Design II as a special topic (ME 498) and a technical elective in the 2018/2019 and 2019/2020 academic years. ME received APC's approval to offer the course the third time in the current term to upgrade its lab and engineering design components in preparation to transit it to a design elective. The course instructor, Prof. J. Johnston, introduced a large project component (lab and design) to the course and has integrated the project component into the course content and deliverables. The project, integrated with a hands-on lab, consists of designing an ATV winch. Students are tasked with tearing down an existing 1000 lb winch and design their own winch with different load-carrying capacities. This project entails safety factor selection, impact, fatigue, shaft design, bearings, gears, clutch, bolts and wire. The department considers the course to have enough design content and recommends that UAPC approves it as a permanent design elective, effective September 2021. Increasing the number of ME design electives will offer our students more flexibility in the choice of design electives. It also offers the department opportunity to offer a sufficient number of design electives whenever one or more design elective instructor(s) proceed on sabbatical leave at the same time. Motion: A. Odeshi Seconded: R. Evitts Negative votes: 0 Abstentions: 0 CARRIED g) MOTION: To create GE 197 Selected Introductory Topics in Engineering course effective 2021-05. Rationale: This course is being offered to facilitate the integration of transfer or irregular students into Engineering programs. With the introduction of the revised first year Engineering curriculum featuring a modular design, non-standard course scheduling, and innovative course content, it is likely that transfer students from other colleges or institutions, or returning students, will be missing components of courses that will inhibit them from progressing on to upper year majors in a timely manner. By offering selected portions of first year courses on an as-needed basis, this will allow students to fill in academic gaps to allow for a more efficient progression to upper year programs, as well as to satisfy prerequisite requirements for subsequent first year courses. Note: This is a placeholder course.	
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	GE 124, GE 125, & GE 111 will be offered in the 202005/202007 academic terms on a one-time basis to supplement some classes students have failed. These courses could be held in various ways depending on the demand from students (examples: spring/summer, distance learning). Motion: A. Bourassa Seconded: A. Odeshi Negative votes: 0 Abstentions: 0 CARRIED	
6	Discussion	
a)	Undergraduate degree completion timeframe Information item only as SAAC has authority in this area. Routinely degree completion extension cases have been heard in SAAC and without fail the extension has been granted. The ten-year rule was to ensure a student was current in their technical knowledge when they graduated and typically most of these expired courses are not courses that would speak to their technical skill. Rather than having a ten-year limitation on all classes we would like to move to a six-year limitation on the core technical classes once you enter the second year of your major. If a student does not complete all courses within the six-year timeframe they can request an extension, which will go to the program for approval. The program will then decide to deny this request, based on whether the classes have changed too much or need to be refreshed for other reasons, or approve this request and allow the student to graduate with these courses.	
7	Next Meeting	
	Our next meeting is scheduled for December 14 from 1:30-2:30 pm , via Webex.	
8	Meeting Adjourned – B. Sparling	



UNDERGRADUATE ACADEMIC PROGRAMS COMMITTEE

MEETING MINUTES

March 8, 2021, 1:30 PM– 2:30 PM

WebEx Meeting

CHAIR: B. Sparling
PRESENT: A. Bourassa, T. Cao, R. Evitts, D. Gaudet, W. Helgason, K. Mazurek, D. Milne, A. Odeshi, C. Owen, A. Pajic, K. Wahid
REGRETS: E. Salt
GUESTS: R. Johanson
SECRETARY: A. Galambos

AGENDA ITEM		SUPPORTING DOCUMENTATION
1	Comments from the Chair – B. Sparling	
2	Approval of Agenda – B. Sparling MOTION: To approve the agenda of March 8, 2021, as circulated. Motion: K. Wahid Seconded: A. Bourassa CARRIED	
3	Approval of Consent Agenda – B. Sparling	
4	Approval of Prior Minutes – B. Sparling	
a)	MOTION: To approve the minutes from January 11, 2021 as circulated. Motion: R. Evitts Seconded: T. Cao CARRIED	
5	New Business	
a)	MOTION: To remove CMPT 113.3 from the Chemical Engineering Curriculum. CMPT 113.3 Introduction to Computer Science for Engineers An introduction to computer science and problem solving using procedural programming. This course introduces the basic computer science and computer programming principles of algorithms, abstraction, encapsulation, variables, conditional branching, repetition, functions, recursion, and elementary data structures. These concepts are applied to problem solving applications such as data analysis and visualization, simulation, text processing, and image processing. An introduction to MATLAB leverages the basic principles in an Engineering-specific setting. Rationale: With the advent of the new first year curriculum, this course will no longer be a required course. Motion: R. Evitts Seconded: A. Odeshi CARRIED	



b)	MOTION: To add CMPT 141.3 to the Chemical Engineering Curriculum CMPT 141.3 Introduction to Computer Science An introduction to computer science and problem solving using procedural programming. This course introduces the basic computer science and computer programming principles of algorithms, abstraction, encapsulation, variables, conditional branching, repetition, functions, recursion, and elementary data structures. These concepts are applied to problem solving applications such as data analysis and visualization, simulation, text processing, and image processing. The programming skills acquired in this course are applicable in all fields of study, the work-place, and personal projects. Rationale: In the case that a Chemical Engineering student is deficient in the Computer Science requirement, the student will be allowed to take CMPT 141.3 to meet said requirement. Computer Science will not offer CMPT 113.3 in the 2021 - 2022 academic year. Moved: R. Evitts Seconded: A. Odeshi CARRIED <i>CMPT 141 will be taken only by Engineering students which provides us with a higher level of control; first-year curriculum coordinators will meet regularly with the College of Arts & Science to be sure learning objectives are being fulfilled as the content of this course will be integrated in our first year.</i> <i>CMPT 141 course content will be delivered in the new first year and be aligned with our new learning objectives for first and upper-year programs, as such the CMPT 141 course will be phased out of our programs within the next 2-3 years.</i>	
6	Discussion	
a)	First year documents to help with planning and preparation of the changes in the upper years. Engineering First year: https://programs.usask.ca/engineering/first-year/index.php <i>Major program changes (those that change the total number of credit units, and result in changes to tuition and/or program length) typically need to be submitted to the APC by mid-November; so they should be approved by the departments and the UAPC before that.</i>	6.a.i. Supporting documents may be found at this path: J: \Committees\UAPC\2021-22\2021-03-08
7	Next Meeting	
	Our next meeting is scheduled for April 12 from 1:30-2:30 pm , via Webex.	
8	Meeting Adjourned – B. Sparling	



UNDERGRADUATE ACADEMIC PROGRAMS COMMITTEE
MEETING MINUTES
April 12, 2021, 1:30 PM– 2:30 PM
WebEx Meeting

CHAIR: B. Sparling
PRESENT: A. Bourassa, T. Cao, R. Evitts, W. Helgason, K. Mazurek, D. Milne, A. Odeshi, A. Pajic, E. Salt, K. Wahid

REGRETS: D. Gaudet, C. Owen
GUESTS: S. Maw
SECRETARY: A. Galambos

AGENDA ITEM		SUPPORTING DOCUMENTATION
1	Comments from the Chair – B. Sparling	
2	Approval of Agenda – B. Sparling MOTION: To approve the agenda of April 12, 2021, as circulated. Moved: D. Milne Seconded: K. Mazurek K. Wahid suggested discussing final exams – B. Sparling will send out the message this afternoon, add item 6.e. CARRIED with Addition	
3	Approval of Consent Agenda – B. Sparling	
4	Approval of Prior Minutes – B. Sparling	
a)	MOTION: To approve the minutes from March 8, 2021 as circulated. Moved: K. Wahid Seconded: A. Bourassa Abstention: 1 member CARRIED	4. 2021_03_08 UAPC Draft Minutes
5	New Business	
a)	MOTION: Remove prerequisite for GE431 of only open to students in the Technological AMENDED MOTION: Replace prerequisite of GE 431 with GE 348 or equivalent in the TIC. Innovation Certificate program. Rationale: The course is a project-based course that uses the method of systematic engineering design to define a new product and develop a business model. Students will work in teams to bring different perspectives to solve the	

	problem together. Essential knowledge in business will be provided by the instructor through lectures and workshops for the students that are not in TIC. Item tabled for next meeting, T. Cao to review prerequisites of GE 431. <u>Civil Engineering Program</u>	
b)	MOTION: To add GEOL 121.3 Earth Processes to the first term of second year of the CE program for 2022-2023. Rationale: The 3-credit science elective in first year, which is currently recommended to be GEOL 121 for CE and GEOE students, is being dropped in the new first-year program and replaced with a general science course that contains four modules of different topics (Phys 142.1 Introduction to Nuclei for Engineering, CHEM 142.1 The Global Impact of Chemistry for Engineering, GEOL 102.1 Introduction to Geology for Engineering, and BIOL 102.1 Nature for Engineering). GEOL 121 is a prerequisite for GEOE 218, which is a course core in the CE program.	
c)	MOTION: To move GEOE 218 Engineering Geology to the second term of second year of the CE program for 2022-2023. Rationale: GEOL 121 needs to be moved to Term 1 of second year to accommodate the changes to the first-year program. GEOE 218, for which GEOL 121 is a prerequisite, then needs to be moved from Term 1 to Term 2 in second year (in place of CMPT 141).	
d)	MOTION: To remove CMPT 141 from second year Term 2 from the CE program for 2022-2023. Rationale: Programming course CMPT 142 is being added to first year. It replaces CMPT 141.	
e)	MOTION: To renumber CE 271 Spring Surveying Camp instead CE 171 for the year 2022-2023. Rationale: CE 271 is moving to first year in 2021-2022 and should be appropriately numbered to match its timing in the program. Those entering second year in 2021-2022 will take the course at the end of 2021-2022. Therefore, the renumbering should be delayed to 2022-2023.	
f)	MOTION: To change the prerequisite for CE 212 Civil Engineering Materials from CHEM 114 (taken) to CHEM 146.3 (taken) for the year 2022-2023. Rationale: The new first year program will start in 2021-2022 and the first-year students will take CHEM 146.3 as their chemistry course. A prerequisite change for CE 212 needs to take effect for the year 2022-2023.	
g)	MOTION: To change the prerequisite for CE 220 Spatial Analysis and Engineering Drawings from GE 121 Engineering Design to GE 133.2 Engineering Communication 2 for the year 2022-2023.	

	Rationale: A prerequisite change for CE 202 needs to take effect for the year 2022-2023 to accommodate the changes to the first-year program. Engineering Communication 2 includes the first-year modules “Technical Communication II and III”, “CAD”, and “Research”.	
h)	MOTION: To change the prerequisite for CE 225 Fluid Mechanics from GE 125 Engineering Mechanics II and Math 223 (taken) to GE 123.3 Engineering Mechanics II (Statics) and Math 223 (taken) for the year 2022-2023. Rationale: The new first year program will start in 2021-2022 and the first-year students will take GE 123.3 as their statics course. It is statics that is needed for CE 225, not dynamics. The prerequisite change for CE 225 needs to take effect for the year 2022-2023.	
i)	MOTION: To change the prerequisite of GEOE 218 Engineering Geology from GEOL 121 pre- or co-requisite to GEOL 121 prerequisite starting the year 2022-2023. Rationale: The change from GEOL 121 pre- or co-requisite to prerequisite is only to ensure students take GEOL 121 in Term 1 in the second year CE program.	
j)	MOTION: To change the prerequisites of CE 295 Design Project from CE 202 and 33 credit units from the (EN Four Year Common Core and CE Program Core) and prerequisite or corequisite of GE 213 and RCM 300 to the prerequisites of CE 202 and CE 212 and pre- or co-requisites of GE 213, GEOE 218, and RCM 200 for the year 2022-2023. Rationale: RCM 300 has been renumbered to RCM 200. GEOE 218 should be a prerequisite for the GEOE projects in CE 295. The credit unit reference was removed to reduce complexity and for clarity.	
k)	MOTION: To change the prerequisites of CE 318 Applied Engineering Mathematics from CMPT 113 (taken) or CMPT 141 (taken), CE 225 (taken), GE 213 (taken), and Math 224 (taken) to CMPT 142.3 (taken), CE 225 (taken), GE 213 (taken), and Math 224 (taken) for the year 2022-2023. Rationale: CMPT 142 replaces CMPT 141 in the first-year program in 2021-2022.	
l)	MOTION: To change the prerequisites of CE 327 Municipal Engineering from CHEM 114 and CE 315 (taken) to CHEM 146.3 and CE 315. Rationale: CHEM 146.3 replaces CHEM 114 in the first-year program in 2021-2022. CE 315 has material that is important to CE 327; the CE 315 pre-requisite should be more than for sequencing (i.e., taken).	
m)	MOTION: To change the prerequisites of CE 464 from CE 315 (taken) or BLE 431 (taken) and GE 348 (taken), and CE 319 to CE 319, CE 315 (taken), and GE 348 (taken) in 2021-22. Rationale: BLE 431 no longer exists.	
n)	MOTION: To change the prerequisites of CE 418 Design in Reinforced Concrete from CE 321 (taken) to CE 321 in 2021-2022.	

	Rationale: The prerequisite of CE 321 is more than a weak prerequisite (taken) meant more for timing of courses in the program. Similar course CE 470 has CE 321 as a full prerequisite. <u>For all Civil Engineering Program Motions</u> MOTION: K Mazurek SECONDED: D. Milne CARRIED <u>Geological Engineering Program</u>	
o)	MOTION: To add GEOL 121.3 Earth Processes to the first term of second year of the GeoE program for 2022-2023. Rationale: The 3-credit science elective in first year, which is currently recommended to be GEOL 121 for CE and GEOE students, is being dropped in the new first-year program and replaced with a general science course that contains four modules of different topics (Phys 142.1 Introduction to Nuclei for Engineering, CHEM 142.1 The Global Impact of Chemistry for Engineering, GEOL 102.1 Introduction to Geology for Engineering, and BIOL 102.1 Nature for Engineering). GEOL 121 is a prerequisite for GEOE 218, which is a course core in the GEOE program.	
p)	MOTION: To move GEOE 218 Engineering Geology to the second term of second year of the GEOE program for 2022-2023. Rationale: GEOL 121 needs to be moved to Term 1 of second year to accommodate the changes to the first-year program. GEOE 218, for which GEOL 121 is a prerequisite, then needs to be moved from Term 1 to Term 2 in second year (in place of CMPT 141).	
q)	MOTION: To change the prerequisite of GEOE 218 Engineering Geology from GEOL 121 pre- or co-requisite to GEOL 121 prerequisite starting in 2022-2023. Rationale: This was considered under the CE program (see reasoning above).	
r)	MOTION: To change the 3-credit senior humanities elective to a junior humanities elective in the second year of the GEOE program (term 1 or 2). Rationale: Student will no longer take a Junior Social Science or Humanities elective in 1st year. The students will not have the pre-requisites required to take many of the senior humanities elective without a junior humanities course.	
s)	MOTION: To remove CMPT 141 from second year Term 2 from the GEOE program for 2022-2023. Rationale: Programming course CMPT 142 is being added to first year. It replaces CMPT 141.	
t)	MOTION: To replace CE 271, Spring Surveying Camp, with CE 171 for the year 2022-2023 for the GEOE program.	

	Rationale: The CE program is renumbering CE 271 as CE 171 since this surveying course is now at the end of 1st year. <u>For all Geological Engineering Program Motions</u> MOTION: D. Milne SECONDED: W. Helgason CARRIED <u>Environmental Engineering</u>	
u)	MOTION: To add GEOL 121.3 Earth Processes to the first term of second year of the ENVE program for 2022-2023. Rationale: The ENVE students will need GEOL 121 as a prerequisite for GEOE 218, which is a core course in the ENVE program.	
v)	MOTION: To move GEOE 218 Engineering Geology to the second term of second year of the ENVE program for 2022-2023. Rationale: GEOL 121 is now in term 1 of second year. GEOE 218 can be moved from Term 1 to Term 2 in second year in place of CMPT 141.	
w)	MOTION: To remove CMPT 141 from second year Term 2 from the ENVE program for 2022-2023. Rationale: Programming course CMPT 142 is being added to first year. It replaces CMPT 141.	
x)	MOTION: To remove CHEM 115.3 General Chemistry II as a requirement from the ENVE program for 2022-2023. Rationale: Currently, students in the ENVE program must complete BIOL 120.3 The Nature of Life, CHEM 115.3 General Chemistry II Chemical Processes and GEOL 121.3 Earth Processes by the end of Year 2. However, all engineering students will take now Chem 146.3 General Chemistry for Engineers in 1st year, which has equivalency to CHEM 115.3	
y)	MOTION: To add a Jr. Humanities / Social Science elective to the ENVE 2nd year (T1 or T2) for 2022-2023. Rationale: This elective was dropped from the new first year program but will now fit in the ENVE 2nd year because CHEM 115 is no longer required (see previous motion).	
z)	MOTION: To replace CE 271, Spring Surveying Camp, with CE 171 for the year 2022-2023 for the ENVE program. Rationale: The CE program is renumbering CE 271 as CE 171 since this surveying course is now at the end of 1st year. <u>For all Environmental Engineering Program Motions</u> MOTION: W. Helgason SECONDED: R. Evitts	

	CARRIED	
6	Discussion	
a)	First year design team – S. Maw Expectations for student admissions First Year Design Team is expecting remote learning for most of the 2021-22 academic year. Three options for how first-year students will submit work: 1. Everything scanned and uploaded, typically handwritten. 2. No handwritten allowed, everything types in pictures drawn using software. 3. Combination where typed answers could be typed in, but drawings could be done by written hand. Reviewed in detail the learning outcomes and marking breakdowns for all assignments, which includes graphical layout and neatness for students' solutions. When returned to the college assignments could be submitted electronically or by combination, however tests would probably be handwritten. Members asked to send thoughts to S. Maw on their preference.	
b)	Exit Surveys – A. Pajic A. Pajic will work on these and send via email.	
c)	Override request process using the Jira system 57 Moving to all override requests on the Jira system. Including prerequisite and time conflict overrides. All the requests will go to A. Galambos who will request the info and apply approvers, as necessary. Jira does not allow approvers to have private conversations within the ticketing system. All private conversation will be required to be sent via email.	
d)	Revised draft of the Deferred/ Supplemental exam policy Supplemental exams in years other than final will be a possibility under very controlled circumstances which are included in the policy document. Supplemental exams may be offered for specific courses in the first-year program that do not offer top ups, particularly bridge courses that will cause ongoing trouble if students are unsuccessful.	

e)	Item to be brought before SAAC and Faculty Council for approval before June, and application in early fall, so supplemental exams may be offered to students in their first-year programs. Final exams Instructors must deal with students' submission issues (Wi-Fi, power outages, etc.) on a case-by-case basis. It is the student's responsibility to plan ahead and try to do that in a reliable way and should contact instructors as soon as possible if they are experiencing issues. B. Sparling may be contacted via cell #306-220-3499 for reasonable recommendations. B. Sparling will recommend to N. Turner that we leave it up to individual instructors to add their teaching assistants as designates and have Gwenna Moss provide training for how TA's can access the sites where exams are submitted.	
7	Next Meeting	
	Our next meeting is scheduled for May 10 from 1:30-2:30 pm, via Webex.	
8	Meeting Adjourned – B. Sparling	



UNDERGRADUATE ACADEMIC PROGRAMS COMMITTEE
MEETING MINUTES
May 10, 2021, 1:30 – 2:30pm
WebEx Meeting

CHAIR: B. Sparling
PRESENT: A. Bourassa, T. Cao, R. Evitts, W. Helgason, K. Mazurek, D. Milne, A. Odeshi, A. Pajic, E. Salt
REGRETS: K. Wahid
GUESTS: S. Maw
SECRETARY: A. Kowalyk

AGENDA ITEM		SUPPORTING DOCUMENTATION
1	Comments from the Chair – B. Sparling	
2	Approval of Agenda – B. Sparling MOTION: To approve the agenda of May 10, 2021, as circulated. Moved: A. Odeshi Seconded: W. Helgason CARRIED	
3	Approval of Consent Agenda – B. Sparling	
4	Approval of Prior Minutes – B. Sparling	
a)	MOTION: To approve the minutes from April 12, 2021 as circulated. Moved: R. Evitts Seconded: A. Bourassa CARRIED	4. 2021_04_12 UAPC Draft Minutes
5	New Business	
a)	Mechanical Engineering Program MOTION: Create ME 498.3 Kinematics, Kinetics and Design of Machinery as a Design Elective in the Mechanical Engineering program, effective September 2021. It was mentioned in the course creation form that Physics 253 could possibly be used as an equivalent. As of now, a decision has not been made whether students could take both, but the intent is that students that take this course will not take Physics 253. <u>For all Mechanical Engineering Program Motions</u>	

	MOTION: A. Odeshi SECONDED: R. Evitts CARRIED <u>Changes in the 2022/23 Catalogue</u>	
b)	MOTION: Remove EE 204.3 Basic Electronics and Electrical Power from the Mechanical Engineering B.E. program effective 2022-23. During the transition, it will have to be decided how returning students who still need the course will have it satisfied. The advisors will have to be made aware of the plan for students that still need EE 204 in their program.	
c)	MOTION: Remove CMPT 141.3 Introduction to Computer Science from the Mechanical Engineering B.E. program effective 2022-23.	
d)	MOTION: Remove ME 251.3 Engineering Analysis I from the Mechanical Engineering B.E. program effective 2022-23. An additional section of GE 210 should be noted and planned in the assignment of duties next year.	
e)	MOTION: Delete ME 251.3 Engineering Analysis I effective 2022-23.	
f)	MOTION: Add GE 210.3 Probability and Statistics to the Fall Term of the second-year Mechanical Engineering B.E. program effective 2022-23. In the past we have had one or two sections, in the last couple years it has been a single section. Numbers will have to be reviewed and teaching assignments and building courses should be included in discussions for the GE program.	
g)	MOTION: Add a 3-cu Junior Humanities or Social Science Elective to be taken in either term of the second-year Mechanical Engineering B.E. program effective 2022-23.	
h)	MOTION: Add a 3-cu Science Elective to be taken in either term of the second-year Mechanical Engineering B.E. program effective 2022-23.	
i)	MOTION: Remove a 3-cu Science Elective from the third year of the Mechanical Engineering B.E. program effective 2022-23.	
j)	MOTION: Remove the tutorial sections of ME 229.3 Mechanical Engineering Design effective 2022-23.	

k)	MOTION: Prerequisite/corequisite change in ME 215.3 Fluid Mechanics I due to first year redesign, effective 2022-23: From Prerequisite(s): MATH 223 (taken) Prerequisite(s) or Corequisite(s): GE 125 To: Prerequisite(s): MATH 223 (taken) Prerequisite(s) or Corequisite(s): GE 125 or GE 123. Because of changes in first year program	
l)	MOTION: Prerequisite/corequisite change in ME 226.3 Mechanics III due to first year redesign, effective 2022-23: From Prerequisite(s): GE 125 and MATH 223 (taken) To: Prerequisite(s): (GE 125 or GE 123), GE 152, and MATH 223 (taken).	
m)	MOTION: Prerequisite/corequisite change in ME 227.3 Thermodynamics I due to first year redesign, effective 2022-23: From: Prerequisites: CHEM 114 and MATH 124 (taken) To Prerequisites: (CHEM 114 or CHEM 146) and [MATH 124 (taken) or MATH 134 (taken)].	
n)	MOTION: Prerequisite/corequisite change in ME 229.3 Introduction to Mechanical Engineering Design due to first year redesign, effective 2022-23: From Prerequisite(s): GE 121, GE 125 (taken), and ME 214 (taken) To Prerequisite(s): (GE 121 or GE 143), [GE 125 (taken) or GE 123 (taken)], ME 113, and ME 214 (taken).	
o)	MOTION: Prerequisite/corequisite change in ME 313.3 Mechanics of Materials I due to first year redesign, effective 2022-23: From Prerequisite(s): GE 111 (taken), GE 213 (taken), and MATH 223 (taken) To Prerequisite(s): [GE 111 (taken) or MATH 134 (taken)], GE 213 (taken), and MATH 223 (taken).	
p)	MOTION: Prerequisite/corequisite change in ME 314.3 Machine Design I due to first year redesign, effective 2022-23: From Prerequisite(s): ME 313 (taken), ME 226, ME 251 (taken), ME 324 (taken), and MATH 224 (taken).	

	To Prerequisite(s): ME 313 (taken), ME 226, [ME 251 or (ME 113 (taken) and GE 210 (taken))], ME 324 (taken), and MATH 224 (taken). q) MOTION: Prerequisite/corequisite change in ME 321.3 Engineering Analysis II due to first year redesign, effective 2022-23: From Prerequisite(s): ME 251 (taken) and MATH 224 (taken) To Prerequisite(s): [ME 251 or (ME 113 (taken) and GE 210 (taken))] and MATH 224 (taken). r) MOTION: Prerequisite/corequisite change in ME 352.3 Engineering Analysis III due to first year redesign, effective 2022-23: From Prerequisite(s): ME 226, ME 251 (taken) and MATH 224 (taken) To Prerequisite(s): ME 226, [ME 251 (taken) or ME 113 (taken)], and MATH 224 (taken) <u>For All Changes in the 2022/23 Catalogue</u> MOTION: A. Odeshi SECONDED: D. Milne CARRIED s) MOTION: Change the prerequisite for GE 123.3 (effective September 2021) from Restriction(s): Restricted to students in the College of Engineering. Prerequisite (s): GE 122.2 (taken) Prerequisite(s) or Corequisite(s): MATH 134.3 To Restriction(s): Restricted to students in the College of Engineering. Prerequisite(s): GE 122.2 Prerequisite(s) or Corequisite(s): MATH 134.3. <u>GE 123.3 Change</u> MOTION: T. Cao SECONDED: A. Odeshi CARRIED t) MOTION: Remove restriction for GE431 of only open to students in the Technological Innovation Certificate program, and change the prerequisites from Restriction(s): Only open to students registered in the Engineering Entrepreneurship Option (EEO) Program. Prerequisite(s): 9 credit units from COMM 200 – 399 Note: Students with credit for GE 430 will not receive credit for this course. To Prerequisite(s): Completion of 30 credit units at the university level.	
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	Permission of the department is required. Note: Students with credit for GE 430 will not receive credit for this course. This change is to ensure that the students have more commitment to the class and the college. Currently, we have removed a lot of the prerequisites from the COMM classes; this is to give them experience to ensure that they are successful. GE 431 Change MOTION: T. Cao SECONDED: A. Odeshi CARRIED	
6	Discussion	
a)	Program Maps for 2021-22 The maps for 2021-22 have all the approved changes for the upper years, but it still has the “old” first year because this is the one that students that are going into majors have completed and we did not want to create a disconnect. There is an additional map with just the new first-year for reference to see the connections between the courses.	<i>6.a. Program Maps</i>
7	Next Meeting	
	Our next meeting is scheduled for June 14 via WebEx.	
8	Meeting Adjourned – B. Sparling	



UNDERGRADUATE ACADEMIC PROGRAMS COMMITTEE
MEETING MINUTES
June 14, 1:30 – 2:30
WebEx Meeting

CHAIR: B. Sparling
PRESENT: T. Cao, R. Evitts, W. Helgason, K. Mazurek, D. Milne, A. Odeshi, A. Pajic, E. Salt, K. Wahid
REGRETS: A. Bourassa
GUESTS:
SECRETARY: A. Kowalyk

AGENDA ITEM		SUPPORTING DOCUMENTATION
1	Comments from the Chair – B. Sparling	
2	Approval of Agenda – B. Sparling	
	MOTION: To approve the agenda of June 14, 2021, as circulated. Moved: R. Evitts Seconded: D. Milne CARRIED	
3	Approval of Consent Agenda – B. Sparling	
4	Approval of Prior Minutes – B. Sparling	
a)	MOTION: To approve the minutes from May 10, 2021, as circulated. Moved: A. Odeshi Seconded: K. Mazurek CARRIED	
5	New Business	
	Chemical and Biological Engineering	
a)	MOTION: To change the pre-requisite for CHE 210 from (CHEM 115 and MATH 223(taken)), to (CHEM 115 and MATH 223(taken) OR CHEM 146 and MATH 223 (taken)). To take effect for the 2022/2023 academic year.	
b)	MOTION: To change the pre-requisite for CHE 220 from (CHEM 115), to (CHEM 115 OR CHEM 146 and GE 163). To take effect for the 2022/2023 academic year.	
	For all Chemical and Biological Engineering MOTION: R. Evitts SECONDED: A. Odeshi CARRIED	

	<u>GE Course Changes</u> c) MOTION: To delete course GE 101.1 Introduction to the Engineering Profession effective 2022-23. d) MOTION: To delete GE 111.3 Engineering Problem Solving effective 2022-23. e) MOTION: To delete GE 121.3 Engineering Design effective 2022-23. f) MOTION: To delete GE 124.3 Engineering Mechanics I effective 2022-23. g) MOTION to delete GE 125.3 Engineering Mechanics II effective 2022-23. RATIONALE: All these courses have been effectively integrated or replaced into new first year curriculum. <u>For all course deletions</u> MOTION: R. Evitts SECONDED: A. Odeshi CARRIED For every course that is in the current program there will be an alternative path or equivalency once the course has been deleted, should students need to repeat the course. h) ~~MOTION: To change the prerequisite for GE 210.3 Probability and Statistics from Prerequisite(s): MATH 124 (taken) to MATH 133.4.~~ MOTION: K. Mazurek SECONDED: W. Helgason In 2022-23 we will have students who are finishing up the new first-year, but we may have some students who have fallen behind or face other circumstances where they may still need MATH 124 (taken). Having a statement without a “MATH 124 (taken) <u>or</u> “may cause prerequisite issues in the future. AMENDMENT: To change the prerequisite for GE 210.3 Probability and Statistics from Prerequisite(s): MATH 124 (taken) <u>or</u> MATH 133.4. MOTION: K. Mazurek SECONDED: W. Helgason CARRIED i) ~~MOTION: To change the prerequisite GE 213.3 Mechanics of Materials from Prerequisite(s): GE 125 (taken) to GE 123.3.~~ MOTION: R. Evitts SECONDED: D. Milne	
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	Currently, there are issues with GE 213 because GE 124 is a taken prerequisite and not a full prerequisite. Even if it is temporary, to assist in rectifying the issues with the prerequisites with GE 213 (taken), make GE 124 a full prerequisite, even if only for the year it would affect. AMENDMENT: To change the prerequisite GE 213.3 Mechanics of Materials from Prerequisite(s): GE 125 (taken) to GE 123.3 or GE 124.3. MOTION: R. Evitts SECONDED: D. Milne CARRIED MOTION: To delete EE 204.3 Basic Electronics and Electrical Power in 2022-23. (*CHE, ENVE, ME) In 2022-23 students requiring completion of EE 204.3 should take courses GE 152.1 and GE 153.2 instead.	
j)	The course will be offered in a regular time block and will not affect upper years taking a first-year course. The difficulty for the student will be that it will take out the time block for the entire term even though the course itself will only be offered during a period of that term. It is recommended telling ENVE students to take EE 204 this year. MOTION: R. Evitts SECONDED: W. Helgason CARRIED MOTION: To change the EN Year Two Common Core effective 2022-23 due to overhaul of the common first year.	
k)	Engineering Two Year Common Core • <u>BIOL 120.3</u> The Nature of Life or <u>CHEM 115.3</u> General Chemistry II Chemical Processes or <u>GEOL 121.3</u> Earth Processes or <u>PHYS 125.3</u> Physics and Technology • <u>CHEM 114.3</u> • <u>COMM 101.3</u> Introduction to Business or <u>COMM 102.3</u> Introduction to Business Management or <u>COMM 201.3</u> Introduction to Financial Accounting or <u>COMM 105.3</u> Introduction to Organizational Behaviour or <u>COMM 204.3</u> Introduction to Marketing or <u>COMM 205.3</u> Introduction to Operations Management or <u>COMM 206.3</u> or <u>COMM</u>	

	<u>210.3</u> Introduction to Management Accounting or <u>COMM 304.3</u> Introduction to Business Law • <u>GE 101.1</u> Introduction to the Engineering Profession • <u>GE 111.3</u> Engineering Problem Solving • <u>GE 121.3</u> Engineering Design • <u>GE 124.3</u> Engineering Mechanics I • <u>GE 125.3</u> Engineering Mechanics II • <u>MATH 123.3</u> • <u>MATH 124.3</u> • <u>MATH 223.3</u> Calculus III for Engineers • <u>MATH 224.3</u> Calculus IV for Engineers • <u>PHYS 155.3</u> Introduction to Electricity and Magnetism • <u>GE 102.2</u> Introduction to Engineering I • <u>GE 112.1</u> Engineering Discipline Experience • <u>GE 122.2</u> Engineering Mechanics I • <u>GE 132.1</u> Engineering Communications I • <u>GE 142.2</u> Design I • <u>GE 152.1</u> Electrical Circuits I • <u>CMPT 142.3</u> Introduction to Computer Science for Engineers • <u>MATH 133.4</u> Engineering Mathematics I • Natural Science Series: Students must complete all of the following courses: - o <u>PHYS 152.1</u> Introduction to Atoms and Nuclei for Engineering - o <u>CHEM 142.1</u> Global Impact of Chemistry for Engineering - o <u>GEOL 102.1</u> Introduction to Geology for Engineering - o <u>BIOL 102.1</u> Nature for Engineering • <u>GE 103.1</u> Introduction to Engineering II • <u>GE 123.3</u> Engineering Mechanics II • <u>GE 133.2</u> Engineering Communication II • <u>GE 143.2</u> Design II (Please note: This course is not taken by students entering Civil, Geological and Environmental Engineering majors.) • <u>GE 153.2</u> Electrical Circuits II • <u>GE 163.2</u> Process Engineering • <u>CHEM 146.3</u> General Chemistry for Engineering • <u>MATH 134.3</u> Engineering Mathematics II • <u>PHYS 156.3</u> Electromagnetism and Waves for Engineering • <u>MATH 223.3</u> Calculus III for Engineers • <u>MATH 224.3</u> Calculus IV for Engineers MOTION: A. Odeshi SECONDED: R. Evitts CARRIED	
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MOTION: To change the EN Year Three Common Core effective 2022-23 due to overhaul of the common first year.

1)

Engineering Three Year Common Core

- [BIOL 120.3](#) The Nature of Life or [CHEM 115.3](#) General Chemistry II Chemical Processes or [GEOL 121.3](#) Earth Processes or [PHYS 125.3](#) Physics and Technology
- [CHEM 114.3](#)
- [COMM 101.3](#) Introduction to Business or [COMM 102.3](#) Introduction to Business Management or [COMM 201.3](#) Introduction to Financial Accounting or [COMM 105.3](#) Introduction to Organizational Behaviour or [COMM 204.3](#) Introduction to Marketing or [COMM 205.3](#) Introduction to Operations Management or [COMM 206.3](#) or [COMM 210.3](#) Introduction to Management Accounting or [COMM 304.3](#) Introduction to Business Law
- [GE 101.1](#) Introduction to the Engineering Profession
- [GE 111.3](#) Engineering Problem Solving
- [GE 121.3](#) Engineering Design
- [GE 124.3](#) Engineering Mechanics I
- [GE 125.3](#) Engineering Mechanics II
- [MATH 123.3](#)
- [MATH 124.3](#)
- [MATH 223.3](#) Calculus III for Engineers
- [MATH 224.3](#) Calculus IV for Engineers
- [PHYS 155.3](#) Introduction to Electricity and Magnetism
- [RCM 200.3](#) Engineering Professional Communication
- [GE 102.2](#) Introduction to Engineering I
- [GE 112.1](#) Engineering Discipline Experience
- [GE 122.2](#) Engineering Mechanics I
- [GE 132.1](#) Engineering Communications I
- [GE 142.2](#) Design I
- [GE 152.1](#) Electrical Circuits I
- [CMPT 142.3](#) Introduction to Computer Science for Engineers
- [MATH 133.4](#) Engineering Mathematics I
- **Natural Science Series:**
Students must complete all of the following courses:
 - o [PHYS 152.1](#) Introduction to Atoms and Nuclei for Engineering
 - o [CHEM 142.1](#) Global Impact of Chemistry for Engineering

- o [GEOL 102.1](#) Introduction to Geology for Engineering
- o [BIOL 102.1](#) Nature for Engineering
- [GE 103.1](#) Introduction to Engineering II
- [GE 123.3](#) Engineering Mechanics II
- [GE 133.2](#) Engineering Communication II
- [GE 143.2](#) Design II (Please note: This course is not taken by students entering Civil, Geological and Environmental Engineering majors.)
- [GE 153.2](#) Electrical Circuits II
- [GE 163.2](#) Process Engineering
- [CHEM 146.3](#) General Chemistry for Engineering
- [MATH 134.3](#) Engineering Mathematics II
- [PHYS 156.3](#) Electromagnetism and Waves for Engineering
- [RCM 200.3](#) Engineering Professional Communication
- [MATH 223.3](#) Calculus III for Engineers
- [MATH 224.3](#) Calculus IV for Engineers

MOTION: K. Mazurek

SECONDED: R. Evitts

CARRIED

MOTION: To change the EN Year Four Common Core effective 2022-23 due to overhaul of the common first year.

m)

Engineering Four Year Common Core

- ~~[BIOL 120.3](#) The Nature of Life or [CHEM 115.3](#) General Chemistry II Chemical Processes or [GEOL 121.3](#) Earth Processes or [PHYS 125.3](#) Physics and Technology~~
- ~~[CHEM 114.3](#)~~
- ~~[COMM 101.3](#) Introduction to Business or [COMM 102.3](#) Introduction to Business Management or [COMM 201.3](#) Introduction to Financial Accounting or [COMM 105.3](#) Introduction to Organizational Behaviour or [COMM 204.3](#) Introduction to Marketing or [COMM 205.3](#) Introduction to Operations Management or [COMM 206.3](#) or [COMM 210.3](#) Introduction to Management Accounting or [COMM 304.3](#) Introduction to Business Law~~
- [GE 101.1](#) Introduction to the Engineering Profession
- [GE 111.3](#) Engineering Problem Solving
- [GE 121.3](#) Engineering Design
- [GE 124.3](#) Engineering Mechanics I

	• ~~GE 125.3~~ Engineering Mechanics II • ~~GE 348.3~~ Engineering Economics • ~~GE 449.3~~ Engineering in Society • ~~MATH 123.3~~ • ~~MATH 124.3~~ • ~~MATH 223.3~~ Calculus III for Engineers • ~~MATH 224.3~~ Calculus IV for Engineers • ~~PHYS 155.3~~ Introduction to Electricity and Magnetism • ~~RCM 300.3~~ Effective Professional Communication • GE 102.2 Introduction to Engineering I • GE 112.1 Engineering Discipline Experience • GE 122.2 Engineering Mechanics I • GE 132.1 Engineering Communications I • GE 142.2 Design I • GE 152.1 Electrical Circuits I • CMPT 142.3 Introduction to Computer Science for Engineers • MATH 133.4 Engineering Mathematics I • Natural Science Series: Students must complete all of the following courses: ◦ PHYS 152.1 Introduction to Atoms and Nuclei for Engineering ◦ CHEM 142.1 Global Impact of Chemistry for Engineering ◦ GEOL 102.1 Introduction to Geology for Engineering ◦ BIOL 102.1 Nature for Engineering • GE 103.1 Introduction to Engineering II • GE 123.3 Engineering Mechanics II • GE 133.2 Engineering Communication II • GE 143.2 Design II (Please note: This course is not taken by students entering Civil, Geological and Environmental Engineering majors.) • GE 153.2 Electrical Circuits II • GE 163.2 Process Engineering • CHEM 146.3 General Chemistry for Engineering • MATH 134.3 Engineering Mathematics II • PHYS 156.3 Electromagnetism and Waves for Engineering • RCM 200.3 Engineering Professional Communication • MATH 223.3 Calculus III for Engineers • MATH 224.3 Calculus IV for Engineers • GE 348.3 Engineering Economics	
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	• GE 449.3 Engineering in Society MOTION: R. Evitts SECONDED: A. Odeshi CARRIED	
6	Discussion	
	C. Owen and R. Evitts will be leaving for sabbatical and will not be a part of UAPC in 2021-22.	
7	Next Meeting	
	Our next meeting is scheduled for TBD via WebEx.	
8	Meeting Adjourned – B. Sparling	



UNDERGRADUATE ACADEMIC PROGRAMS COMMITTEE

MEETING AGENDA

Thursday, September 9, 1:30 – 2:30

CHAIR: B. Sparling

PRESENT: C. Niu, K. Mazurek, D. Milne, E. Salt, K. Wahid, A. Odeshi, W. Helgason, S. Koustov, S. Maw, D. Gaudet, A. Pajic

REGRETS:

GUESTS:

SECRETARY: S. Farthing

AGENDA ITEM		SUPPORTING DOCUMENTATION
1	Comments from the Chair – B. Sparling	
	Welcome to new term. Happy to be back in person for meetings. There will be a series of meetings this fall to get ready for the new calendar year. Will be in contact with Aleksandra We are expecting changes in response to feedback about the implementation of the new first year program.	
2	Approval of Agenda – B. Sparling	
	MOTION: To approve the agenda of September 9, 2021, as circulated. Motion: S. Maw Second: S. Koustov <i>Carried</i>	
3	Approval of Consent Agenda – B. Sparling	
	NA	
4	Approval of Prior Minutes – B. Sparling	
a)	MOTION: To approve the minutes from June 14, 2021, as circulated. Motion: A. Odeshi Second: D. Milne+ <i>Carried</i>	
5	New Business	
a)	MOTION: To add COMM 100-level courses to the list of Complementary Studies Elective and delete CLAS 104 exception. CEAB has changed its definition of complimentary studies. It previously excluded languages, but now they are included. As long as things fall under the CEAB definition, we can include them as options.	

Motion: A. Odeshi
Second: W. Helgason
Carried

b. MOTION: To add CLAS 104.3 Classical Myths to the Junior Humanities/Social Science Elective list.

Motion: S. Koustov
Second: D. Milne
Carried

c. MOTION: To change the prerequisites of CE 495.6 Capstone Design Project from:

Prerequisites: CE 295 and CE 318

Pre- or co-requisites: GE 348, CE 320, and 12 credit units from (W,G,S electives)

to

Pre-requisites: CE 295, CE 318, CE 320, GE 348, CE 327 (taken), CE 330 (taken), CE 329 (taken), CE 319 (taken), CE 321 (taken)

Pre- or Co-requisites: 9 credit units from (W,G,S electives, CE 467).

RATIONALE: Students currently are required to take 4 fourth-year electives in first term of fourth year to meet the co-requisite requirements. This has meant that there is a significant imbalance in enrolment between first and second term CE electives in fourth year. Additionally, the program wishes to make sure students in CE 495 have taken all second-term, third year courses before moving on to CE 495.

Motion: K. Mazurek
Second: W. Helgason
Carried

d. MOTION: To change prerequisites of CE 329.3 Transportation Engineering I from:

Prerequisites: CE 271 (taken) and GE 210 (taken)
to

Prerequisites: CE 171, GE 210, and CE 202.

RATIONALE: CE 171 (renumbering of CE 271) will be taken in first year and will have a means to “upgrade” the final grade at the end of the course, as is the case for the other engineering courses in first year. No taken requirement is needed. CE 329 requires GE 210 content to a higher degree than provided by a taken prerequisite. CE 202 includes important Civil 3D



training and is soon to include GIS, and these are both important tools for CE 329.

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There was a question regarding the date by which this would go into effect, which was determined to be 202105

Motion: K. Mazurek

Second: S. Koustov

Carried

e. MOTION: To create new course CE 213.3 Mechanics of Materials.

It was proposed to make this effective for the 2022-2023 academic year, in order to align with the other changes precipitating from the First Year Redesign.

GE 213 and CE 213 will not be considered equivalent if a student fails CE 213. However, the department can consider using GE 213 in lieu of CE 213 in the case of a student transferring from ME or CHE.

For the Chemical Engineering Department, if student can't take GE 213 in Term 1, then we must revise our course catalogue to say it could be an accepted equivalent.

The attribute mapping on these supporting documents was left with the information from the old version, but we do know that it will be modified to meet the new descriptors.

Motion: K. Mazurek

Second: D. Milne

Carried

f. MOTION: To delete GE 213.3 from the second term of second year of the CE program starting in 2022-2023 and add course CE 213.3 Mechanics of Materials in its place.

Motion: K Mazurek

Second: D. Milne

Carried

g. MOTION: To delete GE 213.3 from the second term of second year of the GEOE program starting in 2022-2023 and add CE 213.3 in its place.



	Motion: D. Milne Second: W. Helgason <i>Carried</i> h. MOTION: To delete GE 213.3 from the second term of second year of the ENVE program starting in 2022-2023 and add CE 213.3 in its place. RATIONALE: (for motions e), f) and g) and h)): GE 213 has two sections for second year students in all disciplines in the College. Mechanical Engineering teaches GE 213 in Term 1 and Civil Engineering is responsible for GE 213 in Term 2. Mechanical Engineering teaches GE 213 with less content, and the missing content is required by civil engineering students for their later structural engineering courses. The Term 1 course is therefore no longer appropriate for civil engineering students. The civil engineering structural engineering group also wants more flexibility to control the content of the course for sequencing. The change is proposed to start in 2022-2023, which aligns with other changes in the CE program due to the changes in first year. Motion: W. Helgason Second: D. Milne <i>Carried</i>	
6	Discussion	
	a. Year at the Glance memo - Includes key dates and deadlines related to: Catalogue publication; the curricular approval process; Academic Calendar publication; admission processes; Access and Equity Services (AES); class build and registration; room scheduling processes, as well as the processes related to tuition and fee approval by the Board of Governors and the Provost's Advisory Committee (PAC). -- UAPC meetings will be scheduled a few days before each deadline. One change to note is the deadline for APC approval. This year it is moved to the end of November. Because we are submitting a package of all the changes resulting from our first year program change, the APC has asked to see the whole package all at once. There will be a couple of longer meetings needed to get through all details. We will aim to make it nice and clear, so that we know what to tell students in advising. B. AU count in GE 112.1 Engineering Discipline Experience Whether GE 112 should be considered Complementary Studies, Engineering Science, or some combination. It was approved as 100% Complementary Studies (23 AUs in CS).	<i>6.a Year at a Glance memo</i> <i>6.b AU count in new First Year</i>



	This is currently classified as Complimentary Studies, which is consistent with what GE 101 used to be. However, if we can count on everybody doing some Engineering Science, then we could adjust that. It has to be consistent for every department. It's not urgent, but we would like to be accurate. Calling this 100% Complimentary Studies would likely not be accurate. If all departments are doing things of a more technical nature, then it is more accurate to change it to include some Engineering Science. Members are encouraged to take this conversation back to their program committees. Please let A. Pajic know the breakdown for Engineering Science and Complimentary Studies. We can bring that data back for information and approval.	
7	Next Meeting	
	Our next meeting is scheduled for October TBA, 2021. This will be a longer meeting. Committee members will get an invite shortly.	
8	Meeting Adjourned – B. Sparling	2:04pm



UNDERGRADUATE ACADEMIC PROGRAMS COMMITTEE

MEETING AGENDA

Tuesday, October 12, 10:00 – 11:30

CHAIR: B. Sparling
PRESENT: C. Niu, K. Mazurek, D. Milne, E. Salt, K. Wahid, A. Odeshi, S. Koustov, S. Maw, D. Gaudet, A. Pajic
REGRETS: W. Helgason
GUESTS: O. Baik
SECRETARY:

AGENDA ITEM		SUPPORTING DOCUMENTATION
1	Comments from the Chair – B. Sparling	
2	Approval of Agenda – B. Sparling MOTION: To approve the agenda of October 12, 2021, as circulated. MOVER: S. Maw SECONDER: D. Milne <i>Carried</i>	
3	Approval of Consent Agenda – B. Sparling <u>For 2021-22</u> a) MOTION: To approve the second offering of special topics course EE 498.3 Renewable Energy and Power Systems (as created and approved by the UAPC in May 2019). EE 498.3 would be applied in lieu of EE 442.3 requirement in the EE program. The course will be offered in Term 2 of academic year 2021-22. <u>For 2022-23</u> b) MOTION: To change the prerequisites for EE 265.3 (Discrete Time Signals and Systems) from Prerequisite(s): MATH 123 and MATH 124 Prerequisite(s) or Corequisite(s): CMPT 116 or CMPT 141 Note: Students with credit for EE 351 will not receive credit for this course. To Prerequisite(s): ((GE 152 and MATH 134) or (MATH 123 and MATH 124)) and (CMPT 142 or CMPT 116 or CMPT 141). RATIONALE: The new prerequisites are required by the changes to first year. The addition of GE 152 is for the	



	MATLAB content. Note that MATH 123, MATH 124, CMPT 116, and CMPT 141 are retained to accommodate students entering engineering prior to 2021-22. Since EE 351 was last offered in 2012-13, the note is no longer needed. c) MOTION: To change the prerequisites for EE 271.3 (Materials and Heat Transport in Electrical Engineering) from Prerequisite(s): CHEM 114 and PHYS 155 (taken) to Pre-requisite(s): (CHEM 146 or CHEM 114) and (PHYS 156 (taken) or PHYS 155 (taken)). RATIONALE: The new prerequisites are required by the changes to first year. Note that CHEM 114 and PHYS 155 are retained to accommodate students entering engineering prior to 2021-22. d) MOTION: To change the prerequisites for EE 216.3 (Probability Statistics and Numerical Methods) from Prerequisite(s) MATH 123 and MATH 124 to Prerequisite(s) MATH 134 or (MATH 123 and MATH 124). RATIONALE: The new requisites are required by the changes to first year. Note that MATH 123 and MATH 124 are retained to accommodate students entering engineering prior to 2021-22. e) MOTION: To change the prerequisites for EE 271.3 (Materials and Heat Transport in Electrical Engineering) from Prerequisite(s): CHEM 114 and PHYS 155 (taken) to Pre-requisite(s): (CHEM 146 or CHEM 114) and (PHYS 156 (taken) or PHYS 155 (taken)). RATIONALE: The new prerequisites are required by the changes to first year. Note that CHEM 114 and PHYS 155 are retained to accommodate students entering engineering prior to 2021-22. f) MOTION: To change the prerequisites for EE 216.3 (Probability Statistics and Numerical Methods) from Prerequisite(s) MATH 123 and MATH 124 to Prerequisite(s) MATH 134 or (MATH 123 and MATH 124).	
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	RATIONALE: The new requisites are required by the changes to first year. Note that MATH 123 and MATH 124 are retained to accommodate students entering engineering prior to 2021-22. g) MOTION: That the prerequisites for EE 241.3 (Introduction to Electric Power Systems) be changed from Prerequisite(s): MATH 123 and MATH 124 and EP 202 Note: Students with credit for EE 212 will not receive credit for this course. to Pre-requisite(s): (MATH 134 or (MATH 123 and MATH 124)) and (GE 153 or EP 202). RATIONALE: The new requisites are required by the changes to first year. Note that MATH 123, MATH 124, and EP 202 are retained to accommodate students entering engineering prior to 2021-22. Since EE 212 was last offered in 2011-12, the note is no longer needed. h) MOTION: To change the prerequisites for EE 468.3 (Design of a Computer Vision System) from Prerequisite(s): EE 466 and EE 467 to Prerequisite(s): EE 467. RATIONALE: The EE 466 prerequisite is redundant since EE 466 is a prerequisite for EE 467. i) MOTION: Change the prerequisites for CME 331.3 Microprocessor Based Embedded Systems from Prerequisite(s): CMPT 116 or CMPT 141; and EE 232 to Prerequisite(s): (CMPT 214 or CMPT 116 or CMPT 141) and EE 232. RATIONALE: The new requisites are required by the changes to first year. Note that CMPT 116 and CMPT 141 are retained to accommodate students entering engineering prior to 2021-22. j) MOTION: Change the prerequisites for CME 341.3 Logic Design Using FPGAs from Prerequisite(s): CMPT 116 or CMPT 141; and EE 232 to Prerequisite(s): (CMPT 214 (taken) or CMPT 116 or CMPT 141) and EE 232. RATIONALE: The new requisites are required by the changes to first year. Note that CMPT 116 and CMPT 141 are retained	
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	to accommodate students entering engineering prior to 2021-22. k) MOTION: Change the prerequisites for CME 332.3 Real Time Computing from Prerequisite(s): (CMPT 115 or CMPT 117 or CMPT 145); CME 331; and CME 341 (taken) to Prerequisite(s): CME 331 and CME 341 (taken). RATIONALE: The new requisites are required by the changes to first year. Note that CMPT 145 is retained to accommodate students entering engineering prior to 2021-22. All consent agenda items approved at once. MOVER: S. Koustov SECONDER: S. Maw <i>Carried</i>	
4	Approval of Prior Minutes – B. Sparling	
a)	MOTION: To approve the minutes from September 9, 2021, as circulated. MOVER: A. Odeshi SECONDER: S. Maw <i>Carried</i>	<i>4a) Minutes from September 9, 2021 meeting</i>
	New Business	
	<u>Engineering Physics (for 2022-23)</u> a) MOTION: To remove CMPT 116.3 from the required course for the EP program. b) MOTION: To remove CMPT 116.3 and CMPT 145.3 from the list of prerequisites. RATIONALE (for motion 5a) and 5b)): The computer class CMPT 116 is taken by all EP students in T1 of the second year. The class is not available anymore. The alternative class can be a second-year Computer Science class, but the EP there was no support for the introduction of this class among EP faculty. There is a lot of computing in Year 1 in the New Engineering program. Once the class is removed, the total required CUs would go down by 3. c) MOTION: To move EP 370.3 class to Year 2 Term 1 (from T1 in Year 3). d) MOTION: To renumber course Heat Kinetic Theory and Thermodynamics from EP 370.3 to EP 270.3.	

RATIONALE (for motion 5c) and 5d)): In the long past, the thermodynamics class EP 370 used to be given in T1 of year 2. Because of overload, it was moved to year 3. The EP program is now overloaded in year 3. Since free the time slot is available now from dropped CMPT 116 class, it can be allocated for the thermodynamics class. The class content has not changed in the past and will not change in EP 270.

MOVER: S. Koustov
SECONDER: S. Maw
Carried

Mechanical Engineering (for 2022-23)

Mining Option

- e) **MOTION:** Replace the second-year science elective with GEOL 121.3 Earth Processes.
- f) **MOTION:** Replace EPIP 401.0, EPIP 402.0 and EPIP 403.0 with ECIP 200.1, ECIP 400.0, ECIP 401.0 and ECIP 402.0.
- g) **MOTION:** Move the courses in the third-year science electives list in the current mining option to the list of ~~science~~ technical electives in the fourth year for this option.
- h) **MOTION:** Add ME 496.3 (Machine Design II) to the list of Pool B electives for the mining option.

RATIONALE (for motion 5e), 5f), 5g) and 5h)): As a result of the first-year program redesign, ME students in the mining option can no longer take Earth Processes (GEOL 121.3) in the first year. GEOL 121 is a prerequisite for some of the required upper-year courses in the mining option. There is, therefore, a need to introduce GEOL 121.3 to the second year stream of courses for ME students in the mining option. We also need to remove the third-year science electives in the mining option to keep the total number of credit units the same as for other ME students. The list of required internship courses also needs to be updated since the Engineering Co-op Internship Program (ECIP) has replaced the Engineering Professional Internship Program (EPIP). With these changes, the total number of 4th-year credit units for a student in the mining option will be 37 against 36 for a student not enrolled in the mining option. The extra one credit unit comes from ECIP 200.1, which every student enrolled in the Co-op program must take.

MOVER: A. Odeshi

5e) Mining Option in ME proposal



	SECONDER: S. Maw <i>Carried</i> <u>Electrical Engineering (for 2022-23)</u> i) MOTION: To remove CMPT 116.3 (Computing I) from Y2T1 of the EE program. RATIONALE: CMPT 116 is redundant with the new first year course CMPT 142. j) MOTION: To add CMPT 214.3 (Programming Principles and Practice) to Y2T1 of the EE program (pending approval from Computer Science). RATIONALE: Computation is part of nearly all electronic systems today, and our graduates need instruction in computer programming that goes beyond the introductory level. CMPT 146 satisfies the pre-requisite for CMPT 214 (needs to be verified). The following two motions are paired. k) MOTION: To move EE 232.3 (Digital Electronics) from Y2T2 to Y2T1. l) MOTION: To move EE 221.3 (Analog Electronics) from Y2T1 to Y2T2. RATIONALE (for motion 5k) and 5l)): Students typically have less difficulty with digital electronics than analog electronics. Also, this ordering parallels the signals and systems courses in Y2. m) MOTION: To change the prerequisites for EE 232.3 (Digital Electronics) from Prerequisite(s): EE 221 to Prerequisite(s): GE 152 or EE 221. RATIONALE: GE 152, which introduces the students to electrical quantities and circuit analysis, is sufficient for EE 232. Note that EE 221 is retained to accommodate students entering engineering prior to 2021-22. n) MOTION: To change the prerequisites for EE 221.3 (Analog Electronics) from Prerequisite(s) or Corequisite(s): EP 202 to Prerequisite(s) or Corequisite(s): GE 153 or EP 202.	
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	RATIONALE: GE 153, which contains a.c. circuit analysis, is sufficient for EE 221. Note that EP 202 is retained to accommodate students entering engineering prior to 2021-22; once EP 202 is removed, GE 153 becomes a pre-requisite. o) MOTION: To remove EE 444.3 (In the Power and Energy Stream) from the EE program beginning 2022-2023. RATIONALE: Since renewable energy such as wind & solar PVs will be a significant source of electricity in the future, EE 444 which covers topics on conventional generators and motors, is being replaced by a new EE 448 -- renewable energy course. p) MOTION: To move EE 442.3 (In the Power and Energy Stream) from Term 2 to Term 1 beginning 2022-2023. RATIONALE: EE 442 covers broader topics related to power system operation, control and protection. Because it covers broader topics it is appropriate to move it to Term 1. q) MOTION: To create EE 448.3 (Renewable Energy and Power Systems) and inserted into the Power and Energy Stream of the EE program beginning the second/winter term of 2022-2023. RATIONALE: Since renewable energy such as wind & solar PVs will be a significant source of electricity in the future, EE 448 -- renewable energy course is being added to the power & energy stream. r) Motion: Moved that EE 441.3 be made a pre-requisite for EE 448.3. MOVER: E. Salt SECONDER: S. Koustov Is the content of EE444 still needed? Will it be moved to some other course? <i>To be verified within the program.</i> <i>Carried.</i> <u>Computer Engineering (for 2022-23)</u> s) MOTION: Delete CMPT 141.3 Introduction to Computer Science from the first term of second year of the CME program starting in 2022-2023.	5q) Course creation form and Course outline for EE 448
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	RATIONALE: CMPT 141.3 is redundant with the new first year course CMPT 142. The change aligns with other changes in the CME program due to the changes in the first year. t) MOTION: Add course CMPT 270.3 Developing Object-Oriented Systems in the first term of second year of the CME program starting in 2022-2023. RATIONALE: New revised program due to the changes in new first year. CMPT 146 and MATH 134 satisfy the prerequisites for CMPT 270.3 (verified with Computer Science). u) MOTION: Delete CMPT 145.3 Principles of Computer Science from the second term of second year of the CME program starting in 2022-2023. RATIONALE: CMPT 145.3 is redundant with the new first year course CMPT 146. The change aligns with other changes in the CME program due to the changes in the first year. v) MOTION: Add course CMPT 280.3 Data Structures & Algorithms in the second term of second year of the CME program starting in 2022-2023. RATIONALE: New revised program due to the changes in new first year. CMPT 270.3 satisfies the prerequisite for CMPT 280.3. w) MOTION: Delete EP 202.3 Electric and Magnetic Fields and Circuits from the first term of second year of the CME program starting in 2022-2023. RATIONALE: The materials in EP 202 have been effectively integrated or replaced into new first year curriculum. EP 202 is 100% ES (Engineering Science). By deleting this course, the AU count in CME program will not be affected (only lose 45 ES counts). x) MOTION: Add course CMPT 214.3 Programming Principles and Practice in the first term of second year of the CME program starting in 2022-2023. RATIONALE: New revised program due to the changes in new first year. CMPT 146 satisfies the prerequisite for CMPT 214 (verified with Computer Science). The following two motions are paired. y) MOTION: Move EE 232.3 Digital Electronics to the first term of second year from the second term of second year starting in 2022-23.	
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	z) MOTION: Move EE 221.3 Analog Electronics to the second term of second year from the first term of second year starting in 2022-23. RATIONALE (for motion 5y) and 5z)): Students typically have less difficulty with digital electronics than analog electronics. Also, this ordering parallels the signals and systems courses in year 2. aa) MOTION: Delete CMPT 214.3 Programming Principles and Practice from the first term of third year of the CME program starting in 2022-2023. RATIONALE: CMPT 214 has been moved to second year from 2022-23. ab) MOTION: Move RCM 200.3 Effective Professional Communication to first term of third year from second term of third year starting in 2022-2023. RATIONALE: To make room for a required course CMPT 332, which will be offered in second term only. cc) MOTION: Add CMPT 332.3 Operating Systems Concepts in the second term of third year of CME program starting in 2022-2023. RATIONALE: CMPT 332 teaches fundamental concepts of operating systems and will become a core course in the CME program. CMPT 280 and CME 331 satisfy as the prerequisites for CMPT 332. We have received confirmation from Computer Science that a new section of CMPT 332 will be offered in Winter 2024 and 2025 terms. Future offerings will depend on course outcomes and enrolments. The following motions will apply to the <u>Software Focus Area only</u> of CME program. ad) MOTION: To delete CMPT 270.3 Developing Object-Oriented Systems from the first term of third year of the CME program (Software Focus Area) starting in 2022-2023. RATIONALE: CMPT 270 has been moved to second year from 2022-23. ae) MOTION: To delete CMPT 280.3 Data Structures & Algorithms from the second term of third year of the CME program (Software Focus Area) starting in 2022-2023.	<i>5dd) CME Program revisions</i>
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	RATIONALE: CMPT 280 has been moved to second year from 2022-23. af) MOTION: To delete all courses (CMPT 332, CMPT 370, CMPT 350, CMPT 432, CMPT 434, CMPT 436 and CMPT 470) from the fourth year of the Software Focus Area of CME program starting in 2022-2023. RATIONALE: These courses have been reorganized in the revised program (Software Focus Area only in CME). gg) MOTION: Add CMPT 370.3 Intermediate Software Engineering in the first term of third year in Software Focus Area of CME program starting in 2022-2023. RATIONALE: New revised program due to the changes in new first year. CMPT 280 satisfies as the prerequisites for CMPT 370. ah) MOTION: Add the following courses in the list of electives in third year (in first or second term, depending on the offering) in Software Focus Area of CME program starting in 2022-2023. - CMPT 318.3 Data Analytics - CMPT 353.3 Full Stack Web Programming - CMPT 381.3 Implementation of Graphical User Interfaces Students will choose only one (3 credits) from the list. RATIONALE: New revised program due to the changes in new first year. CMPT 318 is a new course starting in 2022-23 (confirmation received from Computer Science). CMPT 270 and EE216 satisfy as the prerequisites for CMPT 318. CMPT 280 satisfies as the prerequisites for CMPT 353. CMPT 270 satisfies as the prerequisites for CMPT 381. This list of elective courses will offer the students with a choice to pick one from two pathways, depending on their course load and career choice. One pathway leads to conventional topics in Computer Engineering like, Operating systems, Programming, Networks and Security. Another pathway leads to practical applications in Computer Engineering like, Machine learning, Image processing, Deep learning, Human computer interaction, etc. These courses are not term specific (i.e. offered in Term 1 or Term 2). Therefore, students can take them whenever the courses become available (so they will be listed as Term 1 or Term 2). ai) MOTION: Add the following courses in the list of electives in fourth year (in first or second term, depending on the	
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	offering) in Software Focus Area of CME program starting in 2022-2023. CMPT 423.3 Machine Learning CMPT 436.3 Mobile and Cloud Computing CMPT 481.3 Human Computer Interaction CMPT 487.3 Image Processing and Computer Vision CMPT 489.3 Deep Learning CMPT 432.3 Advanced Operating Systems Concepts CMPT 434.3 Computer Networks CMPT 438.3 Introduction to Computer Security CMPT 470.3 Advanced Software Engineering Students will choose any two courses (6 credits) from the list. RATIONALE: New revised program due to the changes in new first year. CMPT 318 and EE216 satisfy as the prerequisites for CMPT 423. CMPT 332 or CMPT 370 satisfy as the prerequisites for CMPT 436. CMPT 370 or CMPT 381 satisfy as the prerequisites for CMPT 481. EE 216 and CMPT 318 satisfy as prerequisites for CMPT 487. EE 216 and CMPT 318 satisfy as prerequisites for CMPT 489. CMPT 332 satisfies as prerequisites for CMPT 432 and CMPT 434. CMPT 332 and CMPT 434 satisfy as prerequisites for CMPT 438. CMPT 214 and CMPT 370 satisfy as prerequisites for CMPT 470. This list of courses will offer the students with a choice to pick one from two pathways, depending on their course load and career choice. One pathway leads to conventional topics in Computer Engineering like, Operating systems, Programming, Networks and Security. Another pathway leads to practical applications in Computer Engineering like, Machine leaning, Image processing, Deep learning, Human computer interaction, etc. These courses are not term specific (i.e. offered in Term 1 or Term 2). Therefore, students can take them whenever the courses become available (so they will be listed as Term 1 or Term 2). jj) MOTION: To create new course CME 465.3 Embedded Machine Learning in the first term of fourth year in the Software Focus Area of CME program starting in 2022-2023. RATIONALE: Due the evolution in artificial intelligence, machine learning (ML) algorithms are being applied in many applications these days. Conventional ML courses teach fundamental algorithms and software implementation of ML. However, many applications will require efficient hardware deployment of ML algorithms. This course will focus on efficient hardware implementation ML algorithms which will be unique to Computer Engineering program. Students from Computer Science may also enroll in this course. A new course	5jj) Course creation form and Course outline for CME 465.3
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	proposal is attached. The first offering will take place in Fall 2024. MOVER: K. Wahid SECONDER: S. Koustov Have RCM 200 move been discussed with SoPD? SoPD needs to be aware of such changes so they can plan accordingly and have appropriate number of sections in each term. <i>Program will reach out to SoPD.</i> Are all these changes going to impact the schedule, i.e. will all the newly added courses going to create scheduling conflicts? <i>They should not, as these are all existing courses, and many of them can be taken in either tem; but this will be checked.</i> Will new CME 465 require new/additional resources? <i>No, it will be taught by current faculty (F. Bui) as it is matches their expertise, and this faculty will no longer teach a first year course, so will have time to take this course on.</i> <i>Carried.</i> <u>Chemical Engineering (for 2023-24)- Proposal moved to meeting in November 2021, due to change in the implementation year.</u> Bioprocessing Option ak) MOTION: To replace Biochemical Option with newly created Bioprocessing Option starting in the 2023-2024 academic year. The six courses (18 cu) required for a student to receive the Bioprocessing Option are: CHE 260.3, CHE 454.3, CHE 461.3, CHE 462.3, CHE 463.3 and CHE 468.3. al) MOTION : To develop and offer a new course CHE 260.3 (Introduction to Biomaterials). To be offered in Term 2, and added to the Group A Elective list. mm) MOTION: To modify the existing course CHE 461.3 (Biochemical Engineering). To be offered in Term 2, and remain in the Group B Elective list. an) MOTION : To develop and offer a new course CHE 462.3 Biomaterial Processing. To be offered in Term 2, and added to the Group B Elective list.	<i>5kk) Bioprocessing Option in CHE proposal</i>
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	ao) MOTION : To develop and offer a new course CHE 463.3 Bioprocess Industries and Bioproducts. To be offered in Term 1, and added to the Group B Elective list. pp) MOTION 6: To develop and offer a new course CHE 468.3 Downstream Processing. To be offered in Term 2, and added to the Group B Elective list. RATIONALE (for items 5 kk) to 5pp): With predictions that the bioeconomy will continue to grow, the Bioprocessing Option was proposed and developed with a course list and sequence including one existing, one modified, and four new courses. The option will be unique for the College of Engineering, complement existing programming, and fit well with the University of Saskatchewan goals and areas of the desired pre-eminence. In addition, the four new courses of the option add more choices to the Group A Elective and Group B Elective lists. No new students will be admitted into the Biochemical Option after 202305. Students who are currently enrolled in Biochemical Option will be able to complete the option or switch to Bioprocessing Option.	
6	Discussion	
a)	Accreditation meetings- Curriculum Committees This meeting should take place on November 2, 2021 instead of meeting with the research faculty. The purpose is to see how the CC fit into CI process, how to motions are moved through departments, Colleges, and beyond. Updated version of the schedule will be shared with the PALs by the end of this week (week of October 11, 2021).	
7	Next Meeting	
	Our next meeting is scheduled for November 8, 2021.	
8	Meeting Adjourned – B. Sparling	


UNDERGRADUATE ACADEMIC PROGRAMS COMMITTEE MEETING
AGENDA

November 8, 2021 10:30 – 12 p.m.

2A15 ENGR BLDG

CHAIR: B. Sparling
PRESENT: C. Niu, K. Mazurek, D. Milne, E. Salt, K. Wahid, A. Odeshi, S. Koustov, S. Maw, D. Gaudet, W. Helagson
REGRETS: A. Pajic
GUEST: O. Baik, B. Urquart, C. Tate
SECRETARY: M. Wonsiak

AGENDA ITEM	SUPPORTING DOCUMENTATION
1 Introductions – B. Sparling	
2 Approval of Agenda – B. Sparling MOTION: To approve the agenda of November 8, 2021 as circulated. Moved: S. Koustov Seconded: D. Milne Carried :	
3 Approval of Consent Agenda – B. Sparling Motion: To approve all the items in the consent agenda: Moved: S. Maw Seconded: C. Niu Carried	
4 Approval of Prior Minutes – B. Sparling MOTION: To approve the minutes of October 12, 2021 as circulated. Moved: S. Koustov Seconded: A. Odeshi Carried	
5 New Business a. Civil Engineering for 2022-23 a) MOTION: To change the prerequisites for CE 271.2 (will be 171.2) Spring Surveying Camp from (CE) 201 or CE 202) to (GE 133 Engineering Communication II or CE 201 or CE 202 or ENVE 201). The	



change will be included in the new Catalogue (starting in 202205), but should take effect immediately (to accommodate current first year students).

Moved: K. Mazurek
Seconded: D. Milne

Carried

- b) **MOTION:** To change Senior Humanities or Social Science elective in Term 2 of Third year of the CE Program to a “Humanities or Social Science elective”.

Moved: K. Mazurek
Seconded: D. Milne

Carried

- c) **MOTION:** To change the prerequisites for CE 295.3 Design Project from CE 202 and CE 212 and pre-or co- requisites of GE 213, GEOE 218 and RCM 200 to CE 202 and CE 212 and pre- or co- requisites of (CE 213 or GE 213), GEOE 218 and RCM 200 for the year 2022-2023.

Moved: K. Mazurek
Seconded: W. Helgason

Carried

- d) **MOTION:** To change the prerequisites for CE 317.3 Structural Analysis from GE 213 Mechanics of Materials to CE 213 Mechanics of Materials for the 2023-2024 academic year.

Moved: K. Mazurek
Seconded: W. Helgason

Carried

- e) **MOTION:** To change the prerequisites for CE 318.3 Applied Engineering Mathematics from CMPT 142 (taken), CE 225 (taken), GE 213 (taken), and MATH 224 (taken) to CMPT 142 (taken), CE 225 (taken), CE 213 (taken), and MATH 224 (taken) to take into effect for the 2023-2024 academic year.

Moved: K. Mazurek
Seconded: W. Helgason

Carried



- f) MOTION:** To change the prerequisites for CE 328.3 Fundamentals of Soil Mechanics from GEOE 218, CE 225 (taken), and GE 213 (taken) to GEOE 218, CE 225 (taken), and CE 213 (taken) to take into effect for the 2023-2024 academic year.

Moved: K. Mazurek
Seconded: W. Helgason

Carried

Environmental Engineering

- g) MOTION:** For GE 213 to be replaced with CE 213 in the ENVE second year starting in 2022-2023.

Moved: W. Helgason
Seconded: D. Milne

Carried

- h) MOTION:** To change the Prerequisite(s) or Corequisite(s) for ENVE 201.3 Principles of Environmental Engineering from EN First Year Common Core and (BIOL 120 and CHEM 115) or (BIOL 120 and GEOL 121 or (CHEM 115 and GEOL 121) or EN Two Year Common Core to Prerequisite EN First Year Common Core or EN Two Year Common Core and to add restriction to ENVE students. "Approval of department" restriction to be used for non ENVE students. The change is to take into effect for 2022-2023.

Moved: W. Helgason
Seconded: S. Koustov

Carried

Geological Engineering

- i) MOTION:** For GE 213 to be replaced with CE 213 in the GEOE second year starting in 2022-2023.

Moved: D. Milne
Seconded: A. Odeshi

Carried

Engineering Physics

- j) MOTION:** To move EE 232.3 (Digital Electronics) from Y2T2 to Y2T1.

Moved: S. Koustov

Seconded: A. Odeshi

Carried

- k) MOTION:** To move EE 221.3 (Analog Electronics) from Y2T1 to Y2T2.

Moved: S. Koustov

Seconded: A. Odeshi

Carried

Bioprocessing Option

- l) MOTION:** To replace Biochemical Option with newly created Bioprocessing Option starting in the 20222023 academic year. The six courses (18 CUs) required for a student to receive the Bioprocessing Option are: CHE 260.3, CHE 454.3, CHE 461.3, CHE 462.3, CHE 463.3 and CHE 468.3.

Moved: C. Niu

Seconded: W. Helgason

Carried

1 voted against (DM) this is for motions l - q

- m) MOTION:** To develop and offer a new course CHE 260.3 (Introduction to Biomaterials). To be offered in Term 2, and added to the Group A Elective list.

Moved C. :Niu

Seconded: W. Helgason

Carried

1 voted against

- n) MOTION:** To modify the existing course CHE 461.3 (Biochemical Engineering). To be offered in Term 2, and remain in the Group B Elective list.

Moved: C. Niu

Seconded: W. Helgason

Carried

1 voted against

- o) MOTION:** To develop and offer a new course CHE 462.3 Biomaterial Processing. To be offered in Term 2, and added to the Group B Elective list.



Moved: C. Niu
Seconded: W. Helgason

Carried
1 voted against

- p) MOTION:** To develop and offer a new course CHE 463.3 Bioprocess Industries and Bioproducts. To be offered in Term 1, and added to the Group B Elective list.

Moved: C. Niu
Seconded: W. Helgason

Carried
1 voted against

- q) MOTION:** To develop and offer a new course CHE 468.3 Downstream Processing. To be offered in Term 2, and added to the Group B Elective list.

Moved: C. Niu
Seconded: W. Helgason

Carried
1 voted against

L – q) Discussion was raised about having the resources and staff available to add the new Bioprocessing option. Dr. Baik assured the committee that it is possible with 7 – 8 faculty members as well as the potential of hiring another faculty member to do more teaching. This will be determined at a later date. It was mentioned that with the removal of the petroleum options, the teaching load will be redistributed. Discussion was had about having 5 classes instead of 6 for this option as per University standards. Because of the government and Dean Kresta's desire to have this option readily available the Chemical Engineering department will go forward with 6 instead of redesigning the classes. Decision was made to ***amend the motion*** by removing the 800 classes as this committee does not determine graduate programs.

EPIP

- r) MOTION:** To delete Engineering Professional Internship Program effective 202205

Moved: A. Odeshi
Seconded: S. Koustov

Carried



- s) **MOTION:** To delete four existing courses (EPIP 401.0, EPIP 402.0, EPIP 403.0, EPIP 404.0), effective 202205.

Moved: A. Odeshi

Seconded: S. Koustov

Carried

- t) **MOTION:** To delete the Certificate in Professional Communication effective 202205.

Moved: S. Maw

Seconded: S. Koustov

Carried

- u) **MOTION:** To create the Certificate in Professional Communication-Persuasive Communication

Moved: S. Maw

Seconded: S. Koustov

Carried

- v) **MOTION:** To create the Certificate in Professional Communication-Leadership and Negotiation.

Moved: S. Maw

Seconded: S. Koustov

Carried

- w) **MOTION:** To create the Certificate in Professional Communication-Technical and Professional Writing

Moved: S. Maw

Seconded: S. Koustov

Carried

- x) **MOTION:** To approve the following admission requirements for the three new certificates: 1) completed RCM 200.3 or 300.3, or otherwise demonstrate proficiency in English, and 2) complete at least 60 credit units of post-secondary studies. Prospective students will be competitively ranked based upon average calculated on the most 18 credit units of completed coursework.



The question of if these three new certificates would be recognized at convocation was raised. Burton Urquart will look into this with the Registrar's office.

Moved: S. Maw
Seconded: S. Koustov

TIC

- y) MOTION:** To delete the Required Course COMM 346.3 Technology Commercialization from Technological Innovation Certificate (TIC), effective 2022-2023.

Moved: S. Maw
Seconded: A. Odeshi

Carried

- z) MOTION:** To decrease the number of required courses credit units in TIC from 20 to 17.

Moved: S. Maw
Seconded: A. Odeshi

Carried

- aa) MOTION:** To decrease the number of total required credit units in TIC from 29 to 26.

Moved: S. Maw
Seconded: A. Odeshi

Carried

- ab) MOTION:** Add COMM 341.3 Entrepreneurial Thinking and Innovation as an elective for Tech Innovation Certificate, effective 2022-2023

Moved: S. Maw
Seconded A. Odeshi

Carried

6	Discussion:
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7	Next meeting – B. Sparling
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Our next meeting is scheduled for December 6, 2021.

Appendix C– Recent Enrollment Numbers

Academic Year Headcount

Program: Bachelor of Sc Engineering

Major: Chemical Engineering, Civil Engineering, Computer Engineering, Electrical Engineering, Engineering Physics, Environmental Engineering, Geological Engineering, Mechanical Engineering, Undeclared

Year In Program: All

			Reporting Year				
Reporting Level	Major	Year In Program	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021
Undergraduate	Chemical Engineering	2nd Year	78	46	48	37	42
		3rd Year	44	62	38	47	33
		4th Year	79	63	57	64	46
		Chemical Engineering Total	201	171	143	148	121
	Civil Engineering	1st Year					1
		2nd Year	90	82	74	66	65
		3rd Year	79	91	90	85	74
		4th Year	60	67	69	76	82
		Civil Engineering Total	229	240	233	227	222
	Computer Engineering	2nd Year	16	33	27	56	57
		3rd Year	33	15	31	21	42
		4th Year	14	28	14	22	34
		Computer Engineering Total	63	76	72	99	133
	Electrical Engineering	2nd Year	77	54	50	44	40
		3rd Year	33	57	47	53	40
		4th Year	25	28	55	52	62
		Electrical Engineering Total	135	139	152	149	142
	Engineering Physics	2nd Year	25	29	20	23	16
		3rd Year	19	21	25	25	19
		4th Year	17	21	24	20	30
		Engineering Physics Total	61	71	69	68	65
	Environmental Engineering	2nd Year	21	10	16	14	18
		3rd Year	12	22	11	12	14
		4th Year	12	11	14	16	12
		Environmental Engineering Total	45	43	41	42	44
		2nd Year	29	12	13	14	15

	Geological Engineering	3rd Year	26	26	18	12	8
		4th Year	20	21	13	16	14
		Geological Engineering Total	75	59	44	42	37
	Mechanical Engineering	2nd Year	96	98	90	96	96
		3rd Year	93	95	88	81	93
		4th Year	84	92	84	89	99
		Mechanical Engineering Total	273	285	262	266	288
	Undeclared	1st Year	423	435	486	444	466
		2nd Year				2	2
		Undeclared Total	423	435	486	446	468
	Undergraduate Total		1,505	1,519	1,502	1,487	1,520
Grand Total		1,505	1,519	1,502	1,487	1,520	

Source: University of Saskatchewan Data Warehouse. Data as of Monday, July 19, 2021
Produced by Information and Communications Technology - Reporting and Data Systems.

Information and Communications Technology - Reporting and Data Systems

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2021 Fall Term Daily Enrolment Trend

New, First Time, Direct Entry Undergraduate				
	19 Jul			
<i>Major College</i>	<i>2020/21</i>	<i>2021/22</i>	<i>Diff</i>	<i>% Diff</i>
Agriculture and Bioresources	258	266	8	3.1%
Arts and Science	1,564	1,660	96	6.1%
Education	233	247	14	6.0%
Edwards School of Business	402	376	(26)	-6.5%
Engineering	314	419	105	33.4%
Kinesiology	159	173	14	8.8%
Medicine		1	1	

[https://uviewweb.usask.ca/ReportServer/Pages/ReportViewer.aspx?%2fStudent%2fEnrolment%2fDaily+Trend%2fS TEN-1550+Daily+Enrolment+Trend+\(Fall+Term\)&rs:Command=Render](https://uviewweb.usask.ca/ReportServer/Pages/ReportViewer.aspx?%2fStudent%2fEnrolment%2fDaily+Trend%2fS TEN-1550+Daily+Enrolment+Trend+(Fall+Term)&rs:Command=Render)

Appendix D - New Course Proposals and Course Outlines

CE 213.3

CME 465.3

EE 448.3

CE 213.3 Mechanics of Materials

College of Engineering
Winter 2023



Instructor: L.R. Feldman
ENG 3B40
Phone: 966-5774
Email: lisa.feldman@usask.ca

Lectures:	MWF	10:30am-11:20pm	TBA
Lab Lecture:	T	11:30-12:50	TBA
Practicum Lab:	T/W/Th	2:30 – 3:50pm or 4:00 – 5:20 pm	TBA

Website: Please refer to the course website on
PAWS/Blackboard

Textbook: *Mechanics of Materials (including Connect access), 7th edition*, by F.P. Beer, E.R. Johnston, Jr., J.T. DeWolf, D.F. Mazurek, McGraw Hill, 2015, ISBN 978-1-259-27998-1.

Course notes to be posted on the class web site or circulated via e-mail
- It is the student's responsibility to have these notes available prior to the appropriate lecture

Students may be required to bring a laptop computer to some practicum laboratory periods

Assessment:	Midterm Examination*	15 or 20%
	Final Examination*	55 or 60%
	Assignments	10%
	Laboratory	15%

*A 5% 'adjustment' will be used between the midterm and final exams (i.e. the best grade given more weight!). The total value of the midterm and final exams combined will be 75%.

Prerequisites: GE123 – Engineering Mechanics II

Corequisites:

- None

Description:

Building upon the concepts introduced in the courses in statics and dynamics and the properties of engineering materials, this course extends equilibrium analysis to deformable bodies. Emphasis is placed on understanding and applying the three fundamental concepts of solid mechanics – equilibrium, constitutive relationships, and geometry of deformation (compatibility). The fundamentals are introduced and reinforced in the context of specific behaviors, including axial tension and compression, pure bending, bending in combination with shear, and torsion of circular shafts. Transformation of stress in two dimensions is introduced.

Detailed Course Outline:

Topic	Approximate Lecture Hours
1. INTRODUCTION: FORCES AND THE CONCEPT OF STRESS • Statics: Short review • Stress in structural members • Axial loading: Normal stress • Shearing stress: Single or double shear • Application to simple structures • 3-D stress components	4
2. STRESS AND STRAIN UNDER AXIAL LOADING • Normal stress under axial load • Stress-strain behavior: ductile versus brittle • Hooke's Law: Modulus of Elasticity • Axial deformations: Statically determinate and indeterminate • Stress and strain due to temperature changes • Multi-axial stress & Poisson's ratio	5
3. TORSION OF CIRCULAR SHAFTS • Torsional stresses in circular shafts • Elastic stresses • Angle of twist in the elastic range • Torsion of noncircular shafts (brief introduction) • Shear flow in thin-walled sections (brief introduction)	5
4. PURE BENDING • Introduction and definitions: prismatic, symmetric members • Stresses and deformations in the elastic range: flexural formula and curvature • Biaxial stresses in composite shapes • Biaxial bending • Normal stresses due to eccentric and axial loading	7
5. TRANSVERSE LOADING ON BEAMS: COMBINED FLEXURE AND SHEAR • Moment and shear in beams – equilibrium approach • Shear and moment diagrams • Role of shear stresses and shear flow • Horizontal shear formula • Shear in built-up beams: fasteners, etc.	6
6. 2-D TRANSFORMATION OF STRESS • 3d General state of stress • Stresses on an oblique plane • Plane stress conditions: ○ Transformation of stresses using equilibrium equations ○ Principal normal stresses and maximum shear stress ○ Mohr's circle for the transformation of plane stress	7
7. BUCKLING OF COLUMNS • Stability of structural members • Critical buckling strength: Euler's formula for pin-ended columns • Extension of Euler's formula to other support conditions	2

Assignments:

- There will be up to ten problem assignments throughout the term. One assignment will be forgiven (i.e. missed, late, poor performance, etc.). Students should note that completion of the assignments is key to success in the course.
- All work submitted by a student for academic credit must be the student's own individual work. Copying of assignments is considered academic dishonesty.
- Online assignments using Connect will generally replace more traditional assignments.
- Guidelines for assignments requiring manual submission are as follows:
 - Assignments are to be submitted into the designated slot in Room 1C01 by 4:30 pm on the specific due date. **No late assignments will be accepted.**
 - Assignments are to be submitted on engineering calculation paper (or graph paper with an appropriate title block and margins added) with all work clearly and neatly documented.
 - Solutions must be presented in the same units (i.e. SI or Imperial units) as presented in the question statement.
 - Assignments must include a cover page.
 - Only select questions on such assignments will be graded.
 - **Assignments submitted that do not follow this format will automatically receive a grade of zero.**
 - Assignment solutions will be posted on the course web page following the due date.
- Problems will be representative of typical expectations for exam questions.

Laboratory:

This class is divided into 2 laboratory lecture sessions (P0x) and four practicum laboratory sessions (L0x). Students assigned to any given laboratory practicum laboratory section must also be assigned to the laboratory lecture session that takes place earlier that same week. Each laboratory lecture session and each practicum laboratory session meets every second week. Because of the need to share laboratory equipment, every attempt has been made to have equal and reasonable section sizes. **Attendance at both the laboratory lecture and the practicum laboratory session that the student has been assigned to is mandatory.**

All labs must be completed and submitted to pass the course. Failure to complete any of the labs will result in a failing grade (< 50%) for the course along with the grade comment of INF (Incomplete Failure). Laboratory reports for selected topics are to be submitted in the designated slot in Room ENG 1C01 by 4:30 pm on the specified due date. With the exception of Laboratory #1 (Statics Review) which is a problem lab and is to be done in teams of two students, laboratory work will be completed in groups of up to four students. All students in a given laboratory group must have attended the same practicum laboratory session and collected the same data from a single laboratory test setup. Refer to the course website for formal laboratory report formatting instructions. **Late laboratory reports or laboratory reports submitted in groups of more than four students will be assigned a grade of zero.**

There is a possibility that practicum laboratory sessions may run long, and so outside of the scheduled laboratory time, due to the nature of the work involved. Please plan accordingly so that this can be accommodated if needed.

Laboratory Lecture:

Laboratory Instructor:	TBA
Time:	Tuesday, 11:30 am – 12:50 pm on alternate weeks.
Location:	TBA
Sections:	Two sections, meeting on alternate weeks.

Laboratory Lecture Topics & Dates:

Laboratory Lecture Description	Date	
	Section P01	Section P02
• Statics Review	TBA	TBA
• Statically Indeterminate Systems	TBA	TBA
• Torsion	TBA	TBA
• Beam Bending	TBA	TBA
• Columns	TBA	TBA

Practicum Laboratory Sessions (Location: 1C01 Engineering Building):**Week 1:**

	L01	L03	L05
Laboratory Day and Time	Wednesday (Week 1) 2:30 – 3:50 pm	Thursday (Week 1) 2:30 – 3:50 pm	Tuesday (Week 1) 4:00 – 5:20 pm
Statics Review	TBA	TBA	TBA
Ind. Systems	TBA	TBA	TBA
Torsion	TBA	TBA	TBA
Beam Bending	TBA	TBA	TBA
Columns	TBA	TBA	TBA

Week 2:

	L04
Laboratory Day and Time	Wednesday (Week 2) 2:30 – 3:50 pm
Statics Review	TBA
Ind. Systems	TBA
Torsion	TBA
Beam Bending	TBA
Columns	TBA

Exams:**Midterm Exam:****TBA**

Examination Policies:

- Students must pass at least one of the midterm or the final examination to receive a passing grade ($\geq 50\%$) in this course. If the student fails both the midterm and the final examinations, the final mark will be based on:

Midterm Examination	30%
Final Examination	70%

Assignment and laboratory marks will not be counted.
- All examinations are closed book. No reference material, including, but not limited to: notes, solved examples, or any other material, is permitted.
- The use of electronic devices, including calculators with document storage and/or communication capabilities, is prohibited during exams.
- An equation sheet will be provided for both the midterm and final examinations.
- Alternate times to write midterm examinations will not be considered except in the case of illness or a conflict with other university related activities.
- If a student cannot write the midterm examination due to a scheduling conflict with university-related activities, the student must contact the instructor at least three weeks prior to the scheduled exam to arrange an alternate exam time. Students writing the midterm examination at an alternate time must agree not to discuss or in any way disclose the nature or contents of the exam should the student write the exam before his/her classmates nor to discuss or obtain information about the exam should the student write the exam after his/her classmates. Such students must also complete the "Affidavit Regarding the Rearrangement of Midterm Exam Time" in advance of writing the examination. Failure to adhere to these regulations could result in disciplinary action as with any other type of cheating on examinations.
- If a student cannot write the midterm examination at the scheduled time due to illness or extraordinary circumstance, the student must contact the instructor either before or immediately following (within 3 days) the scheduled exam to explain the absence. In return for a request to write the midterm examination at an alternate time being arranged, the student must agree not to discuss or in any way disclose the nature of contents of the said examination should the student write before his/her classmates nor to discuss or obtain information about the examination should the student write after his/her classmates. The student must also complete the "Affidavit Regarding the Rearrangement of Midterm Exam Time" in advance of writing the examination. Failure to adhere to these regulations could result in disciplinary action as with any other type of cheating on examinations.
- Students that cannot write the midterm examination due to illness must complete the Student Declaration of Absence form available at the Engineering Student Centre or on the University website.
- If a student cannot write the midterm examination due to illness or extraordinary circumstance and does not inform the instructor within 3 days of the exam, a grade of "0" will be assigned.
- Alternate times to write final examinations cannot be accommodated. If a student misses a final exam, application must be made to the Engineering Student Centre to write a deferred exam.
- Students planning on registering with the office for Access and Equity Services (AES) must do so in accordance with AES procedures and deadlines.

Academic Dishonesty and Academic Appeals:

Academic dishonesty will not be tolerated in this class. Work on all assignments, labs, and exams must be independent and follow the guidelines set out in this syllabus or agreed to within class. Any confirmed misconduct will result in an assigned grade of "0" for the item being considered and a possible academic misconduct action being filed. For more information on what constitutes academic misconduct please consult the University Council document on academic misconduct (www.usask.ca/honesty).

For information regarding appeals of a final grade or other academic matters, please consult the University Council document on academic appeals (www.usask.ca/honesty).

Important Dates:

TBA	First day of classes.
TBA	Last day for making changes in registration for second-term courses.
TBA	Family Day – University closed
TBA1 to TBA2	Winter Mid-Term Break – No classes
TBA	MIDTERM EXAM (6:30 – 8:30pm)
TBA	Last day to withdraw from Term 2 classes.
TBA	Last day of classes.
TBA	Good Friday – University closed

English:

Students are expected to be able to communicate in spoken and written English. “Developing and practicing communication skills is an essential experience requirement.” – Experience Guideline 2 (Updated May 2009), Components of an Acceptable Engineering Work Experience, APEGS.

Students may be penalized up to 10% of the marks on all assignments, laboratories, tests, and examinations for the improper use of English. Additionally, poorly written work with the exception of final exams may be returned without grading. If resubmission of the work is permitted, it may be graded with marks deducted for poor English and/or late submission.

Conduct:

The Instructor will practice fairness in all aspects of the course, and will make every reasonable effort to create a positive, professional, and enjoyable learning environment. The Instructor will endeavor to deliver all lectures on time, to have graded material returned in a timely manner, and to be clear in all course-related expectations. In return, the same manner of conduct is expected from the students. Some points to consider:

- Students are expected to be on time for all lectures and lab sessions. Arriving late creates a disturbance that is not appropriate.
 - Cell phones are to be turned off during lectures and lab sessions.
 - Use of computers, electronic notebooks, and similar devices during lectures and labs is limited to matters that pertain to the course.
-

Recording of Class and Laboratory Lectures:

Students are not permitted to record classroom or laboratory lectures without express written permission of the instructor unless allowed to do so by AES. Copyright of class materials is held by the instructor.

Consultation:

Students are encouraged to discuss problems with their instructor at the end of the lecture, or during the instructor's scheduled weekly office hours for this course. Other individual consultation may be arranged by appointment.

Sickness or Other Problems:

Students should immediately consult with the instructor or Associate Dean Academic if they have any problems that could affect their performance in this course. Where appropriate, the problems should be documented. The student should seek advice from the instructor or Associate Dean Academic regarding how best to deal with the problem. Failure to notify the instructor or Associate Dean Academic immediately (or as soon as possible thereafter) will have a negative effect on any appeal.

Notice:

Students are responsible for regularly checking their e-mail, and the course web site. It is also the responsibility of the students to be aware of any announcements made in the course and laboratory lectures.

Learning Outcomes:

1. Students should be able to perform a static analysis of a two-dimensional, statically determinate beam, truss or frame structure on an assignment or exam using the basic principles of static equilibrium. In order to do this, students should be able to perform the following tasks:
 - a. Identify appropriate support and member connection conditions based on physical considerations;
 - b. Draw complete free-body diagrams of structural assemblies and components;
 - c. Determine support reactions and member connection forces; and
 - d. Determine resultant internal axial forces, shear forces and bending moments at specified locations on selected structural members.
 2. Understand and calculate normal, shear, and bearing stresses due to axial loading.
 3. Calculate stresses for statically indeterminate problems using axial deformation relationships.
 4. Calculate stress and strain due to temperature changes.
 5. Determine torque, shearing stress, angle of twist in the elastic range, and deformation in circular shafts.
 6. Students should be able to describe internal shear and bending moment distributions in flexural members.
 7. Evaluate flexural members based upon bending stress, transverse shear, and (time permitting) beam deflections. Students should also be capable of calculating the effects of biaxial bending in flexural members and be able to analyze built-up beams including fastening methods.
 8. Students should be able to calculate total stress for eccentric loading.
 9. Students should be able to perform two-dimensional transformation of stresses both using equilibrium equations and using Mohr's circle for the transformation of plane stress. Student must also be able to identify principal normal stresses and maximum shear stress.
 10. Students should be able to calculate the critical buckling strength using Euler's formula for pin-ended columns and to extend Euler's formula for other support conditions.
-

Attribute Mapping:

	<i>Level of Performance[‡]</i>											
	Attribute[†]											
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
	IDA	IDA	IDA	N/A	N/A	DA	DA	N/A	N/A	N/A	N/A	N/A

[†]Attributes:

A1 A knowledge base for engineering
A2 Problem analysis
A3 Investigation
A4 Design
A5 Use of engineering tools
A6 Individual and team work
A7 Communication skills
A8 Professionalism
A9 Impact of engineering on society and the environment
A10 Ethics and equity
A11 Economics and project management
A12 Life-long learning

[‡]Levels of Performance:

N/A Not Applicable
I Introduced
D Developed
A Applied
ID Introduced and Developed
IA Introduced and Applied
DA Developed and Applied
IDA Introduced, Developed, and Applied

Accreditation Unit (AU) Mapping: (% of total class AU)

Math	Natural Science	Complementary Studies	Engineering Science	Engineering Design
-	-	-	100%	-

Assessment Mapping:

Component	Weighting	Methods of Feedback*	Learning Outcomes Evaluated
Assignments	10%	S	1, 2, 3, 4, 5, 6, 7, 8, 9
Labs	15%	F, S	1, 3, 5, 6, 7, 10
Midterm	20%	F, S	1, 2, 3, 4, 5
Final	55%	S	1, 2, 3, 4, 5, 6, 7, 8, 9, 10

*Methods of Feedback: **F** – *formative* (written comments and/or oral discussions)
S – *summative* (number grades)



1. Approval by Department Head or Dean

- 1.1 College or School with academic authority: Engineering
- 1.2 Department with academic authority: Civil, Geological, and Environmental Engineering
- 1.3 Term from which the course is effective: Winter 2023

2. Information required for the Catalogue

- 2.1 Label & Number of course: CE213
- 2.2 Academic credit units: 3
- 2.3 Course Long Title (maximum 100 characters): Mechanics of Materials
Course Short Title (maximum 30 characters): Mechanics of Materials
- 2.4 Total Hours: Lecture: 36 Seminar Lab: 15 Tutorial Other
- 2.5 Weekly Hours: Lecture: 3 Seminar Lab: 1.5 Tutorial Other
- 2.6 Term in which it will be offered: T1 T2 T1 or T2 T1 and T2
- 2.7 Prerequisite: GE123 – Engineering Mechanics II

If there is a prerequisite waiver, who is responsible for signing it?

D – Instructor/Dept Approval

H – Department Approval

I – Instructor Approval

- 2.8 Catalogue description (150 words or less): Building upon the concepts introduced in the courses in statics and dynamics and the properties of engineering materials, this course extends equilibrium analysis to deformable bodies. Emphasis is placed on understanding and applying the three fundamental concepts of solid mechanics – equilibrium, constitutive relationships, and geometry of deformation (compatibility). The fundamentals are introduced and reinforced in the context of specific behaviors, including axial tension and compression, pure bending, bending in combination with shear, and torsion of circular shafts. Transformation of stress in two dimensions is introduced.

- 2.9 Do you allow this course to be repeated for credit? No

- 3. **Please list rationale for introducing this course:** GE213 is currently taught in two sections: one in the fall for students from the chemical and mechanical engineering programs, and one in the winter for students in the civil, geological, and environmental engineering programs. Material as presented in the two course sections has strayed over the past number of years, such that the term 1 version of the course is not appropriate for students in the CGEE programs. Changing the Term 2 version of this course to CE213 will allow the department to maintain control over the

material presented to students in the programs within our department and ensure that our students are learning the necessary material critical to successful performance in courses in the upper years of our programs.

4. **Please list the learning objectives for this course:**

1. Students should be able to perform a static analysis of a two-dimensional, statically determinate beam, truss or frame structure on an assignment, test, or exam using the basic principles of static equilibrium. In order to do this, students should be able to perform the following tasks:
 - a. Identify appropriate support and member connection conditions based on physical considerations;
 - b. Draw complete free-body diagrams of structural assemblies and components;
 - c. Determine support reactions and member connection forces; and
 - d. Determine resultant internal axial forces, shear forces and bending moments at specified locations on selected structural members.
2. Understand and calculate normal, shear, and bearing stresses due to axial loading.
3. Calculate stresses for statically indeterminate problems using axial deformation relationships.
4. Calculate stress and strain due to temperature changes.
5. Determine torque, shearing stress, angle of twist in the elastic range, and deformation in circular shafts.
6. Students should be able to describe internal shear and bending moment distributions in flexural members.
7. Evaluate flexural members based upon bending stress, transverse shear, and (time permitting) beam deflections. Students should also be capable of calculating the effects of biaxial bending in flexural members and be able to analyze built-up beams including fastening methods.
8. Students should be able to calculate total stress for eccentric loading.
9. Students should be able to perform two-dimensional transformation of stresses both using equilibrium equations and using Mohr's circle for the transformation of plane stress. Student must also be able to identify principal normal stresses and maximum shear stress.
10. Students should be able to calculate the critical buckling strength using Euler's formula for pin ended columns and to extend Euler's formula for other support conditions.

5. **Impact of this course**

Are the programs of other departments or Colleges affected by this course? Chemical Engineering, Mechanical Engineering, and Engineering Physics.

If so, were these departments consulted? (Include correspondence) Yes.

Were any other departments asked to review or comment on the proposal? No.

6. **Other courses or program affected** (please list course titles as well as numbers)

- 6.1 Courses to be deleted? None. The GE 213 Term 2 section would no longer be required.
- 6.2 Courses for which this course will be a prerequisite? CE317, the course will also be a co-requisite for CE295, and a taken requirement for CE318 and CE328.
- 6.3 Is this course to be required by your majors, or by majors in another program? This course will be taken by Civil, Geological, and Environmental Engineering but will be open to all Engineering students if students from other Engineering programs wish to take the course. Enrolment of students from programs outside civil, geological, or environmental engineering in the Term 2 GE 213 section this replaces has been limited.

7. **Course outline**

(Weekly outline of lectures or include a draft of the course information sheet.)
A draft of the course information sheet is provided.

8. **Enrolment**

- 8.1 Expected enrollment: 132
- 8.2 From which colleges? Engineering

9. **Student evaluation**

Give approximate weighting assigned to each indicator (assignments, laboratory work, mid-term test, final examination, essays or projects, etc.)

- 9.1 How should this course be graded?
C – Completed Requirements
(Grade options for instructor: *Completed Requirements, Fail, IP In Progress*)
N – Numeric/Percentage
(Grade options for instructor: *grade of 0% to 100%, IP in Progress*)
P – Pass/Fail
(Grade options for instructor: *Pass, Fail, In Progress*)
S – Special
(Grade options for instructor: *NA – Grade Not Applicable*) If other, please specify:

9.2 Is the course exempt from the final examination? No

10. **Required text**

Include a bibliography for the course.
Mechanics of Materials (Connect eBook online access), 8th International Student edition, by F.P. Beer, E.R. Johnston, Jr., J.T. DeWolf, D.F. Mazurek, McGraw Hill, 2015, ISBN 978-1-260-32757-1.

11. **Resources**

- 11.1 Proposed instructor: Lisa R. Feldman
- 11.2 How does the department plan to handle the additional teaching or administrative workload? The addition of this course is resource neutral given that GE213 in Term 2 will be eliminated.
- 11.3 Are sufficient library or other research resources available for this course? Yes.
- 11.4 Are any additional resources required (library, audio-visual, technology, etc.)? access to the online material (connect) as provided by the textbook publisher.

12. **Tuition**

- 12.1 Will this course attract tuition charges? If so, how much? (use tuition category) \$729.60
- 12.2 Does this course require non-standard fees, such as materials or excursion fees? If so, please include an approved “Application for New Fee or Fee Change Form”
<http://www.usask.ca/sesd/info-for-instructors/program-course-preparation.php#course-fees> No

Detailed Course Information

1. Schedule Types

Please choose the Schedule Types that can be used for sections that fall under this course:

Code	Description	Code	Description
CL	Clinical	PRB	Problem Session
COO	Coop Class	RDG	Reading Class
FLD	Field Trip	RES	Research
ICR	Internet Chat Relay	ROS	Roster (Dent Only)
IHP	Internet Help	SEM	Seminar
IN1	Internship - Education	SSI	Supervised Self Instruction
IN2	Internship - CMPT & EPIP	STU	Studio
IN3	Internship - General	SUP	Teacher Supervision
IND	Independent Studies	TEL	Televised Class
LAB	Laboratory	TUT	Tutorial
LC	Lecture/Clinical (Dent Only)	WEB	Web Based Class
LEC	Lecture	XCH	Exchange Program
LL	Lecture/Laboratory (Dent Only)	XGN	Ghost Schedule Type Not Applicable
MM	Multimode	XHS	High School Class
PCL	Pre-Clinical (Dent Only)	XNA	Schedule Type Not Applicable
PRA	Practicum	XNC	No Academic Credit

2. Course Attributes

Please highlight the attributes that should be attached to the course (they will apply to all sections):

2.1 NOAC No Academic Credit

0 Credit Unit courses that possess “deemed” CUs (Called Operational Credit Units). NOAC causes the system to roll 0 academic credit units to academic history.

2.2 For the College of Arts and Science only: To which program type does this course belong?

- FNAR Fine Arts
- HUM Humanities
- SCIE Science
- SOCS Social Science
- ARNP No Program Type (Arts and Science)

Does this course satisfy one of the official college requirements:

- ELWR – English Language Writing Requirement
- ILRQ – Indigenous Learning Requirement
- QRRQ – Quantitative Reasoning Requirement

3. Registration Information (Note: multi-term courses cannot be automated as corequisites)

- 3.1 Permission Required: No
- 3.2 Restriction(s): course only open to students in a specific college, program/degree, major, year in program: Yes. Restricted to students in civil, geological, and environmental engineering.
- 3.3 Prerequisite(s): course(s) that must be completed prior to the start of this course: GE123
- 3.4 Prerequisite(s) or Corequisite(s): course(s) that can be completed prior to or taken at the same time as this course: CE295
- 3.5 Corequisite(s): course(s) that must be taken at the same time as this course
- 3.6 Notes: recommended courses, repeat restrictions/content overlap, other additional information: content overlap with GE213

4. List Equivalent Course(s) here:

An equivalent course can be used in place of the course for which this form is being completed, specifically for the purposes of prerequisite and degree audit checking. Credit will be given for only one of the equivalent courses.

- 4.1 If this is a recently-repurposed course number, please list the courses that are no longer considered to be equivalent: GE213

***Please note:** If the equivalent courses carry an UNEQUAL number of credit units, DegreeWorks will automatically enforce the following, unless otherwise stated:

- If a 3 credit unit course is considered to be equivalent to a 6 credit unit course, it will fulfill the 6 credit unit requirement and the student will not have to complete another 3 credit units toward the overall number of required credit units for the program.
- If a 6 credit unit course is considered to be equivalent to a 3 credit unit course, ALL 6 of the credit units may be used to fulfill the 3 credit unit requirement.

5. List Mutually-Exclusive Course(s) here:

Mutually exclusive courses have similar content such that students cannot receive credit for both.

- 5.1 If this is a recently-repurposed course number, please list the courses that are no longer considered to be mutually exclusive: GE213

***Please note:** SiRIUS cannot enforce a situation where the exclusion goes only one way.

6. Additional Notes:

CME 465.3 (3L-3P alt week) Embedded Machine Learning

Department of Electrical and Computer Engineering
202X Fall Term



Description:	This course provides an overview of machine learning systems, leading to practical implementation and application for embedded hardware devices. Topics include supervised and unsupervised learning systems, performance evaluation metrics, feature engineering, dimensionality reduction, data fusion and hardware implementation. The students will implement, test and analyze a machine learning systems using both software and hardware techniques.		
Prerequisites:	CME 332, CME 334		
Co-requisites:	None		
Instructor:	Francis Bui Office: Room 3B43, Engineering Building Phone: (306) 966-1332 Email: francis.bui@usask.ca		
Lectures:	Time and classroom TBD		
Tutorials:	None		
Laboratory:	Six 3-hour lab slots will be assigned. Students will work in group in the lab.		
Website:	Assignments, general course information, reference material, and announcements will be posted on Canvas course website. Students are responsible for keeping up-to-date with the information on the course website. https://canvas.usask.ca		
Course Reference Numbers (CRNs):	nnnnn (lectures), nnnnn (laboratory) - TBD		
Textbooks:	Tinyml: Machine Learning With Tensorflow Lite On Arduino And Ultra-low-power Microcontrollers by Pete Warden, Daniel Situnayake, Jan 2020 Additional materials will be provided as lecture notes.		
Office Hours:	By appointment		
Reading List:	No official reading list, but interesting/relevant/helpful materials may be posted on the class website periodically.		
Assessment:	The methods of assessment and their respective weightings are given below:		
	Assignment	20%	
	Midterm	20%	
	Lab Exam	20%	
	Final Exam	40%	

Final Grades:	The final grades will be consistent with the “literal descriptors” specified in the university’s grading system. https://students.usask.ca/academics/grading/grading-system.php
Course Content:	1. Supervised and Unsupervised Learning Systems 2. Performance Evaluation and Metrics 3. Feature Engineering and Dimensionality Reduction 4. Software/Hardware Architecture for Machine Learning 5. Software/Hardware Co-Design 6. Design Testing and Evaluation 7. System Tuning and Optimization
Assignments:	Assignments will be posted on a regular basis in Canvas. Assignments are due within one week after posting.
Final Exam:	The final will be scheduled by the registrar.
Important Dates:	N/A
Course Learning Objectives:	Upon successful completion of the course, students should be able to 1. Describe and analyze popular supervised and unsupervised learning methods. 2. Implement supervised and unsupervised learning methods in software frameworks, such as MATLAB/Python, and on hardware devices, such as microcontroller-based systems and system-on-chip devices. 3. Integrate and debug the components of a machine learning system. 4. Integrate hardware and software modules to design the machine learning system 5. Perform system evaluation and tune machine learning system parameters to meet application-specific scenarios. 6. Analyze hardware/software trade-offs to optimize a machine learning design.
Student Conduct:	Ethical behaviour is an important part of engineering practice. Each professional engineering association has a Code of Ethics, which its members are expected to follow. Since students are in the process of becoming Professional Engineers, it is expected that students will conduct themselves in an ethical manner. The APEGS (Association of Professional Engineers and Geoscientists of Saskatchewan) Code of Ethics states that engineers shall “conduct themselves with fairness, courtesy and good faith towards clients, colleagues, employees and others; give credit where it is due and accept, as well as give, honest and fair professional criticism” (Section 20(e), The Engineering and Geoscience Professions Regulatory Bylaws, 1997). The first part of this statement discusses an engineer’s relationships with his or her colleagues. One of the ways in which engineering students can demonstrate courtesy to their colleagues is by helping to maintain an atmosphere that is conducive to learning, and minimizing disruptions in class. This includes arriving on time for lectures, turning cell phones and other electronic devices off during lectures, not leaving or entering the class at inopportune times, and refraining from talking to others while the instructor is talking. However, if you have questions at any time during lectures, please feel free to ask (chances are very good that someone else may have the same question as you do).

For more information, please consult the University Council Guidelines for Academic Conduct.

<http://www.usask.ca/secretariat/student-conduct-appeals/academic-misconduct.php>

Academic Honesty: The latter part of the above statement from the APEGS Code of Ethics discusses giving credit where it is due. At the University, this is addressed by university policies on academic integrity and academic misconduct. In this class, students are expected to submit their own individual work for academic credit, properly cite the work of others, and to follow the rules for examinations. Academic misconduct, plagiarism, and cheating will not be tolerated. Copying of assignments and lab reports is considered academic misconduct. Students are responsible for understanding the university's policies on academic integrity and academic misconduct. For more information, please consult the University Council Regulations on Student Academic Misconduct and the university's examination regulations.

<http://www.usask.ca/secretariat/student-conduct-appeals/StudentAcademicMisconduct.pdf>
<http://policies.usask.ca/policies/academic-affairs/academic-courses.php>

Safety: The APEGS Code of Ethics also states that Professional Engineers shall “hold paramount the safety, health and welfare of the public and the protection of the environment and promote health and safety within the workplace” (Section 20(a), The Engineering and Geoscience Professions Regulatory Bylaws, 1997).

Safety is taken very seriously by the Department of Electrical and Computer Engineering. Students are expected to work in a safe manner, follow all safety instructions, and use any personal protective equipment provided. Students failing to observe the safety rules in any laboratory will be asked to leave.

Attribute Mapping:

Learning Outcome	Level of Performance [‡]											
	Attribute [†]											
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
1	A	A									3	
2	A											
3				A								
4				A	A							
5		D	D		D							
6		D										

[†]Attributes:

- A1** A knowledge base for engineering
- A2** Problem analysis
- A3** Investigation
- A4** Design
- A5** Use of engineering tools
- A6** Individual and team work
- A7** Communication skills
- A8** Professionalism
- A9** Impact of engineering on society and the environment
- A10** Ethics and equity
- A11** Economics and project management
- A12** Life-long learning

[‡]Levels of Performance:

- Introductory (I)** – Students learn the working vocabulary of the area of content, along with some of the major underlying concepts.
- Development (D)** – Students use their working vocabulary and major fundamental concepts to probe more deeply, to read the literature, and to deepen their exploration of the concepts. They may begin to practice, extend, or refine knowledge in familiar contexts.
- Advanced (A)** – Students approach mastery in the area of content. They explore deeply into the discipline and experience the controversies, debate, and uncertainties that characterize the leading edges of any field. They practice, extend, or refine knowledge in unfamiliar contexts.

Accreditation Unit (AU) Mapping: (% of total class AU)

Math	Natural Science	Complementary Studies	Engineering Science	Engineering Design
-	-	-	65%	35%

Assessment Mapping:

Component	Weighting	Methods of Feedback***	Learning Outcomes Evaluated
Assignment	30%	F/S	1,2,3,4,5,6
Midterm	20%	F/S	1,2,3
Lab Exam	20%	F/S	1,2,3,4,5,6
Final Exam	30%	S	1,2,3,4,5,6

***Methods of Feedback:

F – *formative* (written comments and/or oral discussions)

S – *summative* (number grades)



1. Approval by Department Head or Dean

- 1.1 College or School with academic authority: **College of Engineering**
- 1.2 Department with academic authority: **Department of Electrical and Computer Engineering**
- 1.3 Term from which the course is effective: **Fall 2024**

2. Information required for the Catalogue

- 2.1 Label & Number of course: **CME465**
- 2.2 Academic credit units: **3 CU**
- 2.3 Course Long Title (maximum 100 characters): **Embedded Machine Learning**
Course Short Title (maximum 30 characters): **Embedded Machine Learning**
- 2.4 Total Hours: Lecture **36** Seminar Lab **18** Tutorial Other
- 2.5 Weekly Hours: Lecture **3** Seminar Lab **1.5** Tutorial Other
- 2.6 Term in which it will be offered: **T1 X** T2 T1 or T2 T1 and T2
- 2.7 Prerequisite: **CME 332, CME 334**

If there is a prerequisite waiver, who is responsible for signing it?

D – Instructor/Dept Approval **X**

H – Department Approval

I – Instructor Approval

- 2.8 Catalogue description (150 words or less):

This course provides an overview of machine learning systems, leading to practical implementation and application for embedded hardware devices. Topics include supervised and unsupervised learning systems, performance evaluation metrics, feature engineering, dimensionality reduction, data fusion and hardware implementation. The students will implement, test and analyze a machine learning systems using both software and hardware techniques.

- 2.9 Do you allow this course to be repeated for credit? **NO**

3. Please list rationale for introducing this course:

Machine learning has emerged as an important focus area for computer engineering, with applications in diverse fields, including information technology, health care, consumer electronics and Internet of Things. Currently, several courses in machine learning are being offered at a graduate study level in the ECE department. Delivering this topic at an undergraduate level to meet the needs of industry is a major objective of this course. The course will present students with engineering methods and design guidelines to realize

practical implementation on embedded hardware devices, which are particularly relevant for the CME industry. Moreover, this course will enhance the CME curriculum, as recently described in opportunities for improvement for the CEAB report to fulfill the continual improvement process.

4. **Please list the learning objectives for this course:**

Upon successful completion of the course, students should be able to

- a) Describe and analyze popular supervised and unsupervised learning methods.
- b) Implement supervised and unsupervised learning methods in software frameworks, such as MATLAB/Python, and on hardware devices, such as microcontroller-based systems and system-on-chip devices.
- c) Integrate and debug the components of a machine learning system.
- d) Integrate hardware and software modules to design the machine learning system
- e) Perform system evaluation and tune machine learning system parameters to meet application-specific scenarios.
- f) Analyze hardware/software trade-offs to optimize a machine learning design.

5. **Impact of this course**

Are the programs of other departments or Colleges affected by this course? **NO**

If so, were these departments consulted? (Include correspondence)

Were any other departments asked to review or comment on the proposal? **NO**

6. **Other courses or program affected** (please list course titles as well as numbers)

6.1 Courses to be deleted? **None**

6.2 Courses for which this course will be a prerequisite? **None**

6.3 Is this course to be required by your majors, or by majors in another program?

Software Focus Area in Computer Engineering program

7. **Course outline**

(Weekly outline of lectures or include a draft of the course information sheet.)

Attached

8. **Enrolment**

8.1 Expected enrollment: **40**

8.2 From which colleges? **College of Engineering**

9. **Student evaluation**

Give approximate weighting assigned to each indicator (assignments, laboratory work, mid-term test, final examination, essays or projects, etc.)

The methods of assessment and their respective weightings are given below:

Assignment	20%
Midterm	20%
Lab Exam	20%
Final Exam	40%

9.1 How should this course be graded? **N**

C – Completed Requirements

(Grade options for instructor: Completed Requirements, Fail, IP In Progress)

N – Numeric/Percentage

(Grade options for instructor: grade of 0% to 100%, IP in Progress)

P – Pass/Fail

(Grade options for instructor: Pass, Fail, In Progress)

S – Special

(Grade options for instructor: NA – Grade Not Applicable) If other, please specify:

9.2 Is the course exempt from the final examination? **No**

10. **Required text**

Include a bibliography for the course.

See attached course description

11. **Resources**

11.1 Proposed instructor: **Prof. Francis Bui**

11.2 How does the department plan to handle the additional teaching or administrative workload?

This course matches the current research interests of our faculty. The department does not require any additional resources to teach this course. This will not increase the average teaching load of the faculty.

11.3 Are sufficient library or other research resources available for this course?

Yes. This course is meant to apply engineering knowledge already gained in previous years courses. As a result, no new tools or lab resources will be required.

11.4 Are any additional resources required (library, audio-visual, technology, etc.)? **No**

12. **Tuition**

12.1 Will this course attract tuition charges? If so, how much? (use tuition category)

Yes, 3 CU Tuition category 7

12.2 Does this course require non-standard fees, such as materials or excursion fees? **No**

Detailed Course Information

1. Schedule Types

Please choose the Schedule Types that can be used for sections that fall under this course: **LEC, LAB**

Code	Description	Code	Description
CL	Clinical	PRB	Problem Session
COO	Coop Class	RDG	Reading Class
FLD	Field Trip	RES	Research
ICR	Internet Chat Relay	ROS	Roster (Dent Only)
IHP	Internet Help	SEM	Seminar
IN1	Internship - Education	SSI	Supervised Self Instruction
IN2	Internship - CMPT & EPIP	STU	Studio
IN3	Internship - General	SUP	Teacher Supervision
IND	Independent Studies	TEL	Televised Class
LAB	Laboratory	TUT	Tutorial
LC	Lecture/Clinical (Dent Only)	WEB	Web Based Class
LEC	Lecture	XCH	Exchange Program

LL	Lecture/Laboratory (Dent Only)	XGN	Ghost Schedule Type Not Applicable
MM	Multimode	XHS	High School Class
PCL	Pre-Clinical (Dent Only)	XNA	Schedule Type Not Applicable
PRA	Practicum	XNC	No Academic Credit

2. Course Attributes

Please highlight the attributes that should be attached to the course (they will apply to all sections):

2.1 NOAC No Academic Credit

0 Credit Unit courses that possess “deemed” CUs (Called Operational Credit Units). NOAC causes the system to roll 0 academic credit units to academic history.

2.2 For the College of Arts and Science only: To which program type does this course belong?

FNAR	Fine Arts
HUM	Humanities
SCIE	Science
SOCS	Social Science
ARNP	No Program Type (Arts and Science)

Does this course satisfy one of the official college requirements:

- ELWR – English Language Writing Requirement
- ILRQ – Indigenous Learning Requirement
- QRRQ – Quantitative Reasoning Requirement

3. Registration Information (Note: multi-term courses cannot be automated as corequisites)

3.1 Permission Required: **No**

3.2 Restriction(s): course only open to students in a specific college, program/degree, major, year in program

Must be enrolled in one of the following Levels: Undergraduate Level (UG)

Must be enrolled in one of the following Majors: Computer Engineering (CME)

3.3 Prerequisite(s): course(s) that must be completed prior to the start of this course **CME 332, CME 334**

3.4 Prerequisite(s) or Corequisite(s): course(s) that can be completed prior to or taken at the same time as this course **None**

3.5 Corequisite(s): course(s) that must be taken at the same time as this course **None**

3.6 Notes: recommended courses, repeat restrictions/content overlap, other additional information

4. List Equivalent Course(s) here: **None**

An equivalent course can be used in place of the course for which this form is being completed, specifically for the purposes of prerequisite and degree audit checking. Credit will be given for only one of the equivalent courses.

4.1 If this is a recently-repurposed course number, please list the courses that are no longer considered to be equivalent:

***Please note:** If the equivalent courses carry an UNEQUAL number of credit units, DegreeWorks will automatically enforce the following, unless otherwise stated:

- If a 3 credit unit course is considered to be equivalent to a 6 credit unit course, it will fulfill the 6 credit unit requirement and the student will not have to complete another 3 credit units toward the overall number of required credit units for the program.
- If a 6 credit unit course is considered to be equivalent to a 3 credit unit course, ALL 6 of the credit units may be used to fulfill the 3 credit unit requirement.

5. List Mutually-Exclusive Course(s) here: None

Mutually exclusive courses have similar content such that students cannot receive credit for both.

- 5.1 If this is a recently-repurposed course number, please list the courses that are no longer considered to be mutually exclusive:

***Please note:** SiRIUS cannot enforce a situation where the exclusion goes only one way.

6. Additional Notes:

EE 448

Renewable Energy and Power Systems

Department of Electrical and Computer Engineering
Winter XXXX



Description:	This course introduces salient-pole synchronous machines; solar photovoltaic (PV) power technology including equivalent circuit of PV cells, characteristics of PV modules and arrays, PV current-voltage (I-V) curves and shading impacts on I-V curves, stand-alone and grid-connected PV systems, PV powered water pumping; wind power technology including types of wind turbines and wind turbine generators, assessment of power in the wind, wind turbine power curves, estimating wind turbine energy production, wind farms; energy storage; renewable energy integration and microgrids; various renewable energy conversion systems.
Prerequisites:	EE 441 (Power Systems Analysis) Students are expected to be able to communicate in spoken and written English. “Developing and practicing communication skills is an essential experience requirement.” – Experience Guideline 2 (Updated May 2009), Components of Acceptable Engineering Work Experience, APEGS
Prerequisite or Corequisite:	
Instructor:	Xiaodong Liang, Ph.D., P.Eng Associate Professor and Canada Research Chair in Technology Solutions for Energy Security in Remote, Northern, and Indigenous Communities Department of Electrical and Computer Engineering Office: Room 3B34, Engineering Building Phone: 306-966-4532 Email: xiaodong.liang@usask.ca
Lectures:	Tuesday and Thursday, 10:00-11:20am, online synchronous. The lecture recording will also be posted on the course website.
Laboratory:	Wednesday 2:30 pm – 5:30 pm, computer simulation-based labs.
Website:	Lecture recording, assignments and solutions, lab material, general course information, and announcements will be posted on the course website.
Course Reference Numbers (CRNs):	21857 (Lecture), and 28777 (Laboratory)
Textbook:	Gilbert M. Masters, Renewable and Efficient Electric Power Systems, 2nd Edition, Wiley-IEEE Press, 2013. ISBN 978-1-118-14062-8 (print version). ISBN for etext is 978-1-118-63350-2. The etext is available in the bookstore.
Reference Books	A. E. Fitzgerald, Charles Kingsley, Jr. and Stephen D. Umans, Electric Machinery, 6 th Edition, McGraw-Hill, 2003, ISBN 0-07-366009-4.
Office Hours:	Every Tuesday 11:30 am – 1:30 pm, the instructor can answer your questions through Webex meeting room after the lecture finishes at 11:20 am. The meeting room will remain open until 1:30 pm.
Reading List:	None
Assessment:	The methods of assessment and their respective weightings are given below:

Assignments (5)	10% (2% each)
Labs (6 labs, Lab1 no mark)	15% (3% each for lab reports)
Midterm Exam	25%
Final Exam	50%

Final Grades: The final grades will be consistent with the “literal descriptors” specified in the university’s grading system.
<http://students.usask.ca/current/academics/grades/grading-system.php>

For information regarding appeals of final grades or other academic matters, please consult the University Council document on academic appeals.
http://www.usask.ca/university_secretary/honesty/StudentAcademicAppeals.pdf

Course Content:

1. Salient-pole synchronous machines (3 h)
Principle of salient-pole synchronous machines
2. Solar PV systems (12 h)
Equivalent circuit of PV cells, characteristics of PV modules and arrays, PV current-voltage I-V curves and shading impacts on I-V curves, stand-alone and grid-connected PV systems, PV powered water pumping
3. Wind power (12 h)
Types of wind turbines and wind turbine generators, assessment of power in the wind, wind turbine power curves, estimating wind turbine energy production, wind farms
4. Energy storage technology (2 h)
Introduction to energy storage
5. Renewable energy integration and microgrids (4 h)
Concept of microgrids, their control and operation
6. Introduction to various distributed generation systems (3 h)
Concept of distributed generation, concentrating solar power technology, hydroelectric power, pumped-storage hydro

Assignments: There will be five assignments assigned based on the pace of the course lectures. Assignments must be submitted on time in the class time. Late assignments will not be marked and will be given a mark of zero. Solutions are posted to the course website.

Lab Reports: Lab reports should be submitted one week after the lab day. Late lab reports will not be marked and will be given a mark of zero. The lab can be conducted with two students as a group, each group only needs to submit one report.

Tutorials: To be arranged when needed

Quizzes: None

Exams: There will be one mid-term exam and one final exam.

Important Dates:	January 12, 2021	Class begins
	February 23, 2021	Midterm exam
	April 13, 2021	Last day of class
	April 14, 2021	Final exams begin

Student Conduct: Ethical behaviour is an important part of engineering practice. Each professional engineering association has a Code of Ethics, which its members are expected to follow. Since students are in the process of becoming Professional Engineers, it is expected that students will conduct themselves in an ethical manner.

The APEGS (Association of Professional Engineers and Geoscientists of Saskatchewan) Code of Ethics states that engineers shall “conduct themselves with fairness, courtesy and good faith towards clients, colleagues, employees and others; give credit where it is due and accept, as well

as give, honest and fair professional criticism” (Section 20(e), The Engineering and Geoscience Professions Regulatory Bylaws, 1997).

The first part of this statement discusses an engineer’s relationships with his or her colleagues. One of the ways in which engineering students can demonstrate courtesy to their colleagues is by helping to maintain an atmosphere that is conducive to learning, and minimizing disruptions in class. This includes arriving on time for lectures, turning cell phones and other electronic devices off during lectures, not leaving or entering the class at inopportune times, and refraining from talking to others while the instructor is talking. However, if you have questions at any time during lectures, please feel free to ask (chances are very good that someone else may have the same question as you do).

For more information, please consult the University Council Guidelines for Academic Conduct. http://www.usask.ca/university_secretary/council/reports_forms/reports/guide_conduct.php

Academic Honesty: The latter part of the above statement from the APEGS Code of Ethics discusses giving credit where it is due. At the University, this is addressed by university policies on academic integrity and academic misconduct. In this class, students are expected to submit their own individual work for academic credit, properly cite the work of others, and to follow the rules for examinations. Academic misconduct, plagiarism, and cheating will not be tolerated. Copying of assignments and lab reports is considered academic misconduct. Students are responsible for understanding the university’s policies on academic integrity and academic misconduct. For more information, please consult the University Council Regulations on Student Academic Misconduct and the university’s examination regulations.

http://www.usask.ca/university_secretary/honesty/StudentAcademicMisconduct.pdf
http://www.usask.ca/university_secretary/council/academiccourses.php

Safety: The APEGS Code of Ethics also states that Professional Engineers shall “hold paramount the safety, health and welfare of the public and the protection of the environment and promote health and safety within the workplace” (Section 20(a), The Engineering and Geoscience Professions Regulatory Bylaws, 1997).

Safety is taken very seriously by the Department of Electrical and Computer Engineering. Students are given special safety instructions on the first day of the lab. Students also witness a running demonstration of electric machines, made aware of the different safety hazards, and instructed on precautions and safety measure. Students are expected to work in a safe manner, follow all safety instructions, and use protective equipment provided. Students failing to observe the safety rules in any laboratory will be asked to leave.

Laboratory Learning Outcomes:

Lab 1: The Simulation Software EMTP-RV and Simulink

At the end of this lab the students will be able to:

- Practice how to use the software EMTP-RV and Simulink.
- Create own sample networks and run basic studies using both software.

Lab 2: Modelling of I-V and P-V Characteristics of PV Modules Using Simulink

At the end of this lab the students will be able to:

- Analyze I-V Characteristics of PV cells, modules and arrays.

Lab 3: A Wind and PV Hybrid System in Simulink

At the end of this lab the students will be able to:

- Create a wind and solar PV hybrid system using Simulink.
- Evaluate its performance by varying input resources.

Lab 4: Wind Turbine Characteristics

At the end of this lab the students will be able to:

- Demonstrate characteristics of Type 3 (doubly-fed induction generator) and Type 4 (full converter) types of wind turbines.

Lab 5: Distributed Generation (DG) Effects on Voltage and DG Synchronization

At the end of this lab the students will be able to:

- Evaluate DG's effect on voltage.
- Model DG synchronization to the network.

Lab 6: Energy Storage systems

At the end of this lab the students will be able to:

- Model and analyze battery storage system and its characteristics.

**Course Learning
Outcomes:**

Upon completing this course students will be able to:

1. Perform calculation and analysis of salient-pole synchronous machines based on their operation principle and characteristics.
 2. Explain fundamental principles of solar PV and wind power systems, and conduct analysis and design of such systems.
 3. Evaluate the wind turbine performance.
 4. Explain various types of distributed generation and renewable energy conversion technologies.
 5. Explain the concepts of energy storage systems, and their design and operation.
 6. Explain microgrids and their basic control and operation.
 7. Conduct simulations and analysis for renewable energy systems using Simulink or EMTP-RV, and write lab reports.
-

Attribute Mapping:

Level of Performance*												
Learning Outcome	Attribute**											
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
1	D	D										
2	D	D		D					I			
3	D	D										
4	D	D		D					I			
5	D	D		D					I			
6	I	D							I			
7	A	A		D	A	A	A					

****Attributes:**

- A1** Knowledge base for engineering
A2 Problem analysis
A3 Investigation
A4 Design
A5 Use of engineering tools
A6 Individual and team work
A7 Communication skills
A8 Professionalism
A9 Impact of engineering on society and the environment
A10 Ethics and equity
A11 Economics and project management
A12 Life-long learning

CIS Code – Instruction Level Definition:

- I** - Introduced - Students learn the working vocabulary of the area of content, along with some of the major underlying concepts.
D - Developed - Students use their working vocabulary and major fundamental concepts to probe more deeply, to read the literature, and to deep end their exploration of the concepts. They may begin to practice, extend, or refine knowledge in familiar contexts.
A - Applied - Students approach mastery in the area of content (within the context of their academic program). They explore deeply into the discipline and experience the controversies, debate, and uncertainties that characterize the leading edges of any field. They practice, extend, or refine knowledge in unfamiliar contexts.

Accreditation Unit (AU) Mapping: (% of total class AU)

Math	Natural Science	Complementary Studies	Engineering Science	Engineering Design
0	0	0	33.6	12

Assessment Mapping:

Component	Weighting	Methods of Feedback***	Learning Outcomes Evaluated
Assignments (5)	10%	F	1, 2, 3, 4, 5
Laboratory	15%	F	7
Midterm Exam	25%	F	1, 2
Final Exam	50%	S	1-6

*****Methods of Feedback:**

- F** – *formative* (written comments and/or oral discussions)
S – *summative* (number grades)



1. Approval by Department Head or Dean

- 1.1 College or School with academic authority: **College of Engineering**
- 1.2 Department with academic authority: **Department of Electrical and Computer Engineering**
- 1.3 Term from which the course is effective: **2023 Winter Term**

2. Information required for the Catalogue

- 2.1 Label & Number of course: **EE 448**
- 2.2 Academic credit units: **3 CU**
- 2.3 Course Long Title (maximum 100 characters): **Renewable Energy and Power Systems**
Course Short Title (maximum 30 characters): **Renewable Energy and Power Sys**
- 2.4 Total Hours: Lecture **36** Seminar Lab **18** Tutorial Other
- 2.5 Weekly Hours: Lecture **3L** Seminar Lab **3P alt weeks** Tutorial Other
- 2.6 Term in which it will be offered: **T2**
- 2.7 Prerequisite:

Prerequisite(s): EE 441

If there is a prerequisite waiver, who is responsible for signing it? **Associate Dean Academic, CoE**
In the College of Engineering, only the AD Academic has authority to approve pre-requisite waivers.

D – Instructor/Dept Approval

H – Department Approval

I – Instructor Approval

- 2.8 Catalogue description (150 words or less):

Covers salient-pole synchronous machines; solar photovoltaic (PV) power technology including the equivalent circuit of PV cells, characteristics of PV modules and arrays, PV current-voltage (I-V) curves and shading impacts on I-V curves, stand-alone and grid-connected PV systems, PV powered water pumping; wind power technology including types of wind turbines and wind turbine generators, assessment of power in the wind, wind turbine power curves, estimating wind turbine energy production, wind farms; energy storage; renewable energy integration and microgrids; and various renewable energy conversion systems.

- 2.9 Do you allow this course to be repeated for credit? **No**

3. **Please list rationale for introducing this course:**

Renewable energy is a growing part of electric power generation but presents challenges for planning, operating, and controlling an electric power system. Graduates of the Electrical Engineering program who specialize in electric power need to have exposure to the advantages and difficulties of incorporating renewable energy. This course provides a thorough study of renewable energy which will make our graduates more attractive to the power industry. Currently there is no course dedicated to renewable energy.

4. **Please list the learning objectives for this course:**

Upon completing this course students will be able to
understand salient-pole synchronous machines,
understand fundamental principles of solar PV and wind power systems,
describe the various types of distributed generation and renewable energy conversion technologies,
understand energy storage systems and their basic principles of operation,
understand the basic design of solar PV systems, wind power systems and battery storage systems,
explain microgrids and their basic control and operation, and
conduct simulations of renewable energy systems using Simulink or EMTP-RV.

5. **Impact of this course**

Are the programs of other departments or Colleges affected by this course? **No**

If so, were these departments consulted? (Include correspondence)

Were any other departments asked to review or comment on the proposal? **No**

6. **Other courses or program affected** (please list course titles as well as numbers)

6.1 Courses to be deleted? **EE 444**

6.2 Courses for which this course will be a prerequisite? **None**

6.3 Is this course to be required by your majors, or by majors in another program?

The course is required for EE students who choose the Power and Energy focus area.

7. **Course outline**

(Weekly outline of lectures or include a draft of the course information sheet.)

1. Salient-pole synchronous machines (5 h)

Principle of salient-pole synchronous machines

2. Solar PV systems (8 h)

Equivalent circuit of PV cells, characteristics of PV modules and arrays, PV current-voltage (I-V) curves and shading impacts on I-V curves, stand-alone and grid-connected PV systems, PV powered water pumping

3. Wind power (10 h)

Types of wind turbines and wind turbine generators, assessment of power in the wind, wind turbine power curves, estimating wind turbine energy production, wind farms

4. Energy storage technology (2 h)

Introduction to energy storage

5. Renewable energy integration and microgrids (5 h)

Concept of distributed generation, microgrids, their control and operation

6. Introduction to various distributed generation systems (6 h)

Introduction to concentrating solar power technology, hydroelectric power, pumped-storage hydro, combined heat and power systems

8. Enrolment

8.1 Expected enrollment: **30**

8.2 From which colleges? **College of Engineering**

9. Student evaluation

Give approximate weighting assigned to each indicator (assignments, laboratory work, mid-term test, final examination, essays or projects, etc.)

Assignments 10%

Labs 15%

Midterm Exam 25%

Final Exam 50%

9.1 How should this course be graded? **N**

C – Completed Requirements

(Grade options for instructor: Completed Requirements, Fail, IP In Progress)

N – Numeric/Percentage

(Grade options for instructor: grade of 0% to 100%, IP in Progress)

P – Pass/Fail

(Grade options for instructor: Pass, Fail, In Progress)

S – Special

(Grade options for instructor: NA – Grade Not Applicable) If other, please specify:

9.2 Is the course exempt from the final examination? **No**

10. Required text

Include a bibliography for the course.

Required: Gilbert M. Masters, *Renewable and Efficient Electric Power Systems*, 2nd Edition, Wiley-IEEE Press, 2013. ISBN 978-1-118-14062-8 (print version). ISBN 978-1-118-63350-2 (etext). The etext is available in the university bookstore.

Recommended: A. E. Fitzgerald, Charles Kingsley, Jr. and Stephen D. Umans, *Electric Machinery*, 6th Edition, McGraw-Hill, 2003, ISBN 0-07-366009-4.

11. Resources

11.1 Proposed instructor: **Dr. Xiaodong Liang**

11.2 How does the department plan to handle the additional teaching or administrative workload?

Dr. Liang was hired in 2019 and is a CRC Tier II. She has taught this course twice as EE 498, and this course will be her regular undergraduate teaching assignment.

11.3 Are sufficient library or other research resources available for this course? **Yes**

11.4 Are any additional resources required (library, audio-visual, technology, etc.)? **No**

12. Tuition

12.1 Will this course attract tuition charges? **Yes** If so, how much? **3 CU Tuition category 7**

12.2 Does this course require non-standard fees, such as materials or excursion fees? **No**

Detailed Course Information

1. Schedule Types

Please choose the Schedule Types that can be used for sections that fall under this course: **LEC, LAB**

Code	Description	Code	Description
CL	Clinical	PRB	Problem Session
COO	Coop Class	RDG	Reading Class
FLD	Field Trip	RES	Research
ICR	Internet Chat Relay	ROS	Roster (Dent Only)
IHP	Internet Help	SEM	Seminar
IN1	Internship - Education	SSI	Supervised Self Instruction
IN2	Internship - CMPT & EPIP	STU	Studio
IN3	Internship - General	SUP	Teacher Supervision
IND	Independent Studies	TEL	Televised Class
LAB	Laboratory	TUT	Tutorial
LC	Lecture/Clinical (Dent Only)	WEB	Web Based Class
LEC	Lecture	XCH	Exchange Program
LL	Lecture/Laboratory (Dent Only)	XGN	Ghost Schedule Type Not Applicable
MM	Multimode	XHS	High School Class
PCL	Pre-Clinical (Dent Only)	XNA	Schedule Type Not Applicable
PRA	Practicum	XNC	No Academic Credit

2. Course Attributes

Please highlight the attributes that should be attached to the course (they will apply to all sections):

2.1 NOAC No Academic Credit

0 Credit Unit courses that possess “deemed” CUs (Called Operational Credit Units). NOAC causes the system to roll 0 academic credit units to academic history.

2.2 For the College of Arts and Science only: To which program type does this course belong?

- FNAR Fine Arts
- HUM Humanities
- SCIE Science
- SOCS Social Science
- ARNP No Program Type (Arts and Science)

Does this course satisfy one of the official college requirements:

- ELWR – English Language Writing Requirement
- ILRQ – Indigenous Learning Requirement
- QRRQ – Quantitative Reasoning Requirement

3. Registration Information (Note: multi-term courses cannot be automated as corequisites)

- 3.1 Permission Required: **No**
- 3.2 Restriction(s):

Must be enrolled in one of the following Levels: Undergraduate Level (UG)
Must be enrolled in one of the following Majors: Electrical Engineering (EE)

- 3.3 Prerequisite(s): **EE 441**
3.5 Corequisite(s): **None**
3.6 Notes: recommended courses, repeat restrictions/content overlap, other additional information

4. List Equivalent Course(s) here: None

An equivalent course can be used in place of the course for which this form is being completed, specifically for the purposes of prerequisite and degree audit checking. Credit will be given for only one of the equivalent courses.

- 4.1 If this is a recently-repurposed course number, please list the courses that are no longer considered to be equivalent:

***Please note:** If the equivalent courses carry an UNEQUAL number of credit units, DegreeWorks will automatically enforce the following, unless otherwise stated:

- If a 3 credit unit course is considered to be equivalent to a 6 credit unit course, it will fulfill the 6 credit unit requirement and the student will not have to complete another 3 credit units toward the overall number of required credit units for the program.
- If a 6 credit unit course is considered to be equivalent to a 3 credit unit course, ALL 6 of the credit units may be used to fulfill the 3 credit unit requirement.

5. List Mutually-Exclusive Course(s) here: None

Mutually exclusive courses have similar content such that students cannot receive credit for both.

- 5.1 If this is a recently-repurposed course number, please list the courses that are no longer considered to be mutually exclusive:

***Please note:** SiRIUS cannot enforce a situation where the exclusion goes only one way.

6. Additional Notes:

This course was offered as EE 498 (Renewable Energy and Power Systems) in 2020-21 and 2021-22 as a replacement for EE 444 which is no longer offered. Note that EE 444 is not an equivalent course in terms of content, but EE 498 can be used in place of EE 444 for satisfying program requirements. Students who took the EE 498 course can not take EE 448 for credit.

Appendix E- List of Course Deletions

CHE 431.1 Seminar

EE 204.3 Basic Electronic and Electrical Power

EE 444.3 Advanced Analysis of Electrical Machines and Drive Systems

GE 101.1 Introduction to the Engineering Profession

GE 111.3 Engineering Problem Solving

GE 121.3 Engineering Design

GE 124.3 Engineering Mechanics I

GE 125.3 Engineering Mechanics II

ME 251.3 Engineering Analysis I

Appendix F - Consultation with the Registrar Form

Consultation with the Registrar Form

This form is to be completed by the Registrar (or his/her designate) during an in-person consultation with the faculty member responsible for the proposal. Please consider the questions on this form prior to the meeting.

Section 1: New Degree / Diploma / Certificate Information or Renaming of Existing

1 Is this a new degree, diploma, or certificate?

Yes	☐	No	☒
Yes	☐	No	☒

Is an existing degree, diploma, or certificate being renamed?

If you've answered NO to each of the previous two questions, please continue on to the next section.

2 What is the name of the new degree, diploma, or certificate?

3 What is the credential of this new degree, diploma, or certificate? [Example - D.M.D. = Doctor of Dental Medicine]

4 If you have renamed an existing degree, diploma, or certificate, what is the current name?

5 Does this new or renamed degree / diploma / certificate require completion of degree level courses or non-degree level courses, thus implying the attainment of either a degree level or non-degree level standard of achievement?

6 If this is a new degree level certificate, can a student take it at the same time as pursuing another degree level program?

Yes	☐	No	☐
-----	--------------------------	----	--------------------------

7 If YES, a student attribute will be created and used to track students who are in this certificate alongside another program. The attribute code will be:

8 Which College is responsible for the awarding of this degree, diploma, or certificate?

9 Is there more than one program to fulfill the requirements for this degree, diploma, or certificate? If yes, please list these programs.

10 Are there any new majors, minors, or concentrations associated with this new degree / diploma / certificate? Please list the name(s) and whether it is a major, minor, or concentration, along with the sponsoring department.

One major is required on all programs [4 characters for code and 30 characters for description]

11 If this is a new graduate degree, is it thesis-based, course-based, or project-based?

Section 2: New / Revised Program for Existing or New Degree / Diploma / Certificate Information

1 Is this a new program?

Is an existing program being revised?

If you've answered NO to each of the previous two questions, please continue on to the next section.

Yes	☐	No	☒
Yes	☒	No	☐

2 If YES, what degree, diploma, or certificate does this new/revised program meet requirements for?

Bachelor of Sc Engineering [BE] - current degree description/code

3 What is the name of this new/revised program?

Bachelor of Sc Engineering [BE] - existing program description/code - with the following attached majors / departments:

Civil Engineering [CE] / Civil Geol and Environ Engnrng [CGEE]- major / department

Chemical Engineering [CHE] / Chemical and Biological Engin [CHBI] - major / department

Computer Engineering [CME] / Electrical and Cmptr Engin [ECE] - major / department

Electrical Engineering [EE] / Electrical and Cmptr Engin [ECE] - major / department

Environmental Engineering [ENVE] / Civil Geol and Enviro Engnrng [CGEE] - major / department

Engineering Physics [EP] / Physics and Engin Physics [PHYS] - major / department

Geological Engineering [GEOE] / Civil Geol and Enviro Engnrng [CGEE] - major / department

Mechanical Engineering [ME] / Mechanical Engienering [ME] - major / department

4 What other program(s) currently exist that will also meet the requirements for this same degree(s)?

EN Professional Intern Prog [EPIP] - is in the process of being terminated

5 What College/Department is the academic authority for this program?

n/a

6 Is this a replacement for a current program?

Yes	☐	No	☒
-----	--------------------------	----	-------------------------------------

7 If YES, will students in the current program complete that program or be grandfathered?

8 If this is a new graduate program, is it thesis-based, course-based, or project-based?

n/a

9 If this is a new non-degree or undergraduate level program, what is the expected completion time?

n/a

NOTE: This includes revisions to Years 2, 3, and 4.

Section 3: Mobility

Mobility is the ability to move freely from one jurisdiction to another and to gain entry into an academic institution or to participate in a learning experience without undue obstacles or hindrances.

1 Does the proposed degree, program, major, minor, concentration, or course involve mobility?

Yes ☐ No ☒

If yes, choose one of the following?

Domestic Mobility (both jurisdictions are within Canada)

☐
☐

International Mobility (one jurisdiction is outside of Canada)

2 Please indicate the mobility type (refer to Nomenclature for definitions).

Joint Program

☐
☐

Joint Degree

Dual Degree

☐
☐

Professional Internship Program

☐
☐

Faculty-Led Course Abroad

Term Abroad Program

☐
☐

3 The U of S enters into partnerships or agreements with external partners for the above mobility types in order to allow students collaborative opportunities for research, studies, or activities. Has an agreement been signed?

Yes ☐ No ☐

4 Please state the full name of the agreement that the U of S is entering into.

5 What is the name of the external partner?

6 What is the jurisdiction for the external partner?

Section 4: New / Revised Major, Minor, or Concentration for Existing Degree Information (Undergraduate)

1 Is this a new or revised major, minor, or concentration attached to an existing degree program?

Yes ☐ No ☒ Revised ☐

If you've answered NO, please continue on to the next section.

2 If YES, please specify whether it is a major, minor, or concentration. If it is more than one, please fill out a separate form for each.

3 What is the name of this new / revised major, minor, or concentration?

4 Which department is the authority for this major, minor, or concentration? If this is a cross-College relationship, please state the Jurisdictional College and the Adopting College.

5

Which current program(s), degree(s), and/or program type(s) is this new / revised major, minor, or concentration attached to?

Section 5: New / Revised Disciplinary Area for Existing Degree Information (Graduate)

1 Is this a new or revised disciplinary area attached to an existing graduate degree program?

Yes ☐ No ☒ Revised ☐

If you've answered NO, please continue on to the next section.

2 If YES, what is the name of this new / revised disciplinary area?

3 Which Department / School is the authority for this new / revised disciplinary area? (NOTE - if this disciplinary area is being offered by multiple departments see question below.)

4 Which multiple Departments / Schools are the authority for this new / revised disciplinary area?

4a Of the multiple Departments / Schools who are the authority for this new / revised disciplinary area and what allocation percentage is assigned to each? (Note - must be whole numbers and must equal 100.)

4b

Of the multiple Departments / Schools who is the primary department? The primary department specifies which department / school policies will be followed in academic matters (ex. late adds, re-read policies, or academic misconduct). If no department / school is considered the primary, please indicate that. (In normal circumstances, a department / school with a greater percentage of responsibility - see question above - will be designated the primary department.)

5 Which current program(s) and / or degree(s) is this new / revised disciplinary area attached to?

Section 6: New College / School / Center / Department or Renaming of Existing

1 Is this a new college, school, center, or department?

Is an existing college, school, center, or department being renamed?

Is an existing college, school, center, or department being deleted?

If you've answered NO to each of the previous two questions, please continue on to the next section.

Yes	☐	No	☒
Yes	☐	No	☒
Yes	☐	No	☒

2 What is the name of the new (or renamed or deleted) college, school, center, or department?

3 If you have renamed an existing college, school, center, or department, what is the current name?

4 What is the effective term of this new (renamed or deleted) college, school, center, or department?

5 Will any programs be created, changed, or moved to a new authority, removed, relabelled?

6 Will any courses be created, changed, or moved to a new authority, removed, relabelled?

7 Are there any ceremonial consequences for Convocation (ie. New degree hood, adjustment to parchments, etc.)?

Section 7: Course Information - as per current set-up

- 1** Is there a new subject area(s) of course offering proposed for this new degree? If so, what is the subject area(s) and the suggested four (4) character abbreviation(s) to be used in course listings?

2

- If there is a new subject area(s) of offerings what College / Department is the academic authority for this new subject area?

- 3** Have the subject area identifier and course number(s) for new and revised courses been cleared by the Registrar?

- 4** Does the program timetable use standard class time slots, terms, and sessions?

Yes ☐ No ☐

If NO, please describe.

- 5** Does this program, due to pedagogical reasons, require any special space or type or rooms?

Yes ☐ No ☐

If YES, please describe.

NOTE: Please remember to submit a new "Course Creation Form" for every new course required for this new program / major.
Attached completed "Course Creation Forms" to this document would be helpful.

Section 8: Admissions, Recruitment, and Quota Information**NOTE: Information below is changes in admission to major requirement.****1 Will students apply on-line? If not, how will they apply?****2 What term(s) can students be admitted to?****3 What is the application deadline for each term(s) students can be admitted to?****4 For undergraduate programs, will students be admitted to one of the approved majors or an undeclared major?****5 For undergraduate programs, if there's more than one degree proposed (ex. 3Y and 4Y), which program/degree will students be admitted to?****6 Does this impact enrollment?****7 How should Marketing and Student Recruitment handle initial inquiries about this proposal before official approval?****8 Can classes towards this program be taken at the same time as another program?****9 What is the application deadline?****10 What are the admission qualifications? (IE. High school transcript required, grade 12 standing, minimum average, any required courses, etc.)****11 What is the selection criteria? (IE. If only average then 100% weighting; if other factors such as interview, essay, etc. what is the weighting of each of these in the admission decision.)**

Admission into major average is now based on the highest weighted average based on any combination of courses from the new first year curriculum that adds up to at least 18 cu's (and no longer a set of prescribed courses).
College of EN will rank undergraduate applications on the basis of student preference and "admission into major average" from highest to lowest average until quotas for majors are reached".

12 What are the admission categories and admit types? (IE. High school students and transfer students or one group? Special admission? Aboriginal equity program?)**13 What is the application process? (IE. Online application and supplemental information (required checklist items) through the Admissions Office or sent to the College/Department?)****14 Who makes the admission decision? (IE. Admissions Office or College/Department/Other?)**

15 Letter of acceptance - are there any special requirements for communication to newly admitted students?

16 Will the standard application fee apply?

17 Will all applicants be charged the fee or will current, active students be exempt?

18 Are international students admissible to this program?

Yes ☐ No ☐

If YES, what is the tuition amount for the first 12 months for a full-time international student? This information is required for the Immigration, Refugees and Citizenship Canada [IRCC] form (this form is for students who need to get a visa to study here).

Section 9: Government Loan Information - as per current set-up

NOTE: Federal / provincial government loan programs require students to be full-time in order to be eligible for funding. The University of Saskatchewan defines full-time as enrollment in a minimum of 9 credit units (operational) in the fall and/or winter term(s) depending on the length of the loan.

1 If this is a change to an existing program, will the program change have any impact on student loan eligibility?

2 If this is a new program, do you intend that students be eligible for student loans?

Section 10: Convocation Information (only for new degrees) - not applicable

1 Are there any 'ceremonial consequences' of this proposal (ie. New degree hood, special convocation, etc.)?

2 If YES, has the Office of the University Secretary been notified?

3 When is the first class expected to graduate?

4

What is the maximum number of students you anticipate/project will graduate per year (please consider the next 5-10 years)?

Section 11: Schedule of Implementation Information

1 What is the start term?

202205 [May 2022]

2 Are students required to do anything prior to the above date (in addition to applying for admission)?

Yes ☐ No ☒

If YES, what and by what date?

Section 12: Registration Information - as per current set-up

1 What year in program is appropriate for this program (NA or a numeric year)?

(General rule = NA for programs and categories of students not working toward a degree level qualification; undergraduate degree level certificates will use numeric year.)

2 Will students register themselves?

Yes ☐ No ☐

If YES, what priority group should they be in?

Section 13: Academic History Information - as per current set-up

1 Will instructors submit grades through self-serve?

Yes ☐ No ☐

2 Who will approve grades (Department Head, Assistant Dean, etc.)?

Section 14: T2202 Information (tax form) - as per current set-up

1 Should classes count towards T2202s?

Yes ☐ No ☐

Section 15: Awards Information - as per current set-up

1 Will terms of reference for existing awards need to be amended?

Yes ☐ No ☐

2 If this is a new undergraduate program, will students in this program be eligible for College-specific awards?

Section 16: Government of Saskatchewan Graduate Retention (Tax) Program - as per current set-up

1 Will this program qualify for the Government of Saskatchewan graduate retention (tax) program?

Yes ☐ No ☐

To qualify the program must meet the following requirements:

- be equivalent to at least 6 months of full-time study, and
- result in a certificate, diploma, or undergraduate degree.

Section 17: Program Termination

1

Is this a program termination?

Yes☐ No☒

If yes, what is the name of the program?

2

What is the effective date of this termination?

3

Will there be any courses closed as a result of this termination?

Yes☐ No☐

If yes, what courses?

4

Are there currently any students enrolled in the program?

Yes☐ No☐

If yes, will they be able to complete the program?

5

If not, what alternate arrangements are being made for these students?

6

When do you expect the last student to complete this program?

7

Is there mobility associated with this program termination?

Yes☐ No☐

If yes, please select one of the following mobility activity types.

Dual Degree Program

Joint Degree Program

Internship Abroad Program

Term Abroad Program

Taught Abroad Course

Student Exchange Program

Partnership agreements, coordinated by the International Office, are signed for these types of mobility activities. Has the International Office been informed of this program termination?

Yes☐ No☐

Section 18: Proposed Tuition and Student Fees Information - as per current set-up

1 How will tuition be assessed?

Standard Undergraduate per credit	
Standard Graduate per credit	
Standard Graduate per term	
Non standard per credit*	
Non standard per term*	
Other *	
Program Based*	

* See attached documents for further details

2 If fees are per credit, do they conform to existing categories for per credit tuition? If YES, what category or rate?

3 If program based tuition, how will it be assessed? By credit unit? By term? Elsehow?

4 Does proponent's proposal contain detailed information regarding requested tuition?

Yes ☐ No ☐

If NO, please describe.

5 What is IPA's recommendation regarding tuition assessment? When is it expected to receive approval?

6 IPA Additional comments?

7 Will students outside the program be allowed to take the classes?

8 If YES, what should they be assessed? (This is especially important for program based.)

9 Do standard student fee assessment criteria apply (full-time, part-time, on-campus versus off-campus)?

10 Do standard cancellation fee rules apply?

11 Are there any additional fees (e.g. materials, excursion)? If yes, see NOTE below.

12 Are you moving from one tuition code (TC) to another tuition code?

Yes ☐ No ☐

If YES, from which tuition code to which tuition code?

13 Are international students admissible to the program? If yes, will they pay the international tuition differential?

NOTE: Please remember to submit a completed "Application for New Fee or Fee Change Form" for every new course with additional fees.

Section 19: TLSE - Information Dissemination (internal for TLSE use only)

1	Has TLSE, Marketing and Student Recruitment, been informed about this new / revised program?	Yes	☐	No	☐
2	Has TLSE, Admissions, been informed about this new / revised program?	Yes	☐	No	☐
3	Has TLSE, Student Finance and Awards, been informed about this new / revised program?	Yes	☐	No	☐
4	Has CGPS been informed about this new / revised program?	Yes	☐	No	☐
5	Has TLSE, Transfer Credit, been informed about any new / revised courses?	Yes	☐	No	☐
6	Has ICT-Data Services been informed about this new or revised degree / program / major / minor / concentration?	Yes	☐	No	☐
7	Has the Library been informed about this new / revised program?	Yes	☐	No	☐
8	Has ISA been informed of the CIP code for new degree / program / major?	Yes	☐	No	☐
9	Has Room Scheduling/Scheduling Hub/Senior Coordinator of Scheduling been informed of unique space requirements for the new courses and/or informed of program, course, college, and department changes?	Yes	☐	No	☐
10	Has the Convocation Coordinator been notified of a new degree?	Yes	☐	No	☐
11	What is the highest level of financial approval required for this submission? Check all that apply.				
	a. None - as it has no financial implications		☐		
	<u>OR</u>				
	b. Fee Review Committee		☐		
	c. Institutional Planning and Assessment (IPA)		☐		
	d. Provost's Committee on Integrated Planning (PCIP)		☐		
	e. Board of Governors		☐		
	f. Other		☐		

SIGNED

Date:

Registrar (Russell Isinger):

College Representative(s):

IPA Representative(s):

Archived: Monday, November 29, 2021 12:34:48 PM

From: [Warrington, Seanine](#)

Sent: Thu, 25 Nov 2021 16:35:25

To: [Beck, Jennifer](#) [Isinger, Russ](#) [Bruce Sparling \(AD Academic, Engineering\)](#)

Cc: [Pajic, Aleksandra](#) [Doell, Jason](#) [Zagiel, Eileen](#) [Storey, Amanda](#)

Subject: RE: Consultation with the Registrar Forms - College of Engineering

Importance: Normal

Sensitivity: None

OK, thank you, Jennifer.

Amanda, I think you can consider this string and the final CWR forms themselves to satisfy the CWR part of the proposal packages. From what I can see, there would be no need for RS to review any of this, even after the financial feasibility study is complete.

I'm going to consider the CWR completed and file it as such in my program files. I will wait to hear from Jason and Russ when these are on the APC agenda.

Seanine

From: Beck, Jennifer <jennifer.beck@usask.ca>

Sent: Wednesday, November 24, 2021 8:43 PM

To: Warrington, Seanine <seanine.warrington@usask.ca>; Isinger, Russ <russell.isinger@usask.ca>; Bruce Sparling (AD Academic, Engineering) <engr.academicdean@usask.ca>

Cc: Pajic, Aleksandra <aleksandra.pajic@usask.ca>; Doell, Jason <jason.doell@usask.ca>; Zagiel, Eileen <eileen.zagiel@usask.ca>; Storey, Amanda <amanda.storey@usask.ca>

Subject: RE: Consultation with the Registrar Forms - College of Engineering

Hi Seanine,

There would be no tuition approval required for these since they are using standard rates however, we will still need completion of the financial feasibility form for the following:

- 3 New Degree-Level Certificates in Professional Communication, specifically in Leadership & Negotiation; Persuasive Communication; and Technical & Professional Writing
- New Bioprocessing concentration attached to the B.E. in Chemical Engineering program (and the associated termination of the Biochemical Engineering concentration)

The intent of this template is to provide an opportunity to review any potential impacts of a new or revised programming on a college's resources. It is important that we ensure that programming provides a benefit to the college and if potential resource implications or needs are identified, that these are discussed as soon as possible in the process.

Bruce & Aleksandra –please don't hesitate to reach out to me if you have any questions about completing this template.

Cheers,
-Jennifer

From: Warrington, Seanine <seanine.warrington@usask.ca>

Sent: Wednesday, November 24, 2021 12:19 PM

To: Isinger, Russ <russell.isinger@usask.ca>; Bruce Sparling (AD Academic, Engineering) <engr.academicdean@usask.ca>
Cc: Pajic, Aleksandra <aleksandra.pajic@usask.ca>; Doell, Jason <jason.doell@usask.ca>; Zagiel, Eileen <eileen.zagiel@usask.ca>; Beck, Jennifer <jennifer.beck@usask.ca>; Storey, Amanda <amanda.storey@usask.ca>
Subject: Consultation with the Registrar Forms - College of Engineering

Dear Russ and Bruce,

Please see the completed Consultation with the Registrar Forms to propose the following new programs and revisions for implementation in 2022-23:

- Termination of the Engineering Professional Internship Program
- Termination of the Certificate in Professional Communication
- 3 New Degree-Level Certificates in Professional Communication, specifically in Leadership & Negotiation; Persuasive Communication; and Technical & Professional Writing
- New Bioprocessing concentration attached to the B.E. in Chemical Engineering program (and the associated termination of the Biochemical Engineering concentration)
- B.E. Years 2, 3, and 4 curricular revisions

Please “reply-all” with your confirmation that the details in the forms are correct. Your confirmation email will replace a signature of approval in the midst of the coronavirus pandemic (COVID-19) disruptions.

Jennifer, all of these proposals involve standard College of Engineering tuition and standard per credit unit assessment. Can you let us know if there are any IPA approvals needed, either before or after APC reviews these? I suspect no, but just wanted to confirm here for our records!

Thank you,

Seanine

Seanine Warrington, M.A.
Senior Editor and Coordinator
Catalogue and Academic Programs
Registrarial Services
University of Saskatchewan
Teaching, Learning and Student Experience
Ph: 306-966-1874

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Archived: Monday, November 29, 2021 11:59:00 AM
From: [Warrington, Seanine](#)
Sent: Wednesday, November 24, 2021 3:46:49 PM
To: [Isinger, Russ](#) [Bruce Sparling \(AD Academic, Engineering\)](#)
Cc: [Pajic, Aleksandra](#) [Doell, Jason](#) [Zagiel, Eileen](#) [Beck, Jennifer](#) [Storey, Amanda](#)
Subject: RE: Consultation with the Registrar Forms - College of Engineering
Importance: Normal
Sensitivity: None

Thank you, both!

Jen, we will await your confirmation,

Seanine

From: Isinger, Russ <russell.isinger@usask.ca>
Sent: Wednesday, November 24, 2021 2:57 PM
To: Bruce Sparling (AD Academic, Engineering) <enr.academicdean@usask.ca>
Cc: Warrington, Seanine <seanine.warrington@usask.ca>; Pajic, Aleksandra <aleksandra.pajic@usask.ca>; Doell, Jason <jason.doell@usask.ca>; Zagiel, Eileen <eileen.zagiel@usask.ca>; Beck, Jennifer <jennifer.beck@usask.ca>; Storey, Amanda <amanda.storey@usask.ca>
Subject: Re: Consultation with the Registrar Forms - College of Engineering

Approved

Russell Isinger, BA, MA
University Registrar
and Professional Affiliate, Department of Political Studies

University Registrar's Office
Teaching, Learning and Student Experience
University of Saskatchewan
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On Nov 24, 2021, at 2:55 PM, Bruce Sparling (AD Academic, Engineering) <engr.academicdean@usask.ca> wrote:

?

Seanine,

Aleksandra and I have reviewed the forms and confirm that the details in the forms are correct.

Best regards,

Bruce

Bruce Sparling, Ph.D., P.Eng., FCSCE

Associate Dean Academic

Professor Structures / Materials Group

College of Engineering

Tel: (306) 966-4190 Direct: (306) 966-5366

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From: Warrington, Seanine <seanine.warrington@usask.ca>

Sent: Wednesday, November 24, 2021 12:19 PM

To: Isinger, Russ <russell.isinger@usask.ca>; Bruce Sparling (AD Academic, Engineering) <engr.academicdean@usask.ca>

Cc: Pajic, Aleksandra <aleksandra.pajic@usask.ca>; Doell, Jason <jason.doell@usask.ca>; Zagiel, Eileen <eileen.zagiel@usask.ca>; Beck, Jennifer <jennifer.beck@usask.ca>; Storey, Amanda <amanda.storey@usask.ca>

Subject: Consultation with the Registrar Forms - College of Engineering

Dear Russ and Bruce,

Please see the completed Consultation with the Registrar Forms to propose the following new programs and revisions for implementation in 2022-23:

- Termination of the Engineering Professional Internship Program
- Termination of the Certificate in Professional Communication
- 3 New Degree-Level Certificates in Professional Communication, specifically in Leadership & Negotiation; Persuasive Communication; and Technical & Professional Writing
- New Bioprocessing concentration attached to the B.E. in Chemical Engineering program (and the associated termination of the Biochemical Engineering concentration)
- B.E. Years 2, 3, and 4 curricular revisions

Please “reply-all” with your confirmation that the details in the forms are correct. Your confirmation email will replace a signature of approval in the midst of the coronavirus pandemic (COVID-19) disruptions.

Jennifer, all of these proposals involve standard College of Engineering tuition and standard per credit unit

assessment. Can you let us know if there are any IPA approvals needed, either before or after APC reviews these? I suspect no, but just wanted to confirm here for our records!

Thank you,

Seanine

Seanine Warrington, M.A.

Senior Editor and Coordinator

Catalogue and Academic Programs

Registrarial Services

University of Saskatchewan

Teaching, Learning and Student Experience

Ph: 306-966-1874

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