SFU OFFICE OF THE ASSOCIATE VICE-PRESIDENT, ACADEMIC

8888 University Drive,
Burnaby, BC
Canada V5A 1S6

TEL: 778.782.4636
FAX: 778.782.5876

avpcio@sfu.ca
www.sfu.ca/vpacademic

MEMORANDUM

ATTENTION	Senate	**DATE**	December 12, 2016
FROM	Wade Parkhouse, Acting Chair Senate Committee on Undergraduate Studies	**PAGES**	1/1
RE:	Faculty of Applied Sciences (SCUS 16-46)		

For information:

Acting under delegated authority at its meeting of December 1, 2016 SCUS approved the following curriculum revisions effective Fall 2017.

1. School of Computing Science (SCUS 16-46b)

(i) Upper division requirement changes to the Computing Science and Linguistics Joint Major
(ii) Upper and lower division requirement changes to the Dual Degree Program Major

2. School of Mechatronics Systems Engineering (SCUS 16-46d)

(i) New Course Proposal: MSE 428-3, Design of Mechanisms

3. School of Engineering Science (SCUS 16-41 revised)

(i) New Course Proposals ENSC 316 & 416 (approved by electronic ballot December 22 2016)

SFU FACULTY OF APPLIED SCIENCES

OFFICE OF THE DEAN
8888 University Drive, Burnaby, BC
Canada V5A 1S6
TEL: 778.782.4724
FAX: 778.782.5802
www.fas.sfu.ca

MEMORANDUM

ATTENTION	Senate Committee on Undergraduate Studies	**DATE**	November 21, 2016
FROM	Ed Park, Associate Dean	**PAGES**	
RE:	Curriculum Changes		

The following changes have been approved by the FAS Undergraduate Curriculum Committee and are appended here for approval by SCUS and recommendation to Senate.

1.) Faculty of Applied Sciences
   a. Notice of Intent – Sustainable Energy Engineering program

2.) School of Computing Science
   a. Course Pre-requisite Change
      - CMPT 129
   b. Calendar Changes
      - Revision to CMPT/LING Joint Major
        1. Replacement of CMPT 320 with CMPT 376W
      - Revision to Dual Degree Program
        1. Removal of CHIN 182
        2. Removal of CMPT 320
        3. Addition of course to breadth requirement

3.) School of Engineering Science
   a. Old Business
      - New Course Proposals ENSC 316 & 416 – expanded rationale
   b. Course Pre-requisite Change
      - ENSC 405W
      - ENSC 427
   c. Course Deletion
      - ENSC 376

4.) School of Mechatronic Systems Engineering
   a. Course Pre-requisite Change
      - MSE 320

- MSE 321

b. New Course Proposal

- MSE 428

Thank you,

Edward Park
Associate Dean

(EP/mt)

SFU SENATE COMMITTEE ON UNDERGRADUATE STUDIES

EXISTING COURSE CHANGE FORM

COURSE SUBJECT	CMPT	NUMBER	129	TITLE	Introduction to Computing Science and Programming for Mathematics and Statistics

INSTRUCTIONS (OVERALL):

1. Using Microsoft Word draft changes using the following guideline. Paste in box below.
2. Rationale must be included. If more space is needed than provided below, please use the provided text box on page 2 of this document.
3. Indicate term = Fall, Spring, Summer

TYPE OF CHANGES RECOMMENDED

Please type 'X' for the appropriate revision(s):

	Course number		Credit		Title		Description	x	Prerequisite		Deletion

WORDING/DESCRIPTION EDITS

1. Indicate deleted or changed text using ~~strikethrough~~.
2. Indicate added or new text using underline.
3. Equivalent courses: preclusion statement should read:
   a. Students with credit for x cannot take y for further credit.

CMPT 102 or CMPT 120~~: Introduction to Computing Science and Programming I~~.

SAMPLE

POL 223 ~~Canadian~~ American Political Economy (3)

~~An introductory study of~~ America's ~~Canada's~~ political economy, stressing the interrelated nature of Canada's economic and political life. ~~The course~~ Focuses on current economic problems and policies, taking into account the geographical, historical and political environments. Topics include the resource and industrial structures, research and development, the public sector, fiscal and monetary policy, the role of the state, trade and foreign ownership, energy, regional disparity, corporate concentration and the political economy of federalism.

~~This course is identical to CNS 280 and students cannot take both courses for credit.~~
Students with credit for CNS 280 cannot take POL 223 for further credit.

~~Recommended~~ Pre-requisite: POL 100 or 101W.

Breadth – Social Sciences.

RATIONALE

If more space is needed, please use the provided text box on page 2 of this document

CMPT 102 is considered a sufficient preparation for CMPT 129, and is of interest to Mathematics and Statistics students. Adding this prerequisite will allow Mathematics and Statistics students to choose between CMPT 102 and CMPT 120.

EFFECTIVE TERM AND YEAR, FOR CHANGES

Fall, Spring, Summer and year (please enter in textbox)

Fall 2017

Revision to Computing Science and Linguistics Joint Major

John Edgar

October 2016

Description

Remove CMPT 320 as a program requirement and replace with CMPT 376W.

Rationale

CMPT 320 (Social Implications of a Computerized Society) was removed as a requirement for the Computing Science Major and Honours programs (approved by Senate: S-16-41). This change is intended to bring the joint major into line with the major program.

Program Requirements

Upper Division Requirements

Computing Science Requirements

Students complete a t least 24 units, including all of

CMPT 300 - Operating Systems I (3)
CMPT 307 - Data Structures and Algorithms (3)
~~CMPT 320 - Social Implications - Computerized Society (3)~~
CMPT 376W - Technical Writing and Group Dynamics (3)
CMPT 413 - Computational Linguistics (3)

and four courses chosen from four distinct concentration areas as listed in Table I. CMPT 308 and 379 are recommended.

Revision to Computing Dual Degree Program Major

John Edgar

November 2016

Description

1. Remove CHIN 182 as a program requirement, a lab session will be added into the CHIN 280/281 sequence to partially alleviate the impact of the removal
2. Remove CMPT 320 as a program requirement
3. Add an additional course to the program's breadth requirement.

Rationale

1. CHIN 182 is one of five Chinese language instruction courses required for students with no previous knowledge of the Chinese language. In addition to these five courses, DDP students receive additional language instruction in the form of language immersion at Zhejiang University in China (20 contact hours per week for 28 weeks in two semesters). Although CHIN 182 was considered useful to give students preliminary practice of Mandarin Conversation to be better prepared for the "immersion" in China, it is far less effective than that later immersion in China. Moreover, the proposed lab session, together with recently built online listening exercises will further alleviate the removal and make it possible that the DDP Chinese curriculum continues its success. Finally, the CHIN course credits students receive count towards their degree credit requirement. Hence, the DDP students could receive up to 15 units from the above CHIN courses including CHIN182. Although CS students are encouraged to get more breadth from non-CS courses, it has been suggested that 15 credits Chinese language is excessive. The proposed change will reduce it by 3 units.
2. CMPT 320 (Social Implications of a Computerized Society) is currently one of four required 300 level courses for the B.Sc. credential. These courses tend to act as a bottleneck for students and there has been difficulty staffing CMPT 320. Social and Professional issues in Computing (SP) are considered important for our curriculum so are to be added to the syllabus of two other courses, CMPT 125 and CMPT 376W. CMPT 320 will remain as an elective course.
3. The addition of a course to the breadth requirement will result in the removal of CMPT 320 having no impact on the number of credits required to complete the program.

Program Requirements

Lower Division Requirements

Simon Fraser University Students

Students starting at Simon Fraser University complete 15 units of foundational courses plus customized Mandarin courses prior to attending Zhejiang University. Course substitutions may be approved in consultation with an advisor.

Foundational Courses

CMPT 120 - Introduction to Computing Science and Programming I (3)
MATH 151 - Calculus I (3)
MATH 152 - Calculus II (3)
MATH 240 - Algebra I: Linear Algebra (3)
PHIL 120W - Moral Problems (3)

Mandarin Courses

Students with no previous knowledge of Chinese languages complete the following courses.

CHIN 180 - Intensive Mandarin Chinese for Beginners I (3)
CHIN 181 - Intensive Mandarin Chinese for Beginners II (3)
~~CHIN 182 - Mandarin Chinese Conversation (3)~~
CHIN 280 - Intensive Mandarin Chinese for Beginners III (3)
CHIN 281 - Intensive Mandarin Chinese for Beginners IV (3)

Students with some previous knowledge of Chinese languages are assessed for placement by the DDP Chinese Language Instructor. Students may be required to take one or more of the following courses.

CHIN 190 - Heritage Mandarin Chinese I (3)
CHIN 191 - Heritage Mandarin Chinese II (3)
CHIN 290 - Heritage Mandarin Chinese III (3)
CHIN 291 - Heritage Mandarin Chinese IV (3)

Upon completion of Mandarin courses at Simon Fraser University, students are further assessed by the DDP Chinese Language instructor. Some students may be exempted from further Mandarin studies by taking and passing the HSK level *5* Exam with a score of 180 or higher. All other students must take the Zhejiang non-credit Mandarin summer immersion program prior to commencing academic study at Zhejiang University.

Zhejiang University Course Plans

Students complete lower division requirements following one of the two-year Dual Degree course plans set by Zhejiang University. These plans may include additional Mandarin instruction dependent on language assessment. All plans meet the minimum unit residency requirements of Zhejiang University including the core computing science course work. However, some electives used to satisfy Zhejiang University requirements may not be allowed

for SFU credit. The SFU DDP program advisor will have lists of Zhejiang elective courses that are pre-approved for SFU credit.

Block DDP credit will appear on the SFU transcript for course work completed at Zhejiang University. Students receive 40 units of block DDP credit for the core courses including 3 units of B-Sci credit, 6 units of Q credit and 3 units of B-Soc credit. All course plans include at least 6 required units of additional block credit including 3 units of B-Hum and 3 units of B-Soc credit.

Students required to take the additional Chinese language and culture courses receive up to 9 units of further block credit including 3 units of B-Hum and 3 units of B-Soc credit. Block credit may be assigned for additional pre-approved electives, while electives not on the approved list may be individually assessed.

Courses completed at Zhejiang University are not transfer units. They are marked as DDP units on the Simon Fraser University transcript.

Zhejiang University Students

After successful completion of the two-year Dual Degree program curriculum at Zhejiang University, Zhejiang University students receive 60 units of block DDP credit on the SFU transcript plus up to 6 additional units of assigned upper division CMPT credit. The block DDP credit includes 6 units of B-Hum credit, 6 units of B-Soc credit, 6 units of B-Sci credit, 6 units of B-undesignated and 6 units of Q credit. Zhejiang students must complete 6 units of W credit at Simon Fraser University.

Upper Division Requirements

All SFU and ZJU students complete the following upper division courses or equivalent. Students should consult an advisor before commencing upper division requirements. Course substitutions may be approved in consultation with an advisor.

Breadth Requirement

Seven ~~Six~~ courses from five of the six Table 1 areas of concentration must be completed including

CMPT 300 - Operating Systems I (3)
CMPT 307 - Data Structures and Algorithms (3)
CMPT 371 - Data Communications and Networking (3)
CMPT 354 - Database Systems I (3)

Depth Requirement

Twelve units of additional CMPT courses numbered CMPT 400 or above must be completed (excluding CMPT 415, 416, and 498, which may be included by special permission).

Additional Requirements

~~CMPT 320 - Social Implications - Computerized Society (3)~~
CMPT 376W - Technical Writing and Group Dynamics (3)
MACM 316 - Numerical Analysis I (3)
CMPT 497 - Dual Degree Program Capstone Project (6) *

* CMPT 497 can be replaced by two approved CMPT 400 level courses (6 units)

Rationale for Introduction of ENSC 316-Introduction to Electrodynamics for Engineers and ENSC 416-Introduction to High Frequency Circuit Design

Engineering Science at SFU is a relatively unique program, but can be largely compared to more conventional Electrical and Computer Engineering (ECE), Systems Engineering in Mechanical programs, Biomedical Engineering, and Engineering Physics programs at other universities. As a professional program, our mission is to provide industry-related, hands-on training to our students. A major focus of our program is electric circuits and communication systems.

There is an important difference in pedagogy in advanced Electro-Magnetic (EM) courses for the pure science world and in engineering. In the science field EM theory courses emphasize the derivation and implications of Maxwell's equations plus their application to a range of physics problems in complex mathematical ways that allows them to be applied to qualify new scientific concepts. However, most engineers need to understand how to practically use these same equations and a more targeted set of mathematical tools in understanding the operations of devices (e.g., waveguides, antennas, circuits) to enable predictive calculations that quantify the specific results. Only our Honours Engineering Physics program needs the more theoretical version of the physics based courses. Labs are added to the proposed new courses in order to teach the important practical engineering cycle of (i) designing a device to meet specifications, (ii) fabricating the device to that design, and (iii) verifying experimentally how the device's operation matches the theoretical predications.

- **ENSC is mandated by CEAB to report indicator data on Graduate Attributes as a part of newly-required outcome based learning.**

The Engineering Science curriculum has evolved over the years in response to the changes of the Canadian Engineering Accreditation Board (CEAB). As an example, ENSC has implemented learning based outcomes (termed "Graduate Attributes") in response to CEAB requirements. As a part of meeting the CEAB requirements, our emphasis is to show that the graduate attributes are introduced at the early stages, and progress throughout the curriculum. These attributes, of which there are twelve, must be progressively implemented throughout the curriculum and demonstrable upon graduation. An emphasis (of weakness) for our program is "Engineering Design" and "Use of Engineering Tools" (Attributes #4 and #5). Our goal is to meet these requirements by integrating the engineering concepts developed throughout the sequence of courses on circuits and communications systems, in a carefully and strategically planned manner for a robust mapping of CEAB required academic content (accreditation units) and learning outcomes (graduate attributes) into the curriculum design.

- **Specified AUs taught by PEng are essential to accreditation and CEAB requires ENSC to implement this immediately.**

The CEAB requires that engineering programs exceed a minimum number of <u>specified</u> accreditation units (AUs) on the topics of Engineering Science (ES) and Engineering Design (ED); the term 'specified' refers to AUs under the instruction of a Professional Engineer (PEng). The number of contact hours (weighted as 1 for lecture, and ½ for tutorials and scheduled labs) of course material designated by ES or ED is summed over all courses, and must meet CEAB minima for all students that are graduated by the program. In order to increase the number of specified AUs, the tutorials for ENSC courses with ES and ED content are also taught by the faculty members, not by Teaching Assistants.

The specified ES and ED for the non-honours majors exceed the minima by a razor-thin margin. In cases where a few courses may be taught by non-PEng, the required minima are <u>not</u> met. Our goal is to

increase these margins so that the specified ES and ED safely surpass the minima so that our accreditation is no longer threatened. Increasing the specified ES and ED content (taught by PEng) is essential to meet this goal, and the CEAB requires that this be implemented immediately (by 2017).

- **ENSC students take a different set of pre-reqs for PHYS 321 and 421 than the physics students. This has led to ENSC students performing poorly in comparison.**

In the current curriculum, ENSC students take first year physics, followed by an additional 1 or 2 courses on Electromagnetism (E&M), depending on the option. PHYS 221 and PHYS 321 are the introductory Electromagnetism courses; PHYS 221 is specifically for ENSC Systems students because they do not have vector calculus in their curriculum. PHYS 321 is for the Electronics Option, Biomedical Engineering Option, and the Engineering Physics Option; and it *does* have vector calculus as a pre-req. However, the Engineering students take a different pre-req course (MATH 254) than the physics majors (MATH 252). The math course taken by the Engineers has to include some complex analysis at the expense of the vector calculus focus that the physics majors get in MATH 252. The different pre-reqs set up the Engineering students to do poorly in PHYS 321. Furthermore, the creation of two courses causes a division amongst our students early on, and leads to a divergence between options before the end of a 2-year common core. This adds to the confusion amongst students in selecting options.

PHYS 421 is taken by the Electronics Option and the Engineering Physics Option. Note that PHYS 421 is also the main course for PHYS majors, who have a much stronger mathematical preparation and broader foundation of general physics courses than the ENSC students. In addition, the pre-reqs for PHYS 421 are different for physics majors and engineers. The physics majors take PHYS 321 and PHYS 255. PHYS 255 is a dedicated course on waves that is taken as part of the PHYS major, but is not a part of the ENSC curriculum. The ENSC students take PHYS 321 and ENSC 380 and are thus missing the foundational PHYS 255 course on waves as pre-requisite knowledge for ENSC 421, which puts them at a severe disadvantage relative to the PHYS students. ENSC 380 does not teach waves, it is a course on linear systems (Fourier and Laplace transforms).

Furthermore, the textbooks that are being used in PHYS 221, 321, and 421 are classical physics textbooks. The problems in these texts are general. The physics option has moved away from grading the homework for these classes, which is hurting the Engineering students. Engineering Science has been advocating for the use of engineering-oriented textbooks, and the emphasis of graded homework assignments in these courses.

- **ENSC needs to track learning outcomes, develop a common core for the options, and prepare graduates with hands-on skills required in our industry.**

Our proposal is to unite the Engineering options to all take ENSC 316, which will include the vector calculus toolkits that the Engineers require to solve problems that are practical and related to what the students will encounter in industrial design of circuits and communication systems. An important note is that the Engineering Physics Option students will continue to take the PHYS 321 and 421 combination, as these are pre-reqs for other upper division courses, and reflects the inter-departmental nature of an Engineering Physics option.

We have designed the new course ENSC 316 as 3 credits. We have included a project component in ENSC 316 to capture specified Engineering Design (ED) accreditation units. The textbook for the course is Engineering Electrodynamics by Hayt, which is commonly used by other ECE schools (for example, UBC in ELEC 311). The course ENSC 316 is designed to extend from the circuit concepts taught in ENSC 220 and complement the content of ENSC 320, as well as introduce Engineering Tools through the use of

computer simulation packages such as Sonnet or FEKO for waveguide and antenna design, which are essential to high frequency circuits and communications systems.

We have designed the new course ENSC 416 to include a hands on lab component, and request an increase of one unit (4 credits). This will give our students engineering skills in high frequency circuits that are not currently included in the physics courses. The ENSC 416 labs incorporate highly specialized tools: High frequency CAD software that the much more complex structures of real devices than the more simple symmetric models that are amenable to mathematical analysis. Machined-CNC milling for fabricating prototypes. Microwave Analyser for measuring. Students will compare theoretical calculations with computer simulations with experimental measurements.

Comparably, the ENSC 316 labs are not designed to be specialized. They are designed to accompany E&M knowledge to general engineering applications such as: Shielding and grounding. Signal interference and cross-talk. Modern devices such as capacitive touch sensing, inductive power coupling, RFID, etc. For example, one of the labs will teach how cross talk develops in both signal and power lines due to capacitive and inductive interactions. Another lab will demonstrate how capacitive sensors enable devices like keyboards. The textbook for this course will be Microwave Engineering by Pozar. Note that ENSC 416 will be a pre-requisite for ENSC 426, which is an intermediate course in High Freq Electronics.

The concepts in ENSC 316 and ENSC 416 are essential components in capturing the Graduate Attributes of Engineering Design and Use of Engineering Tools, and will help with the training of specialized skills that are highly relevant to our industry. These courses form a part of the core of professional program on Electrical Engineering, and will help increase the preparedness of our graduates for careers in industry, increase the reputation of our program, and increase our competitiveness with other ECE programs in Canada.

- **The equivalent courses of ENSC 316 and 416 are taught by Engineering Schools at other universities across Canada.**

A comparison of the content in ENSC 316 and ENSC 416 against similar courses taught within Engineering departments at UVIC and UBC as well as other universities across Canada.

Analogues of SFU ENSC 316 taught by Engineering in BC include: UBC, ELEC 211; U. Victoria, ELEC 216. Across Canada: UoT, ECE 259; Waterloo, ECE 375; U. Ottawa, ELG3106; McMaster, ELEC ENG 2FH3, Queen's, ELEC 280; McGill, ECSE 251.

Analogues of SFU ENSC 416 taught by Engineering in BC include: UBC, ELEC 311; U. Victoria, ELEC 340. Across Canada: UoT, ECE 357; Waterloo, ECE 471; U. Ottawa, ELG3106; McMaster, ELEC ENG 2FK4, U. Alberta, ECE 340; Queen's, ELEC 381; McGill, ECSE 354, U. Calgary, Electrical Engineering 475.

SFU SENATE COMMITTEE ON UNDERGRADUATE STUDIES

NEW COURSE PROPOSAL
1 OF 3 PAGES

COURSE SUBJECT ENSC **NUMBER** 316

COURSE TITLE LONG — for Calendar/schedule, no more than 100 characters including spaces and punctuation

Introduction to electrodynamics for engineers

COURSE TITLE SHORT — for enrollment/transcript, no more than 30 characters including spaces and punctuation

Engineering Electrodynamics

CAMPUS where course will be normally taught: ■ Burnaby ☐ Surrey ☐ Vancouver ☐ Great Northern Way ☐ Off campus

COURSE DESCRIPTION — 50 words max. Attach a course outline. Don't include WQB or prerequisites info in this description box.

Basic vector calculus concepts required for the course and introduction to waves. Differential forms of Maxwell equations. Capacitors in circuits; capacitance and field energy. Inductors in circuits and inductance; electrical current, electromotive force, electrical resistance. Design considerations for engineering applications in devices through simulations (course project).

REPEAT FOR CREDIT ■ YES ☐ NO How many times? ☐ Within a term? ☐ YES ☐ NO

LIBRARY RESOURCES

NOTE: Senate has approved (S.93-11) that no new course should be approved by Senate until funding has been committed for necessary library materials. Each new course proposal must be accompanied by the email that servwes as proof of assessment. For more information, please visit www.lib.sfu.ca/about/overview/collections/course-assessments.

Library review done? No

RATIONALE FOR INTRODUCTION OF THIS COURSE

Please see attached

SFU SENATE COMMITTEE ON UNDERGRADUATE STUDIES

NEW COURSE PROPOSAL

SCHEDULING AND ENROLLMENT INFORMATION

Term and year course would first be offered (e.g. FALL 2016): 2017 FALL

Term in which course will typically be offered: ☐ Spring ☐ Summer ☐ Fall

Other *(describe)*: Unknown. Should be offered at least once a year.

Will this be a required or elective course in the curriculum? ■ Required ☐ Elective

What is the probable enrollment when offered? Estimate: 120

UNITS

Indicate number of units: 3

Indicate no. of contact hours: 39 Lecture ____ Seminar 13 Tutorial ____ Lab ____ Other; explain below

OTHER

FACULTY

Which of your present CFL faculty have the expertise to offer this course?

Rodney Vaughan (PEng), Glenn Chapman (PEng), Marinko Sarunic (PEng).

WQB DESIGNATION

(attach approval from Curriculum Office)

None

PREREQUISITE AND / OR COREQUISITE

MATH 251 and (ENSC 220 or MSE 250).

EQUIVALENT COURSES

Does this course replicate the content of a previously-approved course to such an extent that students should not receive credit for both courses?

None

SFU SENATE COMMITTEE ON UNDERGRADUATE STUDIES

FEES

Are there any proposed student fees associated with this course other than tuition fees? ☐ YES ■ NO

COURSE – LEVEL EDUCATIONAL GOALS (OPTIONAL)

RESOURCES

List any outstanding resource issues to be addressed prior to implementation: space, laboratory equipment, etc:

OTHER IMPLICATIONS

Final exam required ■ YES ☐ NO

Criminal Record Check required ☐ YES ■ NO

OVERLAP CHECK

Checking for overlap is the responsiblity of the Associate Dean.

Each new course proposal must have confirmation of an overlap check completed prior to submission to the Faculty Curriculum Committee.

Name of Originator

Lakshman One

SFU SENATE COMMITTEE ON UNDERGRADUATE STUDIES

NEW COURSE PROPOSAL
1 OF 3 PAGES

COURSE SUBJECT ENSC **NUMBER** 416

COURSE TITLE LONG — for Calendar/schedule, no more than 100 characters including spaces and punctuation

Introduction to high frequency circuit design

COURSE TITLE SHORT — for enrollment/transcript, no more than 30 characters including spaces and punctuation

Intro to high frequency circuits

CAMPUS where course will be normally taught: ■ Burnaby ☐ Surrey ☐ Vancouver ☐ Great Northern Way ☐ Off campus

COURSE DESCRIPTION — 50 words max. Attach a course outline. Don't include WQB or prerequisites info in this description box.

Introduction to boundary value problems, intermediate description of waves.
Differential and integral forms of Maxwell equations. Transmission lines, co-axial cables, optical waveguides; antennas, Smith charts. Design of impedance matching networks and filter synthesis. Reflection and transmission in complex networks. Cross-talk and interference in circuits.

REPEAT FOR CREDIT ■ YES ☐ NO How many times? ☐ Within a term? ☐ YES ☐ NO

LIBRARY RESOURCES

NOTE: Senate has approved (S.93-11) that no new course should be approved by Senate until funding has been committed for necessary library materials. Each new course proposal must be accompanied by the email that servwes as proof of assessment. For more information, please visit www.lib.sfu.ca/about/overview/collections/course-assessments.

Library review done? No

RATIONALE FOR INTRODUCTION OF THIS COURSE

Please see attached

SFU SENATE COMMITTEE ON UNDERGRADUATE STUDIES

NEW COURSE PROPOSAL
2 OF 3 PAGES

SCHEDULING AND ENROLLMENT INFORMATION

Term and year course would first be offered (e.g. FALL 2016): 2017 FALL

Term in which course will typically be offered: ☐ Spring ☐ Summer ☐ Fall

Other *(describe)*: Unknown. Should be offered at least once a year.

Will this be a required or elective course in the curriculum? ■ Required ☐ Elective

What is the probable enrollment when offered? Estimate: 100

UNITS

Indicate number of units: 4

Indicate no. of contact hours: 39 Lecture | Seminar 13 Tutorial 26 Lab | Other; explain below

OTHER

FACULTY

Which of your present CFL faculty have the expertise to offer this course?

Rodney Vaughan (PEng), Glenn Chapman (PEng), Marinko Sarunic (PEng).

WQB DESIGNATION

(attach approval from Curriculum Office)

None

PREREQUISITE AND / OR COREQUISITE

Pre-req ENSC 316.

EQUIVALENT COURSES

Does this course replicate the content of a previously-approved course to such an extent that students should not receive credit for both courses?

None

SFU SENATE COMMITTEE ON UNDERGRADUATE STUDIES

NEW COURSE PROPOSAL
3 OF 3 PAGES

FEES

Are there any proposed student fees associated with this course other than tuition fees? ☐ YES ■ NO

COURSE – LEVEL EDUCATIONAL GOALS (OPTIONAL)

RESOURCES

List any outstanding resource issues to be addressed prior to implementation: space, laboratory equipment, etc:

OTHER IMPLICATIONS

Final exam required ■ YES ☐ NO

Criminal Record Check required ☐ YES ■ NO

OVERLAP CHECK

Checking for overlap is the responsiblity of the Associate Dean.

Each new course proposal must have confirmation of an overlap check completed prior to submission to the Faculty Curriculum Committee.

Name of Originator

Lakshman One

SFU SENATE COMMITTEE ON UNDERGRADUATE STUDIES

COURSE MODIFICATION FORM

COURSE SUBJECT	ENSC	NUMBER	405W	TITLE	Project Documentation, User Interface and Group Dynamics.

TYPE OF CHANGES. Please type 'X' for the appropriate revision(s):

	Course number		Credit		Title		Description	X	Prerequisite

WORDING/DESCRIPTION EDITS. Indicate deleted or changed text using ~~strike through~~, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand.

This is the first course in a group-based, two-course capstone sequence: ENSC 405W, ENSC 440. Topics include group writing processes, project documentation and engineering design, group dynamics, engineering standards, project management, dispute resolution, intellectual property, entrepreneurship, and user interface design. These groups will be maintained for the completion of the capstone project in ENSC 440. Engineering Science students cannot take MSE 401W or MSE 405W for credit. A minimum of two co-ops must be completed before enrolling in this course. Students must take ENSC 440 in the term directly following successful completion of ENSC 405W. Grades awarded in ENSC 405W are conditional on the successful completion of ENSC 440 in the subsequent term.

Prerequisite: ENSC 105W, ENSC 204, ~~ENSC 351~~, ENSC 295 or 296, a minimum of ~~100~~ 118 units. Students who have taken (ENSC 304 and ENSC 305W) may not take ENSC 405W for credit. Writing.

EFFECTIVE TERM AND YEAR FOR CHANGES

Fall, Spring, Summer and year (please enter in textbox)

FALL 2017

RATIONALE (must be included)

ENSC 405W should be taken by students that are on the verge of graduation. This is a CEAB requirement. Ideally the annual course enrollment and number of students graduating in the subsequent year should closely correlate.
The requirement for two co-op terms and a completed credit count of 118 should ensure that students are within three semesters from graduation.

SFU SENATE COMMITTEE ON UNDERGRADUATE STUDIES

COURSE MODIFICATION FORM

COURSE SUBJECT ENSC **NUMBER** 427 **TITLE** Communication Networks

TYPE OF CHANGES. Please type 'X' for the appropriate revision(s):

	Course number		Credit		Title		Description	X	Prerequisite

WORDING/DESCRIPTION EDITS. Indicate deleted or changed text using ~~strike through~~, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand.

Quantitative performance analysis and design of data and integrated services networks. Re-transmission error recovery schemes, networks of queues, congestion control, routing strategies. Multiple access techniques in data networks, design for specified throughput and delay performance. Wireless networks, routing approaches in mobile networks. Analysis and design of broadband integrated services digital networks, asynchronous time division multiplexing. Laboratory work is included in this course. Prerequisite: ENSC 327 ~~or, for School of Computing Science Majors, CMPT 371~~. A minimum of 80 units required. Engineering students may not take CMPT 371 as a substitute for ENSC 427 ~~for further credit~~.

EFFECTIVE TERM AND YEAR FOR CHANGES

Fall, Spring, Summer and year (please enter in textbox)

Fall 2017

RATIONALE (must be included)

We have not had Computing Science students taking this course in recent years. Schedules cannot code this pre-requisite as it was intended which is resulting in our own students not being able to register. Since Computing Science students rarely take this course, we would like to remove CMPT 371 as a pre-requisite for those students and handle such requests on a case by case basis if there are any.

SFU

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

EXISTING COURSE DELETION FORM

COURSE SUBJECT ENSC **NUMBER** 376 **TITLE** Introduction to Optical Engineering and Design

RATIONALE (must be included)

ENSC 376 was combined with a special topics laser course to create the current course ENSC 470. There would be too much duplication between ENSC 376 and ENSC 470, so we stopped teaching ENSC 376.

EFFECTIVE TERM AND YEAR FOR CHANGES
Fall, Spring, Summer and year (enter in textbox)

PLEASE DO THE FOLLOWING:

1. Attach a program impact list along with your course deletion form. Contact the Senate and Academic Services Office (sfucal@sfu.ca) for a program impact list.
2. Once you have the program impact list, please review how deleting this course affects each program's requirements.
3. If more substantial changes are required to programs as a result of this deletion, please also submit a program modification form.
4. If no further changes other than deletion is required in program requirements, please list those programs in the box below:

5. Lastly, please conduct a course impact analysis, which reviews the effect of a course number change and/or course deletion on course prerequisites. For instructions on how to do a course impact analysis, please visit our page and click on "deleting a course" and review Step 2. Course Impact Analysis.

SCUS 16-46d
S.17-8

SFU SENATE COMMITTEE ON UNDERGRADUATE STUDIES

COURSE MODIFICATION FORM

COURSE SUBJECT MSE **NUMBER** 320 **TITLE** Machine Design

TYPE OF CHANGES. Please type 'X' for the appropriate revision(s):

	Course number		Credit		Title		Description	X	Prerequisite

WORDING/DESCRIPTION EDITS. Indicate deleted or changed text using ~~strike through~~, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand.

Review of stress and strain in solids, superposition, energy theorems, theories of failure, elastic and inelastic analysis of symmetrical bending, torsion of circular members, and virtual work. Adequacy assessment and synthesis of machine elements with a focus on the design process. Static failure of ductile and brittle materials, fatigue analysis of structures. Topics include the design of welds, bolted connections, springs and shafts. Solution strategies include both analytical and finite element methods. Prerequisite: MSE 100 or ENSC 104, MSE 220 or ENSC 231, MSE 221 or ENSC 281. MSE 100 may be taken concurrently. Students with credit for ENSC 382 may not take MSE 320 for further credit.

EFFECTIVE TERM AND YEAR FOR CHANGES
Fall, Spring, Summer and year (please enter in textbox)

Fall 2017

RATIONALE (must be included)

Students admitted from colleges get waivers for first year courses. As MSE program is highly structured and MSE courses are mainly offered once a year, such students directly register for second year courses and are not able to take MSE 100. Therefore, the instructors of the course proposed to make MSE 100 as a co-requisite.

SFU SENATE COMMITTEE ON UNDERGRADUATE STUDIES

COURSE MODIFICATION FORM

COURSE SUBJECT	MSE	NUMBER	321	TITLE	Engineering Thermodynamics and Heat Transfer

TYPE OF CHANGES. Please type 'X' for the appropriate revision(s):

	Course number		Credit		Title		Description	X	Prerequisite

WORDING/DESCRIPTION EDITS. Indicate deleted or changed text using ~~strike through~~, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand.

Energy transfer as work and heat, the First Law of thermodynamics. Properties and states of simple substances. Control-mass and control-volume analyses. Entropy, the Second Law of thermodynamics. Carnot cycle. Energy conversion systems; internal combustion engines, power plants and refrigeration cycles. Heat transfer by conduction, convection, and radiation. Formulation and solution of steady and transient problems. Cooling of microelectronics, thermal solutions. Prerequisite: MATH 152, 251, PHYS ~~141~~ 140. Students with credit for ENSC 388 or PHYS 344 may not take MSE 321 for further credit.

EFFECTIVE TERM AND YEAR FOR CHANGES

Fall, Spring, Summer and year (please enter in textbox)

Fall 2017

RATIONALE (must be included)

We noted that there was a typo in the calendar description of this course.

SFU

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

NEW COURSE PROPOSAL

COURSE SUBJECT/NUMBER

COURSE TITLE

LONG — for Calendar/schedule, no more than 100 characters including spaces and punctuation

MSE 428 - Design of Mechanisms

AND

SHORT — for enrollment/transcript, no more than 30 characters including spaces and punctuation

Design of Mechanisms

CAMPUS where course will be taught: ☐ Burnaby ☑ Surrey ☐ Vancouver ☐ Great Northern Way ☐ Off campus

COURSE DESCRIPTION (FOR CALENDAR). 50-60 WORDS MAXIMUM. ATTACH A COURSE OUTLINE TO THIS PROPOSAL.

Introduction to mechanisms: linkages, cams, gears, Geneva wheels, etc. Displacement analyses of mechanisms, limit positions, time ratio, and transmission angles. Graphical synthesis of mechanisms, function, path and motion generation. Analytical synthesis of mechanisms: Freudenstein equation and standard dyad method. Coupler curves and mechanism cognates. Cam follower curve synthesis, design of cam profiles using graphical and analytical methods. Gear analysis and design: ordinary and planetary gear trains.

LIBRARY RESOURCES

NOTE: Senate has approved (S.93-11) that no new course should be approved by Senate until funding has been committed for necessary library materials. Each new course proposal must be accompanied by a library report and, if appropriate, confirmation that funding arrangements have been addressed.

Library report status: No additional material is required.

RATIONALE FOR INTRODUCTION OF THIS COURSE

This course is intended to provide the fundamentals of mechanism design. Students will learn different methods for the synthesis of linkages, cams, and other mechanisms. In the course project, students will be required to design, build and analyze a mechanical machine, whose motion is being transmitted by a number of mechanisms.

SCHEDULING AND ENROLLMENT INFORMATION

Indicate effective **term and year** course would first be offered and planned **frequency** of offering thereafter:

This course has been offered as a selected topic for two years. It will continue to be taught annually.

Will this be a required or elective course in the curriculum? ○ Required ◉ Elective

What is the probable enrollment when offered? Estimate: 30

SFU

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

NEW COURSE PROPOSAL

CREDITS

Indicate number of credits (units): 3

Indicate number of hours for: Lecture 3 Seminar 3 Tutorial Lab 1 Other

FACULTY Which of your present CFL faculty have the expertise to offer this course?

Flavio Firmani

WQB DESIGNATION (attach approval from Curriculum Office)

PREREQUISITE

Does this course replicate the content of a previously-approved course to such an extent that students should not receive credit for both courses? If so, this should be **noted in the prerequisite**.

MSE 100 and MSE 222

COREQUISITE

STUDENT LEARNING OUTCOMES

Upon satisfactory completion of the course students will be able to:

- Students will learn different types of mechanism synthesis: path, motion and function generation; the functions of mechanisms; and their applications.
- Students will learn different methods to synthesize mechanisms (graphical and analytical).
- In the project, students will learn how to synthesize and analyze mechanisms, transmit motion through different components, explore functions of the different mechanisms, optimize linkages for desired outputs, and construct mechanisms.
- Students will be exposed to work collaboratively with other students during the design course project.

FEES

Are there any proposed student fees associated with this course other than tuition fees? ○ YES ◉ NO

SFU

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

NEW COURSE PROPOSAL

RESOURCES

List any outstanding resource issues to be addressed prior to implementation: space, laboratory equipment, etc:

Access to the computer laboratory. Matlab and Working Model Licenses.
Access to the machine shop.

OTHER IMPLICATIONS

Articulation agreement reviewed?	○ YES	○ NO	◉ Not applicable
Exam required:	◉ YES	○ NO	
Criminal Record Check required:	○ YES	◉ NO	

APPROVALS: APPROVAL IS SIGNIFIED BY DATE AND APPROPRIATE SIGNATURE.

1 **Departmental approval indicates that the Department or School has approved the content of the course, and has consulted with other Departments/Schools/Faculties regarding proposed course content and overlap issues.**

_____

Chair, Department/School **Date**

_____

Chair, Faculty Curriculum Committee **Date**

2 **Faculty approval indicates that all the necessary course content and overlap concerns have been resolved, and that the Faculty/School/Department commits to providing the required Library funds.**

_____

Dean or designate **Date**

LIST which other Departments, Schools and Faculties have been consulted regarding the proposed course content, including overlap issues. Attach documentary evidence of responses.

Nil.

Other Faculties' approval indicates that the Dean(s) or Designate of other Faculties AFFECTED by the proposed new course support(s) the approval of the new course:

_____ Date _____

_____ Date _____

3 **SCUS approval indicates that the course has been approved for implementation subject, where appropriate, to financial issues being addressed.**

COURSE APPROVED BY SCUS (Chair of SCUS):

_____ Date _____