



**Engineering Faculty Council
Faculty of Engineering and Applied Science**

**Motion EFC_2017_19
APPROVED**

Motion:

To approve a Minor Program Adjustment for Nuclear Engineering and its corresponding Nuclear Engineering and Management program.

- i. Change ENGR 4460U: Nuclear Power Systems from an Engineering Science Elective to a Core course. (EFC_2017_19)

Minor Program Adjustment

Faculty: Faculty of Energy Systems Nuclear Science	Date: November 17, 2017
Program: Nuclear Engineering	
Undergraduate: <input checked="" type="checkbox"/>	Graduate: <input type="checkbox"/>

Minor Program Adjustments include: New required courses, Deletion of required courses, Other changes to degree requirements or program learning outcomes, New academic requirements or changes to existing requirements.

Motion to CPRC: That CPRC approve the inclusion of ENGR 4460U as a core course in the Nuclear Engineering and its corresponding Management program.

Motion to approve a Minor Program Adjustment for Nuclear Engineering and its corresponding Management program.

- i. Change ENGR 4460U: Nuclear Power Systems from an Engineering Science Elective to a Core course and the subject code from ENGR to NUCL. (EFC_2017_19)

Proposal Brief

Summary of the proposed change (for pathways, please include details on the specific or unspecified transfer credits students will receive, if applicable)

Remove an Engineering Science Elective to make ENGR 4460U: Nuclear Power Systems, a core course for Nuclear Engineering.

Change the subject code from ENGR to NUCL.

Description of the ways in which the proposed change will enhance the program and/or opportunities for students

To address issue raised by CEAB.

Process of consultation with other units if the change(s) involves students, staff, and/or faculty from other programs or courses

Not applicable.

Analysis of financial and enrolment implications

Not applicable.

Proposed Implementation Date (state term, e.g. Fall 2017)

2018-2019 Academic Year

Transition Plan (include a plan for all current students in the program, by year level)

Not applicable.

Calendar Copy and/or Program Maps (highlight revisions to existing curriculum)**NUCL 4460U – Nuclear Power Systems**

Principles of fission; nuclear fuels; thermal and fast reactors; converters and breeders; light water reactors; heavy water reactors, gas cooled reactors; direct and indirect cycle nuclear plants; unit control strategies; nuclear plant safety; fuel cycles; plant decommissioning; waste management; environmental effects; life-cycle costs. Principles of fusion reactors; experimental fusion facilities. **Credit hours: 3**

Lecture hours: 3 Tutorial hours: 1 Prerequisite(s): [PHY 1020U](#) [NUCL 2010U](#), [NUCL 3930U](#), **Credit restriction(s):** [ENGR 3860U](#), [ENGR 4640U](#) or [NUCL 4640U](#)

APPROVAL DATES

FESNS Faculty Council approval	Approved per e-vote held on November 28, 2017.
Engineering Faculty Council approval	December 6, 2017
CPRC Approval	16 March 2018
Submission to Academic Council	17 April 2018

BEng (Hons) in Nuclear Engineering - 2017 Entry (pre/co-req in brackets)

Year	Course	Course	Course	Course	Course	Course
1-1	COMM 1050 Technical Communications	ENGR 3200 Engineering Graphics and Design	MATH 1010 Calculus I	MATH 1850 Linear Algebra for Engineers (Coreq: MATH 1010)	PHY 1010 Physics I	Liberal Studies Elective
1-2	CHEM 1800 Chemistry for Engineers	ENGR 1200 Introduction to Programming	ENVS 1000 Environmental Science	MATH 1020 Calculus II (MATH 1010)	NUCL 1530 Radiation and Nuclear Technologies	PHY 1020 Physics II (PHY 1010)
2-1	ELEE 2790 Electric Circuits (MATH 1020, PHY 1020, MATH 1850)	ENGR 2140 Problem Solving, Modelling and Simulation (MATH 1020, PHY 1020, ENGR 1200) (Coreq: MATH 2860)	MANE 2220 Structure and Properties of Materials (CHEM 1800)	MATH 2860 Differential Equations for Engineers (MATH 1020, MATH 1850)	NUCL 2500 Introduction to Nuclear Physics (MATH 1020, PHY 1020)	NUCL 2860 Fluid Mechanics (MATH 1020, PHY 1010)
2-2	ENGR 2010 Thermodynamic Cycles (MATH 1020, PHY 1010)	MATH 2810 Adv Engineering Mathematics (MATH 1020) OR MATH 2070 Numerical Methods (MATH 1020, MATH 1850)	NUCL 2950 Radiation Protection (NUCL 2500)	NUCL 3820 Nuclear Reactor Kinetics (NUCL 2500, MATH 2860)	SSCI 1470 Impact of Science and Technology on Society	STAT 2800 Statistics and Probability for Engineers (MATH 1020)
3-1	RADI 3570 Environmental Effects of Radiation (NUCL 2950)	NUCL 3740 Scientific Instrumentation (ELEE 2790, STAT 2800)	ENGR 3750 Integrated Engineering Laboratory (ENGR 2140, NUCL 2860, MANE 2220)	NUCL 3930 (formerly ENGR 3930) Heat Transfer (ENGR 2010)	NUCL 4640 Nuclear Plant Operation (PHY 1020)	Complementary Studies Elective (BUSI or Liberal)
3-2	ENGR 3360 Engineering Economics	ENGR 3380 Strength of Materials (PHY 1010, MANE 2220)	ENGR 4730 Reactor Control (MATH 2860)	NUCL 4610 Corrosion for Engineers (CHEM 1800)	NUCL 4780 Nuclear Reactor Design (NUCL 2500, NUCL 2860, NUCL 3820, NUCL 3930, MATH 2070 or 2810)	Liberal Studies Elective
4-1	BUSI 3700 Strategic Management for Professionals	NUCL 4625 (formerly ENGR 4620) Radioactive Waste Management Design (RADI 3570, NUCL 3930, NUCL 4610)	ENGR 4660 Risk Analysis Methods (STAT 2800)	NUCL 4994 (formerly ENGR 4994) Capstone I (all courses from 1st-3rd year completed)	NUCL 4700 Nuclear Plant Design and Simulation (ENGR 2010, NUCL 4640, NUCL 4780)	Engineering Science Elective
4-2	NUCL 4525 (formerly ENGR 4620) Nuclear Plant Safety Design (ENGR 4660, NUCL 4640, NUCL 4700)	ENGR 4760 Ethics, Law and Professionalism for Engineers	NUCL 4998 (formerly ENGR 4998) Capstone II (NUCL 4994)	NUCL 4810 Nuclear Fuel Cycles (NUCL 4610, NUCL 4780)	Engineering Design Elective	ENGR 4460 Nuclear Power Systems Engineering Science Elective (ENGR 2010, 3930)

COURSE CHANGE TEMPLATE

Faculty: Faculty of Energy Systems and Nuclear Science	
Program: Nuclear Engineering	
Subject Code and Course Number: ENGR 4460U	Current Full Course Title: Nuclear Power Systems
X Core <input type="checkbox"/> Elective	Current Short-Form Course Title (max. 30 characters): Nuclear Power Systems

COURSE CHANGES (check all that apply)

<input type="checkbox"/>	Course title	<input type="checkbox"/>	Credit weighting
<input type="checkbox"/>	Course description	<input type="checkbox"/>	Contact hours
<input type="checkbox"/>	Course number	<input checked="" type="checkbox"/>	Prerequisites
<input checked="" type="checkbox"/>	Subject code	<input type="checkbox"/>	Co-requisites
<input type="checkbox"/>	Grade Mode (N – alpha grade, P – Pass/Fail)	<input type="checkbox"/>	Cross-listings
<input type="checkbox"/>	Learning outcomes	<input checked="" type="checkbox"/>	Credit restrictions
<input type="checkbox"/>	Course Instructional Method (CLS, HYB, WB1, WEB)	<input type="checkbox"/>	Equivalency Courses
<input type="checkbox"/>	Delete course from Academic Calendar	<input type="checkbox"/>	Delete course from Program only (attach this form to program modification)
<input type="checkbox"/>	Supplementary Fees	<input type="checkbox"/>	Teaching and assessment methods
<input checked="" type="checkbox"/>	Other (please specify) change from elective to core	<input type="checkbox"/>	Term Change

DESCRIPTION AND/OR REASON FOR CHANGE AND WAYS IN WHICH IT MAINTAINS/ENHANCES COURSE/PROGRAM OBJECTIVES

<p>Change current elective to core, required course in Year 4 of the B.Eng., Nuclear Engineering program to address CEAB report comments. Change partially-to-fully addresses this reported concern.</p> <p>Change subject code from ENGR to NUCL.</p>
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CHANGE TO CALENDAR DESCRIPTION (if required)

Current	Proposed
ENGR 4460U: Nuclear Power System - Principles of fission; nuclear fuels; thermal and fast reactors; converters and breeders; light water reactors; heavy water reactors, gas cooled reactors; direct and indirect cycle nuclear plants; unit control strategies; nuclear plant safety; fuel cycles; plant decommissioning; waste management; environmental effects; life-cycle costs. Principles of fusion reactors; experimental fusion facilities. Credit hours: 3 Lecture hours: 3 Tutorial hours: 1 Prerequisite(s): PHY 1020U Credit restriction(s): ENGR 3860U, ENGR 4640U or NUCL 4640U	NUCL 4460U: Nuclear Power System - Principles of fission; nuclear fuels; thermal and fast reactors; converters and breeders; light water reactors; heavy water reactors, gas cooled reactors; direct and indirect cycle nuclear plants; unit control strategies; nuclear plant safety; fuel cycles; plant decommissioning; waste management; environmental effects; life-cycle costs. Principles of fusion reactors; experimental fusion facilities. Credit hours: 3 Lecture hours: 3 Tutorial hours: 1 Prerequisite(s): NUCL 2010U and ENGR 3930U Credit restriction(s): ENGR 3860U

CHANGE TO CONTACT HOURS (if applicable, indicate changes to total contact hours; changes to frequency (e.g. 1x3 hours to 2X1.5 hours) not required): not applicable

Lecture	Lab
Tutorial	Other

OTHER CHANGES (if applicable)

Prerequisites	Remove PHYS 1020U and add ENGR 2010U and ENGR 3930U
Co-requisites	
Credit restrictions	Remove ENGR 4640U and NUCL 4640
Grading scheme	<input type="checkbox"/> letter grade <input type="checkbox"/> pass/fail

CHANGES TO LEARNING OUTCOMES (if applicable)

No changes. Original Learning Outcomes associated with course.

CONSULTATION AND FINANCIAL IMPLICATIONS, WHERE APPROPRIATE

None expected at this time.

EFFECTIVE SEMESTER (Specify First Active Term e.g. Fall 2017)

Academic year, 2018-2019.

APPROVAL DATES

Program Curriculum Committee approval	Decision made by Dean on November 14, 2017 for accreditation.
Engineering Curriculum Committee approval	November 22, 2017
FESNS Faculty Council approval	Decision made by Dean (A. Tokuhira) during November 2, 2017 accreditation meeting FESNS attendees and FEAS (H. Kishawy, T. Sidhu)
Engineering Curriculum Committee approval	December 6, 2017

Reported to CPRC	16 March 2018
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Impact to AUs

Course Code	Term	Course Name	LEC	Lab/Tut	EC-AU	LAB-AU	=Lec+0.5(Lab)
ENGR 4460	Winter	Nuclear Power Systems	3	1	36	12	42

Math%	NS %	CS %	ES%	ED %
0	0	0	100	0