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MEMORANDUM

| | | | |
|------------------|---|--------------|--------------|
| ATTENTION | Senate | DATE | June 5, 2020 |
| FROM | Wade Parkhouse, Chair Senate Committee on Undergraduate Studies | PAGES | 1/2 |
| RE: | Course Changes (SCUS 20-45) | | |

For information:

Acting under delegated authority at its meeting of June 4, 2020 SCUS approved the following curriculum revisions effective Spring 2021.

a. Faculty of Applied Sciences**1. School of Mechatronics Systems Engineering**

- (i) Title and prerequisite changes for MSE 250
- (ii) Prerequisite change for MSE 251

b. Faculty of Environment**1. School of Environmental Science**

- (i) Units change for EVSC 334

2. School of Resource and Environmental Management

- (i) Units change for REM 334
- (ii) WQB designations for:
 - REM 207 (B-Soc)
 - REM 211 (B-Sci)
 - REM 225 (Q) (Fall 2020)

c. Faculty of Health Sciences

- (i) Course number, description, prerequisite and equivalent statement changes to HSCI 304
- (ii) Title change for HSCI 310
- (iii) Deletion of HSCI 329, 430, and 479
- (iv) Prerequisite change for HSCI 483

d. Faculty of Science

1. Department of Biological Sciences

- (i) Prerequisite change for BISC 305, 366, 445 and 455
- (ii) Description and prerequisite change for BISC 405

2. Department of Chemistry (Fall 2020)

- (i) Description change for CHEM 120
- (ii) Equivalent statement change for CHEM 121
- (iii) Title and equivalent statement change for CHEM 215
- (iv) Title and equivalent statement change for CHEM 281

3. Department of Physics

- (i) Title, description and prerequisite changes for PHYS 285
- (ii) Title, description and prerequisite changes for PHYS 385 and PHYS 415 (Fall 2021)

Senators wishing to consult a more detailed report of curriculum revisions may do so on the Senate Docushare repository at <https://docushare.sfu.ca/dsweb/View/Collection-12682>.

COURSE SUBJECT NUMBER TITLE

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

Course number Units Prerequisite
 Title Description Equivalent Statement

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. Please review the "Equivalency statements" section under [Information about specific course components](#) if changing equivalent statement(s).

Electric Circuits I

Prerequisite: PHYS 141 or (PHYS 121 and 131), ~~or PHYS 126 and 131, or PHYS 141,~~ and MATH 232 and (MATH 260 or MATH 310). (MATH 260 or MATH 310) may be taken concurrently.

EFFECTIVE TERM AND YEAR FOR CHANGES

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

RATIONALE (must be included)

There is only one course on circuits in the Mechatronics curriculum; hence, "I" is not required.

Also, the list prerequisites were misleading to students and hence are corrected in this version.



COURSE SUBJECT NUMBER TITLE

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

| | | | | | |
|---------------|--------------------------|-------------|--------------------------|----------------------|-------------------------------------|
| Course number | <input type="checkbox"/> | Units | <input type="checkbox"/> | Prerequisite | <input checked="" type="checkbox"/> |
| Title | <input type="checkbox"/> | Description | <input type="checkbox"/> | Equivalent Statement | <input type="checkbox"/> |

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. Please review the "Equivalency statements" section under [Information about specific course components](#) if changing equivalent statement(s).

Prerequisite: MSE 250 or ENSC 220 or SEE 230. Students with credit for SEE 231, ENSC 225 or ENSC 226 may not take MSE 251 for further credit.

EFFECTIVE TERM AND YEAR FOR CHANGES

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

Spring 2021

RATIONALE (must be included)

SEE 230 is a new course equivalent to MSE 250 that needs to be included.

COURSE SUBJECT NUMBER TITLE

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

Course number Units Prerequisite
 Title Description Equivalent Statement

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. Please review the "Equivalency statements" section under [Information about specific course components](#) if changing equivalent statement(s).

EVSC 334 – Earth's Past Climates (3) (4)

Paleoclimatology is the study of how and why Earth's climate has changed in the past. Paleoclimatologists study ice ages, past abrupt changes, and what the Earth was like during past climate warm periods. The knowledge gained from paleoclimate studies provides us with the information needed to refine climate models, so that we understand how the Earth's climate works, and better predict how human activity will impact climate in the future.

Describes the tools used by paleoclimatologists to reconstruct past climate change and evaluate the hypothesis put forth to explain those changes.

Prerequisites: REM 100 or EVSC 100; GEOG 111 or EASC 101 or EASC 106; and 45 units. Recommended: EASC 210, GEOG 214 or GEOG 215. Students with credit for REM 334 may not take this course for further credit. Students who have taken REM 463-3 "Special Topics" in Spring 2019 may not enroll in this course for further credit.

EFFECTIVE TERM AND YEAR FOR CHANGES

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

RATIONALE (must be included)

The purpose of the unit change is to increase contact seminar hours from 3 hours to 4 hours with professor for conveying more content as the current 3 units has proved inadequate to cover the necessary material.

COURSE SUBJECT NUMBER TITLE

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

Course number Units Prerequisite
 Title Description Equivalent Statement

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. Please review the "Equivalency statements" section under [Information about specific course components](#) if changing equivalent statement(s).

REM 334 – Earth's Past Climates (~~3~~) (4)

Paleoclimatology is the study of how and why Earth's climate has changed in the past. Paleoclimatologists study ice ages, past abrupt changes, and what the Earth was like during past climate warm periods. The knowledge gained from paleoclimate studies provides us with the information needed to refine climate models, so that we understand how the Earth's climate works, and better predict how human activity will impact climate in the future. Describes the tools used by paleoclimatologists to reconstruct past climate change and evaluate the hypothesis put forth to explain those changes. Prerequisites: REM 100 or EVSC 100; GEOG 111 or EASC 101 or EASC 106; and 45 units. Recommended: EASC 210, GEOG 214 or GEOG 215. Students with credit for EVSC 334 may not take this course for further credit. Students who have taken REM 463-3 "Special Topics" in Spring 2019 may not enroll in this course for further credit.

EFFECTIVE TERM AND YEAR FOR CHANGES

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

RATIONALE (must be included)

The purpose of the unit change is to increase contact seminar hours from 3 hours to 4 hours with professor for conveying more content as the current 3 units has proved inadequate to cover the necessary material.

MEMORANDUM

To: Wade Parkhouse, Chair, SCUS
From: Paul Kingsbury, FENV, Chair, UCC

May 21, 2020

Re: Rationales for requesting WQB designations (GEOG 118, REM 207, 211, 225)

Dear Wade,

Given the informal moratorium or case by case basis for approving new WQB designated courses, Kelli Whittle and Kris Nordgren advised me that in addition to the usual WQB certification request forms, I should provide SCUS with a memo providing the rationales for requesting the exceptions.

In addition to the rationales for the individual courses, which I provide below, all courses are new and their designation (as Q or B courses) will help support new or newly revised programs. GEOG 118 is a proposed new course that is specifically designed to be taught to very broad base of students. The goal is for GEOG 118 to be integrated into the current Global Environmental Systems major and a soon to be proposed Climate Change and Society Minor. Geography has also begun discussions around broadening the prerequisites for some of its GEOG 21X courses. If Geography decides to do this, then GEOG 118 can also be usefully integrated into the Geography BA and BSc in the near future.

REM 207, 211, and 225, which were approved at the February 2020 SCUS meeting (see SCUS 20-09), were originally designed and intended for Q and B designations (as noted in the paperwork) “at the earliest opportunity.” I did not request a WQB designation at that time because of uncertainty over the moratorium, that is to say, SCUS discussions about whether to terminate or not the WQB designation process. These new courses are a significant part of a recent overhaul to REM’s (relatively new) undergraduate program. These program changes were also approved at the February SCUS meeting (see SCUS 20-12).

Finally, in order to help keep the number of WQB designations to an acceptable level, I would like to note that REM has only 9 active WQB courses, and, earlier this year, the Faculty of Environment deleted ENV 222W. Further details on the rationale for designating the Q and B designations on the above courses are as follows:

GEOG 118 (B-Sci) “The Water Planet”

This lower-division course, which provides an overview of the processes that control water supply to natural ecosystems and societies in British Columbian and international contexts, is designed for all majors. It is intended and designed as a Breadth course because it covers many

different ways of thinking (e.g. estimation problems) and modes of inquiry (e.g. examining the scientific and social dimensions of the hydrologic cycle). The course also integrates basic ideas and forms of knowledge from several fields including the ecological, economic, and social studies to examine aspects of hydrologic systems such as fisheries.

REM 207 (B-Soc) “Indigenous Peoples and Resource Management”

The intent from the initial design of the course was to seek a B-Soc designation at the earliest opportunity, as noted on the original new course proposal form. One of the main reasons for this request is that REM would like to offer the course to a wide array of SFU students as possible because of its focus on Indigenous perspectives on managing water, land, and the environment, more generally. A B-Soc designation for the course, then, would help contribute to the wider project of Indigenizing SFU’s curriculum.

REM 211 (B-Sci) “Introduction to Applied Ecology”

The Faculty of Environment currently has no introductory course in Applied Ecology. The proposed course will offer students the background knowledge and skills they will need to achieve a basic understanding of the applied ecology field and to enter more advanced courses in Applied Ecology. It is differentiated from similar courses offered in the Faculty of Science (such as BISC 204) and Faculty of Environment (such as GEOG 215) by focusing on applied ecological problems in a general sense and the knowledge, approaches and techniques used to address them. The intent from the initial design of the course was to seek a B-Sci designation at the earliest opportunity, as noted on the new course proposal form.

REM 225 (Q) “Quantitative Toolkit for Social-Ecological systems”

Effective decision-makers use simple models from a range of disciplines to clarify and solve interdisciplinary social-ecological ecological problems. Resource and environmental managers, especially, need to be aware of these models and the insights they provide to decision-making, yet no interdisciplinary modelling courses exist at SFU that could provide this important background. In addition, students require a practical suite of techniques, methods, and software skills to turn these abstract models into actual tools for decision-making. The “toolkit” for this course will improve student success in upper division courses, co-op work, and thesis research, regardless of their quantitative aptitude upon entry to SFU, by teaching students how to use modern analytical tools such as MS Excel and R statistical computing software. The intent from the initial design of the course was to seek a Q-designation at the earliest opportunity, as noted on the new course proposal form.

I sincerely hope that the above provides sufficient explanation for requesting these exceptions and helps to secure their approval at SCUS.

Sincerely,

Paul/



Dr. Paul Kingsbury
Associate Dean, Undergraduate, Faculty of Environment

B-COURSE CERTIFICATION REQUEST

Thank you for your interest in planning and offering a Designated Breadth (B) course. Designated Breadth courses will help meet Simon Fraser University’s commitment to the education of undergraduate students as defined by the new curriculum. This form is intended to:

- determine whether proposed or existing courses meet the B criteria;
- estimate the number of B seats available to students;
- assist faculty to think through the elements of a B course

This form is divided into TWO sections:

Section I requests instructor, program and course information;

Section II requests detailed course content information.

Please contact Susan Rhodes at slrhodes@sfu.ca or Local 3312 if you have any questions about completing this form. Completed forms can be sent either electronically to the email address above or through campus mail to Susan Rhodes, Curriculum Office, VP Academic.

Course Title: Indigenous Peoples and Resource Management

Course # (if known): REM 207

Is the course (double-click the applicable box, select “checked” from the Default Value and click “OK”):

- a new course?
- a modification of an existing course to broaden its focus to meet the B criteria?
- a course that has previously been piloted as a B course?
- an existing course that fulfills the B criteria for certification?

To be considered, this form must be approved by the Chair/Director of your program and by the Associate Dean of your Faculty. Please have them sign off as noted below, or send an email confirmation to slrhodes@sfu.ca



Chair/Director: _____ Date approved: May 20, 2020

Associate Dean: _____ Date approved: _____

Section I

INSTRUCTOR/PROGRAM INFORMATION

Name of Instructor(s): Dr. Cliff Atleo

Department: Resource and Environmental Management

E-mail: cliff_atleo@sfu.ca Telephone: _____

If not the instructor named above, who will develop or revise the course? n/a

If the course has multiple instructors, how will the department ensure that the varying course content will routinely meet the B criteria?

n/a

COURSE ENROLMENT AND OFFERING INFORMATION

If this is a new or modified course:

- when will it first be offered? Spring 2021
- how often will it be offered? Once per year
- what is the expected enrolment per offering? 50-60

Note: this course was approved by SCUS in February but due to the moratorium on new WQB the designation request was not included, as was indicated on the New Course Proposal. We are submitting this now.

If this is an existing course:

- how often is it offered? _____
- what is the current average enrolment per offering? _____
- what is the expected enrolment increase, if relevant, with B designation? _____

Section II

THE B CRITERIA

Designated Breadth (DB) courses expose students to new theoretical perspectives, forms of thought and modes of enquiry. To qualify as a DB course, a course should be intellectually accessible to “non-majors”; that is, students’ ability to master the course content should not depend on bringing to it the kind of specialized knowledge typically possessed by students majoring in a discipline. Although most DB courses will be introductory in nature, upper-division courses may qualify as DB courses if they do not require students to have specialized knowledge or specific prerequisites.

In addition, a DB course should substantially fulfill AT LEAST ONE of the following three conditions:

1. It explicitly addresses how and why a discipline (or disciplines) defines, acquires and organizes knowledge in particular ways; it identifies important questions and problems in the discipline (or disciplines) and describes procedures used to generate valid answers to the questions or workable solutions to the problems.
2. It is designed to give students a broad understanding of the historical development and/or the contemporary dynamics of the physical, natural, social and/or cultural environments.
3. It provides a survey of a substantial body of the knowledge, theories and/or controversies that are deemed to be central to a discipline (or disciplines).

Please give a one-paragraph description of the content of the course, and provide a syllabus (if available).

The course explores Indigenous perspectives, priorities and complications with respect to resource, land and water management in British Columbia. It begins with an introduction to diverse Indigenous worldviews, values and principles, especially as they relate to the lands and waters of Indigenous nations. It then seeks to understand the complexities of resource management within the contexts of settler colonialism and neoliberal capitalism. Students gain some insight into these complex issues with an emphasis on Indigenous self-determination. Several case studies, primarily from British Columbia are examined, including oil and gas projects, forestry and fisheries management issues. Students will be encouraged to critically analyze contemporary resource management/relationship issues from anti-colonial/ reconciliation-informed perspectives.

By definition, Designated Breadth courses address general issues and introductory content (i.e. non-specialist). Therefore, it will be rare for a Breadth course to have multiple or upper-level prerequisites. **Please list prerequisites, if the course has any.**

None.

All Designated Breadth courses are assigned to one (or more) of the Breadth areas: Humanities, Science and/or Social Science. Please identify the area(s) that seems most appropriate to the content of your course and answer the following questions, clarifying how the B criteria pertain to each of these areas. (For example, a course in Psychology could be designated as B-Soc or B-Sci, or both, depending on its approach to the subject matter.)

Which Breadth requirement(s) is the course designed to satisfy? B-Hum B-Sci B-Soc

1. Explain how this course explicitly addresses how and why a Humanities/Science/Social Science discipline (or disciplines) defines, acquires and organizes knowledge in particular ways; it identifies important questions and problems in the Humanities/Science/Social Science and describes the procedures used to generate valid answers to the questions or workable solutions to the problems.

This course explores several Indigenous social science perspectives on knowledge acquisition and organization. We draw upon several diverse Indigenous knowledges from Coast Salish, Tsimshian, Nuu-chah-nulth, Heiltsuk, Dene, Nehiyaw (Cree), Haudenosaunee (Mohawk), and Anishinaabeg (Ojibwe) communities, among others. We do not adhere to pan-Indigenous approach, but expose students to basic understandings of diverse place-based perspectives that offer unique and viable alternatives to contemporary resource management problems and questions.

2. Explain how this course introduces important concepts for understanding the historical development and/or contemporary dynamics of:
 - our Western and/or non-Western heritage of thought and culture (Humanities);
 - the physical, natural, and/or technological environments we inhabit (Science);
 - the social environments we inhabit (Social Science).

The course is an introduction to the timely issues of resource management and Indigenous peoples, such as oil and gas infrastructure, forestry, mining and fisheries, within the unique context of settler colonialism in Canada. Whereas REM 407 delves into these issues much more deeply in a seminar-based learning environment, REM 207 provides a solid, broad-based foundation in a lecture and tutorial format. Several undergraduate REM courses contain Indigenous content but none (other than REM 407) make it their primary focus. REM 207 and 407 are intended to be integral components of the REM curriculum that explore Indigenous issues and perspectives.

3. Explain how this course provides a survey of a substantial body of the knowledge, theories and/or controversies that are deemed central to a Humanities/Science/Social Science discipline or disciplines.

There are many environmental controversies in Canada, especially as they relate to climate change and energy production. In addition to this, Indigenous community influence on the decision-making around these projects has gradually increased through years of hard-fought court cases, political lobbying and direct action. We examine a number of these issues, in addition to examples from fisheries, forestry and mining industries through the complex lenses of place-based Indigenous epistemologies.

4. Describe any other ways in which this course meets the goals and criteria of a Designated Humanities/Science/Social Science Breadth course.

The intent from the initial design of the course was to seek a B-Soc designation at the earliest opportunity, as noted on the new course proposal form. One of the main reasons for this request is that we would like

to offer the course to a wide array of SFU students as possible because of its focus on Indigenous perspectives on managing water, land, and the environment, more generally. A B-Soc designation for the course, then, would help contribute to the wider project of Indigenizing SFU's curriculum. When possible, we will bring in guest speakers from diverse Indigenous traditions.

B-COURSE CERTIFICATION REQUEST

Thank you for your interest in planning and offering a Designated Breadth (B) course. Designated Breadth courses will help meet Simon Fraser University’s commitment to the education of undergraduate students as defined by the new curriculum. This form is intended to:

- determine whether proposed or existing courses meet the B criteria;
- estimate the number of B seats available to students;
- assist faculty to think through the elements of a B course

This form is divided into TWO sections:

Section I requests instructor, program and course information;

Section II requests detailed course content information.

Please contact Susan Rhodes at slrhodes@sfu.ca or Local 3312 if you have any questions about completing this form. Completed forms can be sent either electronically to the email address above or through campus mail to Susan Rhodes, Curriculum Office, VP Academic.

Course Title: Introduction to Applied Ecology

Course # (if known): REM 211

Is the course (double-click the applicable box, select “checked” from the Default Value and click “OK”):

- a new course?
- a modification of an existing course to broaden its focus to meet the B criteria?
- a course that has previously been piloted as a B course?
- an existing course that fulfills the B criteria for certification?

To be considered, this form must be approved by the Chair/Director of your program and by the Associate Dean of your Faculty. Please have them sign off as noted below, or send an email confirmation to slrhodes@sfu.ca



Chair/Director: _____ Date approved: May 20, 2020

Associate Dean: _____ Date approved: _____

Section I

INSTRUCTOR/PROGRAM INFORMATION

Name of Instructor(s): Dr Anne Salomon

Department: REM

E-mail: anne_salomon@sfu.ca Telephone: 778-866-1646

If not the instructor named above, who will develop or revise the course? Scott Harrison, John Moore, Sean Cox

If the course has multiple instructors, how will the department ensure that the varying course content will routinely meet the B criteria?

All instructors will following the same syllabus, assignments and grading scheme.

COURSE ENROLMENT AND OFFERING INFORMATION

If this is a new or modified course:

- when will it first be offered? Spring 2021
- how often will it be offered? Once per year initially
- what is the expected enrolment per offering? 30

If this is an existing course:

- how often is it offered? n/a
- what is the current average enrolment per offering? n/a
- what is the expected enrolment increase, if relevant, with B designation? n/a

Section II

THE B CRITERIA

Designated Breadth (DB) courses expose students to new theoretical perspectives, forms of thought and modes of enquiry. To qualify as a DB course, a course should be intellectually accessible to “non-majors”; that is, students’ ability to master the course content should not depend on bringing to it the kind of specialized knowledge typically possessed by students majoring in a discipline. Although most DB courses will be introductory in nature, upper-division courses may qualify as DB courses if they do not require students to have specialized knowledge or specific prerequisites.

In addition, a DB course should substantially fulfill AT LEAST ONE of the following three conditions:

1. It explicitly addresses how and why a discipline (or disciplines) defines, acquires and organizes knowledge in particular ways; it identifies important questions and problems in the discipline (or disciplines) and describes procedures used to generate valid answers to the questions or workable solutions to the problems.
2. It is designed to give students a broad understanding of the historical development and/or the contemporary dynamics of the physical, natural, social and/or cultural environments.
3. It provides a survey of a substantial body of the knowledge, theories and/or controversies that are deemed to be central to a discipline (or disciplines).

Please give a one-paragraph description of the content of the course, and provide a syllabus (if available).

This course introduces students to the foundations of applied ecology by surveying the body of theories, applications and controversies that are central to this discipline. Students will also be exposed to the historical roots of these applied theories. For example, students will be introduced to the study of populations and concepts such as predation, competition, density dependence and extinction risk by learning about the data needed to protect imperiled species and apply Canada’s Species-at-Risk Act. The field of community ecology and concepts such as disturbance, succession, food webs and facilitation will be introduced by learning how applied ecologists design and assess protected areas.

(please see attached syllabus)

By definition, Designated Breadth courses address general issues and introductory content (i.e. non-specialist). Therefore, it will be rare for a Breadth course to have multiple or upper-level prerequisites. **Please list prerequisites, if the course has any.**

None.

All Designated Breadth courses are assigned to one (or more) of the Breadth areas: Humanities, Science and/or Social Science. Please identify the area(s) that seems most appropriate to the content of your course and answer the following questions, clarifying how the B criteria pertain to each of these areas. (For example, a course in Psychology could be designated as B-Soc or B-Sci, or both, depending on its approach to the subject matter.)

Which Breadth requirement(s) is the course designed to satisfy? B-Hum B-Sci B-Soc

1. Explain how this course explicitly addresses how and why a Humanities/Science/Social Science discipline (or disciplines) defines, acquires and organizes knowledge in particular ways; it identifies important questions and problems in the Humanities/Science/Social Science and describes the procedures used to generate valid answers to the questions or workable solutions to the problems.

This course will demonstrate how the scientific field of applied ecology organizes knowledge about nature by introducing levels of biological organization, starting with the introduction of populations, followed by communities, and then ecosystems. This course will also identify important questions in science and the process by which evidence is generated and answers are drawn by supporting students in a field-based project on terrestrial protected area design. Specifically, students will learn and apply basic field survey and monitoring techniques with short field trips to the local forest.

2. Explain how this course introduces important concepts for understanding the historical development and/or contemporary dynamics of:
 - our Western and/or non-Western heritage of thought and culture (Humanities);
 - the physical, natural, and/or technological environments we inhabit (Science);
 - the social environments we inhabit (Social Science).

The course will introduce the historical development of our understanding of the natural environment we inhabit by familiarizing the students with the original thinkers who advanced the field of applied ecology and with the evolution of their ideas into today's applications. For example, students will learn how to evaluate and discuss current and contentious topics in environmental management and conservation science by reading, critiquing and presenting contemporary peer reviewed journal articles while assessing the origin and evolution of the paper's key concepts.

3. Explain how this course provides a survey of a substantial body of the knowledge, theories and/or controversies that are deemed central to a Humanities/Science/Social Science discipline or disciplines.

Through an introduction to the key concepts across three levels of biological organization (populations, communities and ecosystems), students will be exposed to a broad survey of the foundational concepts in applied ecology. Students will learn how to evaluate and discuss current and contentious topics in environmental management and conservation science by reading, critiquing and presenting contemporary peer reviewed journal articles.

4. Describe any other ways in which this course meets the goals and criteria of a Designated Humanities/Science/Social Science Breadth course.

The Faculty of Environment currently has no introductory course in Applied Ecology. The proposed course will offer students the background knowledge and skills they will need to achieve a basic understanding of the applied ecology field and to enter more advanced courses in Applied Ecology. It is

differentiated from similar courses offered in the Faculty of Science (such as BISC 204) and Faculty of Environment (such as GEOG 215) by focusing on applied ecological problems in a general sense and the knowledge, approaches and techniques used to address them.

Q-COURSE CERTIFICATION REQUEST

Thank you for your interest in planning and offering a Quantitative/Analytic (Q) course. Quantitative/Analytic courses will help meet Simon Fraser University's commitment to the education of undergraduate students as defined by the new curriculum. This form is intended to:

- determine whether proposed or existing courses meet the Q criteria;
- estimate the number of Q seats available to students;
- assist faculty to think through the elements of a Q course

This form is divided into TWO sections:

Section I requests instructor, program and course information;
Section II requests detailed course content information.

Please contact Susan Rhodes at slrhodes@sfu.ca or Local 3312 if you have any questions about completing this form. Completed forms can be sent either electronically to the email address above or through campus mail to Susan Rhodes, Curriculum Office, VP Academic.

Course Title: Quantitative Toolkit for Social-Ecological Systems

Course # (if known): REM 225

Is the course (double-click the applicable box, select "checked" from the Default Value and click "OK"):

- a new course?
- a modification of an existing course that has not been taught as a Q course?
- a course that has previously been piloted as a Q course?
- an existing course that fulfills the Q criteria for certification?

To be considered, this form must be approved by the Chair/Director of your program and by the Associate Dean of your Faculty. Please have them sign off as noted below, or send an email confirmation to slrhodes@sfu.ca



Chair/Director: _____ Date approved: May 20, 2020

Associate Dean: _____ Date approved: _____

Section I

INSTRUCTOR/PROGRAM INFORMATION

Name of Instructor(s): Sean Cox

Department: School of Resource and Environmental Management

E-mail: spcox@sfu.ca Telephone: 778-782-5778

If not the instructor named above, who will develop or revise the course? _____

If the course has multiple instructors, how will the department ensure that the varying course content will routinely meet the Q criteria?

Has the instructor(s) previously taught a Quantitative course? (Please specify)

Yes.

Undergraduate

REM 412 Environmental Modelling; REM 311 Applied Ecology; REM 423 Research Methods in Fisheries Assessment

Graduate

REM 613 Introduction to Fisheries Assessment; REM 614 Advanced Methods in Fisheries Assessment; REM 625 Risk Assessment and Decision Analysis for Natural Resource Management; REM 612 Simulation Modelling for Natural Resource Management

COURSE INFORMATION

If this is a new course:

- when will it first be offered? Fall 2020
- how often will it be offered? Annual
- what is the expected enrolment per offering? 20-40

If this is an existing course:

- how often is it offered? _____
- what is the current average enrolment per offering? _____
- what is the expected enrolment increase, if relevant, with Q designation? _____

Section II

THE Q CRITERIA

Definition:

To qualify as Quantitative/Analytic (or 'Q' for short), a course must have either quantitative (numerical, geometric) or formal (deductive, probabilistic) reasoning as part of its primary subject matter, or make substantial use of such reasoning in practical problem solving, critical evaluation, or analysis.

Interpreting the Definition:

Mathematics courses already required in Math, the Sciences, Engineering, Business Administration and Economics, and statistics courses required in Social Science programs clearly qualify as Q courses, as do the symbolic logic courses offered in Philosophy.

Courses currently offered in programs such as Engineering Science, Physics, Chemistry, Biology, Business, Economics and other Social Science programs that contain a significant math or stats component also would be eligible for Q designation.

A third type of course eligible for Q designation will be designed especially for students in the Humanities and Fine Arts. The goal of such courses will not be simply to nurture traditional math skills. Such courses will aspire to the greater challenge of deepening the understanding and appreciation of quantitative and formal reasoning, their ubiquitous utility, and their creative potential. We view such courses as focusing on the relation between (a) concepts and structures communicated through numbers and other systems of abstract representation (such as formal languages, programming languages, geometries, graphs) and (b) fostering students' ability to engage more effectively with the subject matter of their respective programs and practical everyday situations. Such courses need not focus primarily on quantitative or formal reasoning methods, but should give significant exercise to such techniques through model building and problem solving, both in class and in course assignments.

Please give a one-paragraph description of the content of the course, listing any prerequisites, and provide a syllabus (if available).

Although REM 225 is intended to provide a bridge between quantitative requirements for entry into the REM Major and skills needed to thrive in upper division REM courses, it is also intended to have broad appeal to students in other Departments and Faculties wishing to obtain a basic understanding of quantitative tools used in resource and environmental management. The main goal of the course is to help students develop common sense, critical thinking, and practical toolkit software skills that they can use in course work and their daily lives. Using lectures and hands-on tutorials, the course develops a basic understanding of the breadth and role of quantitative models used in managing social-ecological systems. The toolkit involves skills, methods, and software typically used in data analysis, quantitative modelling, and research within the environmental profession.

Pre-requisites: 18 credits

Identify explicitly the Quantitative components of the course.

As implied by the title, the entire course is quantitative. See attached syllabus – each section covers a specific quantitative topic. Students will learn to: (i) apply basic quantitative concepts to convert physical quantities among measurement systems and estimate real-world quantities, (ii) make appropriate comparisons based on absolute and relative scales of measurement using ratios, percents, and proportions, (iii) identify linear, exponential, and power models and their roles in physical, biological, and social systems, (iv) estimate and interpret properties of real-world phenomena (e.g., climate, fisheries, natural hazards, infectious diseases) using linear, exponential, and power functions in MS Excel, (v) use simple difference equation models to describe dynamic patterns of change over time (e.g., of populations, global carbon cycling), (vi) develop basic environmental management models, analyses, and graphics in MS Excel, and (vii) use R statistical software to summarize, interpret, and graph large data sets.

Description of Quantitative assignments. *Please write a one-paragraph description of each Q assignment or the types of Q assignments your course will require. We are interested in the Q content of the assignments, and particularly in how you will facilitate the learning of Q concepts by students without Quantitative/Analytic backgrounds.*

The following assignments will be required:

1. Chapter Project Assignments (65%): each chapter project is a combination of selected quantitative problem-solving exercises and a short question/answer project. Detailed instructions, data, and software templates are provided for most chapter project assignments. There are nine chapter project assignments.
2. Class participation (10%): participation is defined as productive contributions to class and tutorial discussions. Contributions range from questions, clarification, sharing ideas, offering helpful tips to others, etc.
3. Term project (25%): a major project that integrates course concepts and skills to analyzing a real-world problem. Detailed instructions, data, and software templates are provided for the term project assignment.



| | | | | | |
|-----------------------|------|---------------|-----|--------------|--|
| COURSE SUBJECT | HSCI | NUMBER | 304 | TITLE | Perspectives on Human Health and the Environment |
|-----------------------|------|---------------|-----|--------------|--|

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

| | | | | | |
|---------------|-------------------------------------|-------------|-------------------------------------|----------------------|-------------------------------------|
| Course number | <input checked="" type="checkbox"/> | Units | <input type="checkbox"/> | Prerequisite | <input checked="" type="checkbox"/> |
| Title | <input type="checkbox"/> | Description | <input checked="" type="checkbox"/> | Equivalent Statement | <input checked="" type="checkbox"/> |

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. Please review the "Equivalency statements" section under [Information about specific course components](#) if changing equivalent statement(s).

HSCI 204 ~~304~~ - Perspectives on Human Health and the Environment (3)

An overview of environmental ~~risks~~ hazards and their impacts on human health. ~~Chemical and biological hazards.~~ Methodological approaches to their detection, assessment, management, and mitigation. Prerequisite: HSCI 100 or BISC 101, HSCI 130. ~~Two HSCI 200-level courses, one of which may be taken concurrently.~~

Equivalency Statement: Students with credit for HSCI 304 may not take this course for further credit.

EFFECTIVE TERM AND YEAR FOR CHANGES

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

Spring 2021

RATIONALE (must be included)

The other introductory “perspectives” courses in the Faculty of Health Sciences are all offered at the 200 level, so this change improves the consistency of our course offerings. (We are also changing the pre-requisites to match those of the other 200-level perspectives courses.)



| | | | | | |
|-----------------------|------|---------------|-----|--------------|--|
| COURSE SUBJECT | HSCI | NUMBER | 310 | TITLE | Introduction to Health Economic Evaluation |
|-----------------------|------|---------------|-----|--------------|--|

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

| | | | | | |
|---------------|-------------------------------------|-------------|--------------------------|----------------------|--------------------------|
| Course number | <input type="checkbox"/> | Units | <input type="checkbox"/> | Prerequisite | <input type="checkbox"/> |
| Title | <input checked="" type="checkbox"/> | Description | <input type="checkbox"/> | Equivalent Statement | <input type="checkbox"/> |

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. Please review the "Equivalency statements" section under [Information about specific course components](#) if changing equivalent statement(s).

Title: ~~Introduction to Health Economic Evaluation~~ Health Economic Evaluation

EFFECTIVE TERM AND YEAR FOR CHANGES

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

Spring 2021



RATIONALE (must be included)

To differentiate from the 200-level HSCI health economics course (HSCI 206) and acknowledge that economic evaluation is in fact introduced in the aforementioned course.



COURSE SUBJECT NUMBER TITLE

RATIONALE (must be included)

The course was last time offered in the Fall 2009, and there is no one who has indicated an interest in teaching it. The deletion of this course will have no program impacts.

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.



| | | | | | |
|-----------------------|------|---------------|-----|--------------|----------------------------------|
| COURSE SUBJECT | HSCI | NUMBER | 430 | TITLE | Health of Vulnerable Populations |
|-----------------------|------|---------------|-----|--------------|----------------------------------|

RATIONALE (must be included)

The course has never been taught and there is no one who has indicated an interest in teaching it. The deletion of this course will have no program impacts.

EFFECTIVE TERM AND YEAR FOR CHANGES

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

Spring 2021

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.



COURSE SUBJECT NUMBER TITLE

RATIONALE (must be included)

The course was last time offered in the Fall 2011, and there is no one who has indicated an interest in teaching it. The deletion of this course will have no program impacts.

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.



| | | | | | |
|-----------------------|------|---------------|-----|--------------|--|
| COURSE SUBJECT | HSCI | NUMBER | 483 | TITLE | Senior Seminar in Environmental Health |
|-----------------------|------|---------------|-----|--------------|--|

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

| | | | | | |
|---------------|--------------------------|-------------|--------------------------|----------------------|-------------------------------------|
| Course number | <input type="checkbox"/> | Units | <input type="checkbox"/> | Prerequisite | <input checked="" type="checkbox"/> |
| Title | <input type="checkbox"/> | Description | <input type="checkbox"/> | Equivalent Statement | <input type="checkbox"/> |

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. Please review the "Equivalency statements" section under [Information about specific course components](#) if changing equivalent statement(s).

Prerequisite: 90 units, including ~~HSCI 304~~ HSCI 204 and HSCI 330.

EFFECTIVE TERM AND YEAR FOR CHANGES

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

Spring 2021



RATIONALE (must be included)

The prerequisite change will address re-numbering HSCI 304 to HSCI 204.



COURSE SUBJECT NUMBER TITLE

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

| | | | | | |
|---------------|--------------------------|-------------|--------------------------|----------------------|-------------------------------------|
| Course number | <input type="checkbox"/> | Units | <input type="checkbox"/> | Prerequisite | <input checked="" type="checkbox"/> |
| Title | <input type="checkbox"/> | Description | <input type="checkbox"/> | Equivalent Statement | <input type="checkbox"/> |

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. Please review the "Equivalency statements" section under [Information about specific course components](#) if changing equivalent statement(s).

A comparative study of basic physiological mechanisms in invertebrates and vertebrates. Prerequisite: BISC 205 and MBB221 or MBB 231 and PHYS 102 (or PHYS 121 or 126 or 141) with a grade of C- or better.

EFFECTIVE TERM AND YEAR FOR CHANGES

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

Spring 2021

RATIONALE (must be included)

BISC 205 Principles of Physiology has been introduced as a foundational course in Physiology that better prepares students for upper division courses in this area. MBB 221 is no longer offered so the pre-requisite statement has been simplified.

COURSE SUBJECT NUMBER TITLE

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

| | | | | | |
|---------------|--------------------------|-------------|--------------------------|----------------------|-------------------------------------|
| Course number | <input type="checkbox"/> | Units | <input type="checkbox"/> | Prerequisite | <input checked="" type="checkbox"/> |
| Title | <input type="checkbox"/> | Description | <input type="checkbox"/> | Equivalent Statement | <input type="checkbox"/> |

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. Please review the "Equivalency statements" section under [Information about specific course components](#) if changing equivalent statement(s).

The plant's physical environment and the physiological basis (mechanisms and principles) of the interaction between plants and their environment in relation to their survival and ecological distribution. Prerequisite: BISC 205 and MBB 231 with a grade of C- or better.

EFFECTIVE TERM AND YEAR FOR CHANGES

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

Spring 2021



RATIONALE (must be included)

BISC 205 Principles of Physiology has been introduced as a foundational course in Physiology that better prepares students for upper division courses in this area.



| | | | | | |
|-----------------------|------|---------------|-----|--------------|-------------------------------------|
| COURSE SUBJECT | BISC | NUMBER | 445 | TITLE | Environmental Physiology of Animals |
|-----------------------|------|---------------|-----|--------------|-------------------------------------|

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

| | | | | | |
|---------------|--------------------------|-------------|--------------------------|----------------------|-------------------------------------|
| Course number | <input type="checkbox"/> | Units | <input type="checkbox"/> | Prerequisite | <input checked="" type="checkbox"/> |
| Title | <input type="checkbox"/> | Description | <input type="checkbox"/> | Equivalent Statement | <input type="checkbox"/> |

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. Please review the "Equivalency statements" section under [Information about specific course components](#) if changing equivalent statement(s).

A discussion of the physiological mechanisms and adaptations which permit animals to live in diverse environments. The course will adopt a comparative approach to physiology. Prerequisite: BISC 205 and MBB 231~~BISC 305~~ with a grade of C- or better.

EFFECTIVE TERM AND YEAR FOR CHANGES

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

Spring 2021

RATIONALE (must be included)

BISC 205 Principles of Physiology has been introduced as a foundational course in Physiology and will provide the necessary background in Physiology for this course. MBB 231 was a pre-requisite for BISC 305 so now needs to be added to the statement.

COURSE SUBJECT NUMBER TITLE

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

| | | | | | |
|---------------|--------------------------|-------------|--------------------------|----------------------|-------------------------------------|
| Course number | <input type="checkbox"/> | Units | <input type="checkbox"/> | Prerequisite | <input checked="" type="checkbox"/> |
| Title | <input type="checkbox"/> | Description | <input type="checkbox"/> | Equivalent Statement | <input type="checkbox"/> |

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. Please review the "Equivalency statements" section under [Information about specific course components](#) if changing equivalent statement(s).

A study of endocrine organs and their role in integrating physiological functions in animals. Prerequisite: BISC 205, MBB 231 ~~BISC 305~~ and one of BISC 306 or BISC 316 with a grade of C- or better.

EFFECTIVE TERM AND YEAR FOR CHANGES

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

RATIONALE (must be included)

BISC 205 Principles of Physiology has been introduced as a foundational course in Physiology and will provide the necessary background in physiology for this course. MBB 231 was a pre-requisite for BISC 305 so now needs to be added to the statement.



COURSE SUBJECT NUMBER TITLE

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

| | | | | | |
|---------------|--------------------------|-------------|-------------------------------------|----------------------|-------------------------------------|
| Course number | <input type="checkbox"/> | Units | <input type="checkbox"/> | Prerequisite | <input checked="" type="checkbox"/> |
| Title | <input type="checkbox"/> | Description | <input checked="" type="checkbox"/> | Equivalent Statement | <input type="checkbox"/> |

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. Please review the "Equivalency statements" section under [Information about specific course components](#) if changing equivalent statement(s).

~~Neuroscience, focusing on physiological, cellular and molecular mechanisms~~ Physiology of neuroscience, focusing on cellular and molecular mechanisms. Topics include: cellular and subcellular organization of the nervous system, electrical properties of neurons, ion channels, synaptic transmission, sensory systems, learning and memory, neurodegenerative diseases. Prerequisite: BISC 205 or BPK 205 and MBB 231 ~~BISC 305 or BPK 305 or BPK 306~~ with a grade of C- or better. Students who have completed BISC 472 under the title 'Neurobiology' may not complete BISC 405 for further credit.

EFFECTIVE TERM AND YEAR FOR CHANGES

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

RATIONALE (must be included)

BISC 205 Principles of Physiology has been introduced as a foundational course in Physiology and will provide the necessary background in physiology for this course. As the equivalent second year course in BPK the same is true to BPK 205.

MBB 231 was a pre-requisite for BISC 305 so now needs to be included in the statement.

The small change to the course description better reflects the course content with its focus on neuroscience.

COURSE SUBJECT NUMBER TITLE

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

| | | | | | |
|---------------|--------------------------|-------------|-------------------------------------|----------------------|--------------------------|
| Course number | <input type="checkbox"/> | Units | <input type="checkbox"/> | Prerequisite | <input type="checkbox"/> |
| Title | | Description | <input checked="" type="checkbox"/> | Equivalent Statement | <input type="checkbox"/> |

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. Please review the "Equivalency statements" section under [Information about specific course components](#) if changing equivalent statement(s).

Atomic and molecular structure; chemical bonding; thermochemistry; elements; periodic table; gases, liquids, solids, and solutions. This course has the same lecture component as CHEM 121 but no laboratory work. Students who intend to take further ~~laboratory~~ courses in chemistry should also take CHEM 125 or alternatively take CHEM 121 instead.

EFFECTIVE TERM AND YEAR FOR CHANGES

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

RATIONALE (must be included)

The course description is being edited to account for the creation of a new 1st year laboratory course CHEM 125 that, together with CHEM 120, is equivalent to the joint lecture/lab course CHEM 121. Students who proceed in chemistry need the 1st year lab course CHEM 125 if they take CHEM 120 and this revised description makes that clear.

| | | | | | |
|-----------------------|------|---------------|-----|--------------|------------------------------------|
| COURSE SUBJECT | CHEM | NUMBER | 121 | TITLE | General Chemistry and Laboratory I |
|-----------------------|------|---------------|-----|--------------|------------------------------------|

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

| | | | | | |
|---------------|--------------------------|-------------|--------------------------|----------------------|--------------------------|
| Course number | <input type="checkbox"/> | Units | <input type="checkbox"/> | Prerequisite | <input type="checkbox"/> |
| Title | | Description | | Equivalent Statement | X |

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. Please review the "Equivalency statements" section under [Information about specific course components](#) if changing equivalent statement(s).

Old Equivalency statement: Students with credit for CHEM 120 or 123 may not take this course for further credit.
New Equivalency statement: Students with credit for CHEM 120 or 125 may not take this course for further credit.

EFFECTIVE TERM AND YEAR FOR CHANGES

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

Fall 2020

RATIONALE (must be included)

The course equivalency has been changed to add CHEM 125 (which is the lab portion of CHEM 121 that is being split from CHEM 121). CHEM 123 has never been offered and has been temporarily withdrawn and so we are removing it from the equivalency statement.

| | | | | | |
|-----------------------|------|---------------|-----|--------------|---|
| COURSE SUBJECT | CHEM | NUMBER | 215 | TITLE | Introduction to Analytical Chemistry and Laboratory |
|-----------------------|------|---------------|-----|--------------|---|

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

| | | | | | |
|---------------|--------------------------|-------------|--------------------------|----------------------|--------------------------|
| Course number | <input type="checkbox"/> | Units | <input type="checkbox"/> | Prerequisite | <input type="checkbox"/> |
| Title | X | Description | <input type="checkbox"/> | Equivalent Statement | X |

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. Please review the "Equivalency statements" section under [Information about specific course components](#) if changing equivalent statement(s).

Old Title: Introduction to Analytical Chemistry

New Title: Introduction to Analytical Chemistry and Laboratory

New (Short) Title: Intro to Analytical Chem and Lab

New Equivalency Statement: Students with credit for CHEM 210 or 216 may not take this course for further credit.

EFFECTIVE TERM AND YEAR FOR CHANGES

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

Fall 2020

RATIONALE (must be included)

CHEM 215 is a course with both a lecture and laboratory component and the title is being changed to reflect that fact more clearly; it also harmonizes the title with the naming methodology for the similar CHEM 121 lecture/lab course, and allows the original title to be applied to the new lecture-only version of this course, specifically CHEM 210.

The new equivalency statement ensures that students who take the split versions CHEM 210/216 (or one course thereof) cannot retake the composite CHEM 215 version.

| | | | | | |
|-----------------------|------|---------------|-----|--------------|------------------------------------|
| COURSE SUBJECT | CHEM | NUMBER | 281 | TITLE | Organic Chemistry and Laboratory I |
|-----------------------|------|---------------|-----|--------------|------------------------------------|

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

| | | | | | |
|---------------|--------------------------|-------------|--------------------------|----------------------|--------------------------|
| Course number | <input type="checkbox"/> | Units | <input type="checkbox"/> | Prerequisite | <input type="checkbox"/> |
| Title | X | Description | <input type="checkbox"/> | Equivalent Statement | X |

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. Please review the "Equivalency statements" section under [Information about specific course components](#) if changing equivalent statement(s).

Old Title: Organic Chemistry I

New Title: Organic Chemistry and Laboratory I

New (Short) Title: Organic Chemistry and Lab I

New Equivalency Statement: Students with credit for CHEM 280 or 285 may not take this course for further credit.

EFFECTIVE TERM AND YEAR FOR CHANGES

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

Fall 2020

RATIONALE (must be included)

CHEM 281 is a course with both a lecture and laboratory component and the title is being changed to reflect that fact more clearly; it also harmonizes the title with the naming methodology for the similar CHEM 121 lecture/lab course, and allows the original title to be applied to the new lecture-only version of this course, specifically CHEM 280.

The new equivalency statement ensures that students who take the split versions CHEM 280/285 (or one course thereof) cannot retake the composite CHEM 281 version.

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|-----------------------|------|---------------|-----|--------------|--|
| COURSE SUBJECT | PHYS | NUMBER | 285 | TITLE | Introduction to Relativity and Quantum Mechanics |
|-----------------------|------|---------------|-----|--------------|--|

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

| | | | | | |
|---------------|-------------------------------------|-------------|-------------------------------------|----------------------|-------------------------------------|
| Course number | <input type="checkbox"/> | Units | <input type="checkbox"/> | Prerequisite | <input checked="" type="checkbox"/> |
| Title | <input checked="" type="checkbox"/> | Description | <input checked="" type="checkbox"/> | Equivalent Statement | <input type="checkbox"/> |

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. Please review the "Equivalency statements" section under [Information about specific course components](#) if changing equivalent statement(s).

~~Introduction to Relativity and Quantum Mechanics~~

~~Special relativity, including relativistic kinematics and dynamics; tests of relativity; matter waves and early quantum models; wave mechanics and its application to molecular, atomic and subatomic systems.~~

~~Prerequisite: PHYS 255; either MATH 232 or MATH 240, with a minimum grade of C-.~~

Quantum I

The concepts of quantum mechanics introduced through two-level systems and explored in a way that requires only familiarity with general concepts of linear algebra.

Introduction to concepts in classical and quantum information theory, bits and qubits, quantum dynamics, quantum communication and cryptography, and quantum circuits.

Prerequisite: Either MATH 232 or MATH 240, with a minimum grade of C-. Quantitative.

EFFECTIVE TERM AND YEAR FOR CHANGES

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

Spring 2021

RATIONALE (must be included)

We are revising our quantum mechanics course sequence. The title and course description are being updated to reflect new course content. A focus on two-level systems means that this course will be accessible to any student who has taken linear algebra. This course will become a general introduction to quantum systems that can be taken by students from a range of disciplines.

COURSE SUBJECT NUMBER TITLE

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

Course number Units Prerequisite
 Title Description Equivalent Statement

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. Please review the "Equivalency statements" section under [Information about specific course components](#) if changing equivalent statement(s).

~~Quantum Mechanics I~~

~~Wave mechanics and the Schroedinger equation, the harmonic oscillator, introduction to Dirac notation, angular momentum and spin, the hydrogen atom, atomic structure, time-independent perturbation theory, atomic spectra, and applications. Prerequisite: MATH 252 or 254; PHYS 285 or ENSC 380 or CHEM 260. All prerequisite courses require a minimum grade of C-. Recommended prerequisites: MATH 260; PHYS 211. Quantitative.~~

Quantum II

Stern-Gerlach experiments and the structure of quantum mechanics; operators; angular momentum and spin; Schrödinger equation and examples for time evolution; systems of two spin-1/2 particles; density operators; wave mechanics in one dimension including the double slit experiment, particle in a box, scattering in one dimension, tunnelling; one-dimensional harmonic oscillator; coherent states. Prerequisite: MATH 252 or 254; MATH 260; PHYS 255; PHYS 285 or ENSC 380 or CHEM 260. All prerequisite courses require a minimum grade of C-. Recommended prerequisite: PHYS 211. Quantitative.

EFFECTIVE TERM AND YEAR FOR CHANGES

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

RATIONALE (must be included)

COURSE SUBJECT NUMBER TITLE

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

| | | | | | |
|---------------|-------------------------------------|-------------|-------------------------------------|----------------------|-------------------------------------|
| Course number | <input type="checkbox"/> | Units | <input type="checkbox"/> | Prerequisite | <input checked="" type="checkbox"/> |
| Title | <input checked="" type="checkbox"/> | Description | <input checked="" type="checkbox"/> | Equivalent Statement | <input type="checkbox"/> |

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. Please review the "Equivalency statements" section under [Information about specific course components](#) if changing equivalent statement(s).

~~Quantum Mechanics II~~

~~Foundations of quantum mechanics, time-dependent perturbation theory, radiation, variational methods, scattering theory, advanced topics, and applications. Prerequisite: PHYS 385; and either PHYS 384 or both MATH 314 and 419, all with a minimum grade of C-. Quantitative.~~

Quantum III

Wave mechanics in three dimensions; orbital angular momentum and spherical harmonics; central potentials, hydrogen atom; time-independent perturbation theory, Stark effect, Zeeman effect; identical particles, helium atom; scattering, Born approximation; time-dependent perturbation theory, interaction picture. Prerequisite: PHYS 385; either PHYS 384 or MATH 314. All prerequisite courses require a minimum grade of C-. Quantitative.

EFFECTIVE TERM AND YEAR FOR CHANGES

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

RATIONALE (must be included)