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MEMORANDUM

ATTENTION	Senate	DATE	January 8, 2021
FROM	Wade Parkhouse, Chair Senate Committee on Undergraduate Studies	PAGES	1/1
RE:	Course Change (SCUS 20-82)		

For information:

Acting under delegated authority at its meeting of January 7, 2021 SCUS approved the following curriculum revision effective Fall 2021.

a. Faculty of Science (SCUS 20-82)1. Department of Physics

- (i) Q designation for PHYS 313-3, Special Relativity

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>.

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: Special Relativity

Course # (if known): PHYS 313

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: _____
Nov. 23, 2020

Associate Dean: _____ Date approved: _____

Section I

INSTRUCTOR/PROGRAM INFORMATION

Name of Instructor(s): _____

Department: Physics _____

E-mail: _____ Telephone: _____

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?

Course syllabus are reviewed by the Physics UCC each year, and any requests for changes to text or content must be approved by the Physics UCC.

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

Yes. All courses taught in Physics are Quantitative.

COURSE INFORMATION

If this is a new course:

- when will it first be offered? Spring 2022
- how often will it be offered? Yearly
- what is the expected enrolment per offering? 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).

Please see the attached course outline. The course will give a detailed presentation of Einstein's Special Theory of Relativity. It starts with the observation that the speed of light has been measured to be constant in all reference frames. The course will derive the Lorentz transformations that act on both space and time variables to preserve the constancy of the speed of light. It will present the intriguing predictions such as time and length dilation along with some paradoxes and their resolutions. The course will then develop the mathematics for solving for the motion of relativistic particles. It will also show how electricity and magnetism are relativistic phenomenon. Lastly it will present an introduction to the theory of General Relativity, that is covered in greater detail in a follow up course, Phys 490: General Relativity and Gravitation.

Identify explicitly the Quantitative components of the course.

The course uses extensive amounts of linear algebra (space + time are treated as a four dimensional vector), a pre-requisite for the course.

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.

This course is intended for Physics and Math majors/honours students. There will not be any students without a quantitative background taking this course. Assessment will be done with written assignments, midterms, and a final exam that will test students problem solving abilities as well as conceptual understanding of special relativity.