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SFU GRADUATE STUDIES

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MEMORANDUM

ATTENTION Senate

DATE February 11, 2025

FROM Mary O'Brien,
Chair of Senate Graduate Studies Committee (SGSC)

RE: New Courses

For information:

Acting under delegated authority at its meeting of **February 4, 2025**, SGSC approved the following new course(s), effective **Fall 2025**:

Faculty of Science

Department of Physics

1) New Course: PHYS 813 Advanced Mechanics

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

SFU

MEMO

Faculty of Science

ATTENTION: Senate Graduate Studies Committee

FROM: Vance Williams, Associate Dean Graduate Studies, Faculty of Science

RE: Proposed Course Additions Fall 2025, Faculty of Science

DATE: January 8, 2025

Dear SGSC,

The following curriculum changes have been approved by the Faculty of Science and are being submitted to the Senate Graduate Studies committee for approval.

~~The following program changes are being proposed:~~
~~**M.Sc.** in **Actuarial Science**~~
~~**Master of Environmental Toxicology (MET)**~~

The following *new courses* are being proposed:
~~**ACMA 801** Actuarial Finance~~
~~**ACMA 802** Advanced Models and Methods for Long-Term Insurance~~
~~**ACMA 803** Advanced Models for Short-Term Insurance~~
PHYS 813 Advanced Mechanics

~~The following course changes are being proposed:~~
~~**ACMA 832** Actuarial Risk Management~~
~~**BISC 834** Essential Cell Biology~~

~~The following course deletions are being proposed:~~
~~**ACMA 830** Stochastic Processes for Insurance and Finance~~
~~**ACMA 831** Advanced Actuarial Models~~

Enclosed are the documents in support of these changes.

Sincerely

Vance Williams
Associate Dean Graduate Studies, Faculty of Science

SFU FACULTY OF SCIENCE | DEPARTMENT OF PHYSICS

MEMO

ATTENTION Vance Williams, Associate Dean, Graduate Studies

FROM Nancy Forde, Graduate Program Chair, Physics

RE New course approval, Phys 813

DATE 9 January 2025

The Department of Physics would like to offer a new course at the graduate level: Phys 813, "Advanced Mechanics". The rationale for this new course is as follows

1) Many graduate students in the Department of Physics did not (have the opportunity to) complete coursework in advanced mechanics at the undergraduate level, and this will allow them to strengthen their competency in this core area of Physics.

2) The Department of Physics offers a fourth-year undergraduate course on this topic, Phys 413, "Advanced Mechanics", with which Phys 813 will be crosslisted. This will then result in no additional departmental resources for course delivery and will increase enrollment in the course.

3) Graduate students will be required to do extra work in Phys 813, relative to that required for Phys 413. This could include more advanced problems on assignments and exams and an independent project.

The offering of this new course was approved by the Department of Physics on December 3, 2024.

Dr. Nancy Forde
Graduate Program Chair

SFU GRADUATE STUDIES

NEW GRADUATE COURSE PROPOSAL

Course Subject (eg. PSYC) PHYS	**Number (eg. 810)** 813	**Units (eg. 4)** 3

Course title (max. 100 characters): Advanced Mechanics

Short title (for enrollment/transcript, max. 30 characters): Advanced Mechanics

Course description for SFU Calendar (course descriptions should be brief and should never begin with phrases such as "This course will..." or "The purpose of this course is..." If the grading basis is satisfactory/unsatisfactory include this in the description. Max. 50 words)

Central forces, rigid body motion, small oscillations. Lagrangian and Hamiltonian formulations of mechanics.

Rationale for introduction of this course (if more space is required, add a separate page)

The Department of Physics does not currently offer any graduate courses in mechanics. Many of our students enter the graduate program without a background in this area. We would like to increase the breadth of our graduate course offerings, by cross-listing the existing fourth-year course (Phys 413) and adapting it for graduate students.

Term of initial offering (eg. Fall 2019)	Fall 2025	**Course delivery** (eg. 3 hrs/week for 13 weeks)	3 hrs/week for 13 weeks
Frequency of offerings/year	1	**Estimated enrollment per offering**	4

EQUIVALENT COURSES

Courses that replicates the content of this course to such an extent that students should not receive credit for both courses. Please select the one that is most relevant.

☐ **SEQUENTIAL COURSE** [is not hard coded in the student information management system (SIMS).] Students who have taken (place relevant course(s) in the blank below (ex: STAT 603)) first may not then take this course for further credit.	☐ **ONE-WAY EQUIVALENCY** [is not hard coded in SIMS.] (Place relevant course(s) in the blank below (ex: STAT 603)) will be accepted in lieu of this course.	☑ **TWO-WAY EQUIVALENCY** [is hard coded and enforced by SIMS.] Students with credit for (place relevant course(s) in the blank below (ex: STAT 603)) may not take this course for further credit.
		PHYS 413

Does the partner academic unit agree that this is a two-way equivalency? ☐ YES ☐ NO

Please also have the partner academic unit submit a course change form to update the course equivalency for their course(s).

Prerequisite and/or Corequisite

PHYS 384 or permission of the department.

Criminal record check required? ☐ Yes (if yes is selected, add this as prerequisite) **Additional course fees?** ☐ Yes ☐ No

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

Course Components * ☑ Lecture ☐ Seminar ☐ Lab ☐ Capstone ☐ Practicum ☐ Online ☐ Other: _____

Grading Basis ☑ Letter grades ☐ Satisfactory/ Unsatisfactory ☐ In Progress / Complete

* See important definitions on the curriculum website.

Repeat for credit? ☐ Yes ☑ No	**Total completions allowed?** 1	**Repeat within a term?** ☐ Yes ☑ No
Required course? ☐ Yes ☑ No	**Final exam required?** ☑ Yes ☐ No	

Combined with an undergraduate course? ☑ Yes ☐ No If yes, identify which undergraduate course and the additional course requirements for graduate students. Please include a copy of the undergraduate course outline and fill out the Equivalent Courses section above.

PHYS 413. Graduate students will have additional course requirements, such as additional / more involved problem set questions, exam questions, and/or an independent project. The choice among these advanced requirements is at the discretion of the instructor.

RESOURCES

If additional resources are required to offer this course, provide information on the source(s) of those additional resources.

Faculty member(s) who will normally teach this course

Malcolm Kennett, Igor Herbut, Levon Pogosian, John Bechhoefer, Andrei Frolov

Additional faculty members, space, and/or specialized equipment required in order to offer this course

N/A

CONTACT PERSON

Academic Unit / Program	**Name (typically, Graduate Program Chair)**	**Email**
Physics	Nancy Forde	physgchr@sfu.ca

ACADEMIC UNIT APPROVAL

☐ A course outline / syllabus is included

Non-departmentalized faculties need not sign

Graduate Program Committee Nancy Forde	**Signature** Nancy Forde Digitally signed by Nancy Forde Date: 2024.12.04 09:42:51 -08'00'	**Date** 4 December 2024
Department Chair Levon Pogosian	**Signature** Levon Pogosian Digitally signed by Levon Pogosian Date: 2024.12.04 14:42:28 -08'00'	**Date** 4 December, 2024

FACULTY APPROVAL

The course form and outline must be sent by FGSC to the chairs of each FGSC (fgsc-list@sfu.ca) to check for an overlap in content

Overlap check done? ☑ YES

This approval indicates that all the necessary course content and overlap concerns have been resolved. The Faculty/Academic Unit commits to providing the necessary resources.

Faculty Graduate Studies Committee Vance Williams	**Signature** Vance Williams Digitally signed by Vance Williams Date: 2025.01.08 14:27:49 -08'00'	**Date** January 8, 2025

A library review will be conducted. If additional funds are necessary, Graduate Studies will contact the academic unit prior to SGSC.

SENATE GRADUATE STUDIES COMMITTEE APPROVAL

Senate Graduate Studies Committee Mary O'Brien	**Signature** Mary O'Brien	**Date** February 12, 2025

ADMINISTRATIVE SECTION (for Graduate Studies office only)

Library Check: _____

Course Attribute: _____

Course Attribute Value: _____

Instruction Mode: _____

Attendance Type: _____

If different from regular units:

Academic Progress Units: _____

Financial Aid Progress Units: _____

Physics 813: Advanced Mechanics

Course webpage: canvas.sfu.ca

Textbook: "Mechanics, 3rd Edition", L. D. Landau and E. M. Lifshitz

Additional text that may be helpful:
"Classical Mechanics", H. Goldstein, J. L. Safko and C. P. Poole, Jr.

Topics:
– Generalized co-ordinates, principle of least action
– Lagrangian formulation of mechanics, Conservation Laws
– Motion in a central field, Kepler's problem
– Scattering
– Small oscillations
– Motion of a rigid body
– Canonical transformations
– Hamilton's equations, Poisson brackets
– The Hamilton-Jacobi equation

Instructor Option A

Grading:

Problem assignments	40%
Midterm exam	15%
Final exam	45%

Note: Students enrolled in PHYS 813 will have additional / more challenging problems included to their assignments and exams, beyond those for students enrolled in PHYS 413.

Instructor Option B

Grading:

Problem assignments	30%
Midterm exam	15%
Independent project	15%
Final exam	40%

Physics 413: Advanced Mechanics
Fall 2023

Dr Malcolm Kennett (Office: P8439, malcolmk@sfu.ca)
Lectures: Mon, Wed, Fri 9:30 – 10:20 AQ 5009
Office Hour: TBA
Final Exam: TBA

Course webpage: canvas.sfu.ca

Textbook: "Mechanics, 3rd Edition", L. D. Landau and E. M. Lifshitz

Additional texts that may be helpful:
"Classical Mechanics", H. Goldstein, J. L. Safko and C. P. Poole, Jr.

Topics:
– Generalized co-ordinates, principle of least action
– Lagrangian formulation of mechanics, Conservation Laws
– Motion in a central field, Kepler's problem
– Scattering
– Small oscillations
– Motion of a rigid body
– Canonical transformations
– Hamilton's equations, Poisson brackets
– The Hamilton-Jacobi eqation

Grading:		
	Problem assignments	40 %
	Midterm exam	15 %
	Final exam	45 %

Students who cannot write their exam during the course's scheduled exam time must request accommodation from their instructor in writing, clearly stating the reason for this request, before the end of the first week of classes. There will be a zero tolerance policy for academic dishonesty. If you have any doubts as to whether an activity might count as academic dishonesty, ask beforehand so there are no misunderstandings later.

In the event that you require a concession for a short-term illness (1-5 days), you should use the SFU self-declaration form as SFU does not require medical notes for minor absences. If you need to be absent for a longer period of time or for assessments worth more than 20% of the final course grade, you should expect to need to obtain additional medical documentation. You are reminded that filing false Academic Concession requests is a violation of the Student Academic Integrity policy. The self-declaration form may be found at:

https://www.sfu.ca/students/academic-success/academic-concessions.html