PHYB54 W2023 - Mechanics: From Oscillations to Chaos

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E-mail communication (preferred to Quercus messages)

Please send all e-mail correspondences from your university account and include your student number. In the email subject, include the prefix "PHYB54: "

Text Book

We will use the textbook Classical Mechanics by John R. Taylor. The UTSC library should have copies available.

Office hours (Online):

Tuesday 12:30-1:30pm

There will be regularly scheduled online office hours during which the instructor will be available to engage in individual or group consultations as determined by the needs of the students. Should additional office hours be required, students are encouraged to make such requests, specifying a few preferred time slots that would be convenient for them.

Learning outcomes

Understanding of fundamental principles of Newtonian mechanics:

- concepts of force and mass,
- nature and use of conservation laws (momentum, angular momentum and energy)

Understanding of linear and non-linear theory of harmonic oscillators

Use of Lagrange equations to solve mechanics problems

Basic understanding of deterministic chaos

Use of numerical tools to solve non-linear dynamics problems

Lectures

In-person lectures will be on Thursdays 1:10pm - 3:00pm.

Note that the lectures will start 10 minutes past the hour. Please make sure you are on time.

Please refrain from eating lunch during the lectures.

Covid safety

Wearing a mask is strongly encouraged.

Tutorials

Thursdays, 5:10pm - 6pm

Attendance is mandatory for all tutorials. During the tutorials, we will solve/review exercises assigned to all students as practice.

Technical requirements

Zoom video recording of assigned tutorial and homework problems (to be detailed).

Grading Scheme

Assessment Title	Percent (%)
Lecture Participation (weekly questions)	5
Tutorial video solutions	15
Homework (x4)	30
Midterm exam	15
Final Exam	35
Total Percentage	**100**

Academic Integrity in PHYB54

Students in this course are obligated to understand what constitutes plagiarism. UTSC demands high standards of integrity and ethical

conduct. We will follow a strict adherence to the University's Code of Behaviour for Academic Matters. You can find it in https://www.utsc.utoronto.ca/vpdean/academic-integrity-matters

There are also certain specific guidelines that apply to this course. While collaboration with fellow students is encouraged, it is prohibited to present any work that is not one's own original production. In the event of working with a partner, it is mandatory to indicate this on all assignments submitted. Failure to do so will be considered as a violation of academic integrity. It is important to note that even when working in partnership, each individual is required to produce their own distinct document and submitting identical documents will also be considered as a violation.

Furthermore, it is a violation of academic integrity to solicit the assistance of friends, family members or any other third party in completing assignments. Similarly, the hiring of external entities to produce assignments on one's behalf is strictly prohibited and shall be treated as a severe violation of academic integrity.

As a general rule, the use of the internet for research purposes is permissible, however, the sharing or distribution of any course-related materials such as lectures, assignments, quizzes or exams is strictly prohibited. This includes posting such material on public spaces such as discussion forums, and sharing it in private spaces such as instant messaging apps or chat groups. Any such violations will be treated as a severe breach of academic integrity.

Accessibility

This course welcomes and accommodates students with a diverse range of learning styles and needs. If you have any disability or health condition that may require accommodations, please do not hesitate to contact the instructor or the AccessAbility Services Office for assistance. Your enquiries will be treated with the utmost confidentiality.

Tentative Lecture Schedule:

Week 1, January 12th

Introduction and overview. Vectors in Mechanics (Chapter 1)

Week 2, January 19th

Newton's Laws of motion (Chapter 1)

Week 3, January 26th

Projectiles and Charged Particles (Chapter 2)

Week 4, February 2nd

Momentum and Angular Momentum (Chapter 3)

Week 5, February 9th

Energy (Chapter 4)

Week 6, February 16th

Oscillations (Chapter 5)

Reading Week - No lecture or tutorial on February 23rd

Week 7, March 2nd

In-Class Midterm Exam

Week 8, March 9th

Lagrange Equation (Chapter 7)

Week 9, March 16th

Two-Body Central Force Problems (Chapter 8)

Week 10, March 23th

Planetary Orbits and Particle Scattering (Chapter 8+)

Week 11, March 30st

Nonlinear Mechanics and Chaos (Chapter 12)

Week 12, April 6th

Numerical Integration of Ordinary Differential Equations (ODEs)