PHYS 310- (Undergraduate) Theoretical Mechanics I (3 credits)
Department of Physics & Astronomy, University of Hawaii
Instructor: Prof. Pui K. Lam
Fall Semester 2020

Time: Tu, Th 9:00 - 10:15 a.m.
Place: Via Zoom
Instructor: Prof. Pui K. Lam (956-2988; plam@hawaii.edu)
Office Hours: TBD via Zoom

Text: "Classical Mechanics" by John R. Taylor, University Science Books.

Pre-req: Pre: 151 or 170 or 170A, and MATH 244 (or concurrent) or MATH 253A (or concurrent); or consent.

Course Outline:

Ch.1 Newton's Law of Motion - (2 or 3L)
        End of Chapter Quiz
Ch. 2 Projectiles and Charge Particles (3L)
        End of Chapter Quiz
Ch. 3 Momentum and Angular Momentum (3L)
        End of Chapter Quiz
Ch. 4 Energy (3L)
        End of Chapter Quiz
Ch. 5 Oscillations (4L)
        End of Chapter Quiz
Ch. 6 Calculus of Variations (3L)
        End of Chapter Quiz
Ch. 7 Lagrange Equations (3L)
        End of Chapter Quiz
Ch. 8 Two-Body Central-Force Problems (4L)
        End of Chapter Quiz
Final Exam

Homework:

> Doing homework is an important part of active learning. However, there are 36 students in the class and the college has no budget for graders, it would not be possible to provide individual feedback, hence **homework will not be graded nor given any course credit**. Homework will be utilized as tutorials rather than assessments If you have questions, see me at office hours. Assessment is shifted to end of chapter quizzes. In principles, doing your homework will help you prepare for the quiz. It is up to you to decide whether doing homework is useful for you.

End of Chapter Quizzes:

> You will take each End of Chapter quiz on Laulima by specified deadline and there is a time limit once you start. There will be 8 to 10 questions; one of them you have to show your work by uploading an image of your hand-written solution. **(Make sure that you have means of taking a photo and uploading to Laulima)**
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Worksheets:

A few days before a lecture, a worksheet will be given which outlines the topics to be covered. It is important that you do the worksheet before the lecture because it preps your brain for the lecture/discussion. Upload your completed worksheet to Laulima to get extra credit by the deadline (typically a day before lecture)

Forum Discussions:

I want to encourage you to learn from each other. You will be given extra credit for participation in forum discussions (posting and reply).

Final Exam:

Cumulative.
Administered via Laulima during final exam hours. Similar format as End of Chapter Quiz

Course Grade Distribution:

Total (100%) = 8 Quizzes (80%) + Final Exam (20%) + Forum (5% extra credit max.) + Worksheets (5% extra credit max.)

Grade Scale: (Based on an absolute scale)

- 96-100 (A+), 91-95 (A), 86-90 (A-)
- 81-85 (B+), 76-80 (B), 71-75 (B-)
- 66-70 (C+), 61-65 (C), 56-60 (C-)
- 51-55 (D+), 46-50 (D), 41-45 (D-)
- <40 (F)
- No "incomplete" (I Grade) will be given.

Student Learning Outcomes:

At the successful completion of this course a student is expected to have:
- An understanding that Newton's Second Law (F=ma) is a differential equation and that most motions do not have constant acceleration, hence we need to solve the differential equation.
- Able to solve analytically a class of problems where F=ma is a linear differential equation with coefficients.
- Able to solve numerically problems where F=ma is a non-linear differential equation.
- A good introduction to an alternative formulation of mechanics called Lagrangian formulation.
- Gain a deeper understanding of conservation laws via the Lagrangian formulation.
- A good introductory understanding of the fundamental difference between non-relativistic and relativistic mechanics