PHYS 310- (Undergraduate) Theoretical Mechanics I (3 credits)
Department of Physics & Astronomy, University of Hawaii
Instructor: Prof. Pui K. Lam
Fall Semester 2021

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

Join Zoom Meeting
https://hawaii.zoom.us/j/96690164724

Meeting ID: 966 9016 4724
Passcode: LAM_310

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
        End of Chapter Quiz
Ch. 2 Projectiles and Charge Particles
        End of Chapter Quiz
Ch. 3 Momentum and Angular Momentum
        End of Chapter Quiz
Ch. 4 Energy
        End of Chapter Quiz
Ch. 5 Oscillations
        End of Chapter Quiz
Ch. 6 Calculus of Variations
        End of Chapter Quiz
Ch. 7 Lagrange Equations
        End of Chapter Quiz
Ch. 8 Two-Body Central-Force Problems
        No End of Chapter Quiz - topics to be included in the Final Exam.
Final Exam

Logon to the Laulima course site, go to "Lessons" to access the zoom link and the "Course Log" that details the schedule for whole semester

Homework:

Administered via Laulima. Some questions will have immediate feedback so that students can revise their answers. Hopefully, students will use the opportunity to rethink the question rather than use trial and error to guess the answer.

End of Chapter Quizzes:

End of Chapter quizzes are also administered via Laulima. However, there will be NO feedback feature. There is a specified deadline and a time limit once you start. There will be 8 to 10 questions; some 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. PDF, IMG, PNG are acceptable but PDF is preferred.)**
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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. I will go over the worksheet with you in class.**

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%) =Homework (30%) + Quizzes (50%) + Final Exam (20%) + Forum (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