

**PHYS 311- (Undergraduate) Theoretical Mechanics I (3 credits)**  
**Department of Physics & Astronomy, University of Hawaii**  
**Instructor: Prof. Pui K. Lam**  
**Spring Semester 2021**

**Time:** M,W,F 9:30 - 10:20 a.m.

**Place:** Via Zoom

**Instructor:** Prof. Pui K. Lam (956-2988; [plam@hawaii.edu](mailto:plam@hawaii.edu))

**Office Hours:** TBD via Zoom

**Zoom Link:**

Join Zoom Meeting

<https://hawaii.zoom.us/j/xxxxxxx>

Meeting ID: xxxxxxxxxxx

Passcode: xxxxxxx

**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 (Tentative, may have to skip some materials):**

Ch. 9 - Mechanics in Non-inertial Frames

Ch. 10 - Rotational Motion of Rigid Bodies

Chapter Quiz

Ch. 11 – Coupled Oscillations and Normal Modes

Ch. 12 – Nonlinear Mechanics and Chaos End of Chapter Quiz

Chapter Quiz

Ch. 13 – Hamiltonian Mechanics

Ch. 14 – Collision Theory

Chapter Quiz

Ch. 15 – Special Relativity

Ch. 16 – Continuum Mechanics

Chapter Quiz

Final Exam

**Instructional/Learning Pedagogy:**

To be proficient in physics, one must formulate a clear, coherent conceptual model in one's mind (not simply memorizing a set of formulae or solutions to various problems) and acquire the necessary mathematical techniques to apply those concepts. Reading the textbook is an important part of information gathering but it must be followed by the student summarizing his/her understanding in their own words and refine their understanding by doing homework problems. My goal as an instructor is to guide you to develop your own coherent conceptual model and to help you develop the necessary math skills

## Homework:

Doing homework is an important part of active learning. It is also important to receive timely feedback. In this semester, I will design the homework similar to the quiz format in PHYS 310 ; there is a feedback button for you to check your numerical results.

## Chapter Quiz

For this semester, you will have a chapter quiz after every two chapters (so hopefully, it will be less hectic). You will take the quiz on Lulima by specified deadline and there is a time limit once you start. There will be 8 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 Lulima). The quizzes have similar format as the homework except that there will be NO feedback button for the quizzes. (you need to learn to check your answers for consistency)**

## Pre-lecture student questions:

To promote active learning, you will be asked to write a short summary statement on your reading assignment and pose one question of what you do not understand (if you understood everything, then pose an exam-like question). Respond to the Google form by 5 p.m. the day before class. I will collate all the responses (with the student's name removed) and post on the course log. Please read all the responses and bring a printout to the class. This will show collectively what the class understands and what the class does not understand. I will try to address some common questions,

We will get a grade proportional to your participation effort.

## Forum Discussions:

I want to encourage you to learn from each other. You will be given extra credit for participation in forum discussions (posting or replying to questions). **To get the maximum extra credit for the forum participation, you must author (posting or replying to questions) at least 5 questions per chapter on the average.**

## Final Exam:

**Cumulative.**

**Administered via Lulima during final exam hours.** Similar format as Chapter Quiz

## Course Grade Distribution:

Total (100%) = Student's questions (10%) + Homework (25%) + Quizzes (50%) + Final Exam (15%) + 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:

- A good understanding of Newtonian (non-relativistic) mechanics of a system of particles; the types of approximations needed to render the problems tractable.
- Formulation of mechanics in terms of the Hamilton's principles
- A good understanding of the fundamental difference between non-relativistic and relativistic mechanics
- A set of mathematical skills to solve a variety of problems in mechanics

**Online Resource:**

I discover this on you tube. This person (Brian Jackson) made video lectures on some selected chapters in Talyor. I have thoroughly reviewed them but it seems that he pretty much lecture materials directly from the book. I searched him on the internet. It appears that he is a faculty member at Bosie State University. Let me know if you find it useful.

<https://youtu.be/JJFAojRTXQg?list=PLEP4fCXP3ftBWJ2fvfsINH91492SNxWTI>