

# University of Hawaii Physics 310

## Theoretical Mechanics I - Fall Semester 2017

Course Information and Syllabus

**Revised 7 September 2017, updated 26 October, 2  
November**

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**Classes:** Tuesday and Thursday 0900-1015 in 114 Watanabe Hall, UH Manoa

See schedule below.. [Should be stable through the first mid-term 4 October.](#)

**Prerequisites:** Physics 151 or 170, and Math 232 (concurrent alright), or equivalent (see instructor for exceptions).

### ***General Information and Comments:***

- The text will be ``**Classical Mechanics**'' by **John R. Taylor**, University Science Books. Website <http://www.uscibooks.com>
- The pace will be about 1-2 weeks per chapter. We will cover chapters:

1. **Newton's Laws of Motion**
2. **Projectiles and Charged Particles**
3. **Momentum and Angular Momentum**
4. **Energy**
5. **Oscillations**
6. **Calculus of Variations**
7. **Lagranges's Equations**
8. **Two-Body Central Force Problems.**

- We will cover the mathematical topics as needed in the course. Much of this course will depend upon this knowledge, and it is important preparation for later more advanced courses. So, if you are weak in this area, or have never seen some of the mathematical material, it is time to hit the books before you get swamped. It will make more sense as we see the applications.... but these are tools you need for this semester and much more for later, and as a professional physicist.
- Class attendance required (or -1 grade). Students will sometimes be asked to present

problem solutions on the board in class. This is good practice, and helps us all get mutual understanding. Since the class is larger than in the past, maybe not so much going to the board though... see how it goes.

- Homework requires thinking; no copied old solutions accepted. Think of solving these problems as a game, a mental exercise, a workout like going to the gym. The point is in doing them, not so much getting the precise answer... it is the mental struggle which is the real learning goal, learning to think like a physicist.
- Classes will alternate between lectures and problem solving.
- Coming to class unprepared will not work. You need to put aside time to at least quickly read the chapter before class. It takes me an hour to read a known chapter, it is not light reading. In general each chapter will need three readings...
- Computer experience will be part of course. Mathematica is the preferred software. Everyone needs an email account.
- Grades will be 30% class participation (this may be revised) and homework, 40% midterms, and 30% final exam. Paper possible for extra credit. This is a 3 credit course.
- See student learning outcomes below.

**By general consensus, problems are due on Tuesdays at the start of class.**

***Schedule:*** These dates and some problem numbers may change, but the schedule will remain roughly the same...

<i>Month</i>	<i>Date</i>	<i>Week</i>	<i>Day</i>	<i>Topic in Class</i>	<i>Assign due on Tuesdays</i>
Aug	21	1	Tues	Introduction	Read Chapt. 1
	23		Thurs	Chapter 1	1- 10, 13, 19, 22
	28	2	Tues	1	1- 23, 24, 25, 36
	30		Thurs	1	1- 41, 45, 48
Sep	5	3	Tues	2	2- 1, 5, 7, 11
	7		Thurs	3	2- 12, 13, 14, 15

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Tues 3 - 4

3 - 1, 2, 4, 8, 11

	14		Thurs	4	3 - 13, 25, 27, 31, 35
	19	5	Tues	4	4 - 2, 3, 4, 8, 15, 26
	21		Thurs	5	4 - 31, 34, 36, 41, 46
	26	6	Tues	5	5 - 2, 5, 6, 7
	28		Thurs	5	5 - 12, 13, 26, 29, 35
Oct	3	7	Tues	5	5 - 43, 44, 45, 50
	5		Thurs	First mid-term	Chapters 1-5
	10	8	Tues	Review Exam	
	12		Thurs	6	6 - 1, 2, 5, 11
	17	9	Tues	6	6 - 24, 25, 27
	19		Thurs	7	Read Chapter 7
	24	10	Tues	7	7 - 2, 8, 9, 14
	26		Thurs	7	7 - 21, 22, 23
	31	11	Tues	7	7 - 29, 31, 44, 51
Nov	2		Thurs	Review	
	7	12	Tues	more review, not holiday	

	9		Thur	Second Mid-Term Exam	Chapters 6 7
	14	13	Tues	8	
	16		Thur	8	
	21	14	Tues	8	8 - 3, 5, 6
	22		Thur	Thanksgiving	
	28	15	Tues	8	8 - 12, 15, 17
	30		Thur	8	8 - 18, 22, 25
Dec	5	16	Tues	8	8 - 28, 30, 35
	7		Thur	Review	Chapters 1-8
	12		Tues	0945 - 1145	Final Exam, Chapters 1-8

### *Student Learning Outcomes-*

**At the successful completion of this course a student is expected to have:**

1. **modest facility with the mathematical methods needed for this level of course;**
2. **mastered Newtonian Mechanics;**
3. **come to appreciate the important of oscillations in phenomena**
4. **and carry out simple calculations with the simple harmonic oscillator;**
5. **mastered first level applications in Newtonian gravitation;**
6. **understood some methods in the Calculus of Variations;**
7. **gotten beginning appreciation of, and facility with, Lagrangian Dynamics**
8. **and perhaps most important, have made progress in learning to “think like a physicist”.**

*teacher:* Prof. John G. Learned

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*Grader:* Andrew Kuhlman

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***recitation:* Thursdays at 1-2 PM in Watanabe Hall 4th floor student center**

[Back to John Learned's Home Page](#)

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