Syllabus

Course #/name: PH610/710, Classical Mechanics

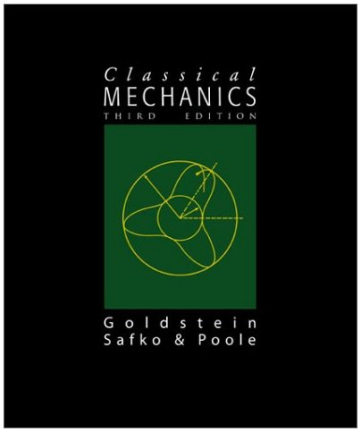
Instructor: Xujing Wang (934-8186, xujingw@uab.edu)
Office: CH303 (TR), Shelby 1203 (MWF same phone #).
Course duration: 08/16/12-12/04/12
Course meet at: TR: 1:30-2:45pm, in CH394
Office hour: T, 9-10; R,12-1, or by appointment

Course Description: Applications of methods of Lagrange, Hamilton, and Hamilton-Jacobi to study motion

PH610 and PH710 cover the same topics. However, the students in PH710 will be given higher levels of homework and exam problems than those in PH610.

Textbook:
Classical Mechanics

- **Author** Herbert Goldstein, Charles P. Poole, John L. Safko
- **Publisher:** Addison Wesley; 3 edition
- **ISBN-10:** 0201657023
- **ISBN-13:** 978-0201657029



Learning Objectives/Chapters to be covered:

chapter 1. Survey of elementary principles

chapter 2 variation principles and Lagrange's equations

chapter 3 The central force problem

chapter 6 Oscillations

chapter 8 The Hamilton Equations of motion

chapter 9 Canonical transformation

chapter 10. Hamilton-Jacobi Theory (if we have time)**

Acquire deep understanding of Variation Principles, Lagrange and Hamilton's approaches to classical mechanics, canonical transformation. can solve classical problems as central force, small oscillation, and classical chaos.

Grading Scheme:
Course grades will be determined based on 2 midterm exams (20% each), comprehensive final exam (30%), and homework (30%). A general guideline of the letter grades is given in Table.

In both homework and exams, adequate amount of detail is required to demonstrate the reasoning and problem solving steps.

Grading Scheme

Grade	
A	85+
B	75+
C	60+
F	otherwise

Other course policies, attendance, make up exams:
To do well on the tests & exams, you should attend and stay focused at the lectures, do the reading assignments of notes and textbook before class, and personally work all of the homework problems. Homework can be emailed directly (the department fax machine in the mailroom can email scanned doc) to xujingw@uab.edu, or leave at my mailbox. Late homework will be penalized, with 25% reduction in score if within 3 days past due, 50% reduction in score if within 7 days past due, and will no longer be accepted after that. Late homework can be excused, make-up tests & exams granted, only for the most extraordinary circumstances (documented illness, etc.).

Course schedule (subject to change. for the most up to date version, go to my website http://www.phy.uab.edu/~xwang/ for the latest update, and the schedule of homework)

Date	Topics	Subsections	Homework	HW Due
Aug 16 (Thu)	Over review of course, requirements, logistics			
Aug 21 (Tue)	Survey of the Elementary Principles	1.1-1.3	1,2, 5	08/29 (Wed) 12 PM
Aug 23 (Thu)		1.4-1.6	(8), 9, 15, 16	
Aug 28 (Tue)	Variational Principles and Lagrange's Equations	Chapter1	5 (12)	
Aug 30 (Thu)		2.1-2.3	18, 20	
Sep 04 (Tue)		homework	21, 23 + a problem not from the book, will be emailed	9/12 (Wed) 12PM
Sep 06 (Thu)	Chapter2 variational principle	2.4		
Sep 11 (Tue)	Chapter 2	2.6-2.7		
Sep 13 (Thu)	Problem solving	2.6-2.7		
Sep 18 (Tue)				
Sep 20 (Thu)				10/10 (wed) 12PM
Sep 25 (Tue)	The Central Force Problem, dimension reduction, classification of orbits	3.1-3.3		
Sep 27 (Thu)	Inverse square law of force	3.6-3.7-3.8		
Oct 2 (Tue)	General power law potential	3.5-3.6		
Oct 04 (Thu)	Virial Theorem, LRL vector Problems Solving	3.4, 3.9		
Oct 9 (Tue)	**Midterm Exam 1 (in class)**	Chapters 1-2		
Oct 11 (Thu)	Fall break			
Oct 16 (Tue)	Review Homework, midterm			
Oct 18 (Thu)	Oscillations	6.1-6.3		
Oct 23 (Tue)	oscillations	6.1-6.3		
Oct 25 (Thu)	oscillations	6.4-6.6	HW#4: chapter 6: 1, 4, 5,11,12, (13), (14)	HW#4 due 11/04, 12pm
Oct 30 (Tue)	Problem solving			

Nov 01 (Thu)	oscillation			
Nov 06 (Tue)	The Hamiltonian Equation of Motion	Chapter 8, will cover 8.1-8.2, 8.5-8.6 8.1-8.2	Homework #5 Derivation: 1 Exercise: 12, 13, 15, 19, 26	Due Nov 21
Nov 08 (Thu)	**MidTerm2**	In class		
Nov 13 (Tue)	The Hamiltonian Equation of Motion	8.1-8.2, 8.5-8.6		
Nov 15 (Thu)	The Hamiltonian Equation of Motion Canonical Transformation	8.5, 8.6, problems, 9.1-9.3		
Nov 20 (Tue)	Canonical Transformation	9.1-9.9		
Nov 22 (Thu)	**Thanksgiving Holiday**			
Nov 27 (Tue)	Canonical Transformation	9.1-9.9	Homework #6 4, 23, 28, 30	Due Dec 5
Nov 29 (Thu)	Canonical Transformation			
Dec 04 (Tue)	Summary review Comprehensive Problems Solving			
Dec 5 Last day of class	Last homework due			
Dec 6-7	Make up			
Dec 11	Final (take home) exam due			
Dec 8-14	final			