**PHYSICS 5200: Classical Mechanics I**

**COURSE OUTLINE: FALL 2011**

Room 177, Physics Building, MWF, 3:00 – 3:55 p.m.

LECTURER: P. H. Keyes OFFICE: Room 239, Physics Building, PHONE: 577-2606

e-mail: keyes@wayne.edu

OFFICE HOURS: MW, 10:40 – 11:40 a.m.; and by appointment.

TEXT: *Classical Mechanics*, by R. Douglas Gregory, ISBN 978-0-521-53409-3 (pbk)

**Lectures and reading assignments**

The Lecture Schedule given below shows what sections of the text will be covered in each day’s lecture. You should read the appropriate sections of the text before coming to class if you want to obtain the maximum benefit from the lecture. The lecture will consist of a combination of explanations of the material and illustrated examples. These will generally complement, rather than repeat, the accounts and worked examples in the text.

**Homework assignments**

A few problems will be assigned each week and will be collected one week later. At that time solutions will be posted in the glass case on the second floor of the Physics building. Thereafter no late homework will be accepted. Your homework will be marked on a scale with two points being given for each complete and correct answer and one point for each reasonable attempt. No credit will be given for minimal efforts or for work that is obviously copied from another student or another source.

**Quizzes**

Each Friday (except for when an exam is given) there will be a 10-15 minute closed book quiz at the beginning of class. Each quiz will typically consist of about three multiple choice questions written at the level of the Physics GRE.

**Exams**

Each hourly exam will typically consist of three to five problems similar in spirit to the homework problems. The final exam will cover all the material of this course; however, there will be slightly more emphasis on material not covered by the two hourly exams. All exams will be closed book.

**Grading**

Your grade in the course will be determined by your performance on the homework, the quizzes, the two hourly exams, and the final exam:

Homework 1 unit

First Hourly Examination 1 unit

Second Hourly Examination 1 unit

Quizzes 1 unit

Final Examination 2 units

TOTAL 6 units

**Grading Scale**: A/A-: 80%-100%; B+/B/B-: 70%-80%; C+/C/C-: 60%-70%; D+/D/D-: 50%-60%; E 0%-50%.

## In-class policies

Out of consideration for the other students in the lecture please abide by the following rules of conduct: (1) Turn off all cell phones while in lecture, (2) Please arrive on time for lecture and do not leave early, (3) Please be mindful of your classmates.

## Academic dishonesty

All of the graded assignments are designed to measure your individual understanding of the material. No forms of cheating on these graded assignments will be tolerated (working together on the homework assignments is not considered cheating but copying of someone else’s homework is). Anyone found cheating on any graded activity will receive a grade of zero for that part of their grade, and may receive a failing grade for the course.

## Pre-requisites and co-requisites

This course requires PHY2180 as a pre-requisite and PHY5100 as a co-requisite.

**Adding & withdrawing**

This semester Wednesday, September 7 is the last day a course may be added and Saturday, November 12 is the last day you may withdraw from a course.

## Students with disabilities

If you have a documented disability that requires accommodations, you will need to register with Student Disability Services for coordination of your academic accommodations. The Student Disability Services (SDS) office is located at 1600 David Adamany Undergraduate Library in the Student Academic Success Services department. SDS telephone number is 313-577-1851 or 313-577-3365 (TDD only). Once you have your accommodations in place, I will be glad to meet with you privately during my office hours to discuss your special needs. Student Disability Services’ mission is to assist the university in creating an accessible community where students with disabilities have an equal opportunity to fully participate in their educational experience at Wayne State University.

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**LECTURE SCHEDULE: FALL 2011**

DATE TOPIC HW due/ Quiz

8/31 Course introduction, Chapter 1: vector algebra

9/2 Chapter 1: vector calculus

9/5 **Labor Day – no class**

9/7 Chapter 2: velocity HW 1 due

9/9 Chapter 2: acceleration Quiz 1

9/12 Chapter 2: (scalar) angular velocity HW 2 due

9/14 Chapter 3: Newton’s laws

9/16 Chapter 3: center of mass Quiz 2

9/19 Chapter 3: law of gravitation HW 3 due

9/21 Chapter 4: rectilinear motion

9/23 Chapter 4: constrained rectilinear motion Quiz 3

9/26 Chapter 4: air friction HW 4 due

9/28 Chapter 4: projectiles

9/30 Chapter 5: simple harmonic motion Quiz 4

10/3 Chapter 5: damped harmonic motion HW 5 due

10/5 Chapter 5: forced harmonic motion

10/7 **Exam 1** **- Chaps. 1-4**

10/10 Chapter 5: coupled oscillators & normal modes HW 6 due

10/12 Chapter 6: energy conservation

10/14 Chapter 6: energy conservation in rectilinear motion Quiz 5

10/17 Chapter 6: energy conservation in conservative fields HW 7 due

10/19 Chapter 6: energy conservation in constrained motion

10/21 Chapter 7: central force fields Quiz 6

10/24 Chapter 7: the path equation HW 8 due

10/26 Chapter 7: nearly circular orbits

10/28 Chapter 7: inverse square attraction Quiz 7

10/31 Chapter 7: repulsive inverse square, Rutherford scattering HW 9 due

11/2 Chapter 9: multi-particle systems

11/4 Chapter 9: energy conservation for multi-particle systems Quiz 8

11/7 Chapter 9: energy conservation for multi-particle systems (continued) HW 10 due

11/9 Chapter 9: kinetic energy of a rigid body

11/11 Chapter 10: linear momentum Quiz 9

11/14 Chapter 10: center of mass motion HW 11 due

11/16 Chapter 10: conservation of linear momentum

11/18 **Exam 2 – Chaps. 5 – 7, 9**

11/21 Chapter 10: rocket motion HW 12 due

11/23 Chapter 10: collisions

11/25 **Holiday**

11/28 Chapter 10: two body scattering

11/30 Chapter 11: torque HW 13 due

12/2 Chapter 11: angular momentum Quiz 10

12/5 Chapter 11: angular momentum of a rigid body

12/7 Chapter 11: angular momentum conservation HW 14 due

12/9 Chapter 11: statics Quiz 11

12/12 Chapter 11: statics (continued)

12/16 **Final Exam** – Friday, 1:20 – 3:50