University of California, Berkeley Physics 5A – Spring 2020

GENERAL INFORMATION

Tu & Th 9:30-11:00 am; 2 LeConte

INSTRUCTOR: Prof. Matt Pyle
439 LeConte Hall
Telephone: 650-224-0446
Email: mpyle1@berkeley.edu

Office Hours:
Tues 1:00-3:00 (unless there are lots of complaints by students)

GSIs: Malcolm Lazarow
Email: mlazarow@berkeley.edu
Office Hours: Mon 3-4 and Wed 4-5 429 Birge

Jack Spilecki
Email: jspilecki@berkeley.edu
Office Hours: Tues 4-6pm LeConte 107

DISCUSSION SECTIONS:

1st Discussion Sessions starting 1/22/20

101: W 8-10AM, Hildebrand B56 (Malcolm),
102: M 4-6PM, Dwinelle 246 (Malcolm),
103: F 12PM-2PM, LeConte 385 (Jack)
104: W 10AM-12PM, Stanley 179 (Jack)

LAB SECTIONS:

No Lab

BOOKS:

1. Kleppner and Kolenkow, "An introduction to Mechanics", 2nd Edition
2. R. Feynman, "Lectures on Physics": http://www.feynmanlectures.caltech.edu/

TOPICS:

1. Non-relativistic Kinematics and Dynamics (Ch. 1-11 of KK + a few other sources)

    a. Newton's Laws
    b. Linear Momentum
    c. Work and Energy
    d. Angular Momentum
    e. Oscillations and Waves
    f. Fluids
2. Introduction to Mathematical Techniques/Applications in Physics: Vectors, Calculus, Taylor Expansions, Polar Coordinates
3. Relativistic Dynamics (Ch. 12-14 of KK)

HOMEWORK:

One problem set per week. The problem sets will be posted every Wednesday on class website, and are due the following week on Wednesday at 5pm in the homework box in the LeConte Hallway.

Late homework will be accepted until 5pm Thursday with a 25% penalty. After this, no further homework will be accepted. Note, this very limited "late" homework policy isn't because we're trying to teach you responsibility. We already assume that you are responsible adults! Instead, it's because late homework is really hard on the grader.

There will be 120 total points on most problem sets. However the maximum achievable grade will be 100, on each problem set. Thus, the student could potentially choose to complete a subset of the HW problems or make minor mistakes on some of the questions and still receive a 100%.

The lowest homework assignment grade will be removed from the homework average used in grade calculation.

READING ASSIGNMENTS

Reading assignments will be posted 48 hrs. before most lectures on class website.

QUIZZES

Throughout the semester online reading quizzes will be posted with the reading assignments and must be completed 1hr before the lecture. These quizzes will be purposely designed to be very easy (answers should be readily apparent after simply reading the material). Likewise, there will be sporadic "in class" quizzes of similar difficulty.

The average quiz grade will only **positively** affect a student's final grade by up to +3%.

EXAMS:

There will be night time midterms and one final exam. We will skip class on these days so that you can study

- Midterm 1 over Chapters 1-4.5 of KK on 2/20/20 7-9:30pm
- Midterm 2 over Chapters 4.6-8 of KK on 4/9/20 7-9:30pm

The final exam is all inclusive.

GRADING:

Problem Sets 30%
Midterms 17.5% each
Final Exam 35% (Material: 50% new and 50% review)

WEBSITE https://bcourses.berkeley.edu/courses/1490536

Course Outline

1	T 1/21	1.1-1.7	Vector Algebra & Math Review
2	H 1/23	1.8-1.10	3D Kinematics & Circular Motion
3	T 1/28	1.11	Polar Coordinates & units
4	H 1/30	2	Galilean Transformations & Newton's Laws
5	T 2/4	3.1-3.4	Applications: Constraint Forces, Ropes, Pulleys
6	H 2/6	4.1-4.5	Systems of Particles & the Free Body Diagram
7	T 2/11	3.4-3.6	Applications: Friction, No Slip, &Viscosity
8	H 2/13	3.7 Notes Ch 1	Applications: Springs & Taylor Expansions Special Topic: stress/strain and modern building design
9	T 2/18	4.6-4.9	Rockets and Fluids

10	H 2/20	No Class	Midterm 1 @ 7-9:30pm Material: KK Ch 1-4.5 Lectures: 1-8
11	T 2/25	5-5.4	Work & Energy
12	H 2/27	5.5-6.4	Potential Energy & Stability
13	T 3/3	6.5	2 Body Collisions & Conservation Laws
14	H 3/5	7.1-7.7	Angular Momentum in 1D
15	T 3/10	7.8-7.10	Translation and Rotational Kinetic Energy
16	H 3/12	8.1-8.5	Angular Momentum in 3D
17	T 3/17	8.5-8.7	Rigid Body Dynamics
18	H 3/19	9	Non-Inertial Reference Frames
19	T 3/31	10	Central Force Motion
20	H 4/2		Special Lecture: Dark Matter (If we're not running behind)
21	T 4/7	11	Damped and Driven Oscillations
22	H 4/9	No Class	Midterm 2 @ 7-9:30pm Material KK: 4.6-8 Lectures 11-17
23	T 4/14		Waves
24	H 4/16	12.1-12.6	Special Relativity: Time Dilation & Length Contraction, Simultaneity
25	T 4/21	12.7-12.9	Special Relativity: Lorentz Transform & Velocity Transforms
26	H 4/23	12.10-12.11	Special Relativity: Paradoxes & Doppler Shifts
27	T 4/28	13	Special Relativity: Relativistic Energy & Momentum
28	H 4/30	14	Special Relativity: 4 vectors Special Lecture: Colliders and Accelerators