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Physics 141 Mechanics Fall 2015

Keiko Kircher

Parkland College, kkircher@parkland.edu

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Physics 141 Fall 2015

August 24th, 2015

Instructor: Dr. Keiko (pronunciation = Cake-o) Kircher (lecture) and Dr. Carl Lorenz (lab)

Office: L240, keikoino@gmail.com

Office Hours: Monday and Wednesday 1:00pm-2:00pm (M124)

Text: Fundamentals of Physics, 10th edition, extended, by Halliday, Resnick and Walker.

Prerequisite: Calculus 1, or equivalent.

Materials: A calculator that can deal with algebraic and trigonometric functions, as well as statistical functions will be required for assignments and exams. A TI calculator is preferred.

Content: This course establishes the fundamental principles and problem-solving tools that form the foundation of physics and engineering applications. We will study mechanics and dynamics, the motion of physics systems and its causes. Calculus will often be used to solve problems and also to derive key findings throughout the course.

The core principles of physics are rooted in Isaac Newton's three laws of motion. The early weeks of the course are devoted to the motion (kinematics) of objects under the influence of these laws. After that, we will develop tools to quantify the causes of accelerated motion. We will draw from your knowledge of algebra, trigonometry and vectors. From time to time we will briefly review these math elements as needed.

We will then move on to an alternative scheme for doing physics: the energy principle. This principle can be derived from Newton's second law

as we will prove. The energy scheme can take some complex problems and make them more manageable. Where forces such as gravity and the spring force (so-called conservative forces) are concerned, the complexity of problems can be reduced considerably with this approach.

Next, we look at systems of masses and collisions among them. A principle of linear momentum conservation is developed, also derived from the Newton's second law.

The next (large) section of the course is devoted to the study of rotational motion and torque. In this section, an angular momentum principle emerges to govern systems of interacting masses, where the interactions have rotational consequences. In these latter stages of the course, problems tend to grow in complexity, where the force, energy, momentum, torque, and angular momentum principles show up in various combinations.

The physics of fluids, both static and dynamic, is explored. After that, systems that exhibit oscillatory motion is covered. Finally, we look at Newton's Law of Gravitation and its application to the orbital motion of satellites and planets.

Homework: Homework assignments are due on Wednesdays before the class. You are to obtain homework through cobra. One lowest homework score will be dropped.

Reading assignments: A reading assignment is assigned daily, to solidify your knowledge of what is covered in class each day. You are to read and do sample problems in the pages I provide. Your work will not be graded, but it is strongly recommended that you write down the solutions to the sample problems to improve your understanding of the materials. The reading assignment will be announced only in class.

Quizzes: Quizzes are done on Fridays in the last 20 minutes of the class time, except on exam weeks. Quiz problems are closely related to problems in the reading assignments, so I (again) strongly encourage you to take the reading assignments seriously. One lowest quiz score will be dropped.

Discussions: Discussions are done on Mondays in the last 20 minutes of the class time, except for the Mondays following hour exams. During a discussion time, you will have an opportunity to work on a problem with your classmates. One lowest discussion score will be dropped.

Exams: There will be four hour exams, on 9/18, 10/16, 11/13, and 12/4

(tentative). During the week of an exam, I will distribute a practice exam. The purpose of this is to help you sharpen up your skills, and get comfortable with the test-taking routine. If you cannot come to class on an exam day with a good reason, you may take the exam early. However, there is no make-up exams under any circumstances. One lowest hour exam grade will be dropped.

The final exam is on 12/14 (M) at 11am-1pm for 11am sections, and on 12/16(W) at 11am-1pm for noon sections.

Laboratory: You have registered for a lab section that meets for a 3-hour block of time each Tuesdays or Thursdays.

Each week there will be a handout distributed at the start of the lab session that will outline your experiment/activities.

We will keep lab sections at no more than 4 persons each.

It is important that you arrive on time to begin your lab session. A 5% deduction will be assessed if you arrive more than 10 minutes late for the session. If you arrive more than 20 minutes late, you may not be able to do the lab.

Lab reports must be handed in before you leave the lab.

Data that you include must be legitimate data collected during the lab session. Lab reports from previous semesters will not be allowed into the lab rooms.

Lab reports which are copied in full or in part will be considered cheating and may result in a failing grade for the course.

You must earn 60% on the laboratory part of the course to receive a passing grade for the course.

Grades: The grades are compounded in the following way:

Homework 15%

Discussions 5%

Quizzes 10%

Labs 15%

Hour exams 35 %

Final exam 20%

Letter grades will be assigned as follows: A 90%, B 80%, C 70%, D 60%. I may decide to curve if it seems reasonable. **You must earn 60% on the laboratory part of the course to receive a passing grade for the course.**

Missed assignment policy: **I do not allow any late or make-up assignments under any circumstances.**

If you are too sick to come to the class to turn in your assignments or to take quiz/exam/discussion, please e-mail me to keikoino@gmail.com before the class, with an explanation of why you cannot show up. If you do so, I will give you an excused grade (counts as your average score). If your e-mail does not get to me before the class, your score will be zero. If you are too sick to even e-mail me before the class, you need to later give me a doctor's note in order to get an excused grade. Please give it to me as soon as you can.

If you cannot come to class but still would like to turn in your homework, I will accept homework through emails ONLY if you have a reason to get an ex grade, and if the email is sent to me before the deadline. I do not accept homework through emails in any other situations.

If you miss a class accidentally without any good reasons (such as oversleeping), you will will get a zero in your assignment, but remember that one lowest score in homework, discussions, and quizzes will be dropped. Again, what you get with good reasons to miss classes is the right to take/turn in assignments early or to obtain excused grades. **YOU DO NOT GET THE PRIVILAGE TO TAKE QUIZZES AND EXAMS LATE, OR TO TURN IN YOUR HOMEWORK LATE.** There will be no make-up quizzes, exams, or labs under any circumstances.

Miscellaneous policies:

1. I do not wish to send my lecture notes electronically or provide it to you. If you wish to get lecture notes for days you missed, please ask your classmate for it.
2. I do not give any extra credit to any students by letting them do extra work (though I may give everyone an opportunity for other reasons). Please do not try to get any extra credit at the end of the semester by making up your missed assignments and doing extra research work. You having have to keep good grades for a scholarship is one common excuse that will definitely not work.

General Education: This course fulfills the following General Education objectives listed in the Parkland catalog. Students will:

- demonstrate their ability to solve problems, by collecting and evaluating facts and using methods of scientific inquiry.

- demonstrate their ability to compute and to think and express themselves effectively in quantitative terms.

Academic Honesty: I have found there to be an increase in the frequency of cheating incidents in recent years. The Student Policies/Procedures Manual (www.parkland.edu/studentpolicy/honesty) defines cheating, fabrication, and plagiarism. Consequences can carry the penalty of a failing grade for the course and possibly suspension from the course.

Be mindful of a few ground rules regarding test/quiz-taking. Tests and quizzes are closed-book and the following things would be considered cheating:

- exchange of materials of any kind (calculators, pencils, pens, information, anything)
- any talking
- looking at someone else's work
- letting someone look at your work

Core Values: I believe strongly in the Core Values espoused by Parkland College: Honesty and Integrity, Fairness and Just Treatment, Responsibility, Multiculturalism, Education, and Public Trust. Essentially, these values set guidelines for how we should treat one another. Failure to be respectful of one another or to maintain ethical behavior will not be tolerated.

Drops/Withdrawals: On the ten-day roster, I am required to assess your attendance. If you have not attended regularly to that point, you will be dropped with no refund of tuition or fees. After the ten-day roster, you should not plan on an instructor withdrawal if you want to withdraw from the course. You are ultimately responsible for your own withdrawal by the withdrawal date. Non-attendance after the ten-day roster will result in an F if you don't withdraw yourself.

Disability: If you believe you have a disability for which you need an academic accommodation (e.g., an alternative testing environment, use of assistive technology, or other classroom assistance) please contact Cathy

Robinson (U260, 353-2082), Director of Disability Services,
crobinson@parkland.edu. Also talk to me as soon as possible.

Center for Academic Success: If you find yourself needing assistance of any kind to complete assignments, stay on top of readings, study for tests, or just to stay in school, please contact one of the following staff at the Center for Academic Success:

Anita Taylor Room: D120 Phone: 353-2005

Sue Schreiber Room: D120 Phone: 351-2441

You may also email the CAS at CenterForAcademicSuccess@parkland.edu.

Note: Please refer to the Syllabus Addendum document (posted on Cobra Learning) for additional College policies.

Week	Chapters	Lecture Content	Lab
8-24	1, 2	1D kinematics, average speed and velocity, position, displacement, distance, velocity, speed, acceleration	Measurement and Statistics, Assessment Pre-Test, Lab Safety Introduction
8-31	2	Gravitational acceleration, 1D kinematics with gravity, multiple segment constant acceleration, chase problems	Free-Fall
9-7	3,4	2D vector methods, vector Cartesian components, unit vectors, relative velocity, adapting 1D kinematics to 2D, projectile motion	Projectile Motion
9-14	4,5	Newton's laws, gravity, tension, normal forces, free-body diagrams, single-mass problems with force combinations, <u>Exam 9-18</u>	Lab Assessments: Standard Error of Acceleration, 2D Projectile Flight, Review
9-21	5,6	Static and kinetic friction, multiple-mass problems with friction, pulley systems	Static Equilibrium
9-28	6, 7	Circular motion, derivation of centripetal acceleration, inclined planes, work-energy theorem	Centripetal Force
10-5	7	Derivation of energy principle from Newton's second law, work done by forces, 1D examples with energy principle	Dynamics with Air Track and Pulley
10-12	7, 8	Hooke's Law, conservative and non-conservative forces, gravitational and elastic potential energy, <u>Exam 10-16</u>	Lab Assessments: Force Vector Addition, Centripetal Lab Technique, Review
10-19	9	Impulse, momentum, derivation of momentum principle from Newton's second law, elastic and inelastic collisions in 1D and 2D	Work and Energy
10-26	10,11	Rotational kinematics, angular displacement, velocity and acceleration, torque, moment of inertia, pulley systems	Two-Dimensional Collisions
11-2	10,11,12	Rolling objects, energy principle applied to systems with rotation, static equilibrium, lever arms	Equilibrium of Rigid Bodies
11-9	11,12	Angular momentum principle, energy and angular momentum principles with collisions, tensile, bulk and shear stress, <u>Exam 11-13</u>	Lab Assessments: Balance of Torques, Pulley System and Linear Regression, Review
11-16	14	Fluids, density, Archimedes Principle, Bernoulli's Equation, Continuity Equation	Density and Buoyancy
11-23	13	Newton's Law of Gravitation, Modified gravitational potential energy, orbital motion	Tuesday activity to be announced, Thanksgiving Thursday
11-30	15	Oscillating systems, simple harmonic motion, spring-mass system, simple and compound pendulum, torsion pendulum <u>Exam 12-4</u>	Lab Assessments: Density of Unknown Material, Standard Error Analysis of Density, Review
12-7	--	review	Torsion Pendulum
12-14	-----	<u>Final Exam either 12-14 at 11 AM or 12-16 at 11 AM</u>	Finals Week (no lab)