Syllabus for

Physics 137

Fall 2019 Semester

Fundamentals of Physics:
Mechanics & Thermodynamics

Course title	Physics 137 "Fundamentals of Physics: Mechanics and Thermodynamics"
Professor	Soren P. Sorensen
Office	Science and Engineering Research Facility (SERF), room 607
Email	sorensen@utk.edu
Office Hours	MWF 11:00 AM - 12:00 PM (Basically after class)
Lecture Time	MWF 10:10-11:00 AM
Lecture Location	Physics Nielsen 306
Lab and Recitation Instructor	TBA
Recitation Time	Monday 4:40 – 5:30 PM
Recitation Location	Physics Nielsen 608
Lab Time	Monday 5:45 – 7:35 PM
Lab Location	Physics Nielsen 508
Homework Grader	TBA
Textbook	Randall D. Knight: "Physics for Scientists and Engineers: A strategic Approach", 4th Edition (Chapter 1-35)
"Clicker"	ResponseWare on your cell phone or laptop

Text Assignments

Chapter	Title
1	Concepts of Motion
2	Kinematics in One Dimension
3	Vectors and Coordinate Systems
4	Kinematics in Two Dimensions
5	Force and Motion
6	Dynamics I: Motion in a Line
7	Newton's Third Law
8	Dynamics II: Motion in a Plane
9	Work and Kinetic Energy
10	Interactions and Potential Energy
11	Impulse and Momentum
12	Rotation of a Rigid Body
13	Newton's Theory of Gravity
14	Fluids and Elasticity
15	Oscillations
18	A Macroscopic Description of Matter
19	Work, Heat, and the First Law of Thermodynamics
20	The Micro/Macro Connection
21	Heat Engines and Refrigerators

Course Description:

- Calculus-based physics of mechanics, sound, waves, and thermodynamics.
- Satisfies General Education Requirement: (NS)
- (RE) Co-requisite(s): Mathematics 141.
- Recommended Background: High school calculus and physics.
- Comment(s): For physics and engineering physics majors and qualified students from other majors.
- Registration Permission: Consent of department.

Learning objectives:

Students who successfully complete this course will be able to:

1. Understand and apply fundamental concepts of Classical Mechanics and Thermodynamics like, displacement, velocity, acceleration, force, work, kinetic energy, potential energy, mechanical energy, momentum, angular momentum, heat, temperature and entropy as well as the relationships between these concepts.
2. Understand and apply the conservation laws of mechanical energy, momentum, and angular momentum as well as the second law of thermodynamics.
3. Analyze and solve problems in 1-, 2, and 3-dimensional mechanical systems by applying force and/or conservation concepts. Analyze and solve problems in thermodynamics.
4. Apply either analytical or numerical techniques to solve physics problems depending on the character of the problem.

Lectures:

The most important way for you to learn the physics contained in this course will be to carefully study the textbook and to try to solve as many problems as possible. _It is assumed that you have studied the material contained in each chapter before the lectures_, so during the lectures we can focus on a few particularly important issues. In particular, we will rely heavily on student participation and student discussions aided by the use of a "clicker" system.

Homework:

The homework problems are due Wednesday at 5:00 PM following the day we finish each chapter. The homework should be placed in the Teaching Assistant's (TBA) mailbox in the Physics Office. The homework will all together count 15% of the total score.

Laboratory:

The laboratory exercises are an important and integral part of this course and have to be completed before a final grade will be assigned. The score assigned by the lab instructor will count 20% of the final score.

Recitations:

Recitations will normally be used to focus on how to solve problems. Your recitation instructor will be your lab instructor. Occasionally when I have to be out of town, a recitation might be swapped with a lecture. You will always be informed about that via email prior to the swap (except in emergencies).

Clickers:

Each student is required to have a Personal Response System (= Clicker system) ready *before the first lecture*. Instructions for how to setup and use such a system can be found at OIT's web site https://oit.utk.edu/teachingtools/clickers/. I recommend that you use the mobile device system (laptop, phone, tablet etc.), since this will be free of charge to you. Any technical questions concerning the Personal Response System should be address to the OIT helpdesk.

Each correct answer to a clicker question during a lecture will count 2 points, a wrong answer will count 1 point, and no answer will of course not give any points.

VPython:

The VPython 3-dimensional computational modeling system is an integral part of this course. It will enable you to better visualize the behavior of the many systems we will discuss, and it will also teach you how to solve many problems using numerical techniques that often cannot be solved using analytical (calculus) methods.

Instructions for how to setup and program in VPython can be found on the Physics 137 Canvas website under /Files/VPython/Vpython User Guide.pdf

Exams and Grading:

There will be given 4 tests, three during the semester and one final, comprehensive test at the end of the semester. Each semester test is counting 12.5% of the final score, but the lowest score of the first 3 tests will be discarded. **The final test is mandatory and will count 25% of the final score.** If you miss one of the first three tests for personal or medical reasons it will automatically be counted as your lowest score. **There is no make-up test,** so if you miss more than one of the first 3 tests or the final test you are in deep trouble!

If you know that you have potential scheduling conflicts with tests or other parts of the course, please tell as soon as you are aware of this potential conflict, so we together might be able to find a solution.

A "curve" might be used to transform your final score into the final grade. You are welcome to discuss and/or complain about the grading of a given assignment up to a week after it has been returned to you. After a week the score will not be changed.

Exam Schedule		
Test no.	Date & Time	Main content
1	Friday, 9/27, 10:10-11:00 AM	Chapters 1-8
2	Friday, 10/25, 10:10-11:00 AM	Chapters 9-12
3	Friday, 11/15, 10:10-11:00 AM	Chapters 13-15 and 18-19
Final	Wednesday, 12/11, 7:45 – 9:45 AM	Chapters 1-15 and 18-21

During tests you are required to bring a pencil and a pocket calculator and you are allowed 1 or 2 pieces of paper (letter size) with notes and formulas written by yourself. For tests #1 and #2 your will be allowed to bring ONE pieces of paper and for test #3 and the final test you may bring TWO pieces of paper. *In particular, no laptops, cell phones, or other means of communication are permitted.* You will receive a handout containing information on Physical Constants, Units, selected tables of physical properties, and selected mathematical formulas.

Summary of weights for scores in the different components of the course	
Final exam	25%
The 2 best of the 3 first tests (12.5% each)	25%

Labs	*20%*
Homework (each chapter counts equally much)	*15%*
Clicker / Responseware	*15%*

Course Material:

 This course consists of several components: lectures, laboratories, homework problems, and the text book. The material you will be expected to learn and will be tested on during the exams will be taught to you as part of all these course components. In particular, I will stress the importance of carefully working (not just reading) your way through all the parts of the textbook indicated above under "text assignments". The lectures will NOT just repeat the material in the text book, but will be used to discuss the course material in a variety of ways, some of them following the text book and some of them discussing topics not covered in the textbook, or discussing them in a different manner.

Attendance:

 You will not be required to attend class (lab attendance is required), but I have not yet had a student that was able to pass this course without attending nearly all the lectures! Furthermore, if an announcement is made in class and you are not present, it will be your responsibility to be aware of the content of the announcement.

Email:

 You are required to have an official UT email address (name@utk.edu or name@tennessee.edu) and read your email on a daily basis, since some of the needed information for this class, that can not be transmitted to you during the lectures or on this web site, will be given to you via email. In particular, issues like cancellation of classes or last minute changes in assignments. Please remember, that if you are using an existing non-UT email account (AOL, Yahoo, etc.) it is your own responsibility to re-route your UT email to your preferred account.

Honor Code, Collaboration and Plagiarism:

 As a student in this class you are highly encouraged to interact with other students concerning understanding of physics, in general, or homework problems. However, this

interaction has to be at a level where it increases your general knowledge of physics and of different ways to approach a particular homework problem. It can never cross the level to actual plagiarism. If I judge you have copied other sources (online or other students) or you have aided others in plagiarizing your work, you will receive a 0 (zero) score on the particular assignment or test and your final grade will be reduced by a letter grade (A- will be B- etc.). A second offense will lead to a grade of F for the course and a report to the Dean of Students.

Personal Pronouns:

I will be happy to honor your request to be addressed by a preferred name and gender pronoun. Please advise me of this preference as early as possible in the semester.

Disabled Students:

Any student who feels s/he may need an accommodation based on the impact of a disability should contact me privately to discuss your specific needs. Please contact the Office of Disability Services at 865-974-6087 in Hoskins Library to coordinate reasonable accommodations for students with documented disabilities.