OFFICIAL SYLLABUS WILL BE PROVIDED IN THE COURSE

EAST TENNESSEE STATE UNIVERSITY

College of Arts and Sciences

Department of Physics and Astronomy

PHYS-2110: Technical Physics I
Syllabus — Fall 2019

Course ID:	PHYS-2110-001
Lecture Times:	M W F 9:20- 10:15 am T R 9:45 - 11.05 am
Lecture Location:	Brown Hall, Room 265 Brown Hall Lab, Room 262
Lecturer:	Dr. Frank Hagelberg (hagelber@etsu.edu)
Office Hours:	T, Th, F 3:00 p.m. - 4:00 p.m. - but students may see me any time (279 Brown Hall, 439-6725)
Textbook:	*Fundamentals of Physics, 10th Edition* by Halliday & Resnick & Walker
Class Website:	D2L

Overview

Technical Physics I is the first semester of a one-year course in physics; topics will include mechanics, heat and thermodynamics, and the properties of solids, liquids, and gases. **Technical Physics I is a problem-solving course, that is, the measure of a student's progress is demonstrated by the ability to solve numerical problems, and analyze physical situations, not just to quote laws and formulas.** The suggested problems will be designed to help you develop these skills and the exams will test you on them. It is assumed that you have a reasonable working knowledge of algebra and trigonometry, and calculus. If you suspect your math preparation is inadequate, please consult with me. You are expected to have (*and know how to use*) a good scientific calculator — especially for exams. Sharing of calculators on exams is not permitted.

Course Outline

Week	Topics	Readings
August 26	Introduction, Motion in 1 dimension	Chapters 1, 2
September 2	Vectors, Motion in 2-D and 3-D (**No class on Labor Day: 9/2**) (**Lab Exercise: 9/3**)	Chapters 3, 4
September 9	Motion in 2-D and 3-D (**Lab Exercise: 9/10**)	Chapter 4
September 16	Force and Motion, Part I (**Lab Exercise: 9/17**)	Chapter 5
September 23	Force and Motion, Part II (**Lab Exercise: 9/24**)	Chapter 6
September 30 1	Kinetic Energy and Work (**Lab Exercise: 10/1**) (**Exam 1 Ch. 1-6 (Oct. 3)**)	Chapter 7
October 7	Potential Energy and Energy Conservation (**Lab Exercise: 10/8**)	Chapter 8
October 14	Center of Mass and Linear Momentum (**No Class Oct. 14-15-Fall Break)**	Chapters 9
October 21	Rotation, Rolling, Torque, and Angular Momentum (**Lab Exercise: 10/22**)	Chapters 10,11
October 28	Equilibrium and Elasticity (**Exam 2 Ch. 7-11 (Oct. 31)**)	Chapter 12
November 4	Gravitation, Fluids (**Lab Exercise: 11/5**) (**No class on Veteran's Day: 11/9**)	Chapters 13, 14
November 11	Fluids, Temperature, Heat (**Lab Exercise: 11/12**)	Chapters 14, 18
November 18	The Kinetic Theory of Gases (**Lab Exercise: 11/19**)	Chapter 19
November 25	Entropy and the Second Law of Thermodynamics (**Lab Exercise: 11/26**) (**No Class Nov. 27-29 due to Thanksgiving break**)	Chapter 20
December 2	Entropy, Thermodynamics, and final wrap-up (**Exam 3 Ch.11-14, 18 (Dec. 3)**) (**Lab Exercise: 12/3**)	Chapter 20
December 9	**Final Examinations**	

Homework

Every week, homework problems will be assigned. Every Thursday of each course week, selected homework problems will be discussed in class. Worked solutions to selected problems will be available at the class website.

Homework Problems

Chap.1	1, 3, 14, 21, 27
Chap.2	2, 5, 27, 28, 33, 44, 45, 49, 61, 73, 80
Chap.3	2, 3, 9, 11, 15, 17, 30, 34, 41, 46
Chap.4	16, 20, 27, 32, 43, 47, 49, 55, 59, 62, 92, 97, 103, 117
Chap.5	7, 15, 19, 41, 45, 49, 52, 53, 55, 57, 77, 80, 85, 95, 96
Chap.6	6, 7, 13, 19, 25, 28, 29, 44, 45, 67, 96
Chap.7	2, 41, 43, 55, 58, 62, 75, 76, 77
Chap.8	1, 3, 5, 6, 7, 17, 18, 23, 27, 28, 29, 31, 49, 54, 60, 101, 104
Chap.9	2, 4, 12, 16, 17, 22, 25, 38, 48, 49, 55, 60, 65, 87, 90, 91, 92, 93, 96, 99, 107, 109
Chap.10	2, 4, 10, 12, 13, 14, 19, 27, 33, 37, 42, 47, 49, 57, 58, 61, 63, 77
Chap.11	3, 12, 19, 28, 33, 37, 43, 51, 78, 82
Chap.12	2, 5, 10, 12, 21, 25, 37, 55, 63, 70
Chap.13	4, 9, 19, 39, 45, 50, 61, 72
Chap.14	3, 7, 24, 28, 32, 35, 45, 79, 85
Chap.18	3, 10, 15, 24, 35, 37, 41, 43, 44, 45, 47, 48, 91
Chap.19	8, 11, 20, 24, 42, 48, 51, 52, 56, 63, 78
Chap.20	5, 16, 19, 24, 27, 29, 33, 35, 52, 53

Exams

There will be three exams throughout the semester and a comprehensive final on the dates listed on the syllabus. Each will cover material prior to the test and be taken during class time (except the final). Each exam will be worth 100 points. In addition, nine short quizzes will be given. The dates of the quizzes are: 9/6, 9/13, 9/20, 9/27, 10/11, 10/18, 10/25, 11/8, 11/15. Each quiz will cover material presented in the two periods preceding the date of the quiz. Each quiz is worth 25 points. I will drop your lowest quiz grade.

Note that all physical constants that you may require will be supplied in both exams and quizzes. These tests will consist mostly of problems similar to the problems and examples in the text book, as well as other problems I work in class. Your lowest quiz score will be dropped. **Make-up tests will NOT be given!** YOU ARE STRONGLY URGED NOT TO MISS A REGULARLY SCHEDULED EXAM! However, should an **EXTREME** emergency arise, get in touch with me as soon as possible (preferably before the exam) with a documented excuse, which will be handled on an individual basis. It is your responsibility to bring this to my attention. You are expected to attend class regularly and note the days of exams. Material is covered at a fairly rapid case in this course, and each new chapter assumes you understand the material in previous chapters. It is very important that you keep up with course work on a daily basis.

Lab Exercises

As noted on the schedule, there will be ten Lab Exercises. These exercises will take place in the laboratory in Brown Hall 262. I will make write-ups for guidance through the lab sessions available on the class website. You will be graded on your participation in these sessions, as well as your lab reports. I will drop your lowest lab score and retain your average percent grade on on the rest. Making up a lab session will only be possible in exceptional cases. Your optimum lab score will be 200 points.

Student Presentations

Students will team up in groups of two. Each group will create a YouTube video, dealing with a physical effect that falls within the thematic scope of this class. In preparing this movie, you will use the *Adobe Creative Cloud*, a suite of applications for graphic design, video editing, web development, and photography. Every student of this class will have free access to the Adobe Creative Cloud for the duration of this year.

For instance, a presentation could deal with the Carnot Cycle. A video on this topic will address the notion of cyclical processes in thermodynamics which should be discussed in terms of both the First and the Second Law of Thermodynamics. Importantly, the video should demonstrate the operation of a Carnot Engine, representing a scheme for understanding heat engines in general, which includes a wide range of technology: cars, power stations, nuclear reactors... Another section of the video will place the concept of the Carnot cycle into a wider frame, highlighting its role beyond science and technology. This could involve its relevance for modern economies. It also could focus on the history of thermodynamic engines, maybe emphasizing their significance in the industrial revolution of the 19th century. All of this will be communicated by means of graphical illustrations and animations, supported by explanatory text, written or spoken.

Accessing the Adobe Creative Cloud:
You will receive an automated e-mail message instructing you to go to adobe.com to activate your license. When you do this, click on Enterprise ID, and when prompted type in your ETSU e-mail address.

Timeline for preparing the video presentations:

By 9/30: each group will have settled for a topic of choice, and will have identified Creative Cloud components to be used in realizing the projects, such as Adobe Illustrator for graphical design, or Adobe Premiere Pro for video editing. I will meet with each group to discuss their project.

By 10/21: hand in a one-page write-up, summarizing your project. Be explicit on

the Adobe Creative cloud programs that you'll employ.

Week of 12/2: presentation of final products. Each presentation will be followed by an in-class discussion of strengths and weaknesses, resulting in suggestions for revisions. We will vote on the best presentation. A (positive) surprise is waiting for the winner.

Week of 12/9 (exam week): The revised video will be handed in. Your final presentation grade will be based on these revised versions. The maximum number of points for your presentation is 200.

Grading

The grading system is calculated in the following way:

Final Percentage = (Exam 1 + Exam 2 + Exam 3 + Quiz Grade + Lab Exercise grade + Final Presentation grade + Final Exam) / 1000

The final grades will be based on the following scale:

A	=	92% or better	**B-**	=	75–79.99%	**D+**	=	55–59.99%
A-	=	90–91.99%	**C+**	=	70–74.99%	**D**	=	50–54.99%
B+	=	85–89.99%	**C**	=	65–69.99%	**F**	=	Less than 50%
B	=	80–84.99%	**C-**	=	60–64.99%			

Note that a failing grade also will be given if the student has engaged in any form of academic dishonesty. No student will be allowed to disrupt the class. No cellphones will be used during class time.