



EAST TENNESSEE STATE  
UNIVERSITY

College of Arts and Sciences  
Department of Physics and Astronomy

## PHYS-2120: Technical Physics II Syllabus — Spring 2020

- 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:** M, W, F 3:00 - 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 II is the second semester of a one-year course in physics; topics will include waves, electrostatics, and electrodynamics, including optics. Technical Physics II 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. Further, this course will train you in using up-to-date video technology for efficient presentation of scientific results. For this purpose, the program suite *Adobe Creative Cloud* will be available to you. 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

<u>Week</u>	<u>Topics</u>	<u>Readings</u>
January 20	Electric Charge, Electric Fields	Chapters 21, 22
January 27	Electric Fields, Gauss's Law <b>(Lab Exercise: 1/28)</b>	Chapters 22, 23
February 3	Electric Potential <b>(Lab Exercise: 2/4)</b>	Chapter 24
February 10	Electric Capacitance, Current, Resistance <b>(Lab Exercise: 2/11)</b>	Chapters 25,26
February 17	Circuits <b>(Lab Exercise: 2/18)</b> <b>(Exam 1 Ch. 21-26 (2/20))</b>	Chapter 27
February 25	Magnetic Fields, Magnetic Fields due to currents <b>(Lab Exercise: 2/26)</b>	Chapters 28, 29
March 2	Induction, Chapter 30 <b>(Lab Exercise: 3/3)</b>	
March 9	Oscillations, Waves I <b>(Lab Exercise: 3/10)</b> <b>(No Class March 16-20: Spring Break)</b>	Chapters 15, 16
March 23	Waves I, II <b>(Lab Exercise: 3/24)</b> <b>(Exam 2 Ch.15, 16, 27-30(3/26))</b>	Chapters 16, 17
March 30	Electromagnetic Oscillations, Maxwell's Equations <b>(Lab Exercise: 3/31)</b>	Chapters 31, 32
April 6	Electromagnetic Waves <b>(Lab Exercise: 4/7)</b>	Chapter 33
April 13	Images <b>(Lab Exercise: 4/14)</b>	Chapter 34
April 20	Interference <b>(Lab Exercise: 4/21)</b>	Chapter 35
April 27	Diffraction <b>(Exam 3 Ch. 17, 31-35 (4/28))</b>	Chapter 36,
May 4	Student presentations: 4/30 <b>Final Examinations</b>	

## 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.21	2, 5, 6, 9, 10, 11, 14, 19, 27, 42, 49
Chap.22	4, 7, 11, 15, 19, 32, 40, 43, 75, 84
Chap.23	3, 5, 7, 17, 21, 24, 29, 33, 36, 46, 57, 62
Chap.24	5, 14, 19, 36, 43, 45, 73, 90, 98, 99, 104
Chap.25	3, 6, 10, 11, 13, 17, 27, 31, 33, 42, 43, 51, 53, 67, 68, 70, 72
Chap.26	1, 8, 13, 14, 20, 41, 72, 75
Chap.27	1, 2, 5, 10, 18, 23, 41, 45, 53, 58, 59, 61, 78, 82, 90
Chap.28	3, 9, 38, 40, 43, 46, 49, 63, 73, 80
Chap.29	1, 3, 5, 7, 8, 10, 41, 43, 49, 50, 76, 83
Chap.30	3, 7, 11, 13, 23, 27, 28, 31, 35, 37, 40, 44, 48, 53, 55, 61, 62, 72, 75, 76, 79, 85, 89, 94, 97
Chap.15	2, 9, 15, 30, 31, 68, 83, 90
Chap.16	2, 5, 27, 28, 33, 44, 45, 49, 61, 73, 80
Chap.17	2, 3, 9, 11, 15, 17, 30, 34, 41, 46
Chap.31	4, 5, 11, 13, 29, 31, 32, 39, 47, 61, 66
Chap.32	5, 14, 15, 29
Chap.33	11, 13, 49, 55, 59, 64, 75, 92
Chap.34	1, 7, 17 to 29, 32 to 38, 45, 50 to 57, 80 to 87, 89, 92, 106
Chap.35	6, 14, 19, 29, 31, 40, 55, 73, 93, 100
Chap.36	5, 6, 15, 21, 23, 35, 43, 45, 46, 49, 58, 61

## 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 intermediate exam will be worth 100 points, the final exam 150 points. In addition, nine short quizzes will be given. The dates of the quizzes are: 1/31, 2/7, 2/14, 2/28, 3/6, 3/13, 4/3, 4/10, 4/17. Each quiz will cover material presented in the two periods preceding the date of the quiz. Each quiz is worth 25 points.

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 quizzes 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 twelve 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 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 origin of the aurora borealis (northern light). A video on this topic will address the notion of the solar wind as the cause of charged-particle streams that enter the atmosphere of the Earth. Another section of the video will deal with the magnetic field of the Earth and its effect on the particle streams. The concept of the magnetic bottle will be explained, and it will become plausible that the density of the cosmic projectiles is highest at the poles. Finally, collisions between cosmic and atmospheric particles will be specified as the physical mechanism that gives rise to the northern light. All of these phenomena will be communicated by means of graphical illustrations and animations, supported by explanatory text.

#### Accessing the Adobe Creative Cloud:

You will receive an automated e-mail message instructing you to go to [adobe.com](http://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 2/17: 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 3/23: hand in a one-page write-up, summarizing your project. Be explicit on the Adobe Creative cloud programs that you'll employ.

Week of 4/22: 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 5/4 (exam week): The revised video will be handed in. Your final presentation grade will be based on these revised versions.

## 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:

<b>A</b>	=	92% or better	<b>B-</b>	=	75–79.99%	<b>D+</b>	=	55–59.99%
<b>A-</b>	=	90–91.99%	<b>C+</b>	=	70–74.99%	<b>D</b>	=	50–54.99%
<b>B+</b>	=	85–89.99%	<b>C</b>	=	65–69.99%	<b>F</b>	=	Less than 50%
<b>B</b>	=	80–84.99%	<b>C-</b>	=	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.