Physics III – Thermodynamics, Waves and Optics
Phys-UA 95
Fall 2017

Professor
Frank A. Moscatelli
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Office: 726 Broadway 838
Telephone: 212-998-7907
Office hours: M. 1:00 PM – 2:00 PM,
Tu. Anytime by appointment
Wed. 11 AM – 12 noon

Teaching Assistants
Marc Williamson, email: mew488@nyu.edu
TA office hours are usually immediately after recitation session or by appointment.

Administration
William LePage
Email: wlp1@nyu.edu
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Meeting Times
Lectures: M. W. 9:30 – 10:45
Recitation II: M. 12:30 – 1:45
Recitation III: F. 2:00 – 3:15
Meyer 102
Meyer 264
Meyer 264

Course Text(s)

University Physics, 14th edition by Young and Freedman, Pearson Addison Wesley (2012). This is the same text used for Physics II so you may already have it. We will cover chapters 14 – 20 and 32 – 36 although not in that order. (Required)

An Introduction to Thermal Physics by Daniel Schroeder. I will cover chapters 1, 2, and 4 from this book as a complement to the regular text. (not Required)

Classical and Quantum Waves, Lecture Notes D. Pine and T. Lubensky. Available on NYU Classes website
**Pre and Co requisites**
Physics I & II with a grade of C or better or permission of the department. Calculus III or Intensive Calculus II can be taken concurrently with this course. We will use complex algebra that we will learn as a review or new material. Physics majors must also register for Intermediate Experimental Physics I (Phys-UA 73). This is a separate course with a one hour fifteen-minute lecture and an afternoon lab.

**NYU Classes**
All course announcements, homework, solutions, exam dates will on the course website through NYU Classes.

**Homework**
Problem sets will be assigned weekly and posted on NYU Classes. They are due on Fridays at 5:00PM in a box in the Physics Office, 726 Broadway 1005. They will be graded and returned in class at a subsequent time. Solutions will be posted on NYU Classes. To get full credit, the correct answer must be given along with all work shown. Graders will award partial credit, but doing so is more difficult if your work is sloppy and/or poorly organized on the page. Neatness, although not awarded per se, works to your advantage. In calculating your homework average, we will drop your lowest grade.

**Recitation**
Recitation is an integral, essential part of the course. Problem solving techniques are honed by repeated practice either alone or in groups. Recitation attendance is as expected as it is for lecture. In fact, your participation in recitation is part of your overall grade. A sign-in sheet will record attendance. It is your responsibility to contact your TA if you cannot make a section and arrange to attend another one for that week.

**Exams**
There will be two in-class midterms (Wednesday Oct. 4 and Wednesday Nov. 15) as well as a final exam. The final is scheduled for Monday 18 December at 8:00 – 9:50AM in our normal lecture hall, Meyer 102. If you know you will miss an exam it is essential that you notify me as early as possible.

**Grading Breakdown**
<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Homework</td>
<td>25%</td>
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<tr>
<td>Recitation</td>
<td>10%</td>
</tr>
<tr>
<td>Midterms (both)</td>
<td>40%</td>
</tr>
<tr>
<td>Final</td>
<td>25%</td>
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</tbody>
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**Collaboration and permitted aids**
Physics is often a collaborative endeavor. You are encouraged to work with your classmates on homework assignments, but you must produce your own work. You may work through a problem together on the blackboard then transcribe and condense the arguments on your individual assignments. You may not copy directly
from one assignment to another. You may explain to a classmate how you solved a problem. You may not give a classmate a copy of your homework to consult. List your collaborators on each problem set.

On homework, you may of course use any or our textbooks and lecture notes. You may not use solution sets produced for other courses or previous years of this course (e.g. that you might find online or be given by a friend). If you use any resources other than the course texts, course lecture notes, or course section notes, list them on your problem set.

Unless we tell you specifically otherwise, you may not use any aid (books, notes, calculators, etc.) on any exam. If you have any question about what is permitted, please consult the course staff.

You are also reminded of the University policy on academic honesty described in the Handbook. Instances of cheating will be referred to the Director of Undergraduate Studies with a minimum outcome of a failing grade in the course.

**Schedule of lecture topics** (approximate)

<table>
<thead>
<tr>
<th>Topic</th>
<th>Reading</th>
<th>Other</th>
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<tbody>
<tr>
<td>Temperature &amp; heat</td>
<td>17.0-17.5</td>
<td>Schroeder 1.1</td>
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<tr>
<td>Equations of state &amp; the ideal gas law</td>
<td>18.0-18.3</td>
<td>Schroeder 1.2</td>
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<tr>
<td>Gas velocity, pressure &amp; heat capacities</td>
<td>18.4-18.6</td>
<td>Schroeder 1.3,4</td>
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<tr>
<td>First law &amp; work, thermodynamic paths</td>
<td>19.0-19.4</td>
<td>Schroeder 1.5,6</td>
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<tr>
<td>Adiabatic processes, specific heat ratio</td>
<td>19.5-19.8</td>
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<tr>
<td>Heat engines: cyclic processes &amp; efficiency</td>
<td>20.0-20.6</td>
<td>Schroeder Ch.4</td>
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<tr>
<td>Entropy and the second law of thermodynamics</td>
<td>20.7-20.8</td>
<td>Schroeder Ch.2</td>
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<td>Complex Algebra Review, midterm review</td>
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**Midterm Exam 1 Wednesday 4 October**

Intro to differential equations
Undamped SHM
Damped SHM
Driven SHM resonance
Mechanical Waves
Light: EM waves, polarization
Light: Reflection & refraction

**Midterm Exam 2 Wednesday 15 November**

Geometric optics: spherical mirrors
Geometric optics: thin lenses 34.3-34.4
Optical devices: eye, telescope & microscope 34.5-34.8
Interference: 2-slit & film interference 35.0-35.4
Fraunhofer: 1-slit diffraction 36.0-36.3
Multiple-slit diffraction & gratings 36.4-36.5
X-rays, holography & resolving power 36.6-36.8

**Final 18 December. 8:00AM.**