

# PHYSICS 3300: Introduction to Modern Physics

## Course syllabus: Winter 2017

**Instructor: Prof. W.J. Llope**

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### Meeting times

MW, 2:30 - 3:45pm. Room 245 Physics

Note: The lab class (PHY3310) runs at different times – see PHY 3310 syllabus

### Office Hours

Mondays 1:30-2:30.

### Course Synopsis

This course is an introduction to a broad range of topics in Modern Physics. It is meant to introduce the basic concepts of a range of topics, with the full details left to upper-level Physics classes. The course covers Special Relativity, Quantum Mechanics, Atomic Physics, Statistical Physics, Solid State Physics, Nuclear Physics, Particle Physics, and Cosmology.

### Learning Outcomes

By the end of the course students should be able to do the following:

1. Apply the basic principles of special relativity to solve problems
2. Understand and explain the basis for quantum mechanics and be able to solve Schrodinger's equation for simple potentials
3. Be able to apply statistical physics to describe how semiconductors work
4. Calculate the energy required/released in nuclear reactions
5. Know the fundamental particles in the Standard Model
6. Be able to apply Hubble's Law, and use the Friedmann equation to describe the evolution of the Universe

### Text

The course text is “Modern Physics” 3rd ed. by Serway, Moses and Moyer. This edition is expensive, but the older 2<sup>nd</sup> edition is available for about \$15 from internet sellers, and is fine. There are many good textbooks called “Modern Physics” covering essentially the same material -- feel free to use a different one for studying. I will not assign problems directly from the book, so having this specific text is not a requirement. I do, however, highly recommend you get a textbook. There is not enough time in lectures to cover all the material thoroughly. You will gain a much better understanding of the topics by reading the material outside of class. Ideally you will read the relevant chapter *before* coming to class.

### Exams

There will be three exams during the semester plus a final exam. The final exam will cover the material after the 3<sup>rd</sup> exam but will also include material from the first three exams. Exams are closed book, but a single summary (equation) sheet that you write yourself will be allowed. You are also allowed to bring a calculator.

### Homework assignments

Problems from the text will be assigned each week, and collected one week later in class. Homework and due dates will be posted to Blackboard. No late homework will be accepted as solutions will be

automatically be posted on Blackboard after the deadline. No credit will be given for minimal efforts (including for math-based questions writing the answer without showing your working) or for work that is obviously copied from another student.

## Grading

The course grade has the following components:

40% - Best two (out of the three) mid-term exams

35% - Final exam

25% - Homework Problem Sets, after dropping the lowest homework score.

The course grade will be assigned according to the total number of percentage points as follows:

A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
90-100	85-89	80-84	75-79	70-74	65-69	60-64	55-59	50-54	45-49	40-44	0-39

## Policy on Missed Work

There are **no** make-up exams or problem sets. The grading scheme drops the lowest mid-term exam, and lowest homework score, and these provisions accommodate routine illness and personal contingencies.

Generally, if a student is registered for the course a regular grade will be given. A grade of incomplete (I) will be given only in exceptional cases (to accommodate illness or emergency) after consultation with Prof. Llope before the end of term.

## In-class policies

Out of consideration for the other students in the lecture please abide by the following rules of conduct: (1) Turn off all cell phones while in lecture, (2) Please arrive on time for lecture and do not leave early, (3) Please be mindful of your classmates.

## Academic dishonesty

All of the graded assignments are designed to measure your individual understanding of the material. No forms of cheating on these graded assignments will be tolerated (working together on the homework assignments is not considered cheating but copying of someone else's homework is). Anyone found cheating on any graded activity will receive a grade of zero for that part of their grade, and may receive a failing grade for the course.

## Student Disability Services

If you have a documented disability that requires accommodations, you will need to register with Student Disability Services for coordination at 1600 David Adamany Undergraduate Library in the Student Academic Success Services department. SDS telephone number is 313-577-1851 or 313-577-3365 (TTY: telecommunication device for the deaf; phone for hearing impaired students only). Once you have your accommodations in place, I will be glad to meet with you privately during my office hours to discuss your special needs. Student Disability Services' mission is to assist the university in creating an accessible community where students with disabilities have an equal opportunity to fully participate in their educational experience at Wayne State University.

## Class Schedule

The schedule below is tentative and may be adjusted as needed throughout semester. Note the date and time of the final exam is set by the university and cannot be changed. See the PHY 3310 syllabus for an up-to-date lab schedule.

<b>Date</b>	<b>Chapter &amp; Topic</b>
M 01/09	Begin Chp 1-2: Relativity
W 01/11	
M 01/16	<b>NO CLASS (MLK day)</b>
W 01/18	Begin chp 3: Quantum Theory of Light
M 01/23	
W 01/25	Begin Chp 4: Particle nature of matter
M 01/30	
W 02/01	<b>Exam 1</b>
M 02/06	Begin Chp 5: Matter waves
W 02/08	
M 02/13	Begin Chp 6/7: 1-D Quantum Mechanics
W 02/15	
M 02/20	Begin Chp 8: 3-D Quantum Mechanics
W 02/22	
M 02/27	
W 03/01	<b>Exam 2</b>
M 03/06	Begin Chp 9: Atomic Structure
W 03/08	
M 03/13	<b>SPRING BREAK</b>
W 03/15	<b>SPRING BREAK</b>
M 03/20	Begin Chp 10: Statistical Physics
W 03/22	
M 03/27	Begin Chp 11-12: Solid state physics
W 03/29	
M 04/03	<b>Exam 3</b>
W 04/05	Begin Chp 13/14: Nuclear Physics
M 04/10	
W 04/12	Begin Chp 15: Particles
M 04/17	
W 04/19	Begin Chp 16: Cosmology
M 04/24	
W 04/26	<b>FINAL (2:45-4:45pm)</b>