PHYSICS 3300: Introduction to Modern Physics

Course Syllabus: **Winter 2018**

Instructor: Prof. Alex Matos Abiague
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Meeting times
MW, 2:30 pm - 3:45pm, Rm 245 Physics
Note: lab classes run at different times – see PHY 3310

Office Hours
MW 12:30pm - 2pm. If you can't make it during regular office hours, please feel free to email me to schedule an appointment at some other day/time.

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 2nd edition is available for about $10 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 set 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 four exams, each covering about a quarter of the course material. Exams are closed book, but a single summary (equation) sheet is allowed.

Homework assignments

Problems will be assigned each week, and collected one week later in class. In addition an online quiz evaluating fundamental concepts will be scheduled each week. Homework and due dates will be posted to Canvas. No late homework will be accepted as solutions will be automatically be posted on Canvas 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:

80% - Exams, after dropping the lowest 25% of individual problems scores

20% - Homework Problems+Quiz Sets, after dropping the lowest set 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 problems sets. The grading scheme, dropping the lowest 25% of exam problems, and allowing for a missed problem set, will 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. Matos Abiague **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

It will be adjusted as needed throughout the semester. See the PHY 3310 syllabus for an up-to-date lab schedule.

Date	Chapter/item
M 01/08	Begin Chap. 1-2: Relativity I
W 01/10	Relativity II
M 01/15	NO CLASS (Martin Luther King Jr. Day)
W 01/17	Begin Chap. 3: Quantum Theory of Light I
M 01/22	Quantum Theory of Light II
W 01/24	Begin Chap. 4: Particle Nature of Matter I
M 01/29	Particle Nature of Matter II
W 01/31	Review/Examples
M 02/05	**Exam 1**
W 02/07	Begin Chap. 5: Matter waves I
M 02/12	Matter waves II
W 02/14	Begin Chap. 6/7: 1-D Quantum Mechanics I
M 02/19	1-D Quantum Mechanics II
W 02/21	Begin Chap. 8: 3-D Quantum Mechanics I
M 02/26	3-D Quantum Mechanics II
W 02/28	Review/Examples
M 03/05	**Exam 2**
W 03/07	Begin Chap. 9: Atomic Structure I
M 03/12	NO CLASS (Spring Break)
W 03/14	NO CLASS (Spring Break)
M 03/19	Atomic Structure II
W 03/21	Begin Chap. 10: Statistical Physics I
M 03/26	Statistical Physics II
W 03/28	Review/Examples
M 04/02	**Exam 3**
W 04/04	Begin Chap. 13/14: Nuclear Physics I
M 04/09	Nuclear Physics II
W 04/11	Begin Chap. 15: Particles I
M 04/16	Particles II
W 04/18	Begin Chap. 16: Cosmology I
M 04/23	Cosmology II
W 04/25	Review/Examples
M 04/30	**Exam 4**