PHYSICS 3300: Introduction to Modern Physics

Course Syllabus: **Winter 2020**

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Meeting times
TT, 2:30 pm - 3:45pm, Room 1109, Science Hall
Note: lab classes run at different times – see PHY 3310

Office Hours
TT 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, and Particle Physics.

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 ensembles of bosons and fermions
4. Understand the structure, classification, and microscopic properties of solid state crystals such as insulators, metals, and semiconductors
5. Calculate the energy required/released in nuclear reactions
6. Know the fundamental particles in the Standard Model

Text
The course recommended text is "Modern Physics" 3rd ed. by Serway, Moses and Moyer. 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 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:

70% - Exams.
30% - 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 problem sets. The grading scheme, allowing for a missed problem set, will accommodate routine illness and personal contingencies. There are no make-up exams, except in very exceptional cases and under the discretion of the Instructor.

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 any graded assignments will be tolerated. Students are encouraged to work together on the homework via small study groups. However, each student is required to write their own homework report without copying or plagiarizing others. Any copying or plagiarizing will be considered cheating, resulting in no credit and, possibly, university-level disciplinary actions (https://doso.wayne.edu/pdf/student-code-of-conduct.pdf). Your homework may be checked for plagiarism with SafeAssign.

Add/Drop Dates
Please, refer to WSU's Academic and Registration Calendar (http://reg.wayne.edu/students) for the University add and drop dates. Note: Failing to drop a class by a deadline may hurt your GPA, financial aid status, and/or your tuition bill.

Student Disability Services

If you have a documented disability that requires accommodations, you will need to register with Student Disability Services for coordination of your academic accommodations. The Student Disability Services (SDS) office is located at 1600 David Adamany Undergraduate Library in the Student Academic Success Services department. The SDS telephone number is 313-577-1851 or 313-202-4216 for videophone use. Once you have met with your disability specialist, I will be glad to meet with you privately during my office hours to discuss your accommodations. 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. You can learn more about the disability office at www.studentdisability.wayne.edu.

To register with Student Disability Services, complete the online registration form at:
https://wayne-accommodate.symplicity.com/public_accommodation/

WSU Resources for Students

- Student Disability Services (SDS) http://studentdisability.wayne.edu/
- Academic Success Center http://www.success.wayne.edu/
- Counseling and Psychological Services (CAPS) http://www.caps.wayne.edu
- Dean of Students' Office http://www.doso.wayne.edu
- College of Liberal Arts & Sciences: https://clas.wayne.edu/students
- Departmental Website: http://physics.clas.wayne.edu//

Class Schedule

A tentative class schedule is provided in the next page. However, keep in mind that the class schedule is a dynamic document that may be readjusted as the semester progresses.

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
Tu 01/07	Begin Chap. 1-2: Relativity I
Th 01/09	Relativity II
Tu 01/14	Begin Chap. 3: Quantum Theory of Light I
Th 01/16	Quantum Theory of Light II
Tu 01/21	Begin Chap. 4: Particle Nature of Matter I
Th 01/23	Particle Nature of Matter II
Tu 01/28	Review/Examples
Th 01/30	**Exam 1**
Tu 02/04	Begin Chap. 5: Matter waves I
Th 02/06	Matter waves II
Tu 02/11	Begin Chap. 6/7: 1-D Quantum Mechanics I
Th 02/13	1-D Quantum Mechanics II
Tu 02/18	Begin Chap. 8: 3-D Quantum Mechanics I
Th 02/20	3-D Quantum Mechanics II
Tu 02/25	Review/Examples
Th 02/27	**Exam 2**
Tu 03/03	Begin Chap. 9: Atomic Structure I
Th 03/05	Atomic Structure II
Tu 03/10	NO CLASS (Spring Break)
Th 03/12	NO CLASS (Spring Break)
Tu 03/17	Begin Chap. 10: Statistical Physics I
Th 03/19	Statistical Physics II
Tu 03/24	Review/Examples
Th 03/26	**Exam 3**
Tu 03/31	Begin Chap. 12: Solid State Physics I
Th 04/02	Solid State Physics II
Tu 04/07	Begin Chap. 13/14: Nuclear Physics I
Th 04/09	Nuclear Physics II
Tu 04/14	Begin Chap. 15: Particles
Th 04/16	Review/Examples
TBD	**Exam 4**