

# PHYS 324: Modern Physics

Fall 2016

Syllabus

## Instructor

Prof. Sebastian Deffner  
Physics, Rm. 311  
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## Time and Place

MoWeFr 9:00-9:50am  
Physics, Rm. 107

## Office hours

tba

## Textbook

**Modern Physics for Scientists and Engineers**  
John R. Taylor, Chris D. Zafiratos, and Michael A. Dubson  
University Science Books, ISBN 978-1-938787-75-1

## Scope

The breakdown of classical physics, special relativity, quantum mechanics and atomic structure, solid-state, nuclear and elementary-particle physics.

## Dates

- First day of class: August 31, 2016
- Last day of class: December 12, 2016
- First in-class test: September 30, 2016
- Second in-class test: November 04, 2016
- Final exam: December 16, 2016

## Course Objectives

This course will provide a general overview of the main subjects in modern physics. It will discuss key experiments, introduce the relevant terminology, and develop the main ideas of theoretical understanding. You will solve quantitative problems, but presenting long and rigorous derivations and solving complex problems are left for more specialized courses, especially for quantum mechanics.

At the end of the course, you should:

- understand the main ideas and consequences of the special theory of relativity,
- understand why quantum mechanics is needed to explain the phenomena of the micro-world and review the most important historical steps of its development;
- be familiar with the most fundamental principles and applications of quantum mechanics,
- understand some basic principles of nuclear physics, radioactivity, and particle physics,
- have better understanding of how the different branches of physics fit together into a coherent picture,
- improve your analytical ability.

## Course Format

PHYS 324 is a traditional lecture course. Nevertheless, individual reading will play an important role, probably more so than in other core physics courses. Only the most important principles and connections will be discussed in lecture, the rest will be left for reading.

Feel free to ask questions during lecture, whether you have difficulty with a concept, notice an error, or want to hear more details about an aspect of the material. It is important that we do not move on until all the important issues are settled.

## Homework

There will be a homework assignment every week. The assignments will be posted on Blackboard every Friday after class, and submission is due the following Friday on 9:00 am. A homework assignment will consist of two parts:

- Two more complex problems that have to be worked out and written up in detail at home as a usual homework assignment and submitted. These problems will be graded to 4 points each. It will be expected that the submitted problems be written up in a clear, legible, and organized fashion, complete with appropriate verbal comments and figures, very much like examples in the textbook.
- A reading assignment complementary to the material discussed in class. The homework assignments will contain two questions about the reading material, which will amount to another 2 points.

You are allowed, in fact, encouraged, to form study groups and discuss the material and homework questions with each other. However, at the end, the homework solution must be your own work, not a group product. I will give no credit for obvious copies. After all, you are left to your own devices at the tests and in real life. Learn from each other, but be able to work on your own.

**Late homework will not be accepted (no exceptions). Homework will be submitted at the beginning of class on the date it is due.**

## Exams

There will be two in-class tests during the semester, each covering specific sections of the material. The final exam will be cumulative. All tests are closed book, and the value of fundamental constants will be listed on the test sheet. If I ask a question that requires the knowledge of a complicated result – e.g. a H-atom wave function – I will provide that equation as part of the question, as well.

If you miss a test for medical or other unavoidable reason, provide proof, and we will arrange for a make-up test. If you know that you will have to miss a test for a foreseeable reason (religious holiday, court date, family event, existing medical problem, etc.), make arrangements before the test, rather than after.

## Grades

Your grade will be determined according to the following distribution of points:

1. Homework assignments (14): 10 points each; 140 points in total.
2. In-class tests (2): 20 points each, weighted by a factor of 5; 200 points in total.
3. Final exam: 52 points, weighted by a factor of 5; 260 points in total.

This adds up to a possible total of 600 points. Approximately, A will be given above 540 points (90%), B for at least 480 points (80%), C for at least 420 points (70%), and D for at least 360 points (60%).

Full credit requires complete and correct solutions. I also understand that even with a few mistakes, your work may have value. Thus, you can get a good grade in spite of missing a few details or making an occasional mistake in the calculation.

“Incomplete” is given only in exceptional cases. To be considered for an “I”, you must have taken at least one midterm exam, submitted 10 homework solutions, and have C or better standing at the time of incapacitation.

## Academic Integrity

”By enrolling in this course, each student assumes the responsibilities of an active participant in UMBC’s scholarly community in which everyone’s academic work and behavior are held to the highest standards of honesty. Cheating on a test could result in disciplinary action that may include, but is not limited to, suspension or dismissal.” More on the requirements of academic integrity can be found at <http://www.umbc.edu/gradschool/procedures/integrity.html>

Applied to this course, a proven case of misconduct during a test or a blatant copy or plagiarism of a homework solution “earns” zero on the assignment in question. A second offense will result in failing the course.

On my end, I promise well-prepared lectures, careful and timely grading, and openness.

## Disabilities

- If you have any condition such as a physical or learning disability, which will make it difficult for you to carry out the work as described or which will require academic accommodations, please notify me ASAP, but definitely during the first two weeks of classes.
- If you are taking the exam with Student Support Services, remind me by email 48-96 hours before every exam to give me time for proper preparation. You also need to schedule the exam with Student Support Services.