Course Syllabus

Course Name: Modern Physics
Course Code: vp390

Course Pre-requisites
Physics II (vp240) or Honors Physics II (vp260)
Applied Calculus IV (vv256) or Honors Mathematics IV (vv286)

Textbooks
P.A. Tipler, R.A. Llewellyn, *Modern Physics* (6th edition)
additional reading: R.L. Liboff, *Introductory Quantum Mechanics* (4th edition, Addison Wesley, 2002)

Instructor
Mateusz KRZYZOSIAK (m.krzyzosiak@sjtu.edu.cn)
Office hours: Tuesday 14.00-15.30, Tuesday (odd weeks) 18.15-20.00, Thursday (even weeks) 14.00-15.30 and by appointment
Office: room 211 (JI Building), Phone: 021-34206765 ext. 2111

Teaching Assistant
TAN Hanzhou (email: tanhanzhou@sjtu.edu.cn; recitation class: TBA; office hours: Friday 12.10-14.00 in TBA)

Grading Policy

Coursework (25%)
Quiz (15%)
Midterm Exam (30%)
Final Exam (30%)

For this course, the expected median grade is around “B/B+”.

Academic Integrity

Lectures

Students are encouraged to read the relevant chapters in the textbook ahead of the lecture. Students are required to read and review the relevant chapters after the lecture. Lecture notes and other study resources will be available on Canvas. Students are expected to attend lectures.

Recitation Classes

Weekly recitation sessions will be led by the teaching assistant. Recitation classes will focus mostly on problem solving and discussion. Students are expected to attend and actively participate in the recitation sessions.

Homework

Homework will be assigned in the form of problem sets to be solved by each student individually. Problem sets will have a due date, by which solutions have to be handed in for grading. Please plan your time well, late homework will not be accepted.

Quiz

There will be three pre-announced quizzes based on weekly review lists that will be given to the students.

Exams

There will be two exams as listed in the class schedule. The exams are closed book.

Honor Code

Oral discussion of homework problems with other students is allowed and encouraged on the level of general ideas, not specific solutions. It is not allowed to show any written work to other students. If any references to academic textbooks or research journals are made, they should be properly identified with the bibliographical data. No references to Wikipedia entries are allowed.

Course description and detailed teaching schedule

Modern Physics is a course in relativistic classical mechanics and elementary non-relativistic quantum mechanics. The formalism of quantum mechanics is introduced in the wave function approach and illustrated by discussing standard quantum mechanical problems. The concepts are further illustrated by applying the formalism to describe properties of molecules, solids, and nuclear matter.

Teaching Schedule

week	date	topic	textbook chapters
1	May 15–21	special theory of relativity	1
2	May 22–27	special theory of relativity; basic concepts in the general theory of relativity	1, 2
3	May 29–Jun 4	experimental motivation for quantum mechanics; quantum mechanics in the wave-function formulation	3-4, 5, *
4	Jun 5–11	wave-function formalism; Schrödinger equation in one dimension – bound states	5, 6, *
5	Jun 12–18	Schrödinger equation in one dimension – unbound states (1D scattering); measurement in quantum mechanics and uncertainty principles	6, *
6	Jun 19–25	angular momentum; Schrödinger equation in three dimensions	7
7	Jun 26–Jul 2	**midterm exam** Schrödinger equation in three dimensions: the hydrogen atom	7, *
8	Jul 3–9	elements of the theory of the angular momentum and spin; applications in atomic physics	8
9	Jul 10–16	many-particle systems in quantum mechanics; elements of statistical physics – specific heat of gases	9
10	Jul 17–23	molecular structure and bonding mechanisms; quantum-mechanical fundamentals of solid state physics	10, *
11	Jul 24–30	quantum-mechanical fundamentals of solid state physics; band structure of solids	10, *
12	Jul 31– Aug 6	basic ideas in quantum information processing (or fundamentals of nuclear physics)	*/ 11
13	Aug 7–11	**final exam**	

* additional teaching materials will be provided