Course Name – Introduction to Modern Physics (Fall 2017)

Course Number - Physics 3150

Meeting time/day/place - 9:00 am -9:50 am M, W, F (Physics Rm 102)

Instructor Name – Guang Bian

COURSE DESCRIPTION

The course will provide an introduction to several topics in modern physics, such as the theory of relativity and quantum mechanics, including their application to nuclear, atomic, molecular and solid state physics. The course is calculus based and relies heavily on problem solving and essay writing.

Prerequisite: PHYSICS 2760 (University Physics II).

COURSE LEARNING GOALS

The student will gain an understanding of:

• relativistic dynamics and energy;
• quantum theory of light and the particle nature of matter;
• “nuts” and “bolts” of quantum mechanics; how electrons tunnel through barriers; what holds molecules together?
• nuclear reactions and nuclear processes.

INSTRUCTOR INFORMATION

Dr. Guang Bian
E-mail: biang@missouri.edu [preferred method of contact]
Office Location: 312 Physics Bldg.
Phone: 882-7892
Office Hours: M/W/Th 10:00– 11:00 am

TA INFORMATION

TBA - Grader

REQUIRED TEXTBOOKS AND MATERIALS


Additional references (for scientific writing)

COURSE POLICIES (attendance, absences, submitting late work)

Physics 3150 is a 3 credit-hour course. As such, it requires a minimum of 6 hours of outside study per week.

You are expected to read the material from the textbook prior to lectures. Some lecture notes will be provided in electronic form on the course Website. These notes should not be regarded as a substitute for the textbook. Problem solving is an important aspect of the course.

Your performance and grade in this course will be assessed based on:

1) Writing Intensive Assignments: Your main writing assignments will consist of two papers, each addressing different aspects of two important discoveries in modern physics. In addition to problem sets, the exams (midterm and final) and homework assignments will contain short essay questions.

2) Homework: There will be a total of six homework assignments, evenly distributed throughout the semester and each counting 40 points. The homework will be made available in electronic form on Canvas.
   The homework will be collected in class on its due date. Solutions will be posted on the Website on that day. After that, no late homework will be accepted.

3) Exams: There will be two exams, a midterm exam (October 11) and a comprehensive final exam during the Finals week in December. These exams will be closed-book, and you may only use a calculator. Independent work and academic honesty are expected in all exams and assignments.

GRADING SCALE (include +/- grades)

Course grades will be given on the plus/minus scale, based on the following point total:

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Writing Assignments</td>
<td>340</td>
</tr>
<tr>
<td>Homework</td>
<td>240</td>
</tr>
<tr>
<td>Midterm Exam</td>
<td>180</td>
</tr>
<tr>
<td>Final Exam</td>
<td>240</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>1000</strong></td>
</tr>
</tbody>
</table>

25 points out of 170 points will be allocated to the first draft of each writing assignment.

Provided that you attend both exams, hand in all your writing assignments and at least five homework assignments, you may expect the following course grade:

For 0-324 points: F
For 325-399 points: D
For 400-649 points: C
For 650-799 points: B
2
For 800-1000 points: A

You fail the class automatically if you miss 2 or more homework or any exam or a writing assignment!

SEQUENCE OF TOPICS BY WEEK (OR LECTURE)
Course Website: Blackboard (https://courses.missouri.edu)

1. Relativity [6 lectures]
   - Space and time of relativity
   - Relativistic mechanics

2. Quantum Mechanics [~18 lectures]
   - Quantum theory of light
   - Atoms
   - Matter waves
   - 1D, 2D and 3D quantum systems
   - Electron spin and multielectron atoms

3. Statistical Physics [3 lectures]
   - Classical and quantum statistics

4. Molecular Structure [2 lectures]
   - Molecular bonds
   - Molecular spectra, rotation, and vibration

5. Solid State Physics [6 lectures]
   - Bonding of solids
   - Classical free electron theory of metals
   - Semiconductors-applications

6. Nuclear Structure [4-5 lectures]
   - Properties of nuclei
   - Radioactivity
   - Elementary particles

Midterm Exam: October 11, 2016
Final Exam: TBA

I hope you will enjoy the time that we will spend together.

ADA STATEMENT

Students with Disabilities:
If you anticipate barriers related to the format or requirements of this course, if you have emergency medical information to share with me, or if you need to make arrangements in case the building must be evacuated, please let me know as soon as possible.

If disability related accommodations are necessary (for example, a note taker, extended time on exams, captioning), please register with the Disability Center (http://disabilitycenter.missouri.edu), SS Memorial Union, 573- 882-4696, and then notify me of your eligibility for reasonable accommodations. For other MU resources for persons with disabilities, click on "Disability Resources" on the MU homepage.

UNIVERSITY POLICY ON ACADEMIC DISHONESTY

Academic honesty is fundamental to the activities and principles of a university. All members of the academic community must be confident that each person’s work has been responsibly and honorably acquired, developed, and presented. Any effort to gain an advantage not given to all students is dishonest whether or not the effort is successful. The academic community regards academic dishonesty as an extremely serious matter, with serious consequences that range from probation to expulsion. When in doubt about plagiarism, paraphrasing, quoting, or collaboration, consult the course instructor.

Academic Dishonesty includes but is not necessarily limited to the following:

A. Cheating or knowingly assisting another student in committing an act of cheating or other academic dishonesty.

B. Plagiarism which includes but is not necessarily limited to submitting examinations, themes, reports, drawings, laboratory notes, or other material as one’s own work when such work has been prepared by another person or copied from another person.

C. Unauthorized possession of examinations or reserve library materials, or laboratory materials or experiments, or any other similar actions.

D. Unauthorized changing of grades or markings on an examination or in an instructor’s grade book or such change of any grade report.

Academic Integrity Pledge:

Students are expected to adhere to this pledge on all graded work whether or not they are explicitly asked in advance to do so: "I strive to uphold the University values of respect, responsibility, discovery, and excellence. On my honor, I pledge that I have neither given nor received unauthorized assistance on this work."

The University has specific academic dishonesty administrative procedures. Although policy states that cases of academic dishonesty must be reported to the Office of the Provost for possible action, the instructor may assign a failing grade for the assignment or a failing grade for the course, or may adjust the grade as deemed appropriate. The instructor also may require the student to repeat the assignment or to perform additional assignments. In instances where academic integrity is in question, faculty, staff and students should refer to Article VI of the Faculty Handbook. Article VI is also available in the M-
Book. Article VI provides further information regarding the process by which violations are handled and sets forth a standard of excellence in our community.

In the event of a suspected incident of misconduct, the instructor plans to use option B (M-book, http://conduct.missouri.edu/?page_id=349)

Recording Policy:

University of Missouri System Executive Order No. 38 lays out principles regarding the sanctity of classroom discussions at the university. The policy is described fully in Section 200.015 of the Collected Rules and Regulations. In this class, **students may not make audio or video recordings of course activity**, except students permitted to record as an accommodation under Section 240.040 of the Collected Rules. All other students who record and/or distribute audio or video recordings of class activity are subject to discipline in accordance with provisions of Section 200.020 of the Collected Rules and Regulations of the University of Missouri pertaining to student conduct matters.