

**PHYS 3033: Modern Physics**  
**University of Houston Clear Lake**  
**Physics Department**

**Summer 2014**

**PHYS 3033: Modern Physics Course Description:** An introduction to topics in modern physics. The fundamental concepts of quantum physics and relativity. Applications to atomic structure and spectra, black body radiation, solid state physics, and nuclear and particle physics.

Prerequisite: PHYS 3032 or equivalent.

**Textbook:**

Modern Physics, by Kenneth Krane (Third Edition)

Publisher: Wiley (2012) ISBN# 978-1-118-06114-5 (hardback)

**Course Information:** Time: TWTh 3-5:59 pm  
**Classroom:** Bayou 3604 Physics Lab

**Instructor's Information:** Dr. Samina Masood  
Office: Bayou 3531-10  
e-mail: [Masood@uhcl.edu](mailto:Masood@uhcl.edu)  
**Phone: (281) 283-3781**

**Course policies:** Attendance is expected in all classes. Active class participation will be appreciated. Questions, comments are welcome in the class. A missed exam will receive zero credits unless the instructor is notified by email, phone, etc and the instructor is ready to take makeup exam. Make-up exams, if there are any, will be individually scheduled with the student.

**Quizzes:** Short Pop quizzes will be given during the class throughout the semester. There will absolutely be no make-up to them even if you miss the quiz being late in the class for some time. You have to be in the class at the time of the quiz.

**Exams:** Midterm: June 17  
Final: July 6

**Grading:** A solution (homework, exam) that presents nothing more than a restatement of the problem will receive zero credit. Partial credit will be given, with the score of an individual problem ranging between zero and full credit. Credit will be given for clarity of presentation; *illegible work will not be graded*. For the final grade, homework, exams, etc. will be weighted as follows:

**Homework:** 20%

Quizzes: 10%

**Midterms:** 35%

**Final Exam:** 35%

**Attendance Policy:** Attendance is usually not taken in class, but **you are responsible for ALL information given in class, including assignments, notes, changes to the syllabus, etc.**

**Make-ups:** Make-up exams are not recommended. However, under unavoidable circumstances some arrangements can be made if the instructor is informed ahead of time.

**Honesty Code:** I will be honest in all my academic activities and will not tolerate dishonesty.

### **This course is comprised of the following Major Topics**

- (i) **Special Relativity**
  - Lorentz Frames
  - Length Contraction and Time Dilation
  - Synchronization of Clocks and Twin Paradox
  - Doppler Effect
  - Four dimensional description of space-time.
  - Einstein's theory of relativity
- (ii) **Quantum Mechanics**
  - Scale of Quantum Mechanics
  - Basic Postulates of Quantum Mechanics

- Wave-particle duality and uncertainty principle
- Square-well Potential
- Particle in a box
- Potential barrier and tunneling effect
- (iii) **Introduction to Nuclear Physics**
  - Nuclear Structures
  - Nuclear Decays
  - Nuclear Models
  - Nuclear Processes
- (iv) **Introduction to Solid State Physics**
  - Crystal Structure
  - Band theory
  - Phase transition
- (v) **Recent Research Problems and Techniques**
  - Research areas of UHCL Physics faculty
  - Possibility of special topic courses through UHCL faculty or adjuncts
  - Projects of student's interest