

Physics 3310**Quantum Physics I****Fall 2012****Class Hours:** MWF 11:00 - 11:50 AM**Classroom:** MH2002**Text:** Kenneth Krane, *Modern Physics, 2nd Edition*Course webpage: <http://astro1.panet.utoledo.edu/~jamar/phys3310/phys3310.htm>**Instructor:** Professor Jacques G. Amar**Office:** MH5006**Office hours:** MW 1:00 – 2:30**Office phone:** 530-2259**E-mail:** jamar@physics.utoledo.edu**Grading:**

Homework 20%

Midterms 20% (each)

Final 20%

Week Of:	Topics	Reading
Aug. 20	Review of Classical Physics, Units, Intro. to Relativity	Chap.1, Chap.2
Aug. 27	Length-contraction, Twin paradox, Lorentz transform	Chapter 2
Sep. 3	Rel. vel. trans, Doppler effect, Rel. mom, mass & energy	Chapter 2
Sep. 10	Review, Exam 1	Ch. 1-2
Sep. 17	Photoelectric effect, Blackbody radiation	Chapter 3
Sep. 24	Compton effect, X-rays, pair-production	Chapter 3
Oct. 1	Matter waves, Heisenberg uncertainty principle	Chapter 4
Oct. 8	Review, Exam 2	Ch. 3 - 4
Oct. 15	Schrodinger equation	Chapter 5
Oct. 22	Bound states, particle in box, harmonic oscillator	Chapter 5
Oct. 29	Steps and barriers, tunneling	Chapter 5
Nov. 5	Review, Exam 3	
Nov. 12	Atomic spectra, Bohr theory	Chapter 6
Nov. 19	Schrodinger eqn. in spherical coordinates	Chapter 7
Nov. 26	Spin and Spectroscopic Notation.	Chapter 7
Dec. 3	Zeeman effect, Fine Structure	Chapter 7
	Final Exam (Dec. 14)	

Honors students: an Honors project will be required (10% of course grade)

WAC students: a WAC paper will be required (10% of course grade)

Guidelines for WAC paper (due Nov. 30)

To satisfy the WAC requirement a written paper will be required. It is due on Friday, November 30 and should discuss the biography of one of the scientists involved in the early development of modern physics along with that scientist's main contributions to modern physics and the importance of that contribution.

Papers should be written using Microsoft Word (or equivalent) with top-bottom margins of 1" and left-right margins of 1.25" and should be at least 4 pages long using single-spacing with font size 12. A front cover page with title and student's name should be included along with a bibliography/references page in which the sources of the information in the paper are cited. A printed copy of the paper should be submitted along with a copy of the cover and front-pages of at least one reference book used in writing the paper. The paper should be written in your own words. A digital copy is also required (send by e-mail).

The paper should be divided into 3 parts with each part 1 – 1 ½ pages long.

Part (i): a brief biography of the scientist including an overview of his/her career and contributions to science

Part (ii): a discussion of the circumstances and meaning of a particular contribution to modern physics (a few brief equations may be included here) and the circumstances under which that particular contribution was made

Part (iii): a discussion of the impact of that contribution to science and in the modern world.

Some possible topics include: Einstein and Special Relativity, Einstein and the Photoelectric Effect, Planck and Blackbody Radiation, Roentgen and the discovery of X-rays, Bragg and X-ray diffraction, Laue and X-ray diffraction, Compton and the Compton effect, Michelson (or Morley) and the Michelson-Morley experiment, Anderson and the discovery of the positron, Louis de Broglie and matter waves, Davisson (or Germer) and matter waves, Heisenberg and quantum mechanics, Schrodinger and quantum mechanics

Alternatively, you can write a paper focusing on just one "technological" aspect of modern physics and its background and applications. In this case you don't need to divide it into parts. Some possible topics are: Neutron diffraction, X-ray diffraction, Positron-emission tomography, Global positioning, Magnetic resonance imaging and nuclear magnetic resonance, Doppler effect, the Big-Bang and Cosmology.

I would like each student to write a WAC paper on a different topic. **In order to ensure this, please e-mail me your top 2 choices by Monday, September 24.** I will then "re-arrange" if necessary to avoid duplication.

Guidelines for Honors project/paper (due Dec. 7)

To take this course as an Honors course, an Honors project will be required along with a paper describing the results of the Honors project. Topics for the Honors project will be given later in the semester.