

PHYS222: Modern Physics
Spring 2008

Teacher: Dr. Kelly Kriebel	Classroom: CHS 107 M,W,F 9:10-10:00 Th 10:20-11:10
Office: Room 109, Collier Hall of Science	Lab: CHS 107 M 12:45-3:45
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Course Texts: **Modern Physics for Scientists and Engineers**, 3rd ed., Thornton and Rex.
Introduction to Relativity, Kogut

Course Objectives: The primary aim of this course is to provide students with a working knowledge of the concepts leading to the breakdown of classical physics and the emergence of modern quantum theory. The course material follows an historical approach, and contains a substantial experimental and writing component. Students will learn and develop mathematical and physical techniques for solving a wide range of problems. In the laboratory portion of the course students will learn about experimental design and gain experience using a variety of equipment for conducting physical measurements. This course satisfies the Writing Across the Curriculum requirement.

Course Content and Schedule of Topics:

<i>Topic</i>	<i>Approximate Time Span</i>	<i>Readings</i>
Relativity	4 weeks	Chapter 2
Scattering and diffraction a. Photon interactions b. Bragg diffraction c. Rutherford scattering	2 weeks	
Bohr Theory	1 week	Chapter 4
Quantization a. X-rays b. Franck-Hertz c. Wilson-Sommerfeld d. Harmonic oscillator	1.5 weeks	Chapter 3
Wave-Particle Duality a. DeBroglie wavelength b. Complimentarity c. Phase and group velocity d. Uncertainty principle	2 weeks	Chapter 5
Quantum numbers a. Schroedinger equation b. Angular momentum c. Energy splitting (Zeeman effect, etc.)	2 weeks	Chapters 6, 7, 8
Elementary particles and conservation laws	1.5 weeks	Chapter 14
Nuclear physics and radioactivity	2 weeks	Chapters 12, 13

Grading Policy:

- A = 90%-100%
- B = 80%-89%
- C = 70%-79%
- D = 60%-69%
- F = below 60%

Assessment:	% Weight
Homework Problems	20
Labs	20
Paper and Presentation	10
Exams	30
Final Exam	20

Homework Problems:

As illustrated above, the problem sets constitute a significant portion of your grade. Your work on these problem sets, as well as lab reports and paper, is subject to the Moravian College Policy on Academic Honesty. Refer to the Student Handbook or ask your instructor if you have any doubts or questions about any submitted work.

Due dates and late policy: Work submitted after the due date will receive a zero.

Labs:

To augment your overall learning experience and provide an experimental aspect to the course, you will be required to perform a lab each week during the term (unless otherwise stated, the due date for handing in a lab report is one week after the lab is performed). To instill good laboratory report writing skills, lab reports will be submitted throughout the semester according to a prescribed format that follows the style of popular physics journals. Use of the Bedford writing handbook will be encouraged, and a copy will be available in the modern physics lab. Unless otherwise stated, the Physical Review Letters style will be used for all citations.

Schedule of experiments:

Week	Experiments:
1	Interferometer
2	No Lab
3	Relativistic Energy
4	Photoelectric Effect
5	Coincidence
6	Compton Effect
7	Balmer Series in H and D
8	X-Ray Diffraction
9	Electron diffraction
10	Franck – Hertz Effect
11	Zeeman Effect
12	Mossbauer Effect
13	NMR/EPR

Students will also have the opportunity to peer review each other's work. For each lab report turned in, students must supply a copy to one of their peers for comments and suggestions/corrections on grammar, content, style, and readability. Both copies will be returned and a revised report will be re-submitted by the student with the lab portfolio at the end of the semester. All originals and revisions shall be included in the portfolio.

Paper and Presentation:

Throughout the semester students will be researching a topic in physics and will write a formal research paper (approximately 10-15 pages long). Assignments throughout the term will include: selecting a topic, producing a preliminary and final annotated bibliography, rough drafts, and writing the final draft of the paper. A presentation will be given on this work during the last week of class.

Exams: At least three (in-class) one-hour exams during the semester.

Final comprehensive exam: An exam covering all material introduced during the semester.

Attendance Policy:

Students are expected to come to class, however sometimes issues beyond the student's control arise. Excused absences include but are not limited to medical problems, family emergencies, and the like. For each unexcused absence past the first one the student's final letter grade will be reduced one level (i.e. from an A- to a B+). Excused absences for sporting events or field trips may also be approved by the instructor ahead of time.

Good luck in the coming semester. Should you have any comments about the class during the semester, please feel free to discuss them with me.

Subject to Revision