

PHYS 283 - General Physics III

Fall 2017

Tuesday, Thursday, 12:30 –1:45

La Tourette 200

Instructor:

Professor Laurence Lurio

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Through blackboard

Course Description:

Physical laws governing optics, atomic, solid state, nuclear, and elementary particle physics using calculus.

Prerequisites:

Math 230 (Calculus II), and Phys 273 (General Physics II, Electricity and Magnetism)

Materials:

Textbook: Physics for Scientists and Engineers, Volume III, Giancoli ISBN 9780136139256

Course Objectives:

As a result of taking PHYS 283, students will be able to:

1. Understand how to use the properties of waves to analyze problems involving interference and diffraction.
2. Calculate the deviations to the laws of mechanics due to the finite speed of light, using the principle of relativity.
3. Explain the experimental evidence that required the development of quantum mechanics
4. Be able to calculate the quantum mechanical properties of an electron for a number of basic geometries, such as a particle in a box.
5. Understand how quantum mechanical methods can be applied to understanding the properties of atoms, molecules and solids.
6. Become familiar with the principles of radioactive decay, including half-life, decay radiation and decay chains.
7. Understand the applications of nuclear physics in medicine, energy and astronomy.
8. Use symmetry and conservation principles to analyze particle physics interactions.
9. Show how cosmological principles can be understood by applying the laws of relativity, quantum mechanics and classical physics to astronomical observations.

Course Skills:

As a result of taking PHYS 283, students will gain experience in the following skills:

- *Numerical Estimation*- The ability to calculate the size of various physical effects by application of physical laws
- *Derivation of Physical Laws* – Derive a wide variety of physical relationships from a small number of basic laws of physics.
- *Connecting Experimental Evidence to Physical Law* – The ability connect all physical laws to measured experimental evidence.
- *Problem Solving Techniques* – The ability to solve quantitative and qualitative physics problems by combining known physical laws using mathematical principles.

Homework:

Each week students will be responsible for reading a chapter of the textbook and working through 5-15 homework problems. Problems will generally be assigned through the “Mastering Physics” web system.

Class Participation:

Attendance and class participation will be recorded using the “Top-Hat Classroom Response System.

Grading:

The weighting of grades is given below.

Homework:	15%
Class Participation:	15%
Exams (3):	45%
Comprehensive Final Exam:	25%

An initial grade will be calculated based only on your exams (including the final). Class participation and homework scores will only be included in your final grade calculation if they increase your score. Thus, class participation and homework cannot lower your overall grade, only raise it.

Exams and Final Exam:

The exam dates are given in the course calendar listed below. The final exam is comprehensive. Exams are open-book and will require calculators.

Calendar:

	Topic		Topic
8/29	Introduction and Pretest	8/31	Interference (34)
9/5	Interference (34)	9/7	Diffraction (35)
9/12	Diffraction (35)	9/14	Relativity (36)
9/19	Relativity (36)	9/21	Early Quantum Theory (37)
9/26	EXAM 1 (ch 34-36)	9/28	Early Quantum Theory (37)
10/3	Quantum Mechanics (38)	10/5	Quantum Mechanics (38)
10/10	Quantum Mechanics of Atoms (39)	10/12	Quantum Mechanics of Atoms (39)
10/17	Molecules and Solids (40)	10/19	Molecules and Solids (40)
10/24	Molecules and Solids (40)	10/26	Nuclear Physics (41)
10/31	EXAM II (ch 37-40)	11/2	Nuclear Physics (41)
11/7	Nuclear Energy (42)	11/9	Nuclear Energy (42)
11/14	Elementary Particles (43)	11/16	Elementary Particles (43)
11/21	EXAM III (ch 41-42)	11/23	Thanksgiving
11/28	Astrophysics and Cosmology (44)	11/30	Review and Posttest

Class Policies:

Americans with Disabilities Act: If you need an accommodation for this class, please contact the Disability Resource Center as soon as possible. The DRC coordinates accommodations for students with disabilities. It is located on the 4th floor of the Health Services Building, and can be reached at 815-753-1303 or drc@niu.edu. Also, please contact me privately as soon as possible so we can discuss your accommodations. The sooner you let us know your needs, the sooner we can assist you in achieving your learning goals in this course.

Class Visitation Policy: Due to liability concerns, only NIU students are allowed to attend at classes at NIU. Guests, including family members and NIU students not registered for the course, will not be permitted to attend class except with prior arrangement with the educator. Because university classes are not developmentally appropriate situations for young children, children will not be allowed in class except in highly unusual circumstances and with the prior approval of the educator.

Academic Misconduct: For a detailed description of the university's definition of academic misconduct, and the process by which it is adjudicated, please refer to the Student Code of Conduct. Sanctions (consequences) for committing academic misconduct include but are not limited to, failure of the assignment, failure of the course, and suspension or expulsion from Northern Illinois University. Cheating and plagiarism of one's own or another's work will not be tolerated. Academic integrity and civility in the classroom are expected of every member of the NIU community. Please review the *Undergraduate Catalog* for more information on this topic.

Syllabus Clause and Contract: This syllabus may be revised and adapted throughout the semester to better serve the needs of the class. The decision to remain in this class upon receipt of the syllabus serves as students' acceptance of the syllabus as a binding contract, meaning they agree with the terms set forth and the expectations of them as members of the class.

Religious Observances: Northern Illinois University, as a public institution of higher education in the State of Illinois, does not observe religious holidays. It is the university's policy, however, to reasonably accommodate the religious observances of individual students in regards to class attendance, scheduling examinations, and work requirements. Such policies shall be made known to faculty and students. Religious observance includes all aspects of religious observance and practice as well as belief. Absence from classes or examinations for religious observance does not relieve students from responsibility for any part of the course work required during the period of absence. To request accommodation, students who expect to miss classes, examinations, or other assignments as a consequence of their religious observance shall provide educators with reasonable notice of the date or dates they will be absent.

Helpful Resources:

ACCESS Tutoring and Support Services (Access to Courses and Careers through Educational Support Services) provides students with several resources for academic assistance. The ACCESS Tutoring and Support Services website (www.niu.edu/access) offers a complete listing of campus resources for tutoring and other academic services available.

Physics Help Room. The physics help room is located in FR 251 and is open M-Th 9-5, F 9-3.