University of Puerto Rico

Rio Piedras Campus
College of Natural Sciences
Department of Physics
Undergraduate Program

Title: Introduction to nuclear physics

Code: PHYS 4048

Number of Credits: 3

Prerequisites: PHYS 4046

Description

Introduction to the nuclear physics for physics majors. General description of the atomic nucleus. Relativistic dynamics. Experimental techniques. Radioactivity. Nuclear reactions. Nuclear forces. Nuclear structure models. Shell model. Scattering elementary theory. Reactors. High energy physics. Elementary particles and symmetry.

Objectives

After completing this course the student will be able to understand the atomic nucleus composition, the different theoretical models to describe nuclear behavior, and the experimental techniques to study the nucleus and the applications as an energy source. The student will understand the different modes of disintegration of unstable nuclei, including the elementary models of alpha and beta decay. Nuclear reactions including fission and fusion will also be discussed.

Course Content

Topic	Assigned time (hours)
1. Atomic nucleus: what is it and how to study it.	3
2. Atomic nucleus: what is it and how to study it.	3
3. General description of the nucleus.	3
4. General description of the nucleus.	3
5. Relativistic Dynamics.	3
6. Relativistic Dynamics.	3
7. Experimental techniques.	3
8. Experimental techniques.	3
9. Radioactivity	3
10. Radioactivity	3
11. Nuclear reactions and nuclear forces.	3
12. Nuclear reactions and nuclear forces.	3
13. Nuclear models and elementary scattering theory	3

14. Nuclear models and elementary scattering theory	3
15. Reactors and High energy physics.	3
Total hours	45 contact hours

Instructional Strategy

Lecture. Discussion with the students of typical problems. Homeworks.

Minimum Require Facilities

Traditional lecture room.

Student Evaluation

Three partial exams. Quizzes may also be used for additional evaluation.

Grading System

The overall score is determined by calculating the percentage of points obtained by the student. Grades are then assigned according to the standard curve: 100-90% = A, 89-80% = B, 79-70% = C, 69-60% = D, 59-0% = F.

Bibliography

Introductory Nuclear Physics, 3rd Ed., Kenneth S. Krane, (ISBN 0-471-80553-X)

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