

Physics 1378: Introduction to Nuclear and Particle Physics

Spring 2015

- Textbook: B. R. Martin and G. Shaw, "Particle Physics," 3rd edition
- Additional recommended literature:
S. Braibant, G. Giacomelli and M. Spurio, "Particles and Fundamental Interactions"
D. Griffiths, "Introduction to Elementary Particles," 2nd edition
- Prerequisites: Physics 1370
- Lectures: MWF 2:00-2:50pm (106 Allen Hall)
- Office hours: TW 11:00am-12:00pm or by appointment (403 Allen Hall)

Course description

In this course, students will learn

- typical experimental techniques for particle detection and acceleration;
- to approximately calculate particle physics processes based on kinematics and conservation laws, such as conservation of angular momentum;
- the role of symmetries as an organizing principle in particle physics and how to perform simple group theoretical analyses of the symmetry groups SU(2) and SU(3);
- to make phenomenological connections between results of different laboratory and astrophysical experiments;
- the structure of the Standard Model of particle physics and theoretical concepts that go beyond this model, and how to relate these to recent experimental results.

Homework

Homework is an essential part of learning the material of this course. Homework will be assigned each week on Wednesday and collected next week on Wednesday. You are encouraged to discuss the homework problems with each other after you have tried them to the best of your ability because you can learn a lot from each other. The homework assignments and solutions will be available for download on [CourseWeb](#).

Projects

Besides homework, additional insight can be gained from working on specific topics in particle physics in greater depth. For this reason, every student should work on a small project and prepare a presentation to be delivered in front of the class at the end of the term. I will make suggestions for possible project topics and reading material, but you are encouraged to also propose a topic on your own. I will also recommend some reading material, but you are strongly encouraged to do your own literature research in addition. The final presentations will be graded based on the quality of the material, the initiative and effort displayed, and the quality of the delivery of the talk.

Grading scheme

There will one midterm exam and one final exam. The final grade will be determined by the homework (30%), presentations (20%), midterm (20%), and final exam (30%).