Elementary Particle Phenomenology
Physics 661
Fall 2005

Course Description:

Physics 661 begins a survey of the phenomena of the elementary particles of matter and their interactions. Over the three term sequence (661, 662, and 663) we will include the applications of particle physics to questions of cosmology and astrophysics. For the fall term we will study:

- Introduction to the particles, forces, and the observable universe
- Quarks and Leptons
- Interactions and Fields
- Invariance Principles and Conservation Laws
- Quarks in Hadrons
- Lepton and Quark Scattering
- Cosmic Rays

These topics represent an introduction to the important issues in particle physics research today. Throughout the course, the interplay between theory and experiment will be emphasized. This first quarter course is designed to give an introduction to the field of particle physics, with many of the forefront topics to follow in the second and third terms. During the subsequent terms topics will include the standard model, physics beyond the standard model, cosmological models and inflation, gravitational radiation, and experimental methods of particle physics.

Instructor: Prof. Jim Brau
(346-4766)
414B Willamette
(enter through 414 Willamette)

Class Hours: TuTh 8:30 - 9:50
(and substitute hours to be determined)

Classroom: 318 Willamette Hall

Office Hours: MWF 10-11 am

Donald H. Perkins
(Required)
Lars Bergstrom and Ariel Goobar
(Recommended)

Grading: Grades will be based on homework problem sets, a mid-term exam and a final exam.

Problem Sets
- Set 1
Tentative Course Outline and Reading Assignments:

September 27 - October 6
Quarks and Leptons
Perkins, Chapter 1
Bergstroem and Goobar, Chapter 1
(supplemental paper - Particle Physics and Cosmology, John Ellis)

October 11-13
Interactions and Fields
Perkins, Chapter 2

October 18-20
Invariance Principles and Conservation Laws
Perkins, Chapter 3

October 25-27
Quarks in Hadrons
Perkins, Chapter 4

November 1-8
Lepton and Quark Scattering
Perkins, Chapter 5

November 15-22
Parton Model and Perturbative QCD
Lectures by D. Soper

November 29-December 1
Cosmic Rays
Bergstroem and Goobar, Chapters 12, 13, and 14
Particle Data Group Review of Cosmic Rays
(or postscript)