Elementary Particle Phenomenology  
Physics 661  
Fall 2003

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
- Cosmic Rays
- Quarks and Leptons
- Interactions and Fields
- Invariance Principles and Conservation Laws
- Quarks in Hadrons
- Lepton and Quark Scattering

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 10:30 - 11:50  
(and substitute hours to be determined;  
note, the class will start at 10:30 to avoid a  
conflict with Advanced Analog Electronics - Phys 610)

Classroom: 318 Willamette Hall

Office Hours: MWF 10-11 am

Donald H. Perkins

(Required)

Cosmology and Particle Astrophysics (1999)  
Lars Bergstrom and Ariel Goobar

(Optional, but not recommended;  
this book is now out of print and the bookstore)
is having trouble obtaining enough copies.

A second edition is nearly released and should
be available in time for the 2nd and 3rd terms.)

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

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Tentative Course Outline and Reading Assignments:

--- September 30 - October 2 The Observable Universe

Bergstrom and Goobar, Chapter 1


lecture 1

lecture 2

--- October 7-9

Cosmic Rays

Bergstrom and Goobar, Chapter 13


(or http://pdg.lbl.gov/2002/cosmicrayrpp.ps)

--- October 14-16

Quarks and Leptons

Perkins, Chapter 1

--- October 21-28

Interactions and Fields

Perkins, Chapter 2

--- October 30-November 11

Invariance Principles and Conservation Laws

Perkins, Chapter 3

--- November 13-25

Quarks in Hadrons

Perkins, Chapter 4

--- December 2-4

Lepton and Quark Scattering

Perkins, Chapter 5