

Experimental Methods in High Energy Physics, PHYS 6260

Instructor: Alexander Khanov (e-mail: alexander.khanov@okstate.edu)

Course web site: <http://hep0.okstate.edu/khanov/phys6260.html>

Time and location: MW 2:30–3:45 pm, PS 121

Homework: assign problems once a week on Wednesdays, due in a week

Grading: homework 50%, final project 50%

Grading scale: A=(85-100), B=(70-84), C=(55-69), D=(40-54), F=(0-39)

The class work: The homework and materials to study will be assigned on a weekly basis. Instead of the final exam, each student will work on a final project. The students should start this work 4–6 weeks before the end of the course. Each project must be related to one or more topics covered in the course. The project work includes a short (3–4 pages) written summary and an oral presentation.

Outline of topics:

- * Particle detector techniques
 - o Particles: overview
 - o Methods of particle detection
 - o Passage of particles through matter
 - o Detector types
- * Mathematical methods for data analysis
 - o Error analysis: probability distributions, statistical and systematic uncertainties, error propagation
 - o Statistics: fitting, likelihood, parameter estimation, Bayesian vs frequentist approach, confidence level
 - o Numerical solutions: integration, differentiation, roots
 - o Random numbers and Monte Carlo techniques
- * Review of modern HEP detectors
 - o Tevatron and LHC experiments
 - o Neutrino and dark matter experiments
 - o Astro HEP experiments

Presentation of final projects: Friday, December 15, 2:00–3:50 pm