Experimental Methods in High Energy Physics, PHYS 6260

Instructor: Alexander Khanov  (email: alexander.khanov@okstate.edu)

Time and location: MWF 3:30–4:20 pm, PS 108

Homework: assign problems once a week on Fridays, 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: There is no formal text book for the course. The homework and materials to study will be assigned by the instructor 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.

The materials for the course will be placed in Canvas. I will also maintain a permanent course page at http://hep0.okstate.edu/khanov/phys6260.html

Office hours are held online, send me an email if you need to talk.

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 LHC experiments
  o Neutrino and dark matter experiments
  o Astro HEP experiments

Presentation of final projects: Wednesday, December 13, 2:00–3:50 pm