PHY 806 (Radiation Detection) – Prelim. Syllabus Spring 2020

Instructor: Dr. Anselm Vossen

Office hours: Tuesdays 10:00 – 11:30

Description : The course is intended for graduate students that plan to pursue studies in nuclear and high energy physics experiments.
It will provide an introduction into the physical principles behind detectors for charged particles and gamma rays.
The main part of the course will examine the interaction of charged particles, photons and neutrons with matter and their detection. It will cover detector technologies most commonly in use in nuclear and high energy experiments. Examples are the use of gaseous ionization, scintillation or silicon based detectors.
The emphasis will be on techniques relevant to modern nuclear and high energy experiments. Specific challenges facing those experiments will be discussed as well as trends in modern detector design.

Schedule: WF 8:30 – 9:45 (up for discussion)

Location: LSRC A156

Recommended Textbooks:

- Glenn Knoll, *Radiation Detection and Measurement*, John Wiley, 2010
- W.R. Leo, *Techniques for Nuclear and Particle Physics Experiments: A How to Approach*, Springer, 1987

Supplemental Textbooks:

- Claus Grupen and Boris Shwartz, *Particle Detectors*, Cambridge Univ. Pr., 2008
- Klaus Kleinknecht, *Detectors for Particle Radiation*, Cambridge, 1998
- Lucio Cerrito, "Radiation Detectors", Springer 2017

COURSE CONTENT

Radiation Sources, Particle Accelerators, Cosmic Rays, Interactions of Radiation with Matter, Characteristics of Detectors, Ionization Detectors, Spectrometers, Scintillation Detectors, Photomultipliers, Semiconductor Detectors, Calorimetry, Detectors for Particle Identification, Ageing, Electronics for Pulse Signal Processing, Monte-Carlo Simulation of Detectors, Examples of Modern Multi-Purpose Experiments, Radiation Protection

GRADING

Presentations (40%), Final Exam (40%), Class Participation (20%)