SPH 622: Radiation Measurement and Spectroscopy

(Instructor: Dr Angeyo H. Kalambuka)

About the Course

The various modes of interaction of radiation with matter are discussed, including the physical principles behind radiation detection and measurements. The course introduces the concepts of spectroscopy/ imaging and describes the categories and functionality of various radiation detectors and measurement strategies.

Course Content

Interaction of radiation with matter. Principles of radiation detection. Ionization and excitation. Detector resolution. Radiation counting and measurement statistics. Survey of detector types: Gas-filled; solid scintillation ((NaI (Tl), liquid scintillation. Detector characteristics – resolving time, quenching. Si(Li) and HPGe and other solid-state semiconductor. Photo peak efficiencies. Multichannel pulse height analyzers. Radiation spectroscopy with solid and semiconductor detectors. Neutron detection and spectroscopy. Specialized spectroscopic measurements. Position sensitive detection and Imaging.

Course Outcome

To skill the student at an advanced level in the understanding of the principles, methods and instrumentation used in the detection and measurement of ionizing radiation in spectroscopy.

Course Structure

Strength: 45 hours

Examination	1 (out of 70 marks)
CATS:	2 (out of 15 marks) in week 7 and 11
Tutorials	2 (out of 15 marks) in week 4 and 8

Recommended Textbook References

1. **Radiation Detection and Measurement by G. F. Knoll**
2. Nuclear Radiation Detection by W. J. Price
3. Semiconductor Counters for Nuclear Radiations by G. Dearnaley
4. Experimental Nucleonics Part II by B. Brown
5. Nuclear Radiation Physics by R. E. Lapp
6. X-Ray and Gamma-Ray Spectrometry with Semiconductor Detectors by K. Derbertin and R. Helmer