Ancient Biomaterials Institute
and Department of Physics

Radiation Analysis Technician Training Program

Level 0. Applicant to program.

Level 1.

~ Understand the physics of the operation of a Geiger-Muller tube and a scintillation detector in the detection of ionizing radiation. Assessment by written and oral exams.

~ Plot a Geiger-Muller tube plateau graph to determine optimal operating voltage. Assessment by laboratory practicum and written report.

~ Measure the background radiation in multiple locations. Assessment by laboratory practicum and written report.

~ Apply concepts of counting statistics to the analysis of radiation measurements. Assessment by laboratory practicum and written exam.

~ Calibrate a Geiger-Muller system. Assessment by laboratory practicum and written report.

~ Measure the wavelengths of visible light emitted in a known sample of gas. Measure the wavelengths of visible light emitted by an unknown sample of gas and use published wavelength tables to identify gas. Assessment by laboratory practicum and oral report.

~ Maintain comprehensive records for laboratory work. Assessment by review of submitted of laboratory notebook.

~ Conduct literature searches and report on at least two relevant primary research articles. Know how to use relevant reference materials. Assessment by oral report.

~ Attend Ancient Biomaterials Institute seminars. Assessment by submission of written abstract for each presentation.

~ Understand and apply the safety protocols for all equipment and techniques used. Assessment by oral report.

Equipment used in Level 1 certification: Geiger-Muller detector, high voltage power supply, spectrometer.

Level 2.

~ Measure the half-life of at least three radioactive isotopes, one whose half-life is of the order of a few minutes, and two whose half-lives are on the order of several years.

~ Understand the absorption of beta particles by using multiple absorbers of varying materials. Assessment by laboratory practicum and written report.

~ Be able to predict the penetration of beta particles in common materials. Assessment by written exam.

~ Become familiar with equipment used in scintillation spectroscopy of gamma emitters. Calibrate a channel array of a scintillation counter. Identify the energies of emitted gammas in the spectra of selected, known emitters. Assessment by laboratory practicum and written report.

~ Use a Hall probe to measure the ambient magnetic field strength in a static magnetic field and in an oscillating field. Calculate the electric field corresponding to the oscillating magnetic field in an electromagnetic wave. Assessment by oral report.

~ Understand and apply the safety protocols for all equipment and techniques used.

~ Conduct literature searches and report on at least two relevant primary research articles. Know how to use relevant reference materials. Assessment by oral report.

Equipment used in Level 2 certification: Geiger-Muller tube, high voltage power supplies, scintillation detector, nuclear spectrometer, Hall probe.

Level 3.

~ Identify an unknown source of gammas. Assessment by laboratory practicum and oral report.

~ Measure the range of alphas in air for a particular source. Assessment by written report.

~ Understand the mechanism for energy loss for high-energy alphas and betas. Assessment by written exam.

~ Be able to predict the penetration of alphas in common materials. Assessment by written exam.

~ Calculate the absorbed dose produced in exposure to a source of alphas, betas, x-rays and gammas with and without sample screening. Assessment by written exam.

~ Maintain comprehensive records of laboratory. Assessment by review of laboratory notebook.

~ Understand and apply the safety protocols for all equipment and techniques used. Assessment by oral report.

~ Conduct literature searches and report on at least two relevant primary research articles. Know how to use relevant reference materials. Assessment by oral report.

Equipment used in Level 3 certification: scintillation detector, high voltage power supply, Geiger-Muller tube, nuclear spectrometer.

Certificate awarded after completing Level 3 requirements.

Level 4.

~ Demonstrate a minimal competency in the use of two types of electron microscopes. Assessment by oral report before a committee of at least two ABI related faculty.and submission of laboratory portfolio.

~ Work as a member of a research team on an ABI-related project and co-author a peer-reviewed manuscript accepted in a scientific journal.

Certificate Awarded after completing Level 4 requirements. (This certificate may be awarded after graduation due to peer-review time requirements.)

Level 5.

~ Present an ABI seminar. Assessment by review of presentation.

~ As a senior author on an ABI-related project, write a peer-reviewed article accepted in a scientific journal.

Certificate awarded after completing Level 5 requirements. (This certificate may be awarded after graduation due to peer-review time requirements.)