Advanced Nuclear Environmental Engineering and Science (NEES) Course Development

Executive Summary

This proposal is for two improvements in our graduate curriculum: (1) enhancements to our *Advanced Environmental Radiation Measurements* laboratory course and (2) development of a *Nuclear Geochemical Modeling* lecture and laboratory course. With respect to the *Advanced Environmental Radiation Measurements* laboratory course, we are requesting three portable, state-of-the-art spectroscopy systems for *in-situ* measurements. These instruments include a hand-held multichannel analyzer with LaBr3:Ce probe for nuclide identification, a CdTe-diode detection system for x-ray fluorescence measurements, and a portable alpha/beta counting system for air and water measurements. These enhancements will complement the teaching laboratory equipment upgrades that were made with funds from the 2007 U.S. Nuclear Regulatory Commission (NRC) educational grants. Nuclear Geochemical Modeling will be a new lecture and laboratory course focused on the geochemical modeling and measurement techniques required to predict the behavior of radionuclides in groundwater systems. Such predictions are required in waste site performance assessments. Students will learn how to perform surface complexation modeling and how to measure the thermodynamic parameters required in the model. These skills can be used to decrease the uncertainty and improve the accuracy of performance assessments. Nuclear environmental engineering and science (NEES) is a graduate-only academic program established in the early 1980's within the Department of Environmental Engineering and Earth Sciences at Clemson University. The program focuses on the environmental aspects of nuclear technologies, including environmental health physics, radioactive waste processing, environmental risk assessment, nuclear fuel cycle, radiation detection and measurement, environmental radiochemistry, and environmental remediation. The NRC is a major employer of our graduates, 12 of whom are currently working for the agency.