

Curriculum Development for Nuclear Fuel Chemistry, Reprocessing and Separation Chemistry, and Radioactive Waste Management

Executive Summary

A recent initiative at Penn State is the development of a Nuclear Security Education Program in collaboration with MIT and TAMU. The Nuclear Security Education Program includes five new courses, namely:

- 1) "Threat Analysis and Assessment,"
- 2) "Detector and Source Technologies"
- 3) "Applications of Detectors/Sensors/Sources for Radiation Detection and Measurements" (Laboratory)
- 4) "Global Nuclear Security Policies"
- 5) "Design and Analysis of Security Systems for Nuclear and Radiological Facilities."

In order to supplement the Nuclear Security Education Program and attract more undergraduate students to this program, we envision developing six new course modules. The proposed course modules are structured in two tiers: introductory and advanced.

The proposed introductory modules are:

- "Introduction to Actinide and Lanthanide Chemistry"
- "Introduction to the Nuclear Fuel Cycle"

The proposed advanced modules are:

- "Nuclear Fuel Chemistry"
- "Nuclear Fuel Reprocessing and Separations Chemistry"
- "Radioactive Waste Management"
- "Environmental Actinide Chemistry"

Students will be required to satisfactorily complete the two introductory modules before enrolling in the advanced modules, but may take the advanced course modules in any order. Two of these modules together will be a semester-long course. The set of introductory models will be taught in a traditional semester timeframe, and two related advanced modules will be taught sequentially in a semester (i.e., "Nuclear Fuel Chemistry" and "Nuclear Fuel Reprocessing and Separations Chemistry" in one semester and "Radioactive Waste Management" and "Environmental Actinide Chemistry" in one semester), but students may take either or both modules in a semester.

This curriculum development proposal related to nuclear fuel cycle chemistry will: 1) improve the nuclear education infrastructure at Penn State, 2) provide subject matter expertise to nuclear engineering, chemistry, and other students; and 3) will help reach the national goal of safely advancing nuclear energy initiatives.

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