

Nuclear Reactor Design Analysis Processes and Methods

Executive Summary

This project proposal describes the elements and objectives of an undergraduate senior-level class, with a laboratory component, within the mechanical engineering, nuclear track curricula, at the University of Texas of the Permian Basin (UTPB). This course will include aspects of:

- Commercial lattice physics and nodal simulator software tools and processes for reactor core design and analyses of PWRs and BWRs
- Process engineering practices and techniques associated with reactor design analysis, including automation, verification and QA practices
- Working computer labs to implement commercial tools for practical case suite development and execution, to include:
 - Lattice physics models and cases
 - Core simulator models for design and prediction
 - Core thermal hydraulic considerations
 - Core reactivity
 - Instrumentation
 - Technical specifications
 - Fuel cycle analysis
 - Core thermal limits; definitions and evaluations
- Interface requirements with transient and severe accident analysis tools
- Engineering Databases and attendant upstream and downstream data flows

Given the overall College of Energy Engineering and Science academic philosophy, the subject course will have a definite application focus. Consistent with that intent, we will utilize the latest Studsvik CMS package, including CASMO5 and SIMULATE4, as the primary laboratory application tool set. UTPB faculty and staff, working closely with Los Alamos National Lab staff, will prepare lecture and lab materials and working problems.

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