Nuclear Data Fundamentals and AMPX Libraries Generation Course

This course takes the participants through the fundamentals of the nuclear data pipeline, from the creation of Evaluated Nuclear Data File (ENDF) libraries, through processing with the AMPX code suite, to end use in SCALE. In addition to their use in SCALE, AMPX libraries are used in the CASL VERA high-fidelity multi-physics code suite; provide depletion, activation, and decay data for ORIGEN, which is integrated in a wide range of tools; and generate covariance data used in sensitivity uncertainty (S/U) calculations. This course is relevant for all users interested in understanding the sources, approximations and important differences in nuclear data libraries as well as for the advanced practitioners wishing to learn to process nuclear data libraries on their own. Those interested in generating custom libraries, whether from international sources such as the Joint European Fission Fusion (JEFF), the Japanese Evaluated Nuclear Data Library (JENDL), among others, or generating special purpose libraries with customized group structures and weighting spectra will find this course particularly useful. The course is focused on the practical use of the AMPX nuclear data processing code distributed with SCALE and includes demonstrations and in-class exercises, in addition to theoretical lectures. Participants will learn how nuclear data, along with associated uncertainty information, is generated before it enters the ENDF library. They will then be guided through the building of processed libraries for neutron transport in continuous-energy and multi-group formats. Nuclear data uncertainty information and its propagation to quantities of interest through S/U methods will be discussed and the associated AMPX processing capabilities will be demonstrated. Detailed discussion of nuclear data validation will be presented. The course will conclude with lectures on fission product yield and decay data and associated uncertainties, along with demonstrations of their use in SCALE.

No prior knowledge of SCALE or AMPX is required.