Course Title	**Course on Basic Neutron Science (CBNS)**
Duration	Face-to-Face: 10 days (80 hours
Target Participant	For incoming senior undergraduate students taking physics, engineering, or other related course. At least ten (10) participants are required to push through with the course. A maximum of twenty (20) participants will be accepted.
Pre-requisite	A background in algebra, trigonometry, calculus, differential equations, chemistry, electronics, Newtonian mechanics, thermodynamics and statistical physics, modern physics, and material science.
Goal	To enable participants to acquire a sufficient level of understanding/ skills in the following areas: (1) basic radiation and radioactivity concepts; (2) nuclear instrumentation; (3) neutron-induced nuclear reactions; (4) neutron moderation and shielding; (5) neutron flux and dose measurements; (6) modeling and simulation of neutron radiation transport; and (7) neutron applications in different fields.
Objectives	At the end of this course, participants are expected to: 1. Describe the atom's and the nucleus' structure and discuss how radioactivity occurs. 2. Explain the mechanisms involved when different types of radiation interact with matter. 3. Be familiar with instrumentations involved in radiation detection and measurement. 4. Measure photon and neutron radiation using different detectors. 5. Describe neutron properties and explain their interaction mechanisms with matter. 6. Analyze neutron behavior in a given system through measurements and calculations. Be familiar with accelerator-based neutron sources and nuclear reactor technology.
Nature and Scope	This course consists of lectures, exercises, case studies, and examinations. The course will be conducted by the Nuclear Training Center (NTC) staff, PNRI lecturers, scientists, and technologists. Participant's understanding of the subject matter presented will be assessed through the following: 1. Examination (55%) 2. Development and presentation of a case study (30%) 3. Laboratory experiments and practical exercises (10%) 4. Attendance (5%) A certificate of satisfactory completion will be issued to each participant who demonstrates satisfactory knowledge and skills of the subject matter presented.

Requirements	(1) NTC Online Application; (2) Recommendation Letter to attend the course from the Department Chair; (3) Certified true copy of grades or transcript of records
Course Content	**Lectures:** 1. Atomic Structure and Radioactivity 2. Interaction of Radiation with Matter 3. Introduction to Radiation Protection 4. Basic Radiation Detection and Instrumentation 5. Statistics of Counting 6. Introduction to Gamma Spectrometry Using NaI and HPGe Detectors 7. Basic Nuclear Physics 8. Nuclear Reactions 9. Basic Neutron Physics 10. Active Neutron Detectors 11. Neutron Detection by Activation 12. Neutron Flux and Dose Measurement 13. Introduction to Calculation Methods 14. Introduction to Accelerator-Based Neutron Sources and Their Applications 15. Introduction to Nuclear Reactor Technology **Experiments:** 1. Nuclear Instrumentation 2. Gamma Spectrometry with a NaI and High Purity Germanium Detectors 3. Determination of NORMs in Food and Environmental Samples 4. Neutron Detection Using Gas-filled Detectors (BF3 and He-3) 5. Neutron flux measurement with activation detectors 6. Neutron dose measurement using rem ball and proton recoil scintillator **Other Activities:** 1. Case Study 2. Tour of PNRI facilities