UCLouvain

lbnen2023

2020

Advanced Fuel Cycle/Dismantling/ Radiochemistry/MOX/Th (Centre d'étude nucléaire-Mol)

Due to the COVID-19 crisis, the information below is subject to change, in particular that concerning the teaching mode (presential, distance or in a comodal or hybrid format).

3 credits		Q2

Language :	English
Place of the course	Autre site
Main themes	**MOX and Th fuel** • Comparison of the physical properties of Pu and Th • Possible core designs with Th based fuel with high conversion factors • Pu-MOX fuel fabrication (MIMAS process) and fuel rod thermal-mechanical behaviour under irradiation • Pu-MOX impact on reactivity coefficients and safety issues • Th-MOX impact on reactivity coefficients and overview of the possible safety issues • **Radiochemistry** • Applied radiochemistry (complementary to the course under "Nuclear Fuel cycle"): chemical process technology: radiochemical separation techniques, radiochemical analysis, production of radionuclides • Radionuclide migration through a clay host rock ' geochemistry and underlying phenomena: impact on the Safety Case; geochemistry in Boom Clay; role of organic matter; radionuclide speciation, sorption and transport; modelling. **Dismantling, decommissioning** • Introduction: definitions, objectives, levels, regulatory aspects, radioprotection, ALARA • Radionuclide inventory, characterization and measurements • Strategy for decontamination of buildings, concrete pieces and structures, metals • Dismantling of a nuclear reactor (the BR3 case): the experience, materials management • Other types of installations to be decommissioned, REX from other projects • Strategies and planning of decommissioning
Aims	**MOX and Th fuel** To get a global understanding of the utilization of Pu and Th based fuel in light water reactors: • The challenges of the U-Pu-MOX fuel regarding the fuel fabrication, the core and fuel neutronic aspects and fuel behaviour • The Th-Pu-MOX used in LWR for its breeding capabilities, or more realistically as matrix for Pu utilization. 1 **Radiochemistry and Dismantling** • To get an understanding of radiochemistry, as it is a basic discipline to understand the various stages and activities in the nuclear fuel cycle, including the safe disposal of the radioactive waste. • To get acquainted with the principles and practice of dismantling and decommissioining of nuclear materials, as this is becoming an activity of increasing importance in nuclear engineering. - - - - *The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".*
Evaluation methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** Oral examination; written preparation
Inline resources	https://www.sckcen.be/fbnen
Bibliography	**The PowerPoint presentations of the lectures are available on the BNEN website.**

Other infos	This course is part of the Advanced Master programme in nuclear engineering organized by the Belgian Nuclear Higher Education Network (BNEN). BNEN is organised through a consortium of six Belgian universities and the Belgian Nuclear Research Centre, SCK-CEN and takes place at the SCK-CEN in Mol. **Prof. Pierre Van Iseghem** ' Université de Liège **Prof. Hubert Druenne** ' Université de Liège
Faculty or entity in charge	EPL

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Aims
Advanced Master in Nuclear Engineering	GNUC2MC	3		