

3.00 crédits		Q2
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Langue d'enseignement	Anglais
Lieu du cours	Autre site
Préalables	The following BNEN courses are a prerequisite <ul style="list-style-type: none"> • Nuclear Energy: Introduction • Nuclear Fuel Cycle
Thèmes abordés	<p>MOX and Th fuel</p> <ul style="list-style-type: none"> • 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 • <p>Radiochemistry</p> <ul style="list-style-type: none"> • 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. <p>Dismantling, decommissioning</p> <ul style="list-style-type: none"> • 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
Acquis d'apprentissage	<p>A la fin de cette unité d'enseignement, l'étudiant est capable de :</p> <p>MOX and Th fuel</p> <p>To get a global understanding of the utilization of Pu and Th based fuel in light water reactors:</p> <ul style="list-style-type: none"> • 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. <p>¹</p> <p>Radiochemistry and Dismantling</p> <ul style="list-style-type: none"> • 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 decommissioning of nuclear materials, as this is becoming an activity of increasing importance in nuclear engineering.
Modes d'évaluation des acquis des étudiants	Oral examination; written preparation
Ressources en ligne	https://www.sckcen.be/fbnen
Bibliographie	The PowerPoint presentations of the lectures are available on the BNEN website.

Autres infos	<p>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.</p> <p>Prof. Pierre Van Iseghem ' Université de Liège Prof. Hubert Druenne ' Université de Liège</p>
Faculté ou entité en charge:	EPL

Programmes / formations proposant cette unité d'enseignement (UE)				
Intitulé du programme	Sigle	Crédits	Prérequis	Acquis d'apprentissage
Master de spécialisation en génie nucléaire	GNUC2MC	3		