UCLouvain

lbnen2008

2023

Nuclear Materials (Centre d'étude nucléaire-Mol)

3.00 credits		Q1

Language :	English
Place of the course	Autre site
Prerequisites	The following BNEN courses are a prerequisite • Nuclear Energy: Introduction • Introduction to Nuclear Physics and Measurements Basic chemestry material behaviour
Learning outcomes	**At the end of this learning unit, the student is able to :** 1 • To familarise students with the basic aspects of material science as they apply to nuclear systems • To learn the basic processes of material degradation and ageing due to the nuclear environment (esp. radiation effects and fatigue).
Evaluation methods	Oral examination; written preparation.
Content	• Brief review of most important mechanical properties of materials o stress-strain relationship o ductile and brittle fracture; ductile-brittle transition o fatigue failure o creep • Stress analysis: stress intensity, thermal stresses • Functional requirements of materials in a nuclear environment o 'nuclear' materials: fuel, fuel cladding, moderator/reflector, coolant o structural materials: reactor internals and vessel, piping, valves • Degradation mechanisms of materials in a nuclear environment o radiation effects: general principles, atomic displacements, embrittlement, swelling fatigue: due to thermal stresses and stratification o corrosion: p.m. (to be developed in course 'Nuclear Materials II') • Introduction on treatment of important materials in a nuclear environment (especially nuclear-mechanical interactions and relationships) o fuel and cladding o moderator/reflector 0 structural materials (incl reactor internals, reactor vessel).
Inline resources	https://www.sckcen.be/fbnen
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. Jacqueline Lecomte-Beckers** ' Université de Liège **Prof. Eric van Walle** ' Katholieke Universiteit Leuven **Prof. Walter Bogaerts** - Katholieke Universiteit Leuven
Faculty or entity in charge	EPL

Programmes containing this learning unit (UE)

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