UCLouvain

lbnen2008

2019

Nuclear Materials (Centre d'étude nucléaire-Mol)

In view of the health context linked to the spread of the coronavirus, the methods of organisation and evaluation of the learning units could be adapted in different situations; these possible new methods have been - or will be - communicated by the teachers to the students.

3 credits		Q1

Language :	English
Place of the course	Autre site
Aims	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). - - - - *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.
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	Aims
Advanced Master in Nuclear Engineering	GNUC2MC	3		