UCL Faculté des sciences appliquées

FSA

| MECA2600 | Introduction au génie nucléaire et théorie des réacteurs I |

[30h+30h exercises] 5 credits

This course is taught in the 1st semester

Teacher(s):   Ernest Mund
Language: french
Level: 2nd cycle course

Aims

An introductory course in nuclear physics. Some basic knowledge and skill
in mathematical analysis (integration, power series expansions, ordinary
and partial differential equations) as well as in numerical computation. MECA2600
is an introduction to the physical principles governing nuclear reactors. The
aim of this course is threefold: a description of the basic principles of nuclear
engineering (fuel cycles, reactor types, etc ...), the understanding of the
fundsamental concepts (cross sections, phase space, neutron fluxes and currents,
criticality, etc...) and the development of a model (the multigroup-diffusion
model) allowing to perform reactor computations. By reactor computations, one
generally refers to the determination of the conditions that have to be satisfied
in order to produce energy in steady-state, the space dependence of the energy
production inside the reactor and the time evolution of the energy production if
the steady-state conditions are no longer met. The MECA2600 course is adapted
from the reference "Nuclear Reactor Analysis", by J.J. Duderstadt and L.J.
Hamilton (John Wiley, 1976), chapters 1 to 6.

Content and teaching methods

MECA2600 is an introduction to the physical principles governing nuclear reactors.
The aim of this course is threefold: a description of the basic principles of
nuclear engineering (fuel cycles, reactor types, etc ...), the understanding of
the fundsamental concepts (cross sections, phase space, neutron fluxes and currents,
criticality, etc...) and the development of a model (the multigroup-diffusion
model) allowing to perform reactor computations. By reactor computations, one
generally refers to the determination of the conditions that have to be satisfied
in order to produce energy in steady-state, the space dependence of the energy
production inside the reactor and the time evolution of the energy production if
the steady-state conditions are no longer met.

Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)

Pre-requisite :
- An introductory course in nuclear physics
- A basic knowledge and skill in mathematical analysis (integration, power series
expansions, ordinary and partial differential equations) as well as in numerical
computation.
References :
The MECA2600 course is adapted from the reference "Nuclear Reactor Analysis", by J.J.
Duderstadt and L.J. Hamilton (John Wiley, 1976), chapters 1 to 6.

Other credits in programs

ELME22/E	Deuxième année du programme conduisant au grade d'ingénieur civil électro-mécanicien (énergie)	(5 credits)
ELME23/E	Troisième année du programme conduisant au grade d'ingénieur civil électro-mécanicien (énergie)	(5 credits)
ESP32DS/RC	Deuxième annnée du diplôme d'études spécialisées en santé publique (Contrôle physique en radioprotection)	Mandatory
MECA22	Deuxième année du programme conduisant au grade d'ingénieur civil mécanicien	(5 credits)
MECA23	Troisième année du programme conduisant au grade d'ingénieur civil mécanicien	(5 credits)
PHYS22/G	Deuxième licence en sciences physiques	(6 credits)