MECA2600 Introduction to nuclear engineering and reactor technology.

[30h+30h exercises] 5 credits

This course is taught in the 1st semester

Teacher(s):	Hamid Aït Abderrahim
Language:	French
Level:	Second cycle

Aims

MECA2600 is an introduction to the physical principles governing nuclear reactors.

Main themes

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. 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

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
MECA23	Troisième année du programme conduisant au grade d'ingénieur civil mécanicien	(5 credits)	
PHYS22/G	Deuxième licence en sciences physiques	(5 credits)	