

Operation, control and safety of nuclear systems

Lecturers

Pierre-Etienne LABEAU (Coordinator), David FRESON and Arnaud MEERT

Course mnemonic

PHYS-H408

ECTS credits

5 credits

Language(s) of instruction

English

Course period

Second term

Campus

Solbosch

Course content

Operating principles: thermal-hydraulics & neutronics of the nuclear power plants (reactors) [NPP]. Operational bases of the main technological systems for the operation, the control and the safety; fundamental principles for the plant safety & design ; Design criteria for safety at the global & systems levels; defence in depth, single failure); residual heat extraction, limits of operation in temperature and pressure; Reactivity coefficients affecting safety; Protection and shutdown systems; Design basis accident and related criteria.

Technology & safety of the nuclear fuel; principles of the fuel design and of its safe management in the reactor core.

Methodology of the deterministic and probabilistic safety studies. Human reliability.

Objectives (and/or specific learning outcomes)

Teach the basic concepts of the safety of nuclear (pressurized water, power) reactors (NPP-PWR)

Teaching method and learning activities

Lectures (slides) + visit of a nuclear power plant (if possible) + lab sessions on the SCALDIS simulator (Electrabel ENGIE) and on research reactors (SCK-CEN Mol), with reporting.

References, bibliography and recommended reading

Supply of additional PDF files of useful documents: varies with possible recent events

Other information

Place(s) of teaching

Solbosch

Contact(s)

Pierre-Etienne LABEAU, pierre.etienne.labeau@ulb.be

Evaluation method(s)

Other

Evaluation method(s) (additional information)

Oral exam (Three questions + presentation of a scientific paper from literature)

Reporting on visits / lab sessions.

Determination of the mark (including the weighting of partial marks)

Equal weighting of the three questions for 2/3 of the mark, and 1/3 for the paper presentation; possible adjustment on the basis of the report quality

Main language(s) of evaluation

English

Programmes

Programmes proposing this course at the Brussels School of Engineering

MA-IREM | Master of science in Electromechanical Engineering | finalité Professional/unit 2 and MA-IRPH | Master of science in Physical Engineering | finalité Professional/unit 1