



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Nuclear reactor accidents [S2EJ1>AR]

Course

Field of study

Nuclear Power Engineering

Year/Semester

1/2

Area of study (specialization)

–

Profile of study

general academic

Level of study

second-cycle

Course offered in

Polish

Form of study

full-time

Requirements

elective

Number of hours

Lecture

30

Laboratory classes

0

Other

0

Tutorials

15

Projects/seminars

15

Number of credit points

4,00

Coordinators

prof. dr hab. inż. Janusz Wojtkowiak
janusz.wojtkowiak@put.poznan.pl

Lecturers

Prerequisites

none

Course objective

none

Course-related learning outcomes

none

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

none

Programme content

The module program covers the following topics:

- 1) basics of nuclear power plant safety (philosophy and strategy),
- 2) a system of barriers protecting environment against fission products,
- 3) safety systems of nuclear power plants (active and passive),
- 4) classification of possible failures,
- 5) international nuclear emergency scale (INES),
- 6) safety zones around the nuclear power plant,
- 7) measures of reliability of technical systems,
- 8) reliability structures and their properties,
- 9) basics of the PRA methodology.

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The lecture program covers the following topics:

- 1) exposing the population during accidents at nuclear power plants,
- 2) failures caused by increased reactivity,
- 3) failures following a power outage,
- 4) failures caused by loss of heat flow into the secondary circuit,
- 5) failures caused by stop of coolant flow in the core,
- 6) failures caused by leakage of the primary circuit,
- 7) failures during fuel manipulation,
- 8) emergency reactor shutdown systems,
- 9) emergency core cooling systems,
- 10) containment and its emergency systems,
- 11) risk analysis - event trees, fault trees.

The tutorials covers the following topics:

- 1) calculating the probabilities of exemplary failure chains,
- 2) analysis of the failure course using the fault tree method,
- 3) thermal and flow calculations of emergency core cooling systems,
- 4) analysis of the operation of containment systems (spraying, ventilation, hydrogen recombination),
- 5) boiling crisis analysis and calculation of emergency temperature distribution in nuclear fuel,
- 6) calculation of pressure and temperature changes in the NPP containment in emergency situations.

The design exercise program covers the following topics:

- 1) passive emergency core cooling system,
- 2) pump system for emergency core cooling,
- 3) pump system for spraying the interior of the containment enclosure,
- 4) gravity containment shell cooling system.

Teaching methods

none

Bibliography

none

Breakdown of average student's workload

	Hours	ECTS
Total workload		
Classes requiring direct contact with the teacher		
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)		