



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

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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) | | |