COURSE DESCRIPTION CARD - SYLLABUS

Course name
Automation [S2EJ1>Aut]

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
15

Laboratory classes
0

Other
0

Tutorials
15

Projects/seminars
0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

Has knowledge of mathematics and selected branches of physics (mechanics, thermodynamics, electrodynamics) with particular emphasis on nuclear physics. Has knowledge of basic automation elements and systems. Is able to describe selected physical phenomena using mathematical tools. Is able to build models of typical automation systems. Can show initiative in acquiring new knowledge.

Course objective

Acquiring knowledge about basic systems and automation systems, learning the basics of operation of automation systems in nuclear energy. Getting to know the methods of synthesis and analysis of the operation of discrete automation systems.

Course-related learning outcomes

Knowledge:
1. The student has knowledge of the application of automation systems in energy systems, including nuclear energy.

Skills:

1. The student is able to design simple automation systems used in nuclear energy and examine their properties.
2. The student is able to obtain information from various sources, also in a foreign language, regarding nuclear energy, draw conclusions and present his or her own opinions.

Social competences:
1. Understands the impact of control and regulation systems on the operational reliability and safety of equipment used in nuclear energy.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture
Final colloquium in written form at the end of the semester, the colloquium includes test questions or problem tasks related to the topics of classes conducted within the subject, graded on a point scale from 0 to 100%, additionally rewarded for active participation in classes.
Tutorials
Verification of individual preparation for classes, covering material from a single lesson exercise or block of exercises, assessment of individual reports on exercises prepared by the student, colloquium at the end of the semester, colloquium includes test questions or problem tasks, all grades on a point scale from 0 to 100%, final grade based on the weighted average of all component grades. Additionally, bonuses for activity in classes and completed homework assignments.

Programme content

Automation systems in nuclear energy, application of controllers and automation systems.

Course topics

Lecture
Synthesis and operation of discrete automation systems. Algorithms and automation systems used in nuclear energy. Industrial controllers - structure, types, programming methods. Inputs and outputs of analog and digital signals in automation systems. Conditioning of input signals.
Tutorials
Methods of connecting signals with inputs and outputs of automation systems. Construction of algorithms and models of automation systems for applications related to nuclear energy. The use of digital signals in automation systems. Conditioning of input signals, digital filtering algorithms. Analysis of phenomena occurring in automation systems using specialized software.

Teaching methods

Lecture
Multimedia and interactive presentation presenting important issues related to the subject, didactic discussion based on the subject literature, informative lecture, problem-oriented lecture, case analysis, work on source materials.
Tutorials
Carrying out exercises, using publicly available information to support the teaching process, encouraging students to independently search for optimal solutions and solve problems.

Bibliography

Basic:
1. Józef Korbicz, Borys I. Mokin, Metody matematyczne w zagadnieniach kontroli i sterowania w energetyce, Zielona Góra : Wydawnictwo Wyższej Szkoły Inżynierskiej, Kijów Technika, 1990
2. Międzynarodowy słownik terminologiczny elektryki - Elektroenergetyczna automatyka zabezpieczeniowa PN-IEC 60050-448, Warszawa : Polski Komitet Normalizacyjny, 2001.
3. Jacek Nowicki, Część elektryczna elektrowni jądrowej, Warszawa : Stowarzyszenie Elektryków Polskich, 2017
4. Andrzej Strupczewski, Awarie reaktorowe a bezpieczeństwo energetyki jądrowej, Warszawa : Wydawnictwa Naukowo-Techniczne, 1990
5. Bohdan Synal, Wilhelm Rojewski, Witold Dzierżanowski, Elektroenergetyczna automatyka

zabezpieczeniowa : podstawy, Wrocław : Oficyna Wydawnicza Politechniki Wrocławskiej, 2003
6. Praca zbiorowa pod red. Wilibalda Winklera, oprac. Adrian Halinka [et al.], Elektroenergetyczna automatyka zabezpieczeniowa w przykładach i zadaniach, Gliwice : Wydawnictwo Politechniki Śląskiej, 2006
7. Józef Żydanowicz, Elektroenergetyczna automatyka zabezpieczeniowa, Warszawa : Wydawnictwa Naukowo-Techniczne, 1979

Additional:
1. Colin Tucker, Jak zostać operatorem reaktora jądrowego : przewodnik dla początkujących, Bielsko-Biała : Wydawnictwo Dragon, 2022
2. Witold Krieser, Sterowanie programowalne : od mikrokontrolera do sterownika PLC, Gliwice : Helion, 2022

Breakdown of average student's workload

	Hours	ECTS
Total workload	55	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	25	1,00