COURSE DESCRIPTION CARD - SYLLABUS

Course name
Electrical installations [N1IŚrod2>IE]

Course

Field of study
Environmental Engineering

Year/Semester
3/5

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
part-time

Requirements
elective

Number of hours

Lecture
10

Laboratory classes
18

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

dr inż. Karol Nowak
karol.nowak@put.poznan.pl

Lecturers

Prerequisites

Basic knowledge of electrical devices and their ergonomics and safety of use, electrical engineering, mathematics, physics, automation and computer science. Ability to perform mathematical analysis of simple electrical circuits and read electrical diagrams. Awareness of the need to expand one's competences, readiness to cooperate within a team.

Course objective

Gaining knowledge and skills in the field of construction, design and testing of electrical installation systems. Planning an experiment, selecting measuring instruments and implementing a testing system, as well as performing tests and developing results. Learning the principles and possibilities of controlling building installations, aimed at saving energy and achieving comfort of use of the facility.

Course-related learning outcomes

Knowledge:
The student knows the principles of operation and implementation of electrical installations and building automation systems and the basic phenomena occurring in low-voltage installations. The student knows the principles of selecting installation and control equipment for selected algorithms for

controlling lighting, heating and blinds.

Skills:
The student is able to develop electrical diagrams of receiving installations, perform calculations necessary for the selection of conductors and protections and select installation equipment. The student is able to critically analyze available data in order to assess the technical and non-technical aspects of the designed electrical system or system.

Social competences:
The student is aware of the need for continuous education and improvement of professional competences. The student is aware that in technology, knowledge and skills become outdated very quickly

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:
- knowledge acquired during the lecture is verified by a written assessment consisting of open or test questions with different scoring. Passing threshold: 50% of points,
- ongoing assessment during each class (with activity bonuses).

Laboratories:
- ongoing checking and bonuses of knowledge necessary to complete the problems posed in a given area of laboratory tasks,
- assessment of reports on completed exercises,
- bonuses for activity related to the implementation of laboratory exercises.

Programme content

The module program includes the following topics:
1. Electrical installations - legal status.
2. Construction and types of electrical installations.
3. Power cables and wires.
4. Low-voltage power switches.
5. Protection against electric shock, fire and surges in electrical installations.
6. Power demand of buildings.
7. Building automation systems.

Course topics

The lecture program includes the following topics:
1. Basic legal and standardization acts concerning the design and implementation of electrical installations.
2. Low-voltage network systems, power supply systems in low-voltage power networks, classification and parameters of electrical installations, components of electrical installations. Power supply for municipal and industrial recipients.
3. Power cables, power and signal cables, busbars, criteria for the selection of wires and cables in electrical installations, long-term current-carrying capacity of cables and wires.
4. Circuit breakers (installation, motor, residual current), switches, disconnectors and fuses in low-voltage electrical installations.
5. Electric shock hazards. Methods and means of protection against electric shock - basic protection, in the event of damage, supplementary. Fire protection in low-voltage electrical installations. Requirements for planning and installation of electrical systems and means of surge protection. Types of surge protection. Surge arresters for protection against surges.
6. Power demand of residential buildings - COBR Elektromontaż method and method according to the N-SEP-E-002 standard. Power demand of public utility buildings. Planning of power demand of industrial buildings.
7. Intelligent installations in modern utility buildings - intelligent building installations. Wired and wireless building automation systems - structure, topology, communication, devices used, possibilities.

The laboratory program includes the following topics:
1. Testing the characteristics of selected low-voltage electrical devices.

2. Current-carrying capacity of low-voltage power cables and wires.
3. Use of installation relays and contactors to control electrical energy receivers.
4. Determination of the expected shock and touch voltage.
5. Operational tests of protection class I and II devices.
6. Influence of the shock current shape on the operation of differential circuit breakers.

Teaching methods

Lecture:
- multimedia or object presentations supported by illustrated examples presented on the board,
- lecture conducted in an interactive manner with asking questions and initiating discussions.
Laboratories:
- object presentations supported by illustrated examples presented on the board,
- presentations of selected experiments,
- initiating teamwork.

Bibliography

Basic:
1. H. Markiewicz, Instalacje elektryczne, Wydawnictwo Naukowo-Techniczne, Warszawa 2012
2. A. Kamińska A, L. Muszyński, Z. Boruta, R. Radajewski, Nowoczesne techniki w projektowaniu energooszczędnych instalacji budynkowych w systemie KNX, Warszawa, 2011.
3. J. Wiatr, M. Orzechowski, Poradnik projektanta elektryka wydanie V rozszerzone, Dom wydawniczy Medium, Warszawa, 2012.
4. E. Niezabitowska, J. Sowa, Z. Staniszewski, D. Winnicka-Jasłowska, W. Badroń, A. Niezabitowski. Budynek inteligentny. Potrzeby użytkownika a standard budynku inteligentnego. Wydawnictwo Politechniki Śląskiej, Gliwice, 2000.
5. J. Kasprzyk, Programowanie sterowników przemysłowych WNT, Warszawa, 2012.
6. A. Ruda, R. Olesiński, Sterowniki programowalne PLC, COSiW SEP, Warszawa, 2008.

Additional:
1. Technical Guide ABB, Electrical Installation Handbook, Protection, control and electrical devices, 6th edition 2010.
2. J. Mikulik. Budynek inteligentny. Podstawowe systemy bezpieczeństwa w budynkach inteligentnych. Wydawnictwo Politechniki Śląskiej, Gliwice, 2000.
3. PN-HD 60364-4-414. Instalacje elektryczne niskiego napięcia

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	28	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	47	2,00