



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Industrial power supply and energy distribution systems [N1Eltech2>PO8-PSZiRE]

Course

Field of study	Year/Semester
Electrical Engineering	4/8
Area of study (specialization)	Profile of study
–	general academic
Level of study	Course offered in
first-cycle	Polish
Form of study	Requirements
part-time	elective

Number of hours

Lecture	Laboratory classes	Other
10	20	0
Tutorials	Projects/seminars	
0	10	

Number of credit points

4,00

Coordinators

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Lecturers

Prerequisites

A student beginning this course should possess basic knowledge of circuit theory, electrical machines, control systems, electronics, power electronics, and electrical installations.

Course objective

Becoming familiar with the design, construction, and operation of industrial power supply and energy distribution systems. Practical training in the preparation of designs for energy distribution circuits and load supply systems.

Course-related learning outcomes

Knowledge:

1. has knowledge of the principles of designing, constructing, and operating power supply systems,
2. has knowledge of the design and operation of lightning protection systems.

Skills:

1. is able to plan an energy distribution system and power supply for a facility and its loads,
2. is able to select appropriate IT tools for the implementation of a design task,

3. is able to present alternative solutions and select an appropriate power supply system for industrial loads depending on the requirements.

Social competences:

1. understands the necessity of using safe and efficient technical solutions in power supply systems,
2. is aware of the importance of safety and reliability of power supply in industrial applications.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: assessment of the knowledge and skills demonstrated in a written examination of a descriptive, design-oriented, or problem-solving nature (verification of knowledge and skills related to power supply systems in industrial facilities). Individual components are evaluated using a point-based system.

Laboratories: emphasis on practical knowledge acquired during previous and current laboratory exercises, along with hands-on verification of the ability to use engineering software for the preparation of design documentation and the solution of engineering problems. Individual components are evaluated using a point-based system with varying weights.

Project: assessment of the final project carried out in teams (up to three students), covering a comprehensive power supply and energy distribution system; regular progress in completing individual stages of the task is also evaluated.

Programme content

Lecture: Legal, technical, and economic aspects of power supply for industrial consumers; construction of energy distribution systems, user safety, and reliability of power supply in industrial settings. Lightning protection systems.

Laboratories: Applications of engineering software for selected tasks in the planning, design, and operation of industrial power supply systems; practical exercises related to acceptance and periodic measurements in electrical installations.

Project: Analysis of possible variants for planning the system and its power supply components in industrial applications; selection of the optimal variant based on specified criteria.

Course topics

Lecture: the role of power supply systems in industry; characteristics of industrial loads; connection of industrial facilities to the grid; supply of facilities from medium-voltage (MV) and low-voltage (LV) networks; MV and LV switchgear; protection of distribution and load circuits; design of lightning protection systems; operation of industrial power supply systems; fundamentals of BIM technology.

Laboratories: determination of power and energy requirements of an industrial facility; selection, coordination, and selectivity of protections in industrial distribution and load circuits; planning of external and internal surge protection; selection of control and power-status signaling elements in industrial systems; planning of emergency power supply circuits; selection of devices for reactive power compensation; analysis of fault conditions; use of BIM technology in power supply system design (interdisciplinary coordination and 3D visualization).

Project: execution of a team project (maximum 3 students) covering the power supply of a facility, including energy distribution and lightning protection systems, incorporating control and process monitoring systems for a selected industrial facility.

Teaching methods

Lecture: multimedia presentation (including diagrams, images, animations, audio, and videos) supplemented with examples written on the board; the lecture is conducted interactively, with questions posed to students, discussions initiated during the session, and consideration of various aspects of the presented topics, including economic, ecological, legal, and social factors. Introduction of new topics is preceded by a review of related content already familiar to students from other courses.

Laboratories: demonstrations and independent execution of computational tasks (including model development) and simulations.

Project: analysis of different technical and non-technical (economic, ecological, legal, social) aspects of design, case studies, individual and team work, presentation, and discussion of proposed solutions.

Bibliography

Basic:

1. Markiewicz H.: Instalacje elektryczne, WNT, Warszawa 2017.
2. Lejdy B.: Instalacje elektryczne w obiektach budowlanych, WNT, Warszawa 2003.
3. Niestępski S., Parol M., Pasternakiewicz J., Wiśniewski T.: Instalacje elektryczne. Budowa, projektowanie i eksploatacja, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2019.
4. Orlik W.: Egzamin kwalifikacyjny elektryka w pytaniach i odpowiedziach, KaBe S. C., Krosno 2018.
5. Normy (np.: PN-HD 60364 (seria), PN-EN 61439, PN-EN 61936-1, PN-EN 50522, PN-EN 62271, PN-EN 62305 (1-4), PN-EN 61643) i rozporządzenia związane z instalacjami elektrycznymi.

Additional:

1. Dobrzycki A., Analiza parametrów energii elektrycznej w przedsiębiorstwie produkcyjnym branży aluminiowej, Academic Journals Poznan University of Technology, nr 74, 2013, 119-126
2. Tematyczne strony internetowe.
3. Katalogi producentów osprzętu, przewodowania i aparatów instalacyjnych.

Breakdown of average student's workload

	Hours	ECTS
Total workload	110	4,00
Classes requiring direct contact with the teacher	40	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	70	2,50