COURSE DESCRIPTION CARD - SYLLABUS

Course name
Data processing, visualization and exchange in the power industry [N1Energ2>PWiWDwE]

Course

Field of study
Power Engineering

Year/Semester
2/4

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
20

Laboratory classes
10

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

0,00

Coordinators

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Lecturers

Prerequisites

Knowledge of mathematical analysis, circuit theory, basics of signal processing, programming, databases. Knowledge of computer network infrastructure, computer aided design software. Ability to work and cooperate in a group.

Course objective

Getting to know modern information technologies used in power engineering. Application of numerical methods for data processing in power and electrical systems. To familiarize students with the methods of collecting, transmitting and storing data from the power grid. Acquainted with the methods of encryption and data protection as well as legal regulations regarding data protection.

Course-related learning outcomes

Knowledge:
1. has knowledge of methods of processing data from the power grid.
2. has knowledge of the security of data transmission and processing systems.
3. has knowledge of programming techniques and the construction of simulation systems used for data processing and transmission in the power industry.

Skills:
1. has knowledge of methods of processing data from the power grid.
2. has knowledge of the security of data transmission and processing systems.
3. has knowledge of programming techniques and the construction of simulation systems used for data processing and transmission in the power industry.

Social competences:
1. is aware of the significant impact of new technologies on the environment and social environment.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture
Assessment of activity during classes, grade for completed homework, written test at the end of the semester, test including test questions/problem tasks, written exam covering the subject matter assessed on a point scale from 0 to 100%, final grade for lectures conducted by more than one lecturer based on a weighted average, the final grade for more than one component grade based on a weighted average. Passing from 60% of obtained points.
Laboratory
Verification of individual preparation for classes, including material from a single exercise or block of exercises, assessment of individual reports on exercises prepared by the student, colloquium at the end of the semester, colloquium including test questions/problem tasks, all grades on a point scale from 0 to 100%, final grade based on the weighted average of all component scores. Passing from 60% of obtained points.

Programme content

Supervision systems, measurement algorithms and programming of microcomputer systems, recording and digital processing of measurement data, data visualization systems and tools.

Course topics

Lecture:
Control and supervision systems as a tool for monitoring the operation of the power system. Application of microprocessor technology, recording of events and disturbances, and processing of recorded measurement signals in power protection systems. Selected issues in the field of data exchange. Modeling of power system systems and components. Security in IT systems. Rules for preparing presentation of the results of engineering calculations in electronic and printed versions. Selected issues in the field of copyright (patents, database protection, software licensing methods). Support for teaching through extensive use of publicly available programs (open licenses). Presentation of available alternative sources that allow students to independently expand their knowledge and skills.
Laboratory:
Application of microprocessor technology, digital data processing, determination of signal parameters in the power system, use of CAS software to perform calculations, modeling of selected elements of power systems, verification of simulation data, encryption and coding of information.

Teaching methods

Lecture
Multimedia and interactive presentation presenting important issues related to the subject, didactic discussion based on the literature on the subject, informative lecture, problem lecture, case study, work on source materials.
Laboratory
Implementation of exercises, use of publicly available information and software tools to support the didactic process, encouraging students to independently search for optimal solutions and problem solving.

Bibliography

Basic:
1. Kacejko P., Inżynieria elektryczna i informatyczna w nowych technologiach elektroenergetycznych, 2010
2. Kasprzak, A., Projektowanie struktur rozległych sieci komputerowych, Oficyna Wydawnicza Pwr, 2001.
3. Stallings, W., Brown, L., Bezpieczeństwo systemów informatycznych : zasady i praktyka. T. 2, Helion, 2019.
4. Aumasson, J-P., Nowoczesna kryptografia : praktyczne wprowadzenie do szyfrowania, PWN, 2018.
5. Michael Welschenbach, Kryptografia w językach C i C++, Mikom, 2002.
6. Mikołaj Karpiński et al., Bezpieczeństwo informacji : praca zbiorowa, Wydawnictwo PAK, 2012.

Additional:
1. Janusz Szmidt, Michał Misztal, Wstęp do kryptologii, Oficyna Wydawnicza WIT, 2002.
2. J. Izydorczyk, W. Sułek, P. Zawadzki, Kody i szyfry, Wydawnictwo PŚl, 2017.
3. Stokłosa, J., Kryptograficzna ochrona danych w systemach komputerowych, Nakom, 1994.
4. Niels Ferguson, Bruce Schneier, Kryptografia w praktyce, Helion, 2004.
5. Handke J., Kwapisz A., Standard IEC 61850 w zastosowaniach badawczych i dydaktycznych w obszarze automatyki EAZ, Wiadomości Elektrotechniczne, nr 6, 2017

Breakdown of average student's workload

	Hours	ECTS
Total workload	80	3,00
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)	50	2,00