COURSE DESCRIPTION CARD - SYLLABUS

Course name
ICT systems for data processing and exchange [S1Energ2>TSPiWD]

Course

Field of study
Power 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
full-time

Requirements
elective

Number of hours

Lecture
30

Laboratory classes
15

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

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. knows how to use various computer tools, including programming environments, simulation tools and computer algebra systems.
2. is able to develop, check and present the results of data processing and transmission algorithms using computer tools.

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

Data transmission systems, databases, basics of data coding and encryption, measurement algorithms and programming of microcomputer systems, structure of teleinformatic systems.

Course topics

Lecture
Control and supervision systems as a tool for monitoring the operation of the power system. Application of microprocessor technology in automation and teleinformatics systems, processing of recorded signals. Selected issues in the field of cryptography. Data transmission methods, authentication and encryption methods in IT systems. Principles of preparing engineering documentation for IT systems. Selected issues in the field of data protection rights (database protection, personal data protection). Supporting teaching through the extensive use of publicly available programs (open licenses). Presentation of available alternative sources enabling the student to independently expand knowledge and skills.
Laboratory
Control and supervision systems, use of microprocessor technology, data processing from recorders, software configuration in client-server architecture, creation and verification of encryption keys, data encryption in databases, creation of secure network connections.

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	75	3,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00