COURSE DESCRIPTION CARD - SYLLABUS

Course name

Intelligent management support systems

Course

Field of study

Engineering management

Area of study (specialization)

Level of study

First-cycle studies

Form of study

part-time

Year/Semester

3/6

Profile of study

general academic

Course offered in

polish/english

Requirements

compulsory

Number of hours

Lecture

8

Laboratory classes

Other (e.g. online)

Tutorials

10

Projects/seminars

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

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Wydział Inżynierii Zarządzania

ul. Jacka Rychlewskiego 2

60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

Student has knowledge of the foundations of management and information technology carried out at

first-cycle studies. In addition, he should also be able to use the acquired knowledge in practice and is ready to work within team structures.

Course objective

To interest the students of Engineering Management course of the future of the application of expert systems and methods and techniques of artificial intelligence for the requirements of decision-making processes and management of the design, implementation and operation of systems: human communities - a technological and organizational component.

Course-related learning outcomes

Knowledge

1. Student knows the basic methods, techniques and tools used in solving managerial tasks of management engineering using intelligent digital technologies,

2. Student knows the concept of human and the world of his values as well as basic ethical and moral categories as well as the subjective role of human in relations with intelligent digital technologies,

3. Student distinguishes between conceptual categories: data, information, knowledge and wisdom, and knows the principles of construction and functioning of Expert Systems, Artificial Neural Networks and Evolutionary Algorithms.

Skills

1. Student is able to notice and formulate in the management engineering tasks concerning system aspects of decision-making processes of design, implementation and operation of systems: human communities - a technological and organizationa component

2. Student is able to use research, analytical, simulation and experimental methods to formulate and solve engineering tasks using intelligent methods and tools

3. Student is able to make a critical analysis of the functioning and evaluate - from the position of Management Engineering - existing technological and organizational solutions.

Social competences

1. Student is aware of the recognition of cause-and-effect relationships in achieving the set goals of design, implementation and operation of systems management processes: human communities - a technological and organizational component,

2. Student is aware of the recognition of the importance of data, information and knowledge in solving management engineering problems and continuous improvement in the use of intelligent digital technologies.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Knowledge acquired during the lecture is verified by a test carried out after the last lecture. The test consists of 20 closed questions. Assessment threshold: 50% of the points (satisfactory).

Knowledge acquired as part of the exercises is verified on the basis of solving individual tasks covered by the curriculum. The student receives points for each task. Assessment threshold: 50% of the points (satisfactory).

Programme content

Lecture: The course consists of three main thematic modules. The first concerns the issues of processing and searching: data, information, knowledge and wisdom, and in this context it introduces the concept of artificial intelligence in the context of applications in the economy based on intelligent digital technologies and in supporting management information systems. Familiarize students with concepts such as: Business Intelligence System in company management. It also addresses the issue of a modern enterprise as a cyberattack object and the issue of the so-called "intelligent dilemma" of the sixth business cycle. The second module covers the issue of knowledge acquisition, methods of knowledge representation, creation and reconstruction of professional knowledge databases as well as expert strategies and intelligent solution of management decision-making problems. This module concerns methodological nature and deals, among others, with heuristics and strategies of graph searching as well as classic and fuzzy inference methods in intelligent systems supporting decision-making processes of design management, implementation and operation of systems: human communities - a technological and organizational component. The third module is descriptive and methodological in nature and concerns two types of selected artificial intelligence tools (artificial neural networks and evolutionary algorithms) supporting decision-making management processes. Expert Systems are presented in variants of decision solutions based on bivalent fuzzy logic systems. Among the solutions of Artificial Intelligence classified as based on Computational Intelligence, Artificial Neural Networks (in variants: Self Organizing Maps and Learning Vector Quantization) and Evolutionary Algorithms (in variants: Genetic Algorithms, Evolutionary Strategies, Evolutionary Programming) are presented. The so-called hybrid systems and elements of chaos theory.

Exercises: This type of classes is implemented in a joint form with the tutor of student analysis exercises, team practical studies for the issues: a), b), c) and d) and jointly with the tutor concerning the analysis of an example of problem prepared by student e) The list of exercise issues includes: a) selected methods of symbolic knowledge representation in the field of security engineering for the purposes of creating and rebuilding professional knowledge bases b) methods of building and searching knowledge graphs in the field of security engineering, c) operation on triangular and trapezoidal forms of membership functions for the purpose of inference in a fuzzy expert system of a selected issue of security engineering, d) preparation of training programs in the field of business security engineering in cyber threat conditions, e) generating in MATLAB an Artificial Neural Network with multilayer feedback and one hidden layer with 15 input nodes and one node in output layer (as a network learning algorithm - Levenberg-Marquardt gradient back propagation, as a transfer function in both the input and output layers - hyperbolic tangent; the number of neurons in a hidden wa layer determined by trial and error, changing the number of neurons from the set: {7, 10, 13, 16, 19, 22, 25, 27, 29, 31}).

Teaching methods

Monographic lecture in the form of a multimedia presentation, with elements of a conversational lecture.

Classes: auditorium exercises, task solving and case study.

Bibliography

Basic

1. Pacholski L., Systemy ekspertowe i sztuczna inteligencja, Wydawnictwo Politechniki Poznańskiej, Poznań 2011.

2. Zieliński J.S., (red.), Inteligentne systemy w zarządzaniu, PWN, Warszawa 2000.

3. Mulawka J.J., Systemy ekspertowe, WNT, Warszawa 1996.

4. Rutkowska D., Piliński M., Rutkowski L., Sieci neuronowe, algorytmy genetyczne i systemy rozmyte, PWN, Warszawa 1997.

5. Cytowski J., Algorytmy genetyczne. Podstawy i zastosowania, Akademicka Oficyna Wydawnicza, Warszawa 1996.

Additional

1. Medsker L.M., Hybryd Neural Networks and Expert Systems, Kluwer Academic Publisher, Boston 1994.

2. Żurada J.M., Barski M., Jędruch W., Sztuczne sieci neuronowe, PWN, Warszawa 1996.

3. Budrewicz J., Fraktale i chaos, WNT, Warszawa 1993.

Breakdown of average student's workload

	Hours	ECTS
Total workload	60	2,0
Classes requiring direct contact with the teacher	18	1,0
Student's own work (literature studies, preparation for classes/tutorials, preparation for tests) [1]	42	1,0

[1] delete or add other activities as appropriate