

SYLLABUS OF A MODULE

Polish name of a module	Sztuczna inteligencja w diagnostyce medycznej
English name of a module	Artificial intelligence in medicine
ISCED classification - Code	0619
ISCED classification - Field of study	<i>Information and Communication Technologies (ICTs), not elsewhere classified</i>
Languages of instruction	<i>English</i>
Level of qualification:	2
Number of ECTS credit points	4
Examination:	A
Available in semester:	A

Number of hours per semester:

Lecture	Tutorial	Laboratory	Seminar	Project	Others
15	0	45	0	0	0

MODULE DESCRIPTION

Module objectives

- O1. Obtaining knowledge about possibilities to solve various problems encountered in medicine using computational intelligence systems.
- O2. Practice by students of deciding which aspects of the medical problems are important to the problem being solved, and of finding the appropriate soft computing method to solve it.

PRELIMINARY REQUIREMENTS FOR KNOWLEDGE, SKILLS AND OTHER COMPETENCES

- 1. Basic knowledge about diagnostic methods in medicine.
- 2. Knowledge about computational intelligence systems.

3. Programming skills in chosen development environment.
4. Ability to choose a proper numerical method for problem solving given tasks.
5. Ability to perform mathematical operations to solve given problems.
6. Ability to work independently and in the group.
7. Ability to correct interpretation and to presentation of own action.

LEARNING OUTCOMES

- LO 1. students will possess theoretical knowledge in the fields of application of the artificial intelligence systems in medical diagnostics,
- LO 2. students will be able to identify the scope of functionality of the computational intelligence systems in the diagnosis process,
- LO 3. students will be able to design independently computer systems which have implemented methods of the computer-aided medical diagnostics,
- LO 4. students will be able to prepare a report from a designing process of computer system.

MODULE CONTENT

Type of classes – Lectures	Number of hours
Błąd! Nie można odnaleźć źródła odwołania.1 The role of medical diagnostics, scheme of the decision-making.	1
Błąd! Nie można odnaleźć źródła odwołania.2, 3 Traditional methods of image recognition.	2

Błąd! można odnaleźć źródła odwołania.4, 5, 6	Nie	The use of the soft computing techniques to design computer-aided medical diagnostics systems: artificial neural networks, fuzzy-systems, evolutionary and genetic systems. Application of the rough sets and Dempster-Shafer theory.	3
Błąd! można odnaleźć źródła odwołania.7	Nie	Systems with experts database to assist the comparative diagnostics in practice of the general practitioners.	1
Błąd! można odnaleźć źródła odwołania.8	Nie	Data mining on medical databases: recent trends and future directions.	1
Błąd! można odnaleźć źródła odwołania.9. 10	Nie	Methods of signal processing applied to cardiograph and cardio-tocography, and the use of the computer-aided medical diagnostic systems to these techniques.	2
Błąd! można odnaleźć źródła odwołania.11, 12	Nie	Tele-medical diagnostic and monitoring systems: cardiology and obstetric systems.	2
Błąd! można odnaleźć źródła odwołania.13	Nie	Computer-aided laboratory diagnostics systems.	1

Błąd! można odnaleźć źródła odwołania. 14, 15	Nie Automatic interpretation and analyses of the medical images: steps of the image processing process.	2
Type of classes– Laboratory		Number of hours
Błąd! można odnaleźć źródła odwołania. 1	Nie Introduction to the chosen programming environment. Design of a simple application.	3
Błąd! można odnaleźć źródła odwołania. 2, 3, 4	Nie Implementation of a neural network system solving a classification problem.	9
Błąd! można odnaleźć źródła odwołania. 5, 6, 7	Nie Implementation of a fuzzy system solving a classification problem.	9
Błąd! można odnaleźć źródła odwołania. 8, 9, 10	Nie Implementation of a genetic system solving a classification problem.	9
Błąd! można	Nie Designing of a data base application.	6

odnaleźć źródła odwołania. 11, 12	
Błąd! Nie można odnaleźć źródeł odwołania. 13, 14, 15	9

TEACHING TOOLS

1. – lectures using multimedia presentations
2. – chosen programming environment
3. – computer stations with software
4. – laboratory instructions
5. – forms of the test protocols

WAYS OF ASSESSMENT (F – FORMATIVE, S – SUMMATIVE

F1. – assessment of activity during classes
F2. – assessment of the ability to apply acquired knowledge during laboratory exercises and projects
S1. – assessment of the ability to solve the posed problems and the method of presentation of the obtained results - credit for the grade
S2. – assessment of mastery of the lecture material - passing the lecture (or exam)

*) warunkiem uzyskania zaliczenia jest otrzymanie pozytywnych ocen ze wszystkich ćwiczeń laboratoryjnych oraz realizacji zadania sprawdzającego

STUDENT'S WORKLOAD

L.p.	Forms of activity	Average number of hours required for realization of activity
1. Contact hours with teacher		
1.1	Lectures	15
1.2	Tutorials	0
1.3	Laboratory	45
1.4	Seminar	0
1.5	Project	0
Total number of contact hours with teacher:		60
2. Student's individual work		
2.1	Preparation for tutorials and tests	0
2.2	Prreparation for laboratory exercises, writing reports on laboratories	10
2.3	Preparation of project	11
2.4	Preparation for final lecture assessment	9
2.5	Preparation for examination	0
2.6	Individual study of literature	10
Total numer of hours of student's individual work:		40
Overall student's workload:		100
Overall number of ECTS credits for the module		4
Number of ECTS points that student receives in classes requiring teacher's supervision:		2,4
Number of ECTS credits acquired during practical classes including laboratory exercises and projects :		1,8

BASIC AND SUPPLEMENTARY RESOURCE MATERIALS

1. L. Rutkowski, Computational Intelligence, Springer-Verlag 2010
2. L. Rutkowski, Flexible Neuro-Fuzzy Systems, Kluwer Academic Publishers, 2004
3. M. Mitchell, An Introduction to the Genetic Algorithms, the MIT Press, Cambridge, Massachusetts, London, 1998

4. Z. Pawlak, Rough Sets: Theoretical Aspects of Reasoning About Data, Kluwer Academic Publishers, Dordrecht, 1991.

5. P. Jackson, Introduction to Expert Systems, Pearson, Harlow, 1999.

MODULE COORDINATOR (NAME, SURNAME, INSTITUTE, E-MAIL ADDRESS)

Prof. dr hab. inż. Robert Cierniak, robert.cierniak@pcz.pl