

SYLLABUS 2019/2020

Level of study	Master's Course		
Course title in Ukraine	Інтелектуальні системи прийняття рішень у галузі		
Course title in English	Intelligent System of Decision Making in Optoelectronics Speciality		
Course code		ECTS credits	3
Lecturer(s)	Cand. Sci., Doc. Kochubey S.O. Email address:		

Course objectives (learning outcomes)	Familiarization with the methods of labor efficiency increase by means of modern intelligent making decision systems. Development intelligent making decision systems for specified purposes.
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Prerequisites:

Knowledge	Knowledge of mathematics and physics on the level of bachelor in physics or applied physics
Skills	Mathematical and physical skills on the level of bachelor in physics or applied physics
Courses completed	The bachelor in physics or applied physics.

Learning effects:

	Learning effects of the course	Relation of the learning effects to the specialization
Knowledge	W01 A student has a basic knowledge of mathematical models of neural networks. W02 A student understands foundations of expert systems. W03 A student comprehends principles of structure and application of fuzzy logic systems. W04 A student knows the general trends and directions of scientific and technological progress in the field of intelligent making decision systems.	W01 – W10

	Learning effects of the course	Relation of the learning effects to the specialization
Skills	U01 A student is able to use programming tools for development of expert systems. U02 A student is able to use knowledge of artificial decision making systems in solving specific problems in optimization of labor efficiency. U03 A student understands and can use logic and architecture of neural networks. U04 A student can develop model of neural network for specified purpose.	U01 – U07

Social skills	Learning effects of the course	Relation of the learning effects to the specialization
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	K01. A student has the creativity and the ability to conceptual thinking. K02 A student is able to present and justify the personal point of view. K03 A student is able to use the information technologies for the communication with the scientific community. K04 A student is aimed to expand personal knowledge and skills. K05 A student has the legal erudition. K06 A student concerned about the environmental safety of physical experiment.	K01 – K06
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Course organization:

Form of classes	Lecture (W)	Group-exercises						
		A (large group)	K (small group)	L (Lab)	S (Seminar)	P (Project)	Exam	
Contact hours	14		14				1	
Semester	2							

Teaching methods:

Classes will be performed in tutorial system on a weekly basis using multimedia presentation and internet in a form of the lectures open for discussion and questions.
In-class exercises are designed to probe knowledge developed through this process, with emphasis on how well students have understood the underlying mathematical and physical ideas.
The students will prepare one individual presentation.

Assessment methods:

	E – learning	Didactic games	Classes in schools	Field classes	Laboratory tasks	Individual project	Group project	Discussion participation	Student's presentation	written assignment (essay)	Oral exam	Written exam	Test
W01						x		x				x	x
W02						x		x				x	x
W03						x		x				x	x
W04						x		x	x			x	x
U01							x	x				x	x
U02							x	x				x	x
U03							x	x				x	x
U04							x	x				x	x
K01						x		x	x			x	x
K02							x	x				x	x

K03							x	x	x			x	x
K04						x	x	x				x	x
K05												x	x
K06												x	x

Assessment criteria:

Grades	<p>The grading scale will be as follows:</p> <p>90 – 100 % - A including A- excellent (eq. in Ukraine: відмінно (very good))</p> <p>82–89 % : B including B – very good (eq. in Ukraine: добре (good))</p> <p>74–81 %: C including C - good (eq. in Ukraine: добре (good))</p> <p>64–73 %: D including D – satisfactory (eq. in Ukraine: задовільно (satisfactory))</p> <p>60–63 %: E including E – acceptable (eq. in Ukraine: задовільно (satisfactory))</p> <p>< 59 %: F failed (eq. in Ukraine: незадовільно (unsatisfactory))</p>
Criteria	<p>A. A student knows all terms and concepts mentioned in W1-W4, U1- U4 and K1-K4. A student can work without any assistances, his/her knowledge's are creative and easily applied to decision of specific problem.</p> <p>B. A student knows all terms and concepts mentioned in W1-W4, U1- U4 and K1-K4, yet needs a little help when decision of specific problem.</p> <p>C. A student knows all terms and concepts mentioned in W1-W4, U1- U4 and K1-K4, however needs a help when decision of specific problem.</p> <p>D. A student knows the most of terms and concepts mentioned in W1-W4, U1- U4 and K1-K4 and has difficulty in decision of specific problem.</p> <p>E. A student knows only several terms and concepts mentioned in W1-W4, U1- U4 and K1-K4 and can solve only a simple problem.</p> <p>F. A student does not know most of terms and concepts mentioned in W1-W4, he/she did not reach the satisfactory level of knowledge this course.</p>

Course content (topic list):

Topics	<p>1. Artificial neural networks.</p> <p>W1. Types of making decision systems.</p> <p>W2. Biologic ground of artificial neural networks. Types of mathematical models of neurons.</p> <p>W3. Learning mechanisms with or without teacher.</p> <p>W4. Direct propagation artificial neural networks.</p> <p>W5. Fuzzy logic systems.</p> <p>2. Methods of development of expert systems.</p> <p>W6. Classification and stages of expert systems development.</p> <p>W7. Principles of expert systems structure.</p> <p>W8. Knowledge representation.</p> <p>W9. Expert systems development by the CLIPS package.</p>
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Literature:

Compulsory reading	1. Руденко О.Г., Бодянський Є.В. Штучні нейронні мережі, Харків, 2—4 2. Уоссермен Ф. Нейрокомп'ютерна техніка, М., 1992 3. Комарова Л.Г., Максимов А.Б. Нейрокомп'ютери, М., изд. МГТУ, 2004 4. Девятков В.В. Системи штучного інтелекту, М., изд. МГТУ, 2001 5. Частиков Т. А. Гаврилова Д. Л.Белов, Розробка експертних систем. Среда clips, «БХВ-Петербург», 2003
Recommended reading	6. Джарратано Дж., Райли Г. Експертні системи: принципи розробки і програмування. – М.: "Вільямс", 2007. – 1152 с. 7. Хайкин С. Нейронні мережі: повний курс. – М.: "Вільямс", 2008. – 1104 с.

Estimation of the total working time of students:

Contact hours	Lectures	28
	Seminars	
	Other (consultation, meetings)	7
Students' work hours (without the lecturer)	Reading books and preparation for the lectures	10
	Preparation to the seminar	
	Preparation of an individual presentation	10
	Preparation to the test-exam	20
Total works' hours		75
ECTS credits 1 ECTS = 25 h		3