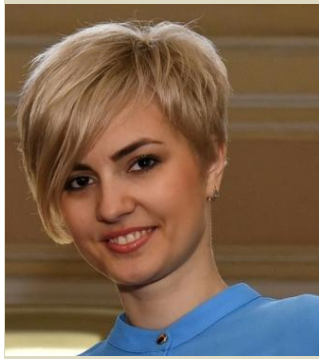
ARTIFICIAL INTELLIGENCE SYSTEMS

СИЛАБУС

Code and name of specialty	121 Software engineering	**Institute / faculty**	Faculty of Computer Science and Software Engineering
Program name	“Software engineering”	**Department**	Software Engineering and Management Information Technologies
Type of program	Educational and Professional	**Language of instruction**	Ukrainian, English

Lecturer

Full name, *e-mail*	Anna Goloskokova, Anna.goloskokova@khpi.edu.ua



PhD, Candidate of Engineering Sciences (05.13.06 – information technologies), Associate Professor of Department of Software Engineering and Management Information Technologies. Work experience – since 2011. Prepared and published more than 20 publications, 1 collective monographs, 2 articles in publications indexed in Scopus and Web of Science.

https://scholar.google.com.ua/citations?hl=uk&user=jnDzQRAAAAAJ

https://orcid.org/0000-0001-9012-7889

https://www.scopus.com/authid/detail.uri?origin=resultslist&authorId=57190428440&zone=57190428440

Extensive teaching at the university level: Bachelor:

- Artificial intelligence systems (in English),
- Introduction into neural networks (in English and Ukrainian),
- Basics of soft computing theory (in English and in Ukrainian)

GENERAL DESCRIPTION OF THE COURSE

Summary	The course "Artificial intelligence systems" is a discipline in the cycle of professional training in the specialty 121 "Software engineering". It is taught in the 8 semester in the amount of 90 hours (3 ECTS credits), in particular: lectures - 20 hours, laboratory classes - 10 hours, independent work - 60 hours. There is no individual task. The study of the discipline ends with a test. The course is aimed at forming a set of knowledge necessary for students to understand the problems that arise during the construction and use of modern intelligent software systems and acquaint students with the basic principles of building artificial intelligence systems.
Course objectives	Providing the future specialist with a clear understanding of models and methods and software tools for solving intelligent problems and for building intelligent systems.
Types of classes and control	Lectures, laboratory classes. Current control - laboratory work, intermediate modular control. Final control – credit.
Term	8

Student workload (credits) / Type of course (mandatory / elective)	3/ mandatory	Lectures (hours)	20	Workshops (hours)	10	Self-study (hours)	60

Program competences	GC 01. Ability to abstract thinking, analysis and synthesis. GC 05. Ability to learn and master modern knowledge. GC 06. Ability to search, process and analyze information from various sources. PC25. Ability to reasonably select and master software development and maintenance tools. PC26. Ability to algorithmic and logical thinking.

Learning outcomes	Teaching and learning methods	Forms of assessment (continuous assessment CAS, final assessment FAS)
PO01. Analyze, purposefully search for and select the necessary information and reference resources and knowledge to solve professional problems, taking into account modern advances in science and technology. PO05. Know and apply relevant mathematical concepts, methods of domain, system and object-oriented analysis and mathematical modelling for software development. PO11. Choose source data for design, guided by formal methods of describing requirements and modelling. PO13. Know and apply methods of algorithm development, software design and data and knowledge structures. PO18. Know and be able to apply information technology processing, storage and transmission of data.	In the process of teaching is used such initial technologies as: lectures, laboratory work, presentations that develop communication and leadership skills, independent work with literary sources, mixed forms of learning using distance platforms	**Current CAS assessment:** Assessment of students' work in the laboratory Intermediate modular control **Final FAS assessment:** Credit

ASSESSMENT AND GRADING

Ranges of points corresponding to grades	Total score (points) for all types of learning activities	ECTS grading scale	The national grading scale
	90-100	A	Excellent
	82-89	B	Good
	74-81	C	
	64-73	D	Satisfactory
	60-63	E	
	35-59	FX	Unsatisfactory (with the exam retake option)
	0-34	F	Unsatisfactory (with mandatory repetition of the course)

Allocation of grade points	**100% final assessment** in the form of credit **(30%)** and current assessment **(70%).** **30%** credit **70%** current rating: Module №1 (10%) Module №2 (20%) Laboratory work (40%)

Course policy	The student is required to attend all classes according to the curriculum and adhere to the norms of academic ethics. To study the discipline you need to have your own personal computer and / or use the computers of the computer center of the department. The student must work with required and additional literature, including information resources on the Internet. All laboratory work must be completed and submitted by the student during the semester in which the discipline is taught, before the start of the test week. Without the personal presence of the student the final control is not carried

	out.

COURSE STRUCTURE AND CONTENT

Theme 1	Basic concepts of artificial intelligence. The concept and properties of intelligent systems. The main areas of research in the field of artificial intelligence. History of the artificial intelligence development. Agent approach to intelligent systems. Intelligent system architecture.			**Individual work**	Review of literature sources about the architecture of the artificial intelligence systems.
Theme 2	Pattern recognition. The problem of pattern recognition. Basic concepts of pattern recognition theory. The task of selection and criteria for assessing the informativeness of features on the basis of heuristic, informational, statistical and probabilistic approaches. Supervised learning. Methods of metric classification.	**Laboratory work 1**	Pattern recognition based on metric classification.		
Theme 3	Crisp cluster analysis. Data mining technologies. Unsupervised learning. Crisp cluster analysis.	**Laboratory work 2**	Self-organizing and unsupervised learning. Cluster analysis		Review of literature sources about the unsupervised learning.
Theme 4	Neuro-fuzzy systems. Basic concepts of fuzzy logic. Fuzzy cluster analysis. Neuro-fuzzy networks.				Review of literature sources about neuro-fuzzy systems.

RECOMMENDED READING

Compulsory	1. Rothma, D. (2020). Artificial Intelligence By Example: Acquire advanced AI, machine learning, and deep learning design skills (2nd ed.). Packt Publishing. 2. Marsland, S. (2015). Machine Learning. An Algorithmic Perspective (second ed.). CRC. 3. Bishop, Ch., M. Pattern (2006). Recognition and Machine Learning. Springer-Verlag New York. 4. Kaufman, L., John Wiley & Sons (2005). Finding Groups in Data. An Introduction to Cluster Analysis Inc., Hoboken, New Jersey. 5. Бостром, Н. (2016). Искусственный интеллект. Этапы. Угрозы. Стратегии. Манн, Иванов и Фербер. 6. Джоши, П. (2019). Искусственный интеллект с примерами на Python. Диалектика-Вильямс. 7. Стюарт, Р., Норвиг, П. (2015). Искусственный интеллект. Современный подход. Вильямс. 8. Шаховська, Н. Б., Камінський, Р. М., Вовк О. Б. Системи штучного інтелекту. Львів: Львівська політехніка.	**Recommended**	1. Kassambara Alboukadel (2017). Practical Guide To Cluster Analysis in R. Unsupervised Machine Learning (First ed.). STHDA. 2. VanderPlas J., O'Reilly. (2017). Python Data Science Handbook / J. VanderPlas Media, Inc. 3. Глибовець, М. М., Олецький, О. В. (2002). Системи штучного інтелекту. Київ: Академія. 4. Субботін, С. О. (2008). Подання й обробка знань у системах штучного інтелекту та підтримки прийняття рішень : навчальний посібник. Запоріжжя: ЗНТУ.
Academic integrity			
The student must adhere to the Code of Ethics of Academic Relations and Integrity of NTU "KhPI": to show discipline, politeness, friendliness, honesty, responsibility			
The content of this syllabus is consistent with the course program.			