

## DESCRIPTION/Syllabi of Curricula/Module

<b>Short Name of the University/Country code</b> <b>Date (Month / Year)</b>	<b>DSEA</b> <b>Sept 2020</b>
<b>TITLE OF THE MODULE</b>	<b>Code</b>
Computing Intelligence Technologies	<b>CIT</b>

<b>Teacher(s)</b>	<b>Department</b>
<b>Coordinating:</b> Pavlo Sahaida, Prof., Doc. Of Sc. <b>Others:</b> Eduard Gribkov	Computer Information Technologdies

<b>Study cycle</b> <b>(BA/MA)</b>	<b>Level of the module</b> <b>(Semester number)</b>	<b>Type of the module</b> <b>(compulsary/elective)</b>
Masters	1 <sup>th</sup> semester (first year) for Masters	Compulsory

<b>Form of delivery</b> <b>(theory/lab/exercises)</b>	<b>Duration</b> <b>(weeks/months)</b>	<b>Language(s)</b>
Lectures, Labs	15 weeks	English/Ukranian

**Prerequisites**

<p><b>Prerequisites:</b></p> <p>Knowledge: Basic knowledge of programming, discrete math, database design, intellectual data processing.</p> <p>Skills: Programming on C#, developing SQL queries and stored procedures on MS SQL Server</p> <p>Competences: Ability of database development, realization and administration</p>	<p><b>Co-requisites (if necessary):</b></p> <p>none</p>
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ECTS (Credits of the module)	Total student workload hours	Contact hours	Individual work hours
5	150	45	105
<b>Aim of the module (course unit): competences foreseen by the study programme</b>			
<p>Students should be able to:</p> <ul style="list-style-type: none"> <li>- to know and use the basic principles of intellectual data processing and hybrid artificial intelligence methods for domain modeling and data processing, including in the field of biomedicine;</li> <li>- to know and use the appropriate mathematical, algorithmic and software to analyze the data and find the hidden dependencies and behaviors of the subject areas, including in the field of biomedicine;</li> <li>- to build models and find dependencies in the behavior of subject areas by methods of computational intelligence, namely, by means of neural networks, systems based on fuzzy inference, neural-fuzzy networks, using specialized software;</li> <li>- to imply intelligent data processing algorithms and user interfaces of integrated computer systems and software systems to use computational intelligence methods in processing database content, including biomedical content.</li> </ul>			
Learning outcomes of module (course unit)	Teaching/learning methods (theory, lab, exercises)	Assessment methods (written exam, oral exam, reports)	
<b>Knowledge:</b> basic principles of intelligent data processing; the use of hybrid artificial intelligence methods for domain modeling and data processing, including in the field of biomedicine.	Work with the lecture notes as well as on the available fundamental subject literature	Written exam	
<b>Skills:</b> ability to use development tools to create integrated computer systems and software for analytical processing through multidimensional representation of aggregate data, including in the field of biomedicine.	Lectures, project, consultation	Active attendance on lectures, individual/group project and presentation	
<b>Competences:</b> ability to intelligent multidimensional data analysis and on-line analytical processing (OLAP) to visualize the analysis results during applied task solving in the computer science area.	Lectures, project, consultation	Individual/group project and presentation	

Themes	Contact work hours							Time and tasks for individual work	
	Lectures	Consultations	Seminars	Practical work	Laboratory work	Placements	Total contact work	Individual work	Tasks
1. Basic methods and technologies of computational intelligence.	1				2		3	8	Study exam/ complete exercise
2. Basic characteristics of fuzzy sets and operations on them	1				2		3	7	Study exam/ complete exercise
3. Fuzzy relations and fuzzy rules in knowledge bases	1				2		3	8	Study exam/ complete exercise
4. Implementation and use of fuzzy inference over rule bases	1				2		3	7	Study exam/ complete exercise
5. The basics of organizing and fulfilling Machine Learning using artificial neural network (ANN)s	1				2		3	8	Study exam/ complete exercise
6. ANN training in supervising and non-supervising modes	1				2		3	7	Study exam/ complete exercise
7. Peculiarities of using ANN when performing tasks of intelligent data processing	1				2		3	8	Study exam/ complete exercise
8. Data processing using hybrid neural-fuzzy networks	1				2		3	7	Study exam/ complete exercise
9. Development of integrated subsystems of intelligent data processing in the field of biomedicine	2				2		4	8	Study exam/ complete exercise
10. Data mining services of modern client-server database management systems (DBMS)	1				2		3	7	Study exam/ complete exercise
11. Common tasks of data analyzing based on their multidimensional representation	1				2		3	8	Study exam/ complete exercise

12. Integration of data analysis services of modern client-server DBMS with external applications	1				2		3	7	Study exam/ complete exercise
13. Development of applications for analysis of data with access to the Analysis Services (in MS SQL Server) functionality using Visual Studio	1				3		4	8	Study exam/ complete exercise
14. Analysis of the adequacy of models and experience of project implementation for solving Data Mining tasks	1				3		4	7	Study exam/ complete exercise
<b>Total</b>	<b>15</b>				<b>30</b>		<b>45</b>	<b>105</b>	

Assessment strategy	Weight in %	Deadlines	Assessment criteria
Individual testing during seminars	20	7 <sup>th</sup> and 14 <sup>th</sup> week	Tests
Final exam	80		Knowledge assessment by answering on theoretical questions and solving practical tasks

Author	Year of issue	Title	No of periodical or volume	Place of printing. Printing house or internet link
<b>Compulsory literature</b>				
Rutkowski L.	2008	Computational Intelligence: Methods and Techniques.		<a href="https://www.amazon.com/gp/product/B007GIHE0I/">https://www.amazon.com/gp/product/B007GIHE0I/</a>
Witten Ian H., Frank Eibe, Hall Mark A., Pal Christopher J.	2016	Data mining: practical machine learning tools and techniques. – 4rd ed.		<a href="https://www.amazon.com/Data-Mining-Practical-Techniques-Management/dp/0128042915/">https://www.amazon.com/Data-Mining-Practical-Techniques-Management/dp/0128042915/</a>
Harinath S., Quinn S.R.	2006	Professional SQL Server Analysis Services 2005 with MDX		<a href="https://www.amazon.com/Principles-Neural-Science-Fifth-Kandel/dp/0071390111">https://www.amazon.com/Principles-Neural-Science-Fifth-Kandel/dp/0071390111</a>
<b>Additional literature</b>				
Барсегян А.А., Куприянов М.С., Степаненко В.В., Холод И.И.	2004	Методы и модели анализа данных: OLAP и Data Mining		СПб.: БХВ
Субботін С.О.	2008	Подання й обробка знань у системах штучного інтелекту та підтримки прийняття рішень : навчальний посібник.		Запоріжжя: ЗНТУ