Cracow University of Technology
Course syllabus
binding for the doctoral students of the CUT Doctoral School commencing their studies
in the academic year 2022/2023

Information on the course

Name of the course in Polish	Sztuczne sieci neuronowe
Name of the course in English	Artificial neural networks
Number of the ECTS points	1
Language of instruction	Polish
Category of the course	Choosable
Field of education	Engineering and Technology
Discipline of education	Civil Engineering and Transport
Person responsible for the course Contact	CUT Prof. Marek Słoński PhD Eng. marek.slonski@pk.edu.pl

Type of course, number of hours in the study programme curriculum

Semester	Credit type (G / NG)*	Lecture	Practical classes	Laboratory	Computer Lab	Project Class	Seminar
2, 3, 4, 5	G	15	0	0	0	0	0

*G – graded credit, NG – non-graded credit

Course objectives

Code	Objective description
Objective 1	Acquiring knowledge about modern computer methods and tools of artificial intelligence.
Objective 2	Acquiring knowledge about contemporary applications of artificial neural networks in civil engineering and transport.
Objective 3	Acquiring the ability to select the appropriate methods and tools of artificial neural networks for the problem being solved.

Learning Outcomes

Code	Description of the learning outcome adjusted to the specific characteristics of the discipline	Learning outcome symbol in the CUT SD	Methods of verification
OUTCOMES RELATED TO KNOWLEDGE			
EUW1	A PhD student knows and understands modern methods and computer tools of artificial intelligence	E_W01, E_W02	Involvement in class activities, a presentation
EUW2	A PhD student knows and understands contemporary applications of artificial neural networks in civil engineering and transport	E_W01, E_W02	Involvement in class activities, a presentation
OUTCOMES RELATED TO SKILLS			

EUU1	A PhD student is able to select the appropriate methods and tools of artificial intelligence and correctly analyse and evaluate the obtained results.	E_U01	Involvement in class activities, a presentation
EUU2	A PhD student is able to select appropriate models of artificial neural networks and correctly analyse and evaluate the obtained results.	E_U01	Involvement in class activities, a presentation
EUU3	A PhD student is able to design and perform scientific research using artificial neural networks.	E_U01	Involvement in class activities, a presentation
OUTCOMES RELATED TO SOCIAL COMPETENCES			
EUK1	A PhD student is ready to critically evaluate the methods of artificial intelligence used in research and to analyse the results of these studies, described in the subject literature.	E_K01, E_K03	Involvement in class activities, a presentation assessment
EUK2	A PhD student is ready to recognize the importance of knowledge on the use of artificial neural networks in the implementation of research in civil engineering and transport.	E_K03	Involvement in class activities, a presentation assessment

Course outline

No.	Contents	Learning outcomes for the course	No. of hours
LECTURE			
W1	Introduction to the subject matter	EUW1, EUU1, EUK1, EUK2	2
W2	Artificial intelligence - presentation of computer methods and tools.	EUW1, EUU1, EUK1, EUK2	3
W3	Artificial intelligence - presentation of computer methods and tools, continued	EUW1, EUU1, EUK1, EUK2	2
W4	Artificial neural networks - discussion of computer methods and tools	EUW1, EUU1, EUK1, EUK2	2
W5	Artificial neural networks - discussion of computer methods and tools, continued	EUW1, EUU1, EUK1, EUK2	2
W6	Review of examples of applications of artificial neural networks in civil engineering and transport	EUW1, EUU1, EUK1, EUK2	2
W7	PhD students' presentations and discussion	EUW1, EUU1, EUK1, EUK2	2

The ECTS points statement

WORKING HOURS SETTLEMENT	
Type of activity	Average number of hours (45 min.) dedicated to the completion of an activity type
SCHEDULED CONTACT HOURS WITH AN ACADEMIC TEACHER	

Hours allotted in the syllabus	15
Consultations	1
Examination / course credit assignment	2
HOURS WITHOUT THE PARTICIPATION OF AN ACADEMIC TEACHER	
Independent study of the course contents	8
Preparation of a paper, a report, a project, a presentation, a discussion	4
ECTS POINTS STATEMENT	
Total number of hours	30
The ECTS points number	1

Preliminary requirements

No.	Requirements
1	Knowledge of the probability calculus and mathematical statistics.
2	Knowledge of the English language

Course credit assignment conditions / method of the final grade calculation

No.	Description
COURSE CREDIT ASSIGNMENT CONDITIONS	
1	80% attendance in class
2	Presentation of a presentation on an agreed topic combining the subject matter and a PhD student's research interests.
METHOD OF THE FINAL GRADE CALCULATION	
Assessment of the presented work, taking into account the attendance	

Additional information

Not specified

The course reading list

1	C.M. Bishop, Pattern recognition and machine learning, Nowy Jork, Springer, 2006.
2	S.J. Russell and P. Norvig, Artificial Intelligence: modern approach, 4th ed., Prentice Hall, 2022
3	K. Murphy, Probabilistic Machine Learning. An Introduction, MIT Press, 2022