POZNAN UNIVERSITY OF TECHNOLOGY

EUROPEAN CREDIT TRANSFER AND ACCUMULATION SYSTEM (ECTS)

COURSE DESCRIPTION CARD - SYLLABUS

Course name
NEW RESEARCH TOOLS - AI & VR [S5SD1>AIVR]

Course

Proposed by Discipline	**Year/Semester**
–	3/5
Level of study	**Course offered in**
Doctoral School	English
Form of study	**Requirements**
full-time	elective

Number of hours

Lecture	**Laboratory classes**	**Other**
4	0	0
Tutorials	**Projects/seminars**	
0	0	

Number of credit points

1,00

Coordinators	**Lecturers**
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Prerequisites

Students starting this course should have a basic understanding of how data is represented, processed, and presented. Familiarity with databases is helpful. Social competencies: They should be able to work effectively in teams by sharing knowledge and tools, and providing constructive feedback to peers. Students should also understand the ethical implications of collecting, processing, and visualizing data and ensure the accuracy, honesty, and integrity of research findings. Through collaborative projects, the course enhances problem-solving abilities and fosters a collective approach to overcoming new challenges related to AI tools.

Course objective

This course aims to provide students with knowledge of artificial intelligence (AI) and virtual reality (VR) as new research tools and techniques. Specifically, the design process for developing AI models will be presented. The use of VR in education and medicine will also be discussed.

Course-related learning outcomes

Knowledge:
A PhD graduate knows and understands the following:
1) How to prepare data for AI models. [P8S_WG/SzD_W01], [P8S_WG/SzD_W02], [P8S_WG/SzD_W03];
2) How to select or build AI models to solve a given scientific problem [P8S_WG/SzD_W03];

3) How VR can be used in different applications, such as education and medicine, [P8S_WG/SzD_W02].

Skills:
A Ph.D. graduate can:
1) Choose appropriate existing models for a given problem and effectively interpret metrics that describe the quality of AI models [P8S_UW/SzD_U01] and [P8S_UW/SzD_U02];
2) Set up and operate a VR headset and use it in commercial and social applications [P8S_UW/SzD_U03].

Social competences:
A Ph.D. graduate is ready to:
1) prepare a data set and use AI models to analyze complex scientific data [P8S_KK/SzD_K01], [P8S_KK/SzD_K03];
2) understand the importance of using the latest techniques and tools, such as AI and VR, to solve research and practical problems P8S_KK/SzD_K03;
3) be aware of the need for a professional approach when using AI and VR, as well as taking responsibility for the results obtained with these tools [P8S_KO/SzD_K04].

Methods for verifying learning outcomes and assessment criteria
Learning outcomes presented above are verified as follows:

Active participation in discussions and solving small exercises. Preparing a short abstract and presentation on a topic related to AI models or VR applications.

Programme content

The lecture presents the basics of using AI techniques in research work. The process of developing new AI models will be presented, as well as an overview of selected publicly available models.
Virtual reality technology will also be presented as a new tool in education and other areas.
The issues discussed will be illustrated with examples from the field of medicine. A demonstration of VR headset is planned.

Course topics

Lecture Topics:
- Introduction to AI: Algorithms, Classification, and Applications
- Design flow of AI model development: data collection and preparation; algorithm selection; model training, evaluation, and testing; model deployment and monitoring.
- Examples of AI model applications in healthcare.
- General overview of virtual reality and its applications.
- Examples of applications in medicine.

Practicing with a VR headset.

Teaching methods

Lectures: multimedia presentations, illustrated with examples given on the blackboard.
Practical exercices with VR headset.

Bibliography
Basic:
1. Russell, S. & Norvig, P. (2016). Artificial Intelligence: A Modern Approach (3rd ed.). Prentice Hall Press, Upper Saddle River, NJ, USA.

Additional:
1. Amita Kapoor: Hands-On Artificial Intelligence for IoT: Expert machine learning and deep learning techniques for developing smarter IoT systems, Packt Publishing, 2019.

Breakdown of average student's workload

	Hours	ECTS
Total workload	25	1,00
Classes requiring direct contact with the teacher	4	0,00
Doctoral student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation)	21	1,00