

Course description

1 General information

Course name	Application of artificial intelligence in engineering
Course code	M6-AI
Level of study (B.Sc, M.Sc., Ph.D.)	B.Sc.
ECTS	3
Course manager	Krzysztof Karbowski, PhD, DSc, Assoc. prof.
Course length	One (1) semester
Coordinator for international programs	erasmus@mech.pk.edu.pl

2 Prerequisites

- Basic knowledge on organization of enterprises

2 Program

Type	Lectures	Classes	Labs	Computer labs	Project	Seminar
Hours	6			18	6	

3 Contents

Lectures		
No.		Hours
1	Introduction to artificial intelligence	1
2	Introduction to project No.1: "Development environment setup"	1
2	(e-learning)	1
3	Introduction to project No.2: "Simple image classification" (e-learning)	1
4	Introduction to project No.3: "Approximation of measurement results" (e-learning)	1
5	Introduction to project No.4: "Advanced image classification"	1
6	(e-learning)	1

Computer labs		
No.		Hours
1	Project No.1: "Development environment setup"	1
2	Project No.2: "Simple image classification". Image acquisition, use of a pre-trained neural classifier	4
3	Project No.3: "Approximation of measurement results". Preparation of training datasets. Neural network architecture. Neural network training. Evaluation of the trained model.	3
4	Project No.4: "Advanced image classification". Image acquisition. Preparation of training datasets. Modification of a pre-trained neural classifier architecture. Neural network training. Evaluation of the trained model.	4
5	Project No.5: "Object detection". Image acquisition. Object annotation. Preparation of training datasets Neural network training. Evaluation of the trained model.	6

Projects		
No.		Hours
1	Simple image classification	1
2	Approximation of measurement results	1
3	Advanced image classification	2
4	Object detection	2

3 Learning Outcomes (skills and knowledge):

Knowledge

- The student knows the basic concepts and the scope of artificial intelligence applications in engineering contexts.
- Possesses knowledge of artificial neural network architectures and their principles of operation in image classification and data approximation tasks.
- Understands the machine learning process, including the importance of training dataset preparation, model training, and subsequent evaluation.
- Knows the requirements for setting up the development environment necessary for implementing AI projects.

Skills

- Is able to configure the development environment for working with artificial intelligence algorithms.
- Can prepare datasets: conduct image acquisition, perform object annotation, and process measurement results for neural network training.
- Can utilize and modify pre-trained models (neural classifiers) and adapt neural network architectures to specific engineering tasks.
- Is able to carry out the model training process and perform an objective evaluation of its effectiveness in tasks such as object detection or regression (approximation).

4 Assessment policy (examination):

The average of the grades obtained for the projects.
