



Course title: **Machine learning**

ECTS credit allocation (and other scores): **2.5**

Semester: spring

Level of study: ISCED-7 - second-cycle programmes (EQF-7)

Branch of science: Engineering and technology

Language: English /Polish

Number of hours per semester: 15 lectures + 30 classes = 60 hours

Course coordinator/ Department and e-mail: Erasmus coordinator Anna Szczepkowska/ WMil,  
erasmuswmil.uwm.edu.pl

Type of classes: classes and lectures

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Substantive content

CLASSES:

Practical applications of machine learning algorithms in models from various fields using the Python language. Training traditional ML algorithms, K-means, and hierarchical clustering. Model tuning and regularization. Gradient descent and boosting in practice. Ensemble modelling: Random Forest - Gradient Boosting - SHAP. Introduction to deep learning.

LECTURES:

Introduction to machine learning. Basic assumptions about data science. Classification of the basic methods of machine learning. Introduction to artificial neural networks. Learning methods with and without supervision. Training and test data sets. Cluster analysis algorithms: hierarchical grouping, K-means method. Dimension reduction methods: principal components analysis. Assessment of the quality of classification models: error matrix, ROC curve, classification accuracy, cross-validation. Combined algorithms: boosting and bagging methods, random forests. In the direction of Deep Learning: Recursive and Convolutional Neural Networks

LEARNING PURPOSE

The aim of the course is to familiarize students with machine learning algorithms that are currently very widely used in the practical analysis of data sets. In the end of the course student should be able to choose appropriate machine learning methods depending on the practical problem. The ability to discover patterns and rules hidden in data. The use of machine learning methods as a support in the process of supporting business decisions After this course, the student will have the ability to use popular among data scientists programming languages and its machine learning libraries, to solve specific data analysis problems.

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On completion of the study programme the graduate will gain:

Knowledge:

The student knows the algorithms and methods of machine learning, their mathematical foundations and applications in models creation and their effectiveness.

Skills:

The student is able to implement, train and evaluate machine learning models for data classification and regression problems using the necessary informatic languages and their libraries.

Social Competencies:



The student understands the need to expand their knowledge and practical skills in the field of machine learning methods

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**BASIC LITERATURE**

1. Albon Ch., *Uczenie maszynowe w Pythonie. Receptury.*, Wyd. Helion, R. 2019, 2. Nattinga D., *Algorytmy Data Science*, Wyd. Helion, R. 2019, 3. Geron A., *Uczenie maszynowe z użyciem Scikit-Learn i TensorFlow.*, Wyd. Helion, R. 2020, 4. Bonaccorso G., *Algorytmy uczenia maszynowego. Zaawansowane techniki implementacji*, Wyd. Helion, R. 2019

**SUPPLEMENTARY LITERATURE**

1. Provost F., Fawcett T., *Analiza danych w biznesie. Sztuka podejmowania skutecznych decyzji.*, Wyd. Helion, R. 2019, 2. Harrison M., *Uczenie maszynowe w Pythonie. Leksykon kieszonkowy.*, Wyd. Helion, R. 2020

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The allocated number of ECTS points consists of:

Contact hours with an academic teacher: 1.6 ECTS points,

Student's independent work: 0.9 ECTS points,