Course Syllabus

I. General Information

Course name in Polish	Machine learning w medycynie i ochronie zdrowia
Course name in English	Machine learning in medicine and healthcare
Programme	
Level of studies (BA, BSc, MA, MSc, long-cycle MA)	Msc.
Form of studies (full-time, part-time)	Full-time
Discipline	Computer Science
Language of instruction	English

Course coordinator/person responsible	Assist. Prof. Dr. Kanita Karadjuzovic-Hadziabdic

Type of class *(use only the types mentioned below)*	Number of teaching hours	Semester	ECTS
Lecture	30	III	6
Tutorial			
Classes	30	III	
Laboratory classes			
Workshops			
Seminar			
Introductory seminar			
Foreign language classes			
Practical placement			
Field work			
Diploma laboratory			
Translation classes			
Study visit			

Course pre-requisites	Knowledge in basic statistics, and linear algebra. Computer science fundamentals and some experience in programming would be beneficial, but not required.

II. Course Objectives

C1 – introduce basic principles of machine learning
C2 – understand and manage the data
C3 – select and apply machine learning methods in medicine and healthcare
C4 – performance evaluation of machine learning models applied to (bio)medical data
C5 – critically read relevant research articles on machine learning in (bio)medical applications

III. Course learning outcomes with reference to programme learning outcomes

Symbol	Description of course learning outcome	Reference to programme learning outcome
KNOWLEDGE		
W_01	Understand the basic concepts and the potentials of artificial intelligence in medicine (with emphasis in machine learning).	K_W01
W_02	Understand, analyze and apply machine learning methods in medical settings.	K_W02
SKILLS		
U_01	Understand and manage the data	K_U01
U_02	Data pre-processing and feature engineering.	K_U02
U_03	Application of supervised and unsupervised machine learning methods to medical datasets.	K_U03
U_04	Performance evaluation of machine learning methods as applied to medical problems.	K_U05
U_05	Effecively disseminate knowledge of a performed research in the form of a research paper.	
COMPETENCIES		
K_01	The student is open-minded to modern research techniques	K_K01
K_02	The students is able to work individually and in a team	K_K02

IV. Course Content

The course aims to introduce basic concepts and principles of machine learning encountered in healthcare. It covers machine learning techniques for the solution of healthcare problems.

V. Didactic methods used and forms of assessment of learning outcomes

Symbol	Didactic methods *(choose from the list)*	Forms of assessment *(choose from the list)*	Documentation type *(choose from the list)*
KNOWLEDGE			
W_01	Conventional lecture Discussion	Written test	Evaluated written test/test
W_02	Conventional lecture Discussion	Written test	Evaluated written test/test
W_03	Conventional lecture Discussion	Written test	Evaluated written test/test
SKILLS			
U_01	Laboratory classes	Report	Report printout
U_02	Laboratory classes	Observation	Observation report
U_03	Practical classes	Test of practical skills	Rating card
U_04	Laboratory classes	Report	Report printout
COMPETENCIES			
K_01 K_02 K_03	Laboratory classes	Observation	Observation report

VI. Grading criteria, weighting factors

E valuation Tool	**Quantity**	**Weight (%)**
Final Exam	1	**30**
S emester Evaluation C omponents		**70**
Research paper	1	25
P roject	1	40
P articipation	1	5

Mark	**Evaluation criteria**	
Very good (5)	the student realizes the assumed learning outcomes at a very good level	the student demonstrates knowledge of the education content at the level of 95-100%
overgood (4.5)	the student accomplishes the assumed learning outcomes an over good level	the student demonstrates knowledge of the education content at the level of 85-94 %
Good (4)	the student accomplishes the assumed learning outcomes at a good level	the student demonstrates knowledge of the education content at the level of 75-84%
Quite good (3.5)	the student accomplishes the assumed learning outcomes at a quite good level	the student demonstrates knowledge of the education content at the level of 65-74%
sufficient (3)	the student accomplishes the assumed learning outcomes at a sufficient level	the student demonstrates knowledge of the education content at the level of 51-64%
insufficient (2)	the student accomplishes the assumed learning outcomes at an insufficient level	the student demonstrates knowledge of the education content below the level of 51%

VII. Student workload

Form of activity	Number of hours
Number of contact hours (with the teacher)	70 (60 + 10 individual consultation)
Number of hours of individual student work	80

VIII. Literature

Basic literature
1. Introduction to Data Mining, Pang-Ning Tan, Michael Steinbach, and Vipin Kumar, Addison-Wesley, 2006 2. Machine Learning with R, Brett Lantz, Packt Publishing, 2013 or 3. Building Machine Learning Systems with Python, Packt Publishing, 2015
Additional literature
Khalid Al-Jabery Tayo Obafemi-Ajayi Gayla Olbricht Donald Wunsch, Computational Learning Approaches to Data Analytics in Biomedical Applications, Academic Press, 2019; ISBN: 9780128144824