



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Human Resource Management Using Machine Learning [S2ETI2>ZZLzWUM]

### Course

Field of study	Year/Semester
Education in Technology and Informatics	1/1
Area of study (specialization)	Profile of study
–	general academic
Level of study	Course offered in
second-cycle	Polish
Form of study	Requirements
full-time	compulsory

### Number of hours

Lecture	Laboratory classes	Other
30	0	0
Tutorials	Projects/seminars	
0	0	

### Number of credit points

2,00

### Coordinators

dr inż. Marcin Nowak  
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### Lecturers

### Prerequisites

Students should have a basic understanding of programming in Python as well as fundamentals of mathematical analysis. The ability to think critically, analyze the implications of technology, and a willingness to engage in discussions on the ethical and social aspects of using AI in human resource management are also recommended.

### Course objective

The aim of the course is to develop the ability to design, select, and evaluate machine learning models in key HR processes - from recruitment and employee assessment to predicting turnover, engagement, and burnout. Students will acquire competencies in explainable AI (XAI) and generative AI, as well as in the responsible, ethical, and compliant application of AI tools in human resource management practice.

### Course-related learning outcomes

Knowledge:

The student knows and understands the HR process cycle and the applications of machine learning and generative AI (including limitations and HR data requirements)

The student possesses structured knowledge of selected ML algorithms used in the social sciences (e.g.,

logistic regression, decision trees/gradient boosting, vector-based methods) and model evaluation metrics

The student knows the principles of model explainability (XAI) and the responsible/ethical use of AI in HR, including bias risks, privacy issues, and legal compliance

Skills:

The student is able to prepare HR data, build, validate, and compare ML models for HR tasks (selection, turnover prediction, engagement, burnout) using appropriate tools

The student is able to apply XAI techniques (e.g., feature importance reports, local explanations) and prepare materials understandable to decision-makers: model card, assumptions, limitations, and recommendations

The student is able to source and critically evaluate literature and documentation of models/AI standards, and subsequently formulate well-founded ethical and legal recommendations for HR projects

Social competences:

The student is ready to apply AI in HR responsibly, respecting professional ethics, employee privacy, and compliance requirements

The student is prepared to seek expert opinions and engage in interdisciplinary collaboration (HR-IT-legal) in the design and implementation of AI solutions

The student is committed to lifelong learning and to inspiring others to enhance digital/AI competencies within the organization

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Two quizzes, for which students receive formative assessments in the form of points - 50 points for each quiz. The final grade is the sum of points from both formative assessments. The first quiz takes place midway through the course, and the second at its conclusion. The passing threshold is a total of 50 points from both quizzes.

Assessment criteria/assessment: in accordance with the study regulations

### Programme content

The basics of human resource management and an introduction to machine learning with a particular focus on its applications in HR. Selected machine learning algorithms used in the selection, assessment, and prediction of employee behavior, such as resignations or burnout, are discussed. The course also addresses ethical issues, responsibility, and explainability of models (XAI), as well as the use of generative AI in personnel management practices.

### Course topics

Introduction to Human Resource Management

The Human Resource Management Cycle

Introduction to Machine Learning

Selected Machine Learning Algorithms for Use in the Social Sciences

Application of Machine Learning Algorithms in Employee Selection

Ethical Aspects of Using AI in Employee Selection

Explainability (XAI) of Machine Learning Models in HR Practice

Generative AI in Human Resource Management

Responsibility in the Use of AI in Human Resource Management

Machine Learning in Employee Evaluation

Using Machine Learning to Predict Voluntary Employee Turnover

Using Machine Learning to Analyze Organizational Engagement and the Phenomena of Quiet and Passive Quitting

Using Machine Learning to Predict Occupational Burnout

### Teaching methods

Problem-based lecture, moderated discussions, case study analysis

### Bibliography

Basic:

Geron, A. (2023). *Uczenie maszynowe z użyciem Scikit-Learn, Keras i TensorFlow*, Helion  
Gallatin, K. (2024). *Uczenie maszynowe w Pythonie. Receptury. Od przygotowania danych do deep learningu*, Helion  
Armstrong, M. (2016). *Zarządzanie Zasobami Ludzkimi*, Wydawnictwo Wolters Kluwier

Additional:

Griffin, R.W. (2017). *Podstawy zarządzania organizacjami*. Warszawa: Polskie Wydawnictwo Ekonomiczne  
Nowak, M. (2025). Grey clustering machine learning model for predicting voluntary employee turnover. *Grey Systems: Theory and Application*, 1-21.  
Nowak, M. (2024). PREDICTION OF VOLUNTARY EMPLOYEE TURNOVER USING MACHINE LEARNING. *Scientific Papers of Silesian University of Technology. Organization & Management/Zeszyty Naukowe Politechniki Śląskiej. Seria Organizacji i Zarządzanie*, (201).

**Breakdown of average student's workload**

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	20	1,00