Syllabus

Descrizione corso

Titolo insegnamento	AI Applications in Industry
Codice insegnamento	47566
Titolo aggiuntivo	
Settore Scientifico-Disciplinare	IIND-04/A
Lingua	Inglese
Corso di Studio	Corso di laurea magistrale in Ingegneria Industriale Meccanica
Altri Corsi di Studio (mutuati)	
Docenti	dr. Matteo De Marchi, Matteo.DeMarchi@unibz.it https://www.unibz.it/en/faculties/engineering/academic-staff/person/44826
Assistente	
Semestre	Primo semestre
Anno/i di corso	2
CFU	5
Ore didattica frontale	24
Ore di laboratorio	24
Ore di studio individuale	77
Ore di ricevimento previste	
Sintesi contenuti	The course belongs to the class of characterizing courses in the Master in Industrial Mechanical Engineering. It aims at introducing Artificial Intelligence to students by teaching fundamentals, scientific foundations and especially practical methods and industrial applications of AI to develop specific professional skills.
Argomenti dell'insegnamento	Part 1 - Introduction to AI and its trends: 1. Introduction to the history of AI. 2. How intelligent is AI really? 3. Basics of machine learning.

	4. Neural networks - on the way to the artificial brain. 5. Deep Learning - The new highlight of AI. 6. AI changes our world. 7. Ethical questions of AI. Part 2 - Fundamentals and methods of AI for applications in industry: 8. Basic concept of intelligent agents and their categorization. 9. Search and constraint satisfaction problems with example application to scheduling and routing. 10. Reasoning under uncertainty with example application to state estimation and prediction. 11. Rational decisions under uncertainty with example application to decision support. 12. Learning from examples and from reinforcement with example application to classification. Part 3 - Exercises and external experts: 13. Excursion and lab demos (Smart Mini Factory lab - unibz) 14. Individual/group project work (assignment).
Parole chiave	Artificial Intelligence, AI, Industry, Machine Learning, Neural Networks
Prerequisiti	None.
Insegnamenti propedeutici	
Modalità di insegnamento	Frontal lectures and exercises with computer.
Obbligo di frequenza	Highly recommended.
Obiettivi formativi specifici e risultati di apprendimento attesi	The course is structured in 3 parts: • Part 1 gives a general introduction in AI and its trends. • Part 2 provides theoretical fundamentals and practical methods for implementing AI applications in industry. • Part 3 covers the exercise part where students will gain insight in realized AI solutions in Industry by excursions, external experts as well as individual practical project work to apply the learned methods from Part 2 in practice. Knowledge and understanding 1. The student knows the historical development as well as basics of modern methods and techniques of artificial intelligence.

	2. Knowledge of the potential of AI in industrial applications. 3. Knowledge of risks and limitations of AI. 4. Knowledge of ethical questions concerning AI. Applying knowledge and understanding 5. The student applies and practices theoretical contents through exercises and project work. Making judgements 6. Ability to correctly classify and assess the advantages and disadvantages, potentials and limitations, as well as the opportunities and risks of AI. 7. Ability to independently analyze application areas with regard to the possible use of methods and techniques from the field of AI. Communication skills 8. Ability to discuss complex and innovative issues in a structured manner. Learning skills 9. Ability to autonomously extend the knowledge acquired during the study course by reading and understanding scientific and technical documentation. The student is able to enlarge his knowledge through self-study and consultation of scientific and technical texts.
Obiettivi formativi specifici e risultati di apprendimento attesi (ulteriori info.)	
Modalità di esame	Knowledge and understanding: written exam Applying knowledge and understanding, Making judgements, Communication skills: Individual/group project work (assignment) with short report and presentation.
Criteri di valutazione	Final evaluation by a single final grade. The final grade is calculated from the results of the written exam (50%) and the results of individual/group project work with short report and presentation (50%).

	Criteria for the evaluation of the written examination: completeness, suitability, and correctness of the answers.
Bibliografia obbligatoria	Lecture notes and documents for exercises will be available online.
Bibliografia facoltativa	Stuart Russell, Peter Norvig (2021). Artificial Intelligence: A Modern Approach, Global Edition. Pearson Higher Ed.- 1167 pages.
Altre informazioni	
Obiettivi di Sviluppo Sostenibile (SDGs)	Istruzione di qualità, Utilizzo responsabile delle risorse, Innovazione e infrastrutture, Buona occupazione e crescita economica