

International Summer University 2024

Module: Applied AI for Non-Programmers

Level: Undergraduate / Bachelor

Module title	Applied AI for Non-Programmers
Learning contents(also taking into account students' soft skill competences)	<p>At the end of the course, students should be able to:</p> <ul style="list-style-type: none">• summarize the main concepts of artificial intelligence (AI) focusing on artificial neural network (ANN)• describe the implementation pipeline from data sets to applied ANNs via training of the ANNs• implement ANNs for classification tasks, time-series prediction, and continuous learning• create datasets (from real data) fitting the needs of AI• know the challenges and limitations of ANNs• understand the potential effects of AI on everyday life• understand evaluation figures of AI• distinguish whether or not the use of AI might outperform classical methods• grasp issues based on unbalanced data set design, overfitting, underfitting as well as overgeneralization• debate the future of AI in the context of computing power, privacy, application domains, and ethical aspects <p>The course fosters the following soft skill competencies:</p> <ul style="list-style-type: none">• reading and comprehension skills of AI-related papers and textbooks• prototypical implementation of ANN incl. training as well as evaluation of these networks• communication skills (e.g., class discussion, presentation of AI concepts incl. code snippets)• summarizing coding and results in paper-like documents or scientific note pads• teamwork in international groups
Teaching methods (mentioning case studies if applied)	<p>The course will provide an overview AI based on artificial neural networks (ANNs), i.e., feedforward neural networks, convolutional neural networks (CNN), long short-term memory (LSTM) network, and generative adversarial networks (GAN). Each network type will be covered on theoretical concepts and the applied perspective. Thus, the course will span the following topics:</p> <ul style="list-style-type: none">• historical and mathematical steps into ANNs• classification: feedforward neural networks and CNN• time-series prediction: LSTM• recreating/compressing knowledge: GAN and autoencoder• dataset design and splitting• evaluation metrics• programming languages and frameworks for ANNs

Requirements / prerequisites	This course is designed for undergraduate students who are majoring in non-informatic fields and others who would like to gain a better understanding of the wide variety of applied AI
Recommended literature	
Examination 1) Type of examination 2) Exam aids	1) In-class presentation and oral examination 2) Presentation Slides, Whiteboard, etc.
Max. Participants	20
Language of lecture	English
Promoter of the module	Prof. Dr. Julius Schöning
Module instructor/ Home university	Prof. Dr. Julius Schöning Osnabrück University of Applied Sciences
Hours all in all a) Time spent in classroom b) Time spent outside classroom	Hours all in all: 150 hours a) 80 hours: 40 hours lecture and 40 hours of practical exercises in computer labs b) 60 hours: 30 hours of preparation and 30 hours of self-study (video and literature)
ECTS-Credits	5