Content

Course Code	Course Name	Semester	Theory	Practice	Lab	Credit	ECTS
IT 537	Generative Artificial Intelligence and Applications	3	4	0	0	3	8

Prerequisites	
Admission Requirements	

Language of Instruction	English
Course Type	Compulsory
Course Level	Masters Degree
Objective	Large Language Models (LLMs) and Multi-Agent Systems have emerged as two of the most prominent research areas in contemporary generative artificial intelligence. This course provides a systematic exploration of fundamental and advanced concepts, including the foundations of deep learning, temporal data analysis using Recurrent Neural Networks (RNNs), attention mechanisms, decoder-only Large Language Model architectures, and advanced techniques such as Retrieval-Augmented Generation (RAG), tool use, and multi-agent collaboration.
Content	1- Foundations of Deep Learning and Temporal Models 2- Attention Mechanisms and Transformer Architecture 3- Large Language Model Applications: Retrieval-Augmented Generation (RAG), Fine-Tuning, and Tool Integration 4- Multi-Agent Systems and Advanced Topics
References	Raschka, Sebastian. Build a Large Language Model (From Scratch). Manning Publications, 2024. ISBN: 978-1633437166.

Theory Topics

Week	Weekly Contents
1	Foundations of Deep Learning and Temporal Models
2	Sequence-to-Sequence (Seq2Seq) Modeling with RNNs and LSTMs
3	Attention Mechanisms and Transformer Architecture
4	Decoder-Only Large Language Model Architectures
5	LLM Applications: Retrieval-Augmented Generation (RAG), Fine-Tuning, and Tool Integration
6	Midterm Exam
7	Multi-Agent Systems and Advanced Topics
8	Agent Architectures: ReAct, Reflexion, and Plan-and-Execute Frameworks
9	AI Safety, Hallucination Detection, and Evaluation Metrics
10	Project Presentations
11	Final Examination