Elements of AI

FREE ONLINE COURSE TO DEMYSTIFY ARTIFICIAL INTELLIGENCE

Opening session **28/01/2025**	**ORGANIZER'S INTRODUCTIONS** Dr. Sana NOUZRI ▪ Complementary course overview presentation ▪ Program and schedule ▪ Software demonstration ▪ Q&A
Session 1 **04/02/2025**	**CHAPTER 1: UNDERSTANDING AI IN TODAY'S WORLD** Speaker: Dr Amro Najjar **Content Overview:** Introduction to AI: • Clear definitions of AI and its core principles. • Differentiating between Artificial Narrow Intelligence (ANI), Artificial General Intelligence (AGI), and Artificial Superintelligence (ASI). Historical Context: • Key milestones in AI development. • Evolution from rule-based systems to machine learning. • The rise of AI in educational contexts AI in Everyday Life: • Virtual Assistants (Siri, Alexa, Google Assistant): Help with tasks like reminders, answering queries, and controlling smart home devices via voice commands. • Chatbots: Used in customer support, providing instant answers and troubleshooting on websites and apps (e.g., ChatGPT, customer service bots). • Education: AI enables personalized learning (Duolingo) and automated grading systems. Debunking Myths: • Addressing common misconceptions (e.g., AI will replace all jobs). • Clarifying what AI is capable of reasoning and what it cannot reason Latest Developments: • Overview of GPT-4 and its capabilities. • Case studies of AI implementation in classrooms
Session 2 **11/02/2025**	**CHAPTER 2: AI PROBLEM SOLVING - HOW MACHINES LEARN TO THINK** Speaker: Dr Sukriti BHATTACHARYA **Content Overview:** Understanding AI Problem Solving: • Explanation of how AI approaches problems differently than humans. Search Algorithms: • Introduction to search algorithms and optimization. • Real-world applications of search algorithms. Reinforcement Learning:

	• Concepts of agents, environments, and rewards. • Case study: OpenAI's advancements in game-playing agents. Case Studies: • Deep dive into AlphaGo and AlphaZero. or • AI-powered adaptive learning platform.
Session 3 **18/02/2025**	**CHAPTER 3: REAL-WORLD AI: PRACTICAL APPLICATIONS IN THE EDUCATIONAL SECTOR** Speaker: Dr Rafael Ferreira Mello **Content Overview:** What is Natural Language Processing (NLP)? • Definition of NLP as a branch of AI that enables machines to understand, interpret, and generate human language. Probabilities and Odds in NLP • How the next word in a sentence is predicted using probabilities. • How likely two different words are to follow a given word based on their odds. AI Technologies in Practice: • NLP for language learning • NLP in interactive learning materials Case Studies: • Successful implementation of AI in schools and universities • NLP for Language Learning Apps (e.g., Duolingo, Babbel) • NLP-based Writing Assistance Tools (e.g., Grammarly) Challenges and Considerations: • Bias in NLP Algorithms Affecting Language Learning • Accuracy and Reliability of NLP in Assessing Open-ended Responses • Balancing Human Feedback with Automated NLP Responses Future Trends in NLP for Education: • Advances in Multimodal NLP (text, speech, image integration)
Session 4 **25/02/2025**	**CHAPTER 4: MACHINE LEARNING UNVEILED–THE DRIVING FORCE BEHIND AI** Speaker: Dr Luis Leiva **Content Overview:** Fundamentals of Machine Learning: • Definitions and key concepts. • Discriminative vs. generative modeling • Classification vs. regression tasks Learning paradigms • Supervised learning • Unsupervised and self-supervised learning • Semi-supervised learning • Reinforcement learning Some learning algorithms • Decision trees • Support Vector Machines • K-means clustering Challenges in Machine Learning • Data quality: volume, variability, velocity • Data preprocessing and feature engineering

	• Model evaluation • Overfitting
Session 5 **04/03/2025**	**CHAPTER 5: NEURAL NETWORKS–THE BRAIN BEHIND INTELLIGENT SYSTEMS** Speaker: Dr Shiwei Liu **Content Overview:** <u>Introduction to Neural Networks:</u> • Biological inspiration and mathematical foundations. • How neural networks learn from data. <u>Training Neural Networks:</u> • Concepts of backpropagation and gradient descent. • Overfitting and regularization techniques. <u>Advanced Architectures:</u> • Convolutional Neural Networks (CNNs) for image processing. • Recurrent Neural Networks (RNNs) and LSTMs for sequential data. <u>Large Language Models:</u> • In-depth look at GPT-4 and its capabilities. <u>Generative Models:</u> • Introduction to GANs and VAEs. • Creative applications like DALL-E for image generation. <u>Current Developments:</u> • Multimodal AI combining text, image, and audio data. • The rise of transformer models in various domains. <u>Educational Innovations:</u> • Speech recognition and AI language tutors

Session 6
11/03/2025
	CHAPTER 6: THE SOCIETAL IMPACT OF AI: ETHICAL, LEGAL, AND FUTURE CONSIDERATIONS IN EDUCATION
	Speaker: Dr Christian M. Stracke
	Content Overview:
	<u>Ethical Frameworks:</u>
	• The Ethics of AI and Education (AI&ED)
	• Human Rights, Democracy and AI&ED
	• Responsible AI use in education
	• Addressing biases and ensuring inclusion, equity and fairness
	<u>Legal Perspectives:</u>
	• Regulatory Considerations for AI in Education
	  ○ Why Should AI in Education (AI&ED) Be Regulated?
	  ○ What Should Be Regulated in AI&ED?
	• Protecting Human Rights, Democracy, and the Rule of Law
	  ○ What Regulations Should Be Put in Place to Protect Human Rights, Democracy, and the Rule of Law Whenever AI is Applied or Taught in Educational Contexts?
	• Intellectual Property and AI-Generated Content
	<u>Societal Implications:</u>
	• AI's Role in Shaping Future Job Markets
	• Lifelong Learning and AI as an Educational Necessity
	• Starting AI Literacy Education
	  ○ The Need for AI Literacy
	  ○ How Should Education and Learning About AI (AI Literacy) Be Initiated?
	• Development and Application of AI in Education

	○ How AI is Developed, Trained, and Applied in Educational Contexts ○ Who Does AI Target and Who are the Real Beneficiaries? <u>Educational Applications and Pedagogy:</u> • AI Applications in Teaching and Learning ○ Learning Objectives and Design for Quality Education with AI • Balancing Human Interaction and AI in Learning Environments ○ Strategies for educators to adapt and thrive with AI
Final test **24/03/2025 to 29/03/2025**	Multiple choice question test to evaluate the understanding and involvement of participants, by doing the test, every participant should be able to: • identify the basic concepts of AI • select the best AI technique for a given problem • understand the use and limitations of AI • Identify some of the major societal implications of AI • Recognize ethical considerations and responsibilities in the development and deployment of AI systems.