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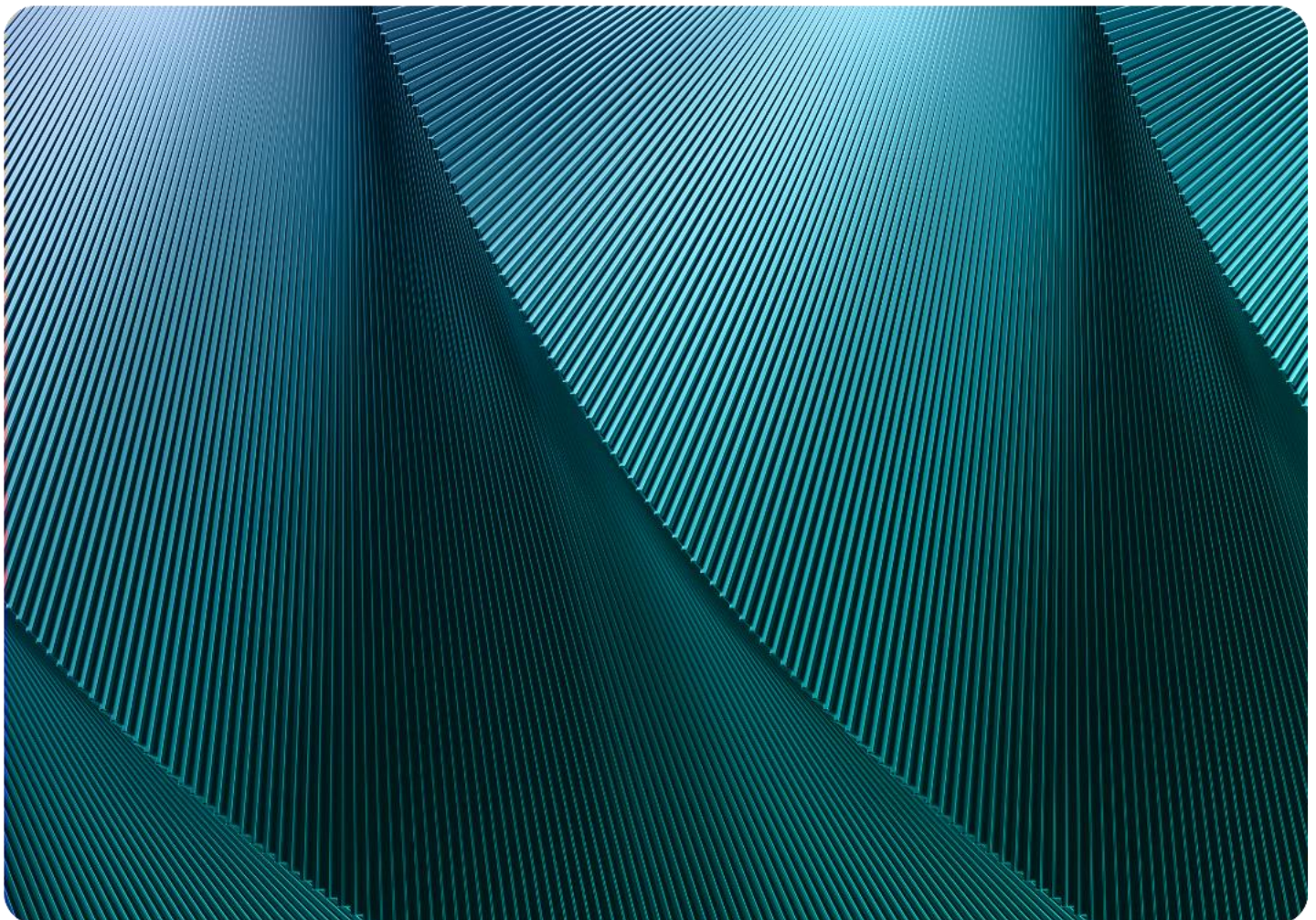
Course Outline Details

Artificial Intelligence (AI) in History, Theory and Platforms

This introductory course provides an overview of the history, theory, and platforms that serve as the foundation for our current understanding of today's AI.

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Course Outline

Week starting on / Module	Module Topic
Week 1	Mod 01: Introduction to Artificial Intelligence
Week 2	Mod 02: History of AI
Week 3	Mod 03: AI and Gaming: Prelude and Pioneering Innovations
Week 4	Mod 04: Fundamentals of Machine Learning
Week 5	Mod 05: Machine Learning Pipeline
Week 6	Mod 06: Neural Networks
Week 7	Mod 07: Deep Learning Architectures
Week 8	Mod 08: Computer Vision Fundamentals
Week 9	Mod 09: Introduction to Natural Language Processing (NLP)
Week 10	Mod 10: Advanced Natural Language Processing
Week 11	Mod 11: Generative AI, Diffusion Models, and Creative Applications
Week 12	Mod 12: Multimodal Models and Autonomous Agents
Week 13	Mod 13: Robotics and AI Integration
Week 14	Mod 14: AI, Ethics, Emerging Innovations, and the Future of AI
Week 15	Mod 15: Course review
Week 16	Final Project Due

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Course Outline Details

Note: This course is purely conceptual. No coding or mathematical concepts are involved.

Module 01: Introduction to Artificial Intelligence

- Course setup, Introduction and Orientation
- Group formation
- AI Definitions, scope, and evolution of AI
- AI in Popular Culture and Media
- Brief overview of ethical considerations in AI

Module 02: History AI

- Key historical figures in AI
- Early AI research and breakthroughs
- Foundations laid by early AI pioneers

Module 03: AI and Gaming: Prelude and Pioneering Innovations

- The role of games in AI development
  - Notable AI-driven games and their technological impact
  - The influence of gaming on modern AI research
    - Major AI milestones such as AlphaGo and IBM Watson; understanding and   Key theories and concepts: Markov decision process
    - How games have been used as platforms for developing and testing AI

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Module 04: Fundamentals of Machine Learning

- Traditional Programming vs Machine Learning
- Basic concepts and types of machine learning
  - Trinity of AI: Data, Algorithm and Hardware
  - The Importance of Data
  - Data Preparation
  - Supervised, Unsupervised and reinforcement Learning

Module 05: Machine Learning Pipeline

- Machine learning pipelines
- Classical Models and Algorithm selection
- Model tuning, optimization, and validation methods
- Evaluation metrics in machine learning
- Introduction to Machine Learning Toolkit Initial exploration of AI tools and environments, like GitHub, Jupyter Notebooks Google Collab, Libraries etc.

Module 06: Neural Networks

- Basics of neural networks
  - Human brain and Neural Networks (NN)
  - NN components and basic structure
    - Artificial Neuron
    - Backpropagation
    - Gradient descent
    - Loss functions
- Deep learning frameworks and applications
- Real-World Applications of Deep Learning

Module 07: Neural Networks and Deep Learning

- Deep learning architectures & Technologies
- Data for Deep Learning
- Addressing Deep Learning's Black-Box Nature

Module 08: Computer Vision Fundamentals

- Introduction to computer vision
- History of Computer Vision (optional)
- Brief overview of cameras, sensors - the eyes of the computer
- How computers can understand, interpret and process visual data
- Computer vision Applications

Module 09: Introduction to Natural Language Processing (NLP)

- Brief History of NLP
- NLP Applications & Challenges
- NLP Foundations (Linguistics, Philosophy, Communication sciences and psychology)
- Text Processing
- NLP Pipeline &Toolkits

Module 10: Advanced Natural Language Processing

- Advanced NLP Applications chatbots, Translation
- Text processing and analysis techniques
- Natural Language Processing vs Natural Language Understanding
- Basics of Large Language Models (LLMs)
- LLMs Under the Hood Architecture Autoencoders, Transformers: Attention is all you need
- Small Language Models

Module 11: Generative AI, Diffusion Models, and Creative Applications

- Introduction to generative models, including GANs and diffusion models
- Creative applications in art, music, and design
- Overview of the latest developments in generative AI

Module 12: Multimodal Models and Autonomous Agents

- True Intelligence?
- Introduction to Autonomous Agents
  - Definitions and Characteristics of Autonomous Agents
  - Applications of Autonomous Agents in Various Fields
  - Ethical Considerations in the Use of Autonomous Agents
- The Path to AGI
  - AI does Math
  - Ai teaching AI

Module 13: Robotics and AI Integration

- Core concepts in robotics and AI integration
- Overview of AI in robotic systems and applications
  - Hardware
  - Software
  - The Robot Works Spectrum and Scope
- Discussion on the latest innovations in AI-powered robotics

Module 14: AI, Ethics, Emerging Innovations, and the Future of AI

- Overview and setup of AI platforms and tools, focusing on the practical aspects of deploying AI systems

- In-depth discussion on security concerns in AI, including data privacy, system vulnerabilities, and strategies for ensuring secure AI applications

- Ethics and responsible AI: Exploring the ethical implications of AI technology, discussing principles of responsible AI development, addressing biases in AI models, and considering the societal impact of AI deployments

- A segment dedicated to the latest trends and innovations in AI, providing space for discussing recent breakthroughs, recent technologies, and future directions in the field

Module 15: Course Review and Project Presentation

- Recap of key concepts and technologies covered throughout the course
- Students will present their projects

Teaching Methods and Strategies

- Total Course Duration: 96 contact hours; 16 weeks
- Weekly Contact Time: 6 hours
- Weekly Structure:
  - Lecture: 2 hours
  - Lab: 4 hours