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Course Syllabus

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.
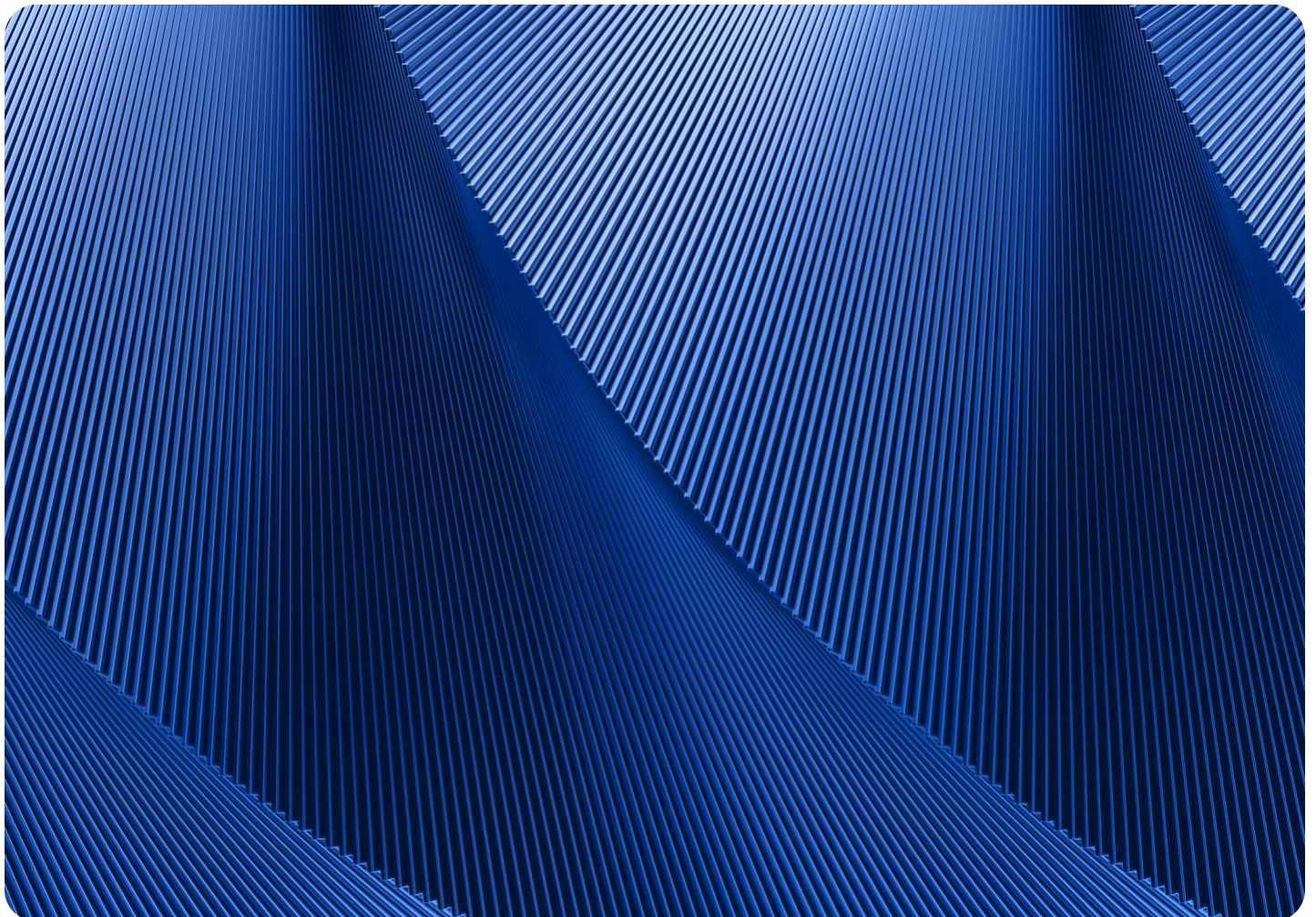
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Course Description

Artificial Intelligence (AI) in History, Theory and Platforms is an overview of the history, theory and platforms that serve as the foundation for our current understanding of today's AI. This course provides the necessary insight needed to learn about the largest field of study that is rapidly expanding into every other field. The course covers everything from post-World War II AI to the ever-changing, moment-by-moment developments of today.

Prerequisites:
College Algebra

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Course Competencies

Competency 1
Students will explore and evaluate the foundational principles, historical development, and significant impacts of Artificial Intelligence (AI)
Competency 2
Students will understand and articulate the basic concepts and techniques in key AI domains, including machine learning, neural networks, deep learning, computer vision, and natural language processing
Competency 3
Students will investigate and implement creative applications of generative AI, focusing on its integration within the field of robotics
Competency 4
Students will synthesize theoretical knowledge and practical skills in AI and Robotics, demonstrated through hands-on projects and case studies

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Instructional Resources

No prescribed textbook is required due to the rapidly evolving nature of artificial intelligence tools, frameworks, and best practices. Instructors will curate up-to-date articles, tutorials, documentation, and other resources available to provide the latest advancements and diverse perspectives. This approach ensures flexibility to tailor content to class needs and incorporate emerging topics and industry practices.

Recommended Reading:
See Course Bibliography/Materials section.

Grading Schema

Assignment Type	Percentage of Grade
Weekly Homework	25%
Conceptual Labs	25%
Midterm Project	30%
Individual Portfolio	20%

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Supplemental Information

The assessment structure for this course is designed to evaluate students' understanding, application, and innovation in AI. The course employs various assessment methods to capture the breadth of student learning.

Weekly Homework (25%)

Objective: To reinforce understanding of weekly topics, encourage peer learning, and enhance collaborative problem-solving skills.
Content: Varies weekly, including case studies, research discussions, or conceptual tasks related to the module content.
Format: Individual and collaborative assignments
Feedback: Continuous, focusing on collaborative skills, problem-solving, and comprehension of weekly topics.

Conceptual Labs (25%)

Objective: To provide students with a deeper understanding of AI concepts relevant to the course topics.
Content: Mix of individual and group tasks focusing on the application of lecture concepts in a conceptual setting.
Format: In-class exercises and discussions utilizing classroom resources.
Feedback: Immediate during sessions, aimed at improving conceptual understanding and problem-solving abilities.

Midterm Project (30%)

Objective: To provide students with experience in developing a comprehensive conceptual project related to AI.
Content: Developing a conceptual project based on AI theories discussed in class; this could include designing a theoretical framework for an AI application, creating detailed use cases, or conceptualizing ethical considerations.
Format: Group project, culminating in a presentation and report.

Individual Course Portfolio (20%)

Objective: To compile a comprehensive record of learning and achievements throughout the course.
Content: Includes selected works, reflective essays, project documentation, and assessments.
Format: Individual dynamic document continuously updated.
Feedback: Assessed for completeness, coherence, depth of reflection, and ability to showcase comprehensive understanding.

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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

Course Bibliography/Materials

YouTube Channels

Two Minute Papers - This channel provides short, digestible explanations of the latest research papers in AI and computer graphics. (https://www.youtube.com/user/keeroy)

 3_ Blue1Brown While primarily focused on mathematics, this channel has exceptional visual explanations of concepts that are foundational to AI and machine learning. https://www.youtube.com/c/3blue1brown

Lex Fridman Lex Fridman is an AI researcher who hosts in-depth interviews with leading figures in AI, machine learning, and robotics. https://www.youtube.com/channel/UCSHZKyawb77ixDdsGog4iWA

deeplearning.ai This channel, founded by AI pioneer Andrew Ng, provides educational videos on deep learning, machine learning, and AI applications. (https://www.youtube.com/channel/UCcIXc5mJsHVYTZR1maL5l9w)

 Stanford Online Offers courses and lectures from Stanford University on various topics, including AI, machine learning, and computer science. (https://www.youtube.com/user/StanfordOnline)

West Roth Covers the latest AI news, emerging technologies, and breakthroughs in artificial intelligence. (https://www.youtube.com/@WesRoth)

AI Revolution Focuses on exploring advancements in AI and how they impact various industries. (https://www.youtube.com/@airevolutionx)

Matthew Berman Provides insights and tutorials on AI tools, automation, and leveraging AI for productivity.(https://www.youtube.com/@matthew_berman)

The Next Wave Pod Discusses the future of technology, including AI, with industry experts and thought leaders.(https://www.youtube.com/@TheNextWavePod)

AI Grid Offers comprehensive coverage of AI topics, including tutorials, research discussions, and the latest AI developments. (https://www.youtube.com/@TheAiGrid)

Foundational and Historical Texts:

Turing, A. M. (1950). Computing machinery and intelligence. *Mind*, *59*(236), 433-460. Link: https://academic.oup.com/mind/article/LIX/236/433/986238

McCarthy, J., Minsky, M. L., Rochester, N., & Shannon, C. E. (1955). A proposal for the Dartmouth summer research project on artificial intelligence. Link: http://www-formal.stanford.edu/jmc/history/dartmouth/dartmouth.html

Philosophical and Conceptual Explorations:

Hofstadter, D. R. (1979). *Gödel, Escher, Bach: an Eternal Golden Braid*. Basic Books.

Bostrom, N. (2014). *Superintelligence: Paths, Dangers, Strategies*. Oxford University Press.

Tegmark, M. (2017). *Life 3.0: Being Human in the Age of Artificial Intelligence*. Knopf.

Russell, S. J., & Norvig, P. (2020). *Artificial intelligence: A modern approach* (4th ed.). Pearson Education, Inc.

AI and Society:

O'Neil, C. (2016). *Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy*. Crown.

Christian, B. (2020). *The Alignment Problem: Machine Learning and Human Values*. W. W. Norton & Company.

Lee, K.-F. (2018). *AI Superpowers: China, Silicon Valley, and the New World Order*. Houghton Mifflin Harcourt.

Additional Resources:

Ai, D. (n.d.). *How to Build Your Career in AI*.

Alto, V. (2023). *Modern generative AI with ChatGPT and OpenAI models: Leverage the capabilities of OpenAI's LLM for productivity and innovation with GPT3 and GPT4* ([First edition]). Packt Publishing Ltd.

Bostrom, N. (2014). *Superintelligence: Paths, dangers, strategies* (First edition). Oxford University Press.

Halfacree, G. (2019). *The official Raspberry Pi beginner´s guide: How to use your new computer* (P. King, Ed.). Raspberry Pi (Trading) Ltd.

Hawkins, J., & Dawkins, R. (2021). *A Thousand Brains: A New Theory of Intelligence*. Basic Books. https://books.google.com/books?id=hYrvDwAAQBAJ

Hurwitz, J. (2018). *Machine Learning For Dummies®, IBM Limited Edition*.

Kurt, W. (2019). *Bayesian Statistics the Fun Way: Understanding Statistics and Probability with Star Wars, LEGO, and Rubber Ducks*. No Starch Press. https://books.google.com/books?id=foBxDwAAQBAJ

McDonald, J. C. (2022). *Dead Simple Python: Idiomatic Python for the Impatient Programmer*. No Starch Press. https://books.google.com/books?id=MPBmEAAAQBAJ

Millington, I. (2019). *AI for Games*. CRC Press.

Starmer, J. (2022). *The StatQuest Illustrated Guide to Machine Learning!!!: Master the Concepts, One Full-Color Picture at a Time, from the Basics All the Way to Neural Networks. BAM!* Packt Publishing, Limited. https://books.google.com/books?id=gWRGzwEACAAJ

Tegmark, M. (2017). *Life 3.0: Being human in the age of artificial intelligence* (First edition). Alfred A. Knopf.

Watzlawick, P., Bavelas, J. B., & Jackson, D. D. (1980). *Pragmatics of human communication: A study of interactional patterns, pathologies, and paradoxes*. Norton.

Wilson, R., & Tyson, J. (2022). *Age of Invisible Machines: A Practical Guide to Creating a Hyperautomated Ecosystem of Intelligent Digital Workers*. Wiley. https://books.google.com/books?id=nvOKEAAAQBAJ