C S 47A: ARTIFICIAL INTELLIGENCE FOR ALL

Foothill College Course Outline of Record

Heading	Value
Effective Term:	Fall 2026
Units:	4.5
Hours:	4 lecture, 2 laboratory per week (72 total per quarter)
Degree & Credit Status:	Degree-Applicable Credit Course
Foothill GE:	Non-GE
Transferable:	CSU Approved, UC Pending
Grade Type:	Letter Grade (Request for Pass/No Pass)
Repeatability:	Not Repeatable

Student Learning Outcomes

- Students will be able to interact with and critically evaluate generative AI to determine fitness for a particular application, limitations, and common failures
- Students will be able to describe the machine learning data pipeline, including the importance of curating quality input data and avoiding algorithmic bias
- Students will be able to analyze the societal, economic, and ethical implications of AI, identifying societal benefits and risks

Description

Comprehensive introduction to artificial intelligence (AI) and its applications. Foundational understanding of modern AI to enable effective communication about its functions, recognition of its applications, and awareness of its core principles. Ethical and societal implications of AI.

Course Objectives

The student will be able to:

1. Define artificial intelligence (AI) and identify current, transformative applications across various industries, including healthcare, cybersecurity, and business.
2. Trace the historical evolution of AI from early rule-based systems to the modern deep learning revolution, contextualizing key milestones in the field.
3. Compare and contrast fundamental AI paradigms - such as symbolic systems and connectionism - and explain how they approach computational problem-solving differently.
4. Interact with and critically evaluate modern generative AI tools, articulating both their practical utility in the near term and their common failure modes.
5. Classify different types of data (structured, unstructured, semi-structured) and explain the critical role of data curation and knowledge discovery in training reliable AI systems.
6. Analyze how advancements in AI research and application inform, disrupt, and influence public policy, regulations, and societal guidelines.
7. Define and differentiate core technical concepts within the broader AI ecosystem, accurately using terminology related to machine learning, deep learning, reinforcement learning, and neural networks.
8. Describe the standard machine learning pipeline - from data preparation to model training and evaluation metrics - and distinguish between supervised and unsupervised learning approaches.
9. Articulate the potential societal and economic benefits of AI adoption, including accelerated scientific discovery, safer technologies, and boosted human creativity.
10. Critically evaluate the ethical risks associated with modern AI, identifying instances of algorithmic bias, data privacy vulnerabilities, and the broader implications of autonomous systems.
11. Discuss the future trajectory of AI integration in society and consider the theoretical and philosophical implications of Artificial General Intelligence.
12. Identify contributions of racial and gender diverse computer scientists.

Course Content

1. Introduction to artificial intelligence (AI)
   a. What is AI?
   b. The power of AI and how is AI is transforming our everyday life
   c. AI and creativity
   d. Emerging applications of AI in natural language processing, healthcare, cybersecurity, business, self-driving vehicles
2. A Brief history of AI
   a. Birth of AI (1940-1950)
   b. Rule-based systems (1960)
   c. Rise of machine learning
   d. Deep learning revolution (2010-now)
3. AI paradigms
   a. Symbolic systems
   b. Connectionism
   c. Embodied AI
   d. Search and heuristics
   e. Task-based vs. generalization-based AI
4. Generative AI systems
   a. ChatGPT
   b. DALL-E (or another image model)
   c. CodeLlama
   d. Babble
   e. Generative adversarial network
   f. MuseNet
   g. Demos of cutting-edge AI systems - what they are good at and some common failure modes
5. AI and data science
   a. AI needs data
   b. Understanding data and knowledge discovery in the context of AI and data science
   c. Different types of data (structured, unstructured, semi-structured)
6. Public policy integration
7. AI concepts and terminology
   a. AI's learning process
   b. Cognitive computing, terminology, and related concepts
   c. Traditional machine learning algorithms

   d. Evaluation criteria
   e. Reinforcement learning
   f. Neural networks
   g. Deep learning
   h. Transfer learning
   i. Generative models
   j. Adversarial models
8. AI in practice
   a. Using black box models in modern AI
   b. Understanding black-box ML models
   c. Understanding data to train and test models
   d. An example of training a prediction model
   e. Supervised learning
   f. Unsupervised learning
   g. Evaluating models, cost functions and metrics
9. AI benefits
   a. Safer technologies
   b. More desirable work
   c. Boosted creativity and personal agency
   d. Accelerated scientific development
10. AI risks and ethical considerations
   a. The importance of data in AI
   b. Examples of biases and ethical issues in modern AI
   c. AI and data privacy
   d. Risks of strong artificial intelligence
   e. AI ethics and regulations
11. The future with AI
   a. The evolution and future of AI
   b. What will our society look like when AI is everywhere?
   c. The AI ladder - the journey for adopting AI successfully
   d. Artificial General Intelligence (AGI)
12. Explore contributions by racial and gender diverse computer scientists and futurists

Lab Content

1. Students interact with early rule-based systems (like ELIZA) and compare their rigid logic to modern LLM outputs to tangibly experience the shift in AI paradigms.
2. Students systematically test cutting-edge generative models to document edge cases, hallucinations, and logic breakdowns.
3. Students train, test, and evaluate a simple supervised learning algorithm (such as a decision tree or linear regression) to predict outcomes from structured tabular data.
4. Students explore transformers using pre-trained models.
5. Students act as a policy board to draft ethical guidelines and usage regulations in a particular AI context, such as robo-taxis or predictive policing.
6. Students explore news and scientific literature to identify real-world cases of algorithmic bias and its impact on human communities.
7. Students explore news and scientific literature to identify real-world cases of social or scientific benefit, such as environmental monitoring or medical image screening.
8. Students calculate and interpret accuracy, precision, recall, and cost functions to determine if a trained model is actually useful for its intended task.

Special Facilities and/or Equipment

1. The college will provide access to a computer laboratory with Python and an IDE and/or a Jupyter environment installed, with sufficient privileges to allow students to install Python packages.
2. The college will provide a website or course management system with an assignment posting component (through which all lab assignments are to be submitted) and a forum component (where students can discuss course material and receive help from the instructor). This applies to all sections, including on-campus (i.e., face-to-face) offerings.
3. When taught online, the college will provide a fully functional and maintained course management system through which the instructor and students can interact.
4. When taught online, students must have currently existing email accounts and ongoing access to computers with internet capabilities.

Method(s) of Evaluation

Methods of Evaluation may include but are not limited to the following:

Tests and quizzes
Lab notebook
Written laboratory assignments which include source code, sample runs, and documentation
Reflective papers
Final examination or project

Method(s) of Instruction

Methods of Instruction may include but are not limited to the following:

Instructor-authored lectures which include mathematical foundations, theoretical motivation, and coding implementation of artificial intelligence models
Detailed review of assignments which includes model solutions and specific comments on the student submissions
Discussion which engages students and instructor in an ongoing dialog about artificial intelligence
Instructor-authored labs that demonstrate a student's ability to implement artificial intelligence models

Representative Text(s) and Other Materials

Christian, Brian. The Alignment Problem: Machine Learning and Human Values. 2021.

Mitchell, Melanie. Artificial Intelligence: A Guide for Thinking Humans. 2025.

Theobald, Oliver. AI for Absolute Beginners: A Clear Guide to Tomorrow. 2024.

Poulton, Nigel. AI Explained. 2024.

Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments

1. Reading
    a. Textbook assigned reading averaging 30 pages per week
    b. Reading the supplied handouts and modules averaging 10 pages per week
    c. Reading online resources as directed by instructor though links pertinent to programming
    d. Reading library and reference material directed by instructor through course handouts
2. Writing
    a. Writing technical prose documentation that supports and describes the programs that are submitted for grades

Discipline(s)

Computer Science