SAGRADO
Universidad del Sagrado Corazón

Syllabus

Title:	Artificial Intelligence (AI)
Code:	CCO 460
Prerrequisite:	INF 201
CREDITS:	3 credits | 45 contact hours | 1 term

Description

Artificial intelligence (*AI*) and *machine learning* have gained prominence due to their innovative approaches in the field of applied technology. This course examines both from a humanistic perspective, grounded in solid theoretical and philosophical foundations. The course analyzes and examines the representation of knowledge and its importance in automated problem-solving. Topics include: decision tree search and heuristics; logic and logic programming; collective intelligence and machine learning; and natural language. It also focuses on the ethical impacts and implications of AI, both positive and negative. This is a semi-practical and analytical course.

Justification

The study of AI offers an extraordinary multidisciplinary scientific approach to intelligence and the ability to solve problems automatically. Furthermore, it provides techniques for programming computers to create useful devices that adapt to the human context. AI also allows for an in-depth analysis of the mechanisms of human thought and intelligence. On a practical and business level, many companies around the world are adopting AI techniques in their environments and products; similarly, the production of “smart” devices and apps—from phones to cars—is constantly increasing and offers a glimpse into the future of our reality.

COMPETENCIES

The course develops the following competencies in students:

- **Critical Thinking**

- **Research and Exploration**
- **Ethical Reflection**

OBJECTIVES

By the end of the course, students will be able to:

1. Discuss the characteristics of AI, its theoretical basis, and its key techniques.
2. Analyze the role of knowledge in the development of intelligence.
3. Implement procedures for automated problem-solving.
4. Use cloud-based programming tools and libraries.
5. Appreciate the interdisciplinary, philosophical, and ethical aspects of AI.

Content

I. General Concepts

   A. Definitions and Theoretical Foundations
      1. Intelligence and the Turing Test
      2. John Searle's Argument: The Chinese Room
      3. Philosophical Issues
      4. The Present and Future of AI
   B. Representations and Methods
      1. Semantic Networks, State Spaces
      2. *Generate-and-Test* Method
      3. Networks and Search
         a. *Breadth-first* and *depth-first*
         b. *Best-first* and Heuristics
         c. *Branch-and-Bound*, Dynamic Programming
         d. A* Algorithm
         e. Search as a Metaphor for Problem Solving
   C. Logic and Predicate Calculus
      1. Symbolic Logic as a Tool for Problem Modeling
      2. Logic Programming
   D. Collective Intelligence
      1. Recommendation Systems
      2. Document Filtering
   E. Machine Learning

1. Decision Trees
2. Genetic algorithms
3. Neural Networks

F. Natural Language
1. Transition Networks and Trees.

METHODOLOGY

The following active learning strategies are recommended:

- Immersion experience
- Discussions, forums, and panel debates
- Blogs and online portfolios
- Critical analysis of readings
- Collaborative learning
- Multimedia resources

ASSESSMENT

Essays	10%
Participation	10%
Midterms	20%
Midterm assessments	20%
Immersion Experience Blog/Portfolio 20% Project or (Final) Exam	20%
Total	100%

Student Learning Assessment

The institutional assessment rubric is applied to the core activity of the course.

BIBLIOGRAPHY

Textbook

Russel, S. J., & Norvig, P. (2020). *Artificial Intelligence: A Modern Approach* (Pearson Series in Artificial Intelligence). Prentice Hall.

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

Cadwalladr, C. (2014). Are the robots about to rise? Google's new director of engineering thinks so… *The Guardian*. http://www.theguardian.com/technology/2014/feb/22/robots-google-ray-kurzweil-t

terminator-singularity-artificial-intelligence

Churchland, P. M., & Churchland, P. S. (1990). Could a machine think? *Scientific American, (262*(1), 32–37). https://doi:10.1038/scientificamerican0190-32

Crawford, K. (2021). *The Atlas of AI: Power, Politics, and the Planetary Costs of Artificial Intelligence*. Yale University Press. https://ebookcentral.proquest.com/lib/sagrado-ebooks/detail.action?docID=6478659

Ertel, W. (2011). *Introduction to Artificial Intelligence*. Springer-Verlag London Limited

Markoff, J. (2013). The Rapid Advance of Artificial Intelligence. *The New York Times.*

http://www.nytimes.com/2013/10/15/technology/the-rapid-advance-of-artificial-intelligence.html?pagewanted=all

Minsky, M. (1982). Why people think computers can't. *AI Magazine, (3*(4), 3–15.). http://www.aaai.org/ojs/index.php/aimagazine/article/view/376/312

Pieraccini, R. (2021). *AI Assistants*. MIT Press.

https://ebookcentral.proquest.com/lib/sagrado-ebooks/detail.action?docID=6705408.

Russell, S. (2019). Human Compatible: Artificial Intelligence and the Problem of Control. Penguin Books.

Schneider, S. (2019). *Artificial You: AI and the Future of Your Mind*. Princeton University Press. https://ebookcentral.proquest.com/lib/sagrado-ebooks/detail.action?docID=5838357

Searle, J. (1990). Is the brain's mind a computer program? *Scientific American, (262*(1), 26–31). https://doi:10.1038/scientificamerican0190-26

Segaran, T. (2007). *Programming Collective Intelligence: Building Smart Web 2.0 Applications.* CA: O'Reilly Media

Turing, A. M. (1950). Computing machinery and intelligence. *Mind, (59*, 433–460.), http://www.loebner.net/Prizef/TuringArticle.html

Winston, P. H. (1992). *Artificial intelligence* (3rd ed.). Addison-Wesley.

You can find more information resources related to the course topics on the library's website at http://biblioteca.sagrado.edu/

Reasonable Accomodation

For detailed information on the process and required documentation, please visit the appropriate office. To ensure a level playing field, in compliance with the ADA (1990) and the Rehabilitation Act (1973), as amended, any student who needs Reasonable Accomodation or special assistance must complete the process established by the Vice-Presidency for Academic Affairs.

ACADEMIC INTEGRITY

This policy applies to all students enrolled at the Universidad del Sagrado Corazón to take courses with or without academic credit. A breach of academic integrity is any act or omission that fails to demonstrate the honesty, transparency, and responsibility that should characterize all academic activity. Any student who violates the policy on honesty, fraud, and plagiarism is subject to the following sanctions: a grade of zero on the assessment and/or having to redo the seminar assignment; a grade of F(*) in the seminar; or suspension or expulsion, as established in the Academic Integrity Policy document effective November 2022.

All rights reserved | Sagrado | September 2023