

PONTIFICIA UNIVERSIDAD CATÓLICA DE CHILE
COLLEGE OF ENGINEERING
DEPARTAMENT OF COMPUTER SCIENCE
ABET COURSE SYLLABI

IIC2613 ARTIFICIAL INTELLIGENCE

Credits and contact hours: 10 credits / 10 hours (3 h. lectures and 7 h. Individual learning experience)

Instructor's name: Jorge Baier / Alvaro Soto

Course coordinator's name Jorge Baier / Alvaro Soto

Textbook:

- Russell, S.; Norving, P. (2002) Artificial intelligence, a modern approach. Prentice Hall, 2nd edition.
- Hastie, T.; Tibshirani, R.; Friedman, J. (2009) The elements of statistical learning. Spinger, 2nd edition.

Course Catalog Description: At the end of the course the student will be familiar with concepts and methodologies used in the area of Artificial Intelligence. In particular the student will be capable of applying deductive reasoning techniques such as logic for modeling knowledge, heuristic search algorithms, and planning algorithms. In addition the student will learn the basics of inductive reasoning, including most well-known machine learning algorithms.

Prerequisite Courses: IIC2233 Advanced Computer Programing and (IIC1253 Discrete Mathematics o IEE2713 Digital Systems)

Co-requisite Courses: None

Status in the Curriculum: Required

Course Learning Outcomes:

1. Comprehend the evolution of artificial intelligence as a research area.
2. Understand and apply deductive techniques of artificial intelligence
3. Understand and apply deductive techniques of artificial intelligence
4. Analyze the computational complexity and memory requirements of artificial intelligence algorithms.
5. Analyze and propose solutions to problems requiring AI techniques.

**Relation of Course to ABET
Criteria:**

- c. Design a system, component, or process
- e. Identify, formulate, and solve engineering problems
- f. Professional and ethical responsibility
- i. Recognition of the need for, and an ability to engage in life-long learning
- k. Techniques, skills, and modern tools for engineering practice.

Topics covered:

1. Introduction
2. Logic
 - 2.1. First-Order Logic
 - 2.2. Applications (ASP or Prolog)
3. Problem resolution using search algorithms
 - 3.1. Formalization of Search Problems
 - 3.2. Blind Search (DFS, BFS)
 - 3.3. Heuristic Search (A*, IDA*)
 - 3.4. Search in two-player games (Minimax)
4. Reasoning under Uncertainty
 - 4.1. Basic properties
 - 4.2. Probabilistic reasoning
 - 4.3. Bayesian Networks
5. Inductive Learning
 - 5.1. Introduction to Machine Learning
 - 5.2. Decision Trees
 - 5.3. Neural Networks
 - 5.4. Genetic Algorithms
6. Intelligent Agents
 - 6.1. Agents that reason logically
 - 6.2. Planning
 - 6.3. Markov decision processes
 - 6.4. Reinforcement Learning