

4th TRIMESTER 2024 Medical Information Systems Module

COURSE SYLLABUS

I. Course title

BME 16 - Artificial Intelligence and Medical Decision Support Systems

II. Instructor

Professor Michail G. Lagoudakis (School of ECE, Tech Univ of Crete)

III. Recommended textbooks

Chapters in textbooks, course notes and current literature (selected reviews and research articles) for Artificial Intelligence, Machine Learning, and their application in medicine and healthcare.

IV. Prerequisites

Basic principles in mathematics, computer science, and information technologies.

V. Course objectives

1. To **introduce** the students to the basic concepts of Artificial Intelligence (AI) and Machine Learning (ML).
2. To **present** to the students state-of-the-art applications of AI and ML in medicine and healthcare, focusing on decision-support systems for disease diagnosis and treatment.
3. To **develop** the students' interest for such systems, and for AI and ML in general.

VI. Course content

1. **Introduction to AI.** What is AI. History of AI. Symbolic AI and Expert Systems. Statistical AI. Data-driven AI. The Intelligent Agent paradigm. AI for medicine: an overview.
2. **Intelligent Search methods.** Informed Search and Uninformed Search.
3. **Constraint Satisfaction Problems.** Applications in the Medical Domain.
4. **Logic:** propositional logic and first-order logic. Logical Inference.
5. **Decision-making under uncertainty:** Bayesian reasoning, Markov Decision Processes.
6. **Expert Systems** for Medical Decision Support and Assistive Technologies (symbolic AI-based expert systems, Bayesian systems, hybrid approaches).
7. **Machine Learning:** Neural Networks, Deep Learning, and their applications in medicine and healthcare.

VII. Teaching methods

Lectures (mostly) and possibly short student's presentations of a relevant article selected from the literature on the course topic.

VIII. Assessment

Class participation, project assignment, written exam, and (possibly) oral presentation.