

Course Syllabi

1. TICS-00034 MACHINE LEARNING

2. 96 credits hours.

3. Bibliography

- The Hundred-page Machine Learning Book, Andriy Burkov, 2019
- Machine Learning and Inductive Inference, H. Blockeel, 2014
- Pattern Recognition and Machine Learning, Christopher M. Bishop , 2006

4. Specific Course Information

a. Machine Learning (Machine Learning) is the conjunction of a fairly broad group of techniques to build programs that can learn how to perform a specific task (or improve their performance in it) based on examples. In other words, the program will be able to discover knowledge of observations/data (inductive input). Machine Learning (AM) is intimately allied with Artificial Intelligence, Data Mining, and Data Science, with AM placing more emphasis on data usage. This course familiarises the student in the domain of AM. After passing the course, the student will: 1) have a basic understanding of the general principles of machine learning; 2) have an overview of the main techniques in AM and Data Mining; 3) understand how these techniques work and why they work; and, 4) can implement programs that learn or demonstrate adaptive behavior. The course will focus on giving an overview of the basic principles of algorithms and will be immediately implemented in different kinds of problems (in a real context).

b. Prerequisites:

- TICS-00053 COMPUTER ORGANIZATION AND ARCHITECTURE
- MAES-00130 LINEAR SYSTEMS AND SIGNALS
- TICS-00050 PROGRAMMING LANGUAGES
- MAES-00123 OPERATIONS RESEARCH
- TICS-00035 DATABASES I: DESIGN AND PRINCIPLES

5. Learning Objectives of the Course

a. Understand correctly the techniques that involve machine learning to apply them in programs that learn based on examples, considering the whole chain of steps necessary to achieve a valid model

- Understand the fundamental concepts that govern the different techniques of Automatic Learning
- Understand the differences between the different types of learning and how they relate to the techniques available for Automatic Learning
- Determine, based on a problem and d available, which techniques to apply to obtain a predictive or descriptive model
- Use correctly the concepts learned to generate an intelligent program taking into account data, transformations, and tunneling parameters

b. Learning Outcomes

- Understand the fundamental concepts of automatic learning
- Understand the fundamental concepts of automatic learning
- Knows how to differentiate when and why to use an algorithm for a specific problem
- Understand the fundamental concepts of automatic learning
- Understand the fundamental concepts of automatic learning
- Use the right algorithm for a specific problem

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6. Course Topics

- Introduction
- General concepts of learning
- Supervised learning
- Unsupervised learning
- Reinforcing learning
- Ensemble methods
- Hypothesis assessment