

Academic Year: ( 2023 / 2024 )

Review date: 28-04-2023

Department assigned to the subject: Signal and Communications Theory Department

Coordinating teacher: MIGUEZ ARENAS, JOAQUIN

Type: Electives ECTS Credits : 6.0

Year : 4 Semester :

**DESCRIPTION OF CONTENTS: PROGRAMME**

In this course the student will advance in the study of inference methods for learning in probabilistic models. The objective of the course is to provide the student with an overview of the various approaches proposed to date in modern applications of Machine Learning. Each of the techniques will be illustrated on the basis of representative probabilistic models within the state of the art.

**PART I: SAMPLING METHODS**

1. Basic Methods of Sampling.
2. MCMC methods: Metropolis-Hastings, Gibbs sampling.

**PART II: APPROXIMATE INFERENCE**

3. Inference in graphic models using methods of dynamic programming and message passing.
4. Variational Inference and the Mean Field approximation.
5. Methods of Propagation of Hopes.

**PART III: SCALABLE METHODS TO LARGE DATASETS**

6. Distributed and parallel MCMC
7. Stochastic Optimization in Variational Inference.

**% end-of-term-examination:** 60

**% of continuous assessment (assignments, laboratory, practicals...):** 40