Universidad Zaragoza

Academic Year/course: 2023/24

27027 - Stochastic Optimisation

Syllabus Information

Academic year: 2023/24
Subject: 27027 - Stochastic Optimisation
Faculty / School: 100 - Facultad de Ciencias
Degree: 453 - Degree in Mathematics
ECTS: 6.0
Year: 4
Semester: First semester
Subject type: Optional
Module:

1. General information

This is an elective course, a natural continuation of Operations Research, which is the discipline in which advanced analytical methods are applied to help make better decisions. Stochastic Optimization studies models that have some random component.

Its objective is to provide the methodological tools necessary to identify, analyze, model and solve problems by means of mathematical models of stochastic character, providing future professionals with knowledge in the modeling of stochastic systems and in the resolution techniques of the associated problems.

The approaches and objectives of this module are aligned with the Sustainable Development Goals (SDGs) of the United Nations 2030 Agenda; the learning activities could contribute to some extent to the achievement of the goals 4 (quality education), 5 (gender equality), 8 (decent work and economic growth), and 10 (reducing inequality).

2. Learning results

- Model real systems that include randomness.
- Identify real systems that can be modeled by dynamic programming.
- Formulate and solve dynamic programming problems.
- Identify real systems that can be modeled by means of Markov chains.
- Analyze the transient and stationary behavior of Markov chains.
- Identify systems that can be modeled using queuing models and recognize their characteristics.
- Represent the transitions diagram of a queuing model and formulate and solve the equilibrium equations.
- Compute the main evaluation measures of the most common queuing models.
- Simulate simple real systems by computer.

3. Syllabus

1. Introduction.
2. Dynamic programming.
3. Markov chains.
4. Queuing theory.
5. Simulation.

4. Academic activities

Master classes: 30 hours.
Problem solving: 12 hours.
Computer classes: 18 hours.
Study: 84 hours.
Assessment tests: 6 hours.

5. Assessment system

- Written tests related to the activities developed in the computer practices (30%).

- A final written exam in the official call (70%).

It will be possible to opt for a continuous evaluation of the subject in which 70% of the score corresponding to the final exam can be obtained as the sum of the scores obtained in three written tests that will be carried out in person throughout the course, corresponding to the three learning blocks: dynamic programming (22%), Markov chains (24%) and queuing theory (24%). In order to be eligible for the continuous evaluation it is necessary to obtain at least 30% of the corresponding score in each of the blocks.

According to the University regulations, the students can refuse the aforementioned system and take only the exams in the official periods as a global test.