Universidad Zaragoza

Academic Year/course: 2024/25

27062 - Stochastic Models

Syllabus Information

Academic year: 2024/25
Subject: 27062 - Stochastic Models
Faculty / School: 100 - Facultad de Ciencias
Degree: 647 - 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 Models 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.

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

- A final written exam in the official call corresponding to topics 2, 3 and 4 (75%).
- A final written exam in the official call corresponding to the activities developed in the computer practices (topic 5) using specific software (25%).

It will be possible to opt for a continuous evaluation of the subject in which 75% of the score corresponding to the final exam of the topics 2, 3 and 4 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: dynamic programming (25%), Markov chains (25%) and queuing theory (25%). 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 three topics.

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.

6. Sustainable Development Goals

4 - Quality Education
5 - Gender Equality
8 - Decent Work and Economic Growth