Universidad Zaragoza

30208 - Discrete mathematics

Syllabus Information

Academic year: 2024/25
Subject: 30208 - Discrete mathematics
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
326 - Escuela Universitaria Politécnica de Teruel
Degree: 439 - Bachelor's Degree in Informatics Engineering
      443 - Bachelor's Degree in Informatics Engineering
ECTS: 6.0
Year: 1
Semester: Second semester
Subject type: Basic Education
Module:

1. General information

The objective of the subject is that the students acquire a series of knowledge in different topics of discrete mathematics that will be useful for their training as computer engineers.

In terms of the approach of the subject, special emphasis will be placed on mathematical rigor as a means to enhance the student's reasoning capacity, and on the correct use of mathematical language as a means to enhance their ability to communicate accurately.

This is a subject whose evaluable contents alone do not yet provide the student with direct capabilities to contribute to the achievement of the 2030 Agenda, however, they are essential to base the subsequent knowledge of the rest of the degree that is more directly related to the SDGs and therefore to the 2030 Agenda.

2. Learning results

Upon passing the subject, the student will be more competent to...

Define and solve mathematical problems that may arise in Computer Engineering.

Understand and master the basic concepts of Discrete Mathematics.

Apply knowledge of Discrete Mathematics to computer science.

Continuous learning and development of autonomous learning strategies.

Thus, in order to pass this subject, the student will be able to:

Manage the basic concepts of symbolic logic to be able to apply them in computing.

Know how to use the knowledge acquired about congruences in its application to computer science.

Know how to apply the basic concepts of combinatorics, particularly the principles of enumeration.

Be able to pose some enumeration problems by means of recurrences. Know how to solve recurrences by means of generating functions.

Know how to model problems in terms of graphs. Recognize the different types of graphs. Apply some algorithms on graphs and know how to handle the representation of graphs by means of matrices.

3. Syllabus

1. Logic : Connectives, truth tables, logical equivalence, tautologies, valid and invalid arguments, introduction to the logic of predicates.

2. Number theory : Principle of induction, Euclidean division, Euclid's algorithm, Bézout's identity, fundamental theorem of arithmetic, congruences, Chinese remainder theorem, modular binary exponentiation, Fermat' s little theorem , Euler's theorem, RSA.

3. Combinatorial : Permutations, combinations, binomial coefficients, pigeon hole principle, inclusion-exclusion principle, recurrence relations.

4. Graph theory : Basic concepts, Eulerian graphs, Hamiltonian graphs, matrix representations of graphs, isomorphism of

graphs, trees, Kruskal's algorithm, Prim's algorithm, Dijkstra's algorithm.

4. Academic activities

The student's dedication to achieve the learning results is estimated in 150 hours, distributed as follows:

hours of theory and problems classes (3 hours per week)

hours of computer practice (sessions of 2 hours each)

hours of effective self-study

hours of final written exam

The face-to-face sessions, both theory and problems classes as well as computer practice, are scheduled for the following days by the center and can be consulted on the website. The dates of the intermediate and final tests will be announced with well in advance.

5. Assessment system

The student must demonstrate achievement of the intended learning results through the following assessment activities:

EINA:

First call: continuous assessment

1. Partial exams: 40%

2. Computer practices: 10%

3. Final exam: 50%

It is necessary to obtain more than a 4 out of 10 in the partial exams in order to be evaluated by continuous assessment.

First call without continuous assessment and second call: final exam.

EUPT:

Continuous assessment:

- Computer practice (20%): Work developed during the practical sessions and final exam.
- Theory and problems:
  - Activities proposed throughout the semester (10%).
  - Partial written test (35%, minimum mark 4.5): Written test on theoretical-practical contents and problems in the middle of the semester.
  - Final Exam (35%, minimum mark 4.5): Written test (only in 1st call) on theoretical-practical contents and problems of part of the subject.

  In the 2nd call, students will conduct the complete Theory and problems part.

Global assessment (official calls):

- Computer practice (20%).
- Theory and problems (80%).

In addition to the continuous assessment, students are entitled to a global assessment with a single exam in the two official exams in both centers. EINA and EUPT.

6. Sustainable Development Goals

4 - Quality Education