Discrete Mathematics

Academic Year: (2022 / 2023)   **Review date: 28-06-2021**

Department assigned to the subject: Mathematics Department

Coordinating teacher: MORO CARREÑO, JULIO

Type: Compulsory ECTS Credits : 6.0

Year : 1 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Fudamentals of Algebra (1st course, 1st semester); Linear Algebra (1st course, 1st semester)

DESCRIPTION OF CONTENTS: PROGRAMME

1. Basic counting techniques: combinatorics
    a) Basic counting rules;
    b) Permutations and combinations; binomial coefficients and identities;
    c) Permutations and combinations with repetition.

2. Recursion
    a) Recursively defined sets and functions; dependence tree;
    b) Linear difference equations;
    c) Time complexity of `divide-and-conquer' algorithms;

3. Binary relations
    a) Relations and their basic properties;
    b) Order relations;
    c) Equivalence relations;

4. Graph theory and applications
    a) Graphs: basic definitions and concepts; undirected graphs;
    b) Euler and Hamilton paths;
    c) Directed graphs;
    d) Weighted graphs;
    e) Trees.

LEARNING ACTIVITIES AND METHODOLOGY

THEORETICAL-PRACTICAL CLASSES. [44 hours with 100% classroom instruction, 1.76 ECTS]
Knowledge and concepts students must acquire. Student receive course notes and
will have basic reference texts to facilitate following the classes and carrying
out follow up work. Students partake in exercises to resolve practical problems
and participate in workshops and evaluation tests, all geared towards
acquiring the necessary capabilities.

TUTORING SESSIONS. [4 hours of tutoring with 100% on-site attendance, 0.16 ECTS]
Individualized attendance (individual tutoring) or in-group (group tutoring)
for students with a teacher.

STUDENT INDIVIDUAL WORK OR GROUP WORK [98 hours with 0 % on-site, 3.92 ECTS]

FINAL EXAM. [4 hours with 100% on site, 0.16 ECTS]
Global assessment of knowledge, skills and capacities acquired throughout the
course.

METHODOLOGIES

THEORY CLASS. Classroom presentations by the teacher with IT and audiovisual
support in which the subject`s main concepts are developed, while providing

material and bibliography to complement student learning.

PRACTICAL CLASS. Resolution of practical cases and problems, posed by the teacher, and carried out individually or in a group.

TUTORING SESSIONS. Individualized attendance (individual tutoring sessions) or in-group (group tutoring sessions) for students with a teacher as tutor.

ASSESSMENT SYSTEM

SE1.FINAL EXAM. Global assessment of knowledge, skills and abilities acquired throughout the course. The percentage of this evaluation is 60% of the final grade.

SE2.CONTINUOUS EVALUATION. Two partial tests, to take place in the 8th and 14th teaching week, during the first half of the weekly practical class. The percentage if this evaluation is 40% of the final grade.

% end-of-term-examination:	60
% of continuous assessment (assigments, laboratory, practicals…):	40

BASIC BIBLIOGRAPHY

 - B. Bollobás Graph Teory: An Introductory Course, Springer , 1990

 - K.H. Rosen Discrete Mathematics and its Applications (8th edition), McGraw Hill, 2019

 - R.P. Grimaldi Discrete and combinatorial mathematics : an applied introduction (5th edition), Pearson, 2017

ADDITIONAL BIBLIOGRAPHY

 - B. Bollobás Modern Graph Theory, Springer, 1998

 - P. Cull, M. Flahive & R. Robson Difference equations: from rabbits to chaos, Springer , 2005

 - R. Diestel Graph Theory, Springer, 2017