Discrete Mathematics

Academic Year: (2021 / 2022) **Review date: 04-06-2021**

Department assigned to the subject: Mathematics Department

Coordinating teacher: MOMPÓ PAVESI, EMANUEL GASTON

Type: Basic Core ECTS Credits : 6.0

Year : 1 Semester : 2

Branch of knowledge: Engineering and Architecture

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Calculus (First year / First semester)
Linear Algebra (First year / First semester)

OBJECTIVES

Areas of learning:

R1. Knowledge and comprehension: Students have basic knowledge and comprehension on the scientific and technological grounds of Informatics Engineering, as well as specific knowledge on Computer Science, Computational Engineering, and Information Systems.
R4. Research and innovation: Students are able to use proper methods in research and attain innovative results in the context of Informatics Engineering.
R5. Applications in engineering: Students are able to use their knowledge and comprehension for problem solving, research leading, and devices or process design in the context of Informatics Engineering, in good agreement with cost, quality, security, efficiency, ecological respect, and ethical criteria. These skills include the knowledge, use and limitations of informatics systems, process engineering, computer architecture, computational models, teams, practical work, technical bibliography and information sources.

Basic and general competences:

CGB1 ¿ Students are able to solve the mathematical problems relevant in engineering, as well as being able to apply their knowledge on: Linear Algebra; Differential and Integral Equations; Numerical Methods; Numerical Algorithmics; Statistics and Optimization.
CGB3 ¿ Students are able to understand and master the basic concepts on Discrete Mathematics, Logic, Algorithmics, and Computational Complexity, as well as their use in engineering problems.
CGO12 ¿ Students are knowledgeable in and are able to use basic tools from Economy, Human Resources Management, Project Management, as well as legislation, regulation, and standardization in the context of IT projects, in good agreement with the acquired knowledge.
CB1 ¿ Students have demonstrated knowledge and understanding in study areas that belong to secondary-level education, and, although supported on advanced text books, also in areas that are in the forefront of the field of study.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Basic set theory.
2. Basic and advanced combinatorics.
3. Graph theory.
4. Algorithms in graph theory.
5. Equivalence relations and application in modulcar arithmetic.
6. Order relations and mathematical induction.
7. Lattices and Boolean algebras.

LEARNING ACTIVITIES AND METHODOLOGY

* THEORETICAL-PRACTICAL CLASSES: 2 ECTS. Concepts and knowledge to be acquired are presented in these sessions. Students are provided with lecture notes and can find basic reference bibliography to facilitate class understanding and posterior personal work. Exercises are solved by students for self-assessment and achievement of necessary skill. During the practical sessions, students are presented with exercises that are discussed and solved.
* INDIVIDUAL AND GROUP WORK: 2.5 ECTS. Students' personal work.

* CONTINUOUS ASSESSMENTS. 1 ECTS. Knowledge, skills and abilities, gradually acquired, are globally assessed. They serve as self-assessment of progress to adapt learning strategies if necessary.
* TUTORING SESSIONS. Sessions to clarify theoretical or practical issues encountered by students on an individual or in-group basis.
* FINAL EXAM: 0.5 ECTS. Knowledge, skills and abilities acquired over the course of the academic semester are globally assessed.

ASSESSMENT SYSTEM

We follow a continuous-assessment system (40%) plus a final exam (60%):

a) The continuous-assessment part consists in two mid-term exams that will be held in regular class hours, according to the current regulations. These mid-term tests allow the students to modify their own learning strategies, if necessary.

b) The final exam will be held at the end of the semester, and allows to assess globally the knowledge of the course topics, skills, and capabilities adquired by the students.

In both the mid-term and final exams, competence CBG3 will be evaluated.

There is an resit exam in June for those students who did not obtain the required end-of-semester mark. This resit exam has a maximum mark of 10, and the June final mark is given by max(RE, 0.6 RE + 0.4 CA), where RE (resp. CA) is the resit-exam (resp. continuous-assessment) mark.

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

BASIC BIBLIOGRAPHY

- F. García Merayo Matemática Discreta, Paraninfo, 2015
- J. Matousek and J. Nesetril Invitation to Discrete Mathematics, Oxford, 2004
- K.H. Rosen Discrete Mathematics and Its Applications, McGraw-Hill, 7th edition, 2012

ADDITIONAL BIBLIOGRAPHY

- N.L. Biggs Discrete Mathematics, Oxford University Press, 2002
- R.P. Grimaldi Discrete and Combinatorial Mathematics: An Applied Introduction, Addison Wesley, 2003