Subject:	Discrete Mathematics	**Code**	93.59
Credits:	6	**Total hours:**	102
Department	Exact and Natural Sciences	**Year:**	2019

Course:

Computer Science Engineering

Curriculum: S10 A - Rev18, S10-Rev23, S10 - Rev18

Subject presentation:

The subject Discrete Mathematics is taught in the second four-month period of the first year of the Degree in Computer Science Engineering.
This subject is fundamental to computer science. Much of the development of modern computer science has its foundations in the concepts studied in this branch of mathematical science.
Algorithms are the rules by which a computer operates. These rules are created through the laws of discrete mathematics.

Learning objectives:

Upon completing the course, the student should:
- Have acquired extensive knowledge of graphs and trees, basic notions of complexity and cardinality.
- Be able to follow and understand algorithms in pseudocode.
- Apply the knowledge acquired to solve problems in his/her professional life.

Contents:

No.	Description
1	**Graphs** Simple graphs. Multigraphs. Directed graphs. Matrix representation of graphs. Degree of a vertex. Subgraphs. Complement graph. Graphs isomorphism. Classes of graphs. Bipartite, complete, regular.
1	**Graphs** Connected graphs. Connected components. Cut sets. Connectivity of order k. Menger and Whitney theorem. Whitney. Eulerian paths and circuits. Hamiltonian paths and cycles. Minimum Path: Dijkstra and Floyd Algorithms Dijkstra y Floyd.
3	**Planar Graphs** Region, Degree of a Region Euler's theorem. Algebraic Proofs of Non-Planarity Homeomorphisms of graphs. Kuratowski's theorem. Dual graphs. Coloring. Chromatic polynomials.
4	**Algorithms and complexity** Pseudocode. Iterative and recursive algorithms. Sorting algorithms. Temporal and spatial complexity. Order of complexity. Polynomial and non-polynomial complexity algorithms.
5	**Trees** Trees, rooted trees, m-ary trees, balanced trees. Isomorphisms of trees. Paths. DFS Y BFS strategies. Expression Trees. Polish and inverse Polish notation. Minimum generating tree. Prim and Kruskal algorithms.
1	**Graphs**

Flow networks with capacity. Theorem of maximum flow and minimum cut. Ford and Fulkerson algorithm. Edmond and Karp algorithm. PERT and CPM graphs.

Laboratory assignments:

No.	Description
1	**In this subject we do not work in the laboratory.** No subject.

Required bibliography:

No.	Description
1	No bibliography has been uploaded.
2	No bibliography has been uploaded.
3	No bibliography has been uploaded.
4	No bibliography has been uploaded.

Additional bibliography:

No.	Description
1	Richard Johnsonbaugh. Discreet Mathematics, 6th Edition – Pearson Prentice Hall, 2005

Professor in charge:	Orecchia, Monica Ines
Head of Department:	Stripeikis, Jorge Daniel