

SUBJECT TEACHING GUIDE

G647 - Discrete Mathematics

Degree in Computer Systems Engineering

Academic year 2023-2024

1. IDENTIFYING DATA					
Degree	Degree in Computer Systems Engineering			Type and Year	Core. Year 2
Faculty	Faculty of Sciences				
Discipline	Subject Area: Mathematical Foundations of Computer Science Basic Training Module				
Course unit title and code	G647 - Discrete Mathematics				
Number of ECTS credits allocated	6	Term	Semester based (1)		
Web	http://moodle.unican.es				
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. MATEMATICAS, ESTADISTICA Y COMPUTACION				
Name of lecturer	DANIEL SADORNIL RENEDO				
E-mail	daniel.sadornil@unican.es				
Office	Facultad de Ciencias. Planta: + 3. DESPACHO DANIEL SADORNIL RENEDO (3003D)				
Other lecturers					

3.1 LEARNING OUTCOMES
- Know the different enumerative and combinatorial principles. Distinguish and calculate the partitions of sets and integers.
- Solve linear recurrences and use generating functions to solve enumeration problems and partitions.
- Know and use basic concepts of graph theory. Know how to model problems in terms of graphs and oriented graphs. Know how to use algorithms to determine a Eulerian circuit or path.
- Use depth and breadth search algorithms to obtain spanning trees and apply Prim and Kruskal algorithms for minimum spanning trees.
- Know eulerian and hamiltonian graphs. Know sorting algorithms, Depth first search and Breadth first search
- Know bipartite graphs and matching problems.

4. OBJECTIVES

Discrete Mathematics has as its fundamental objective to provide the computer science students the basic mathematical tools and techniques closest to your discipline. In general these have a eminently discrete character and must allow the student, in the first place, to understand and manipulate structures, mainly finite, such as graphs, trees, etc. and, secondly, the availability of tools such as combinatorics or enumeration techniques without which a specialist could hardly develop his work.

Discrete Mathematics has an unquestionable formative character since it provides reasoning procedures and mental organization that will be extremely useful both during their studies and in the future development of his professional activity in the field of Computer Science

6. SUBJECT PROGRAM

CONTENTS

1	<p>COMBINATORICS</p> <p>Applications and enumeration.</p> <p>Enumerative principles.</p> <p>Subsets and binomial numbers.</p> <p>Partitions of sets and integer partitions.</p> <p>Recurrence Equations</p> <p>Generating functions</p>
2	<p>GRAPH THEORY</p> <p>Definition, representation and isomorphisms. Paths, cycles and connection.</p> <p>Distances and minimum paths.</p> <p>Trees and search.</p> <p>Bipartite graphs and pairing problems. Coloration in graphs.</p> <p>Digraphs, networks and flows.</p> <p>Planar graphs</p>
3	Partial Exams
4	Final Exam

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Partial Exams	Written exam	No	Yes	45,00
Final Exam	Written exam	Yes	Yes	55,00
TOTAL				100,00
Observations				
<p>Provided that PE and PC marks are equal to or greater than 3 (over 10), the student's final grade will be the weighted average of the grades obtained in the three categories of evaluation labeled as PC and EF plus that obtained in ET. Otherwise, the one obtained in section EF will be assigned if it is lower than 5 (out of 10); or a grade of 4 will be obtained.</p> <p>In September the marks of the ET and PC tests are maintained. In the September exam the student must decide if he / she improves the PC and must perform the final exam compulsory.</p>				
Observations for part-time students				
Partial time students have the option of doing a single final exam that covers all the contents of the whole subject.				

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

C. Valero Revenga, D. Sadornil Renedo. Apuntes Matemática Discreta.

N. L. Biggs. Discrete Mathematics. Oxford University Press, 2002.