COURSE DATA

Data Subject	
Code	34149
Name	Discrete mathematics
Cycle	Grade
ECTS Credits	6.0
Academic year	2021 - 2022

Study (s)

Degree	Center	Acad. year	Period
1107 - Degree in Mathematics	Faculty of Mathematics	1	Second term

Subject-matter

Degree	Subject-matter	Character
1107 - Degree in Mathematics	1 - Mathematics	Basic Training

Coordination

Name	Department
LEBTAHI CHEROUATI, LEILA	363 - Mathematics

SUMMARY

Discrete mathematics, as opposed to mathematical analysis, study structures with finite or countable sets. It uses recursion and induction as the main ingredients in the proofs of their results.

The concern over the algorithm that allows finding the solution of a problem than the solution explicitly. Two of the specific degree of mathematical skills are the ability to reason logically and identify errors in the deductive processes and the capacity for abstraction and modeling.

It is in the discrete mathematics course where you can exercise that strengthens learning ability problems using mathematical reasoning simple statement, for in them the inherent mathematical structure, and draw consequences from the presence of this structure.

Studied combinatorial techniques compteig finite sets, recurrence relations and finite difference equations, an introduction to graph theory id'arbres and simple algorithms for modular

arithmetic.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

OUTCOMES

1107 - Degree in Mathematics

- Capacity for analysis and synthesis.
- Ability to work in teams.
- Learn autonomously.
- Possess and understand the mathematical knowledge.
- Expressing mathematically in a rigorous and clear manner.
- Reason logically and identify errors in the procedures.
- Capacity of abstraction and modeling.
- Knowing the time and the historical context in which occurred the great contributions of women and men in the development of mathematics.

LEARNING OUTCOMES

- Deepen the learning of mathematical reasoning that students have already seen in previous courses as a basic mathematical, mathematical analysis and linear algebra and geometry I.
- Continue learning algorithmic reasoning that students have already seen the course before, Informatics. Master the concepts of induction and recursion.
- Acquiring the ability to count or enumerate various types of discrete structures such as sets, permutations, relations, graphs and trees.
- Apply the knowledge acquired in all sorts of problems and how to model the inherent mathematical structure.

DESCRIPTION OF CONTENTS

1. Methods of enumeration and combinatorial

Permutations, combinations and factorials.
Principle of inclusion-exclusion.
Generalized permutations and combinations.
Generating Functions.

2. Recurrences and finite difference equations

Recurrence relations.
Solving linear recurrence relations.
Finite difference equations.
Solving simple Finite difference equations

3. Graph Theory elementary

Notion of graph. Isomorphism.
Subgraph, components and adjacency matrix.
Hamiltonian paths and cycles or eulerians. Connectivity.
Introduction to tree-like structures.
Algorithm for calculating a minimum cost tree generator in a complete graph with weights.
Bipartite graphs. Perfect matchings.

4. Modular arithmetic

Modular arithmetic in the integers.
Fermats little theorem.
Chinese remainder theorem.
Linear Diophantine equations.
Applications of number theory. Public key cryptographic systems.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	30,00	100
Classroom practices	22,50	100
Other activities	7,50	100
Development of group work	10,00	0
Study and independent work	20,00	0
Preparation of evaluation activities	25,00	0
Preparing lectures	5,00	0
Preparation of practical classes and problem	10,00	0
Resolution of online questionnaires	12,50	0
TOTAL	**142,50**	

TEACHING METHODOLOGY

In the theoretical classes will be introduced and developed the content of each issue. In practical classes will be applied the concepts expressed in lectures and wherever possible will use tools. We propose to students performing works of two types. First, for each of the four themes of the course will mount questionnaires in the virtual classroom. Each student must complete a questionnaire with questions randomly selected from a battery of questions with multiple answers. The questionnaires will be active over a week or so, but will have a time limit to complete them once initiated, and a small number of attempts. Second, for each of the five seminar sessions will prepare a list of issues that will be posted in advance in the virtual classroom. Students at most in groups of two, will solve some of them and deliver them to the teacher at the end of the class. The teacher will resolve any questions that may arise during the session.

EVALUATION

Students must demonstrate through written tests, questionnaires in classroom work and knowledge of the material acquired during the course. Students will be evaluated by an examination of an essentially practical, as well as the results of questionnaires posted on the classroom and presenting collections of solved problems which will be proposed along semester. The weighting in the final grade for the course among the final exam, the grade of the

questionnaires and the proposed work is 80%, 10% and 10% respectively. The minimum grade on the final exam required to make the average with the other two notes is 4 points out of 10.

REFERENCES

Basic

- Referència b1: Kenneth H. Rosen, "Discrete Mathematics and its applications", sisena edició, Mac-Graw-Hill Int., Singapur, 2006.
  Edición en Español: Matemática Discreta y sus aplicaciones. Mc Graw Hill 2004.
  Students Solution Guide for Discrete Mathematics and its applications. K.H. Rosen. Mc Graw Hill, 1999.

  Referència b2: J. Matousek, J. Nesetril "An Invitation to Discrete Mathematics", segona edició, Oxford University Press, Oxford, 2008.

Additional

- Referència c1: Discrete Mathematics (2nd Ed.). S. Lipschutz, M. L. Lipson. McGraw-Hill, 1997

  Referència c2: Matemática Discreta. C. García, J. Ma López, Dolors Puigjaner. Pearson Educación (Prentice Hall), 2002.

  Referència c3: Comellas, Francesc, "Matemática discreta", Edicions de la UPC, Barcelona, 2001.

  Referència c4: Meavilla Seguí, Vicente, "201 problemas resueltos de matemática discreta", Zaragoza Universidad de Zaragoza, Prensas Universitarias 2000

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

In the event of a closure of the facilities due to the health situation, and if this affects all or part of the classes of the subject, these will be replaced by classes where physical attendance will be replaced by online synchronous classes following the established schedules, and with asynchrony work from home.

In the event of a closure of the facilities due to the health situation, and if this affects any of the face-to-face tests of the subject, these will be replaced by tests of a similar nature but in virtual mode through the supported computer tools by the University of Valencia. The evaluation percentages will remain the same as those established in the guide.