

270203 - LMD - Logic and Discrete Mathematics

Coordinating unit: 270 - FIB - Barcelona School of Informatics
 Teaching unit: 749 - MAT - Department of Mathematics
 Academic year: 2019
 Degree: BACHELOR'S DEGREE IN DATA SCIENCE AND ENGINEERING (Syllabus 2017). (Teaching unit Compulsory)
 ECTS credits: 7,5 Teaching languages: Catalan

Degree competences to which the subject contributes

Basic:

CB1. That students have demonstrated to possess and understand knowledge in an area of study that starts from the base of general secondary education, and is usually found at a level that, although supported by advanced textbooks, also includes some aspects that imply Knowledge from the vanguard of their field of study.

Specific:

CE1. Skillfully use mathematical concepts and methods that underlie the problems of science and data engineering.

Generical:

CG5. To be able to draw on fundamental knowledge and sound work methodologies acquired during the studies to adapt to the new technological scenarios of the future.

Transversal:

CT5. Solvent use of information resources. Manage the acquisition, structuring, analysis and visualization of data and information in the field of specialty and critically evaluate the results of such management.

CT6. Autonomous Learning. Detect deficiencies in one's own knowledge and overcome them through critical reflection and the choice of the best action to extend this knowledge.

Teaching methodology

In the theory classes the subject is exposed, complementing it with examples and applications. in the problem sessions we'll discuss problems from a list, encouraging the active participation of students.

Learning objectives of the subject

- 1.To know the language of mathematical logic
- 2.To understand basic arithmetic of integers and polynomials, specially the computational aspects
- 4.To know the basic results of enumerative combinatorics
- 5.To know the basics of graph theory, with emphasis on algorithmic problems

Study load

Total learning time: 187h 30m	Theory classes:	45h	24.00%
	Laboratory classes:	30h	16.00%
	Guided activities:	0h	0.00%
	Self study:	112h 30m	60.00%

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Content

Sets and proofs

Degree competences to which the content contributes:

Description:

The language of set theory. Demonstrations in mathematics. The induction method.

Propositional and predicate calculus

Degree competences to which the content contributes:

Description:

Boolean formulas. Assignment and truth tables. Satisfiability. First-order logic.

Integer arithmetics and polynomials

Degree competences to which the content contributes:

Description:

Divisibility of integers. Maximum common divisor. Congruences Divisibility and congruence of polynomials. Roots and factorization.

Basic enumeration and recurrences

Degree competences to which the content contributes:

Description:

Permutations, sets, and multisets. Binomial numbers. The principle of inclusion and exclusion. Recurrence equations. Resolution of linear recurrence equations.

Graphs and trees

Degree competences to which the content contributes:

Description:

Basic concepts of graph theory. Distances and connectivity. Representation and exploration of graphs. Eulerian graphs. Minimal spanning tree: Kruskal and Prim algorithms.

Planarity and colouring

Degree competences to which the content contributes:

Description:

Planar graphs. Euler's formula. Graph colouring, algorithms.

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Planning of activities

Problem solving	Hours: 0h Theory classes: 0h Practical classes: 0h Laboratory classes: 0h Guided activities: 0h Self study: 0h
Specific objectives: 1, 2, 4, 5	

Qualification system

Midterm exam (40%) and final exam (60%). On the day of the final exam students have the opportunity to resit the midterm.

There will be a retake exam that will substitute 100% of the original grade.

Bibliography

Basic:

Biggs, Normal L. Discrete mathematics. 2nd. ed. Oxford University Press, 2002. ISBN 9780198507178.

Comellas Padró, F ... [et al.]. Matemàtica discreta [on line]. Edicions UPC, 2001 Available on:
<<http://hdl.handle.net/2099.3/36194>>. ISBN 8483014564.

Matousek, Jiri; Nešetřil, Jaroslav. Invitación a la matemática discreta. Reverté, 2008. ISBN 9788429151800.