Course guides
330216 - FMT - Fundamental Mathematics for Icts

Last modified: 24/11/2021

Unit in charge: Manresa School of Engineering
Teaching unit: 749 - MAT - Department of Mathematics.

Degree: BACHELOR'S DEGREE IN ICT SYSTEMS ENGINEERING (Syllabus 2010). (Compulsory subject).

Academic year: 2021 ECTS Credits: 6.0 Languages: Catalan, Spanish

LECTURER

Coordinating lecturer: JOSE MIGUEL GIMENEZ PRADALES
Others: MONTSERRAT ALSINA AUBACH - JOSEP M. CORS IGLESIAS - MARGARITA DOMENECH BLAZQUEZ - JOSEP FREIXAS BOSCH - FRANCISCO PALACIOS QUIÑONERO - MONTSERRAT PONS VALLES - M. ALBINA PUENTE DEL CAMPO - JOSEP MARIA ROSSELL GARRIGA - JOSEP RUBIÓ MASSEGÚ - ENRIC VENTURA CAPELL

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUITS

Specific:
1. Capacity for the resolution of the mathematical problems that the student will have in the enginyeria. Ability to apply the coneixements on: conjunct theory, combinatorics, Boolean algebra, logic, graphs, direct graphs, enter names, integer divisibility, differential calculation, optimization.

Transversal:
2. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 1. Planning oral communication, answering questions properly and writing straightforward texts that are spelt correctly and are grammatically coherent.
3. TEAMWORK - Level 1. Working in a team and making positive contributions once the aims and group and individual responsibilities have been defined. Reaching joint decisions on the strategy to be followed.
4. SELF-DIRECTED LEARNING - Level 1. Completing set tasks within established deadlines. Working with recommended information sources according to the guidelines set by lecturers.

TEACHING METHODOLOGY

LEARNING OBJECTIVES OF THE SUBJECT

Know and apply techniques and methods of discrete mathematics

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours large group</td>
<td>30,0</td>
<td>20.00</td>
</tr>
<tr>
<td>Self study</td>
<td>90,0</td>
<td>60.00</td>
</tr>
<tr>
<td>Hours small group</td>
<td>30,0</td>
<td>20.00</td>
</tr>
</tbody>
</table>

Total learning time: 150 h
## CONTENTS

### 1. SET THEORY

**Description:**
First definitions and properties of Set Theory.  
Principle of inclusion-exclusion. Binary relations.  
Equivalence relations. Partitions.  
Relations of order. Hasse diagram.

**Full-or-part-time:** 25h  
Theory classes: 5h  
Laboratory classes: 5h  
Self study : 15h

### 2. COMBINATORICS

**Description:**
Basic counting techniques. Groupings of elements with and without repetition.  
Permutations. Symmetrical group.

**Full-or-part-time:** 25h  
Theory classes: 5h  
Laboratory classes: 5h  
Self study : 15h

### 3. BOOLEAN ALGEBRAS AND LOGIC

**Description:**
Boolean functions. Minterms and maxterms. Canonical forms.  
Simplification methods of Boolean functions.  
Introduction to Logic. Algebra of propositions: tautology and contradiction.

**Full-or-part-time:** 25h  
Theory classes: 5h  
Laboratory classes: 5h  
Self study : 15h

### 4. GRAPH THEORY

**Description:**
Graphs and digraphs: first definitions and properties.  
Matrix representation of graphs and digraphs. Applications.  
Exploration of graphs and digraphs: paths, cycles, planarity, flow.

**Full-or-part-time:** 25h  
Theory classes: 5h  
Laboratory classes: 5h  
Self study : 15h
5. ARITHMETIC

Description:
Solving equations with integer unknowns.
Congruent numbers. Congruence resolution.

Full-or-part-time: 25h
Theory classes: 5h
Laboratory classes: 5h
Self study : 15h

6. SCALAR FIELDS

Description:
Conics and quadrics.
Representation of scalar fields and contour lines.

Full-or-part-time: 25h
Theory classes: 5h
Laboratory classes: 5h
Self study : 15h

ACTIVITIES

E1: Written exam

Full-or-part-time: 10h
Theory classes: 2h
Self study: 8h

E2: Written exam

Full-or-part-time: 10h
Theory classes: 2h
Self study: 8h

E3: Written exam

Full-or-part-time: 10h
Theory classes: 2h
Self study: 8h

E4: Written exam

Full-or-part-time: 12h 30m
Theory classes: 2h 30m
Self study: 10h
BIBLIOGRAPHY

Basic:

Complementary: