Course guide

200232 - CITG - Combinatorics and Graph Theory

Unit in charge: School of Mathematics and Statistics
Teaching unit: 749 - MAT - Department of Mathematics.
Degree: BACHELOR’S DEGREE IN MATHEMATICS (Syllabus 2009). (Optional subject).
Academic year: 2022 ECTS Credits: 6.0 Languages: English

LECTURER

Coordinating lecturer: MARCOS NOY SERRANO

Others: 
Primer quadrimestre:
MARCOS NOY SERRANO - M-A
CLÉMENT REQUILÉ - M-A
LLUIS VENA CROS - M-A

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
3. CE-2. Solve problems in Mathematics, through basic calculation skills, taking in account tools availability and the constraints of time and resources.
4. CE-4. Have the ability to use computational tools as an aid to mathematical processes.
5. Ability to solve problems from academic, technical, financial and social fields through mathematical methods.

General:
1. CB-4. Have the ability to communicate their conclusions, and the knowledge and rationale underpinning these to specialist and non-specialist audiences clearly and unambiguously.
2. To have developed those learning skills necessary to undertake further interdisciplinary studies with a high degree of autonomy in scientific disciplines in which Mathematics have a significant role.
6. CG-1. Show knowledge and proficiency in the use of mathematical language.
7. CG-2. Construct rigorous proofs of some classical theorems in a variety of fields of Mathematics.
8. CG-3. Have the ability to define new mathematical objects in terms of others already know and ability to use these objects in different contexts.
9. CG-4. Translate into mathematical terms problems stated in non-mathematical language, and take advantage of this translation to solve them.
10. CG-6 Detect deficiencies in their own knowledge and pass them through critical reflection and choice of the best action to extend this knowledge.

Transversal:
11. EFFICIENT ORAL AND WRITTEN COMMUNICATION. Communicating verbally and in writing about learning outcomes, thought-building and decision-making. Taking part in debates about issues related to the own field of specialization.
12. SELF-DIRECTED LEARNING. Detecting gaps in one’s knowledge and overcoming them through critical self-appraisal. Choosing the best path for broadening one’s knowledge.

TEACHING METHODOLOGY

(Section not available)

LEARNING OBJECTIVES OF THE SUBJECT

(Section not available)
STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>Hours small group</td>
<td>30,0</td>
<td>20.00</td>
</tr>
<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>
</tbody>
</table>

Total learning time: 150 h

CONTENTS

1. The symbolic method
   **Full-or-part-time:** 25h
   Theory classes: 5h
   Laboratory classes: 5h
   Self study: 15h

2. Enumeration with symmetries
   **Full-or-part-time:** 15h
   Theory classes: 3h
   Laboratory classes: 3h
   Self study: 9h

3. Finite geometry
   **Full-or-part-time:** 30h
   Theory classes: 6h
   Laboratory classes: 6h
   Self study: 18h

4. Graph connectivity
   **Full-or-part-time:** 20h
   Theory classes: 4h
   Laboratory classes: 4h
   Self study: 12h

5. Matching
   **Full-or-part-time:** 20h
   Theory classes: 4h
   Laboratory classes: 4h
   Self study: 12h
6. Graph coloring

**Full-or-part-time:** 20h  
Theory classes: 4h  
Laboratory classes: 4h  
Self study: 12h

7. Extremal graph theory

**Full-or-part-time:** 20h  
Theory classes: 4h  
Laboratory classes: 4h  
Self study: 12h

**GRADING SYSTEM**

- Midterm exam (contents 1, 2 and 3) (P)  
- Final exam (either contents 4, 5, 6 and 7, or all the contents) (F)  
- Final score: Max { {(P+F) / 2, F} }

**BIBLIOGRAPHY**

**Basic:**

**Complementary:**