200201 - TG - Galois Theory

Coordinating unit: 200 - FME - School of Mathematics and Statistics
Teaching unit: 749 - MAT - Department of Mathematics
Academic year: 2017
Degree: BACHELOR'S DEGREE IN MATHEMATICS (Syllabus 2009). (Teaching unit Optional)
ECTS credits: 6
Teaching languages: Catalan

Teaching staff
Coordinator: JORDI QUER BOSOR
Others: Primer quadrimestre: JORDI QUER BOSOR - A

Prior skills

Contents of Algebraic Structures: permutation groups, simple groups, Jordan-Hölder theorem, solvable groups, p-groups, polynomial rings, fields.

Requirements

The course Algebraic Structures of 3rd year.

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-
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appraisal. Choosing the best path for broadening one's knowledge.

**Teaching methodology**

Theory sessions where the teacher presents the contents of the course and problems sessions where the students and the professor solve the proposed problems.

**Learning objectives of the subject**

Basic concepts and results of Galois theory and its applications to the resolution by radicals of polynomial equations and to the geometric constructions with ruler and compass.

**Study load**

<table>
<thead>
<tr>
<th>Total learning time: 150h</th>
<th>Hours large group:</th>
<th>30h</th>
<th>20.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours medium group:</td>
<td>0h</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td>Hours small group:</td>
<td>30h</td>
<td>20.00%</td>
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<tr>
<td></td>
<td>Guided activities:</td>
<td>0h</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td>Self study:</td>
<td>90h</td>
<td>60.00%</td>
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</table>
### Content

#### Fields and extensions

**Learning time:** 50h  
Theory classes: 10h  
Laboratory classes: 10h  
Self study: 30h

**Description:**  

#### Galois Theory

**Learning time:** 50h  
Theory classes: 10h  
Laboratory classes: 10h  
Self study: 30h

**Description:**  

#### Applications

**Learning time:** 50h  
Theory classes: 10h  
Laboratory classes: 10h  
Self study: 30h

**Description:**  

### Qualification system

Every student can obtain up to 5 points by solving problems in the problem sessions and giving them in written form. Moreover, there will be a final exam. The course mark will be computed as AC + (10-AC)*NF/10, with AC is the mark obtained in problem sessions and NF is the mark of the final exam.
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Bibliography

Basic:


Complementary: