200204 - GA - Algebraic Geometry

Coordinating unit: 200 - FME - School of Mathematics and Statistics
Teaching unit: 749 - MAT - Department of Mathematics
Academic year: 2019
Degree: BACHELOR’S DEGREE IN MATHEMATICS (Syllabus 2009). (Teaching unit Optional)
ECTS credits: 6
Teaching languages: Catalan

Teaching staff

Coordinator: FRANCESC D’ASSIS PLANAS VILANOVA
Others: Segon quadrimestre:
JESUS FERNANDEZ SANCHEZ - M-A
FRANCESC D’ASSIS PLANAS VILANOVA - 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.

Generical:
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>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>
</tr>
<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>
</tr>
</tbody>
</table>
# Content

## Algebraic plane curves

**Learning time:** 37h 30m  
Theory classes: 7h 30m  
Laboratory classes: 7h 30m  
Self study: 22h 30m

**Description:**  
Plucker formules. Cremona transformations.  
$Af+Bg$ Noether's theorem. Group structure of the smooth cubic.

## Singularities of plane curves

**Learning time:** 37h 30m  
Theory classes: 7h 30m  
Laboratory classes: 7h 30m  
Self study: 22h 30m

**Description:**  

## Riemann surfaces

**Learning time:** 37h 30m  
Theory classes: 7h 30m  
Laboratory classes: 7h 30m  
Self study: 22h 30m

**Description:**  

## The Riemann-Roch theorem

**Learning time:** 37h 30m  
Theory classes: 7h 30m  
Laboratory classes: 7h 30m  
Self study: 22h 30m

**Description:**  
Linear series and divisors. Associate divisors to a function and to a differential form. Canonical linear series: degree and dimension. Riemann-Roch theorem. Applications: elliptic curves, low genus curves, the canonical embedding, Weierstrass points, Jacobian of a curve.
Work in Problem classes, projects during the term and a final work or exam. The student can request a final exam. The qualification of the course will be based on the work done by the student in the class of problems, the elaboration of some small project during the course (continuous assessment, up to 60% of the overall mark), and a final test, which will consist of an exam or the preparation of a project. Students may decide to perform only a final exam.

**Bibliography**

**Basic:**

**Complementary:**