Degree competences to which the subject contributes

Specific:
3. CE-2. Solve problems in Mathematics, through basic calculation skills, taking into 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.
3. 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 known 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)

<table>
<thead>
<tr>
<th>Study load</th>
<th>Hours large group: 30h</th>
<th>20.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours medium group: 0h</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td>Hours small group: 30h</td>
<td>20.00%</td>
</tr>
<tr>
<td></td>
<td>Guided activities: 0h</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td>Self study: 90h</td>
<td>60.00%</td>
</tr>
</tbody>
</table>
200242 - SEC - Mathematics for Secondary Education

Content

**Classics problems in mathematics**

- Decimal numbers in base $b$.
- Arithmetic properties of Pascal’s triangle.
- Geometry of the triangle.
- Euler’s formula and the five regular polyhedra.
- Constructible numbers. Doubling the cube and the trisection of the angle.
- The axioms of natural numbers.
- Solution by radicals of the cubic and the quartic.
- The Cauchy Binet theorem and the number of spanning trees of a graph.
- Equidecompositions. The Bolyai-Gerwien theorem and the third Hilbert’s problem.
- A curve that fills a square.
- A continuous nowhere differentiable function.
- A function discontinuous on $\mathbb{Q}$ and continuous on $\mathbb{R}\setminus\mathbb{Q}$; non existence of a function discontinuous on $\mathbb{R}$ and continuous on $\mathbb{Q}$.
- The construction of reals numbers by fundamental sequences.
- The Cantor’s set.
- The transcendence of pi and e. Squaring the circle.
- Weddenburn’s theorem.
- Cardinals, the axiom of choice, equivalences and applications.

**Description:**
In agreement with the students, selected topics from the following list will be studied.

Reviews of texts

- Theory classes: 24h
- Guided activities: 24h
- Self study: 72h

**Learning time: 120h**

**Reviews of texts**

- Theory classes: 6h
- Practical classes: 6h
- Self study: 18h

**Learning time: 30h**

**Description:**
Reviews of historical, pedagogical, philosophical and literary books related to mathematics.

Qualification system

Participation in class and written and oral presentations, 30%

Midterm exam, 30%

The final exam has two alternatives:
A) with the content not included in the midterm exam, 40%
B) with the content of the whole course 70%. (You will lose the midterm exam score)
Bibliography

Basic:


Complementary:

