200101 - FVC - Complex Variable Functions

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 Compulsory)
ECTS credits: 7,5
Teaching languages: Catalan

Teaching staff

Coordinator: JORDI VILLANUEVA CASTELTTORT
Others: INMACULADA CONCEPCION BALDOMA BARRACA - M-A, M-B
         JOSE TOMAS LAZARO OCHOA - CFIS
         MARIA TERESA MARTINEZ-SEARA ALONSO - CFIS, M-A, M-B
         JORDI VILLANUEVA CASTELTTORT - CFIS, M-A, M-B

Degree competences to which the subject contributes

Specific:
1. CE-2. Solve problems in Mathematics, through basic calculation skills, taking in account tools availability and the constraints of time and resources.
2. CE-3. Have the knowledge of specific programming languages and software.

3. CE-4. Have the ability to use computational tools as an aid to mathematical processes.

General:
4. CB-1. Demonstrate knowledge and understanding in Mathematics that is founded upon and extends that typically associated with Bachelor's level, and that provides a basis for originality in developing and applying ideas, often within a research context.
5. CB-2. Know how to apply their mathematical knowledge and understanding, and problem solving abilities in new or unfamiliar environments within broader or multidisciplinary contexts related to Mathematics.
6. CB-3. Have the ability to integrate knowledge and handle complexity, and formulate judgements with incomplete or limited information, but that include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgements.
7. CG-1. Show knowledge and proficiency in the use of mathematical language.

8. CG-2. Construct rigorous proofs of some classical theorems in a variety of fields of Mathematics.

9. 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.
10. CG-4. Translate into mathematical terms problems stated in non-mathematical language, and take advantage of this translation to solve them.
11. 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. 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.
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Teaching methodology

There are three one hour lectures and two one hour problem sessions per week.

Learning objectives of the subject

(Section not available)

Study load

| Total learning time: 187h 30m | Hours large group: 45h | 24.00% |
|                              | Hours medium group: 0h | 0.00%  |
|                              | Hours small group: 30h | 16.00% |
|                              | Guided activities: 0h  | 0.00%  |
|                              | Self study: 112h 30m   | 60.00% |
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<table>
<thead>
<tr>
<th>Content</th>
<th>Learning time</th>
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<tbody>
<tr>
<td><strong>The Complex Plane</strong></td>
<td>5h</td>
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</table>
| **Description:**                             | Theory classes: 0h  
Practical classes: 5h |
| Complex numbers (representation, basic properties, successions, series). The complex plane and its topology. |               |
| **Holomorphic functions**                    | 16h           |
| **Description:**                             | Theory classes: 10h  
Practical classes: 6h |
| **Local Cauchy theory**                      | 16h           |
| **Description:**                             | Theory classes: 10h  
Practical classes: 6h |
| **Global Cauchy theory**                     | 18h           |
| **Description:**                             | Theory classes: 10h  
Practical classes: 8h |
| **Conformal applications and harmonic functions** | 14h           |
| **Description:**                             | Theory classes: 10h  
Practical classes: 4h |
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Other topics

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<th>Learning time: 5h</th>
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<td>Theory classes: 5h</td>
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Description:
Depending on the time available: Rudiments of complex dynamics. Linearization of holomorphic applications around a fixed point. Conjugation to a rotation of holomorphic circle maps.

Qualification system

There will be a mid-term exam (ME) and a final exam (FE).
The final grade (NF) will be given by the formula $\text{NF} = \max(\text{FE}; 0.3 \times \text{ME} + 0.7 \times \text{FE})$.

An extra exam will take place on July for students that failed during the regular semester.

Bibliography

Basic:


Complementary: