Course guides
200001 - CV - Single Variable Calculus

Unit in charge: School of Mathematics and Statistics
Teaching unit: 749 - MAT - Department of Mathematics.

Degree: BACHELOR’S DEGREE IN MATHEMATICS (Syllabus 2009). (Compulsory subject).

Academic year: 2021 ECTS Credits: 7.5 Languages: Catalan, Spanish

LECTURER

Coordinating lecturer: JAIME FRANCH BULLICH

Others:
Primer quadrimestre:
SANTIAGO BOZA ROCHO - M-A, M-B
JAIME FRANCH BULLICH - M-A, M-B
RAFAEL RAMIREZ ROS - M-A, M-B

Segon quadrimestre:
JAIME FRANCH BULLICH - REF
XAVIER RIVAS GUIJARRO - REF

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.

Generical:
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.
12. 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.
TEACHING METHODOLOGY

The teaching of the course will be divided into two separate blocks: theory and problems. In the theory sessions we will develop the theoretical content of the course, based on the different results and demonstrations. In addition, we will include examples to consolidate the concepts introduced.

At sessions of problems we will combine theoretical and complicated exercises so that students get a maximum depth level in the field of mathematical analysis of a variable, with more mechanical ones that students must master, such as the calculation of limits and integration. Also, there will be continuous assessment tests at sessions problems of with deliveries, virtual tests and/or direct interaction sessions between the student and the subject in order to motivate him to bring the subject up to date.

One group of problems will be taught in Catalan.

LEARNING OBJECTIVES OF THE SUBJECT

The main objective of this course is to make the student familiar to the basic concepts of calculus on one variable. The fundamentals of calculus that are needed in the other subjects of the degree are provided. The students are introduced to deduction techniques in calculus and more generally, to proof methods in an axiomatic system.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours large group</td>
<td>45,0</td>
<td>24.00</td>
</tr>
<tr>
<td>Self study</td>
<td>105,0</td>
<td>56.00</td>
</tr>
<tr>
<td>Guided activities</td>
<td>7,5</td>
<td>4.00</td>
</tr>
<tr>
<td>Hours small group</td>
<td>30,0</td>
<td>16.00</td>
</tr>
</tbody>
</table>

Total learning time: 187.5 h

CONTENTS

**Sequences of real numbers**

Description:

Full-or-part-time: 35h
Theory classes: 8h
Practical classes: 6h
Self study: 21h

**Real variable functions. Limits.**

Description:

Full-or-part-time: 22h 30m
Theory classes: 5h
Laboratory classes: 4h
Self study: 13h 30m
Real variable functions. Continuity.

Description:

Full-or-part-time: 20h
Theory classes: 5h
Practical classes: 3h
Self study: 12h

Real variable functions. Differentiability.

Description:

Full-or-part-time: 45h
Theory classes: 11h
Laboratory classes: 7h
Self study: 27h

Integrable functions. Riemann integral.

Description:

Full-or-part-time: 32h 30m
Theory classes: 8h
Laboratory classes: 5h
Self study: 19h 30m

GRADING SYSTEM

The grading is based on three items:
1. Continuous evaluation (AC). Short tests at the end of each chapter and/or periodic handouts from the students.
2. Mid-term exam.
3. Final exam.

The overall grade (NF) will be computed as follows:
NF=max{0.60*EF+0.25*EP+0.15*AC; 0.75*EF+0.25*EP; 0.85*EF+0.15*AC; EF}

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

Basic:

Complementary: