Degree competences to which the subject contributes

Specific:
1. Capacity to solve mathematical problems that can appear in engineering. Aptitude to apply knowledge about: linear algebra; geometry; differential geometry; differential and integral calculus; differential equations and derived partial equations; numerical methods; numerical algorithm; statistics and optimisation.

Teaching methodology

In theory sessions the basic theoretical body of the subject is presented, together with illustrations and examples of the most important notions and results.

In problems sessions, exercises are solved to consolidate concepts introduced in theory sessions and at the same time modelling problems are presented to contrast calculus potential in applied sciences.

In the laboratory session students will be taught to use Matlab in order to introduce effective methods to calculate functions' zeros calculations and graphic representation.

Learning objectives of the subject

The Calculus 1 course intends to provide students with basic tools, analytic and numerical, to analyse single variable real functions, and at the same time show its use in modelling technical and science problems.

This course also intends to be an introduction in the degree's studying methodology, as well as a fundamental support to correctly understand the rest of subjects, this is the reason why the subject's instrumental character will be strongly emphasised.
## 240012 - Calculus I

### Study load

<table>
<thead>
<tr>
<th></th>
<th>Hours large group</th>
<th>Hours medium group</th>
<th>Hours small group</th>
<th>Guided activities</th>
<th>Self study</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total learning time:</strong></td>
<td>150h</td>
<td>56h</td>
<td>0h</td>
<td>4h</td>
<td>90h</td>
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|                          |                   |                   |                   |                  |              |
| **Percentage**           |                   |                   |                   |                  |              |
|                          | 37.33%            | 0.00%             | 2.67%             | 0.00%            | 60.00%      |

Last update: 01-06-2017
# Content

## 1.- Continuity

**Learning time:** 21h 30m  
Theory classes: 4h  
Practical classes: 4h  
Self study: 13h 30m  

**Description:**  

## 2.- Derivation

**Learning time:** 34h 30m  
Theory classes: 6h  
Practical classes: 6h  
Self study: 22h 30m  

**Description:**  

## 3.- Integration

**Learning time:** 42h  
Theory classes: 9h  
Practical classes: 9h  
Self study: 24h  

**Description:**  

## 4.- Series

**Learning time:** 33h  
Theory classes: 6h  
Laboratory classes: 6h  
Self study: 21h  

**Description:**  
Planning of activities

<table>
<thead>
<tr>
<th>MATHEMATICS WORKSHOP</th>
<th>Hours: 15h</th>
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</thead>
<tbody>
<tr>
<td>Description:</td>
<td>Laboratory classes: 6h</td>
</tr>
<tr>
<td></td>
<td>Self study: 9h</td>
</tr>
</tbody>
</table>

- Introduction to Matlab (1h)
- Symbolic manipulation (1h)
- Functions' zeros: bisection, Newton (1h)
- Graphical representation of functions (1h)
- Integration (2h)

Qualification system

The student will be evaluated in three tests:

- A partial test in midterm (EP), date determined by the School.
- A laboratory test of the Mathematics Workshop (ET), which will take place in the workshop timetable
- Final exam (EF), date determined by the School.

Final grade (NF) will be calculated as shown below:

\[ NF = \max(0.6 \times EF + 0.1 \times ET + 0.3 \times EP, 0.9 \times EF + 0.1 \times ET) \]

The grade corresponding to Mathematics Workshop will not be changed. Hence, in case of taking the reevaluation exam (ER), the final grade will be given by:

\[ NF = 0.9 \times ER + 0.1 \times ET \]

Regulations for carrying out activities

For the exams, it is permitted to use a handwritten collection of formulas in a DINA4 paper. It is forbidden to use a calculator.
Bibliography

Basic:


Others resources:
The subject will have a website in which all the necessary material will be uploaded, such as problem lists or information on the laboratory sessions, and all that information that helps autonomous learning.