240022 - Calculus II

Coordinating unit: 240 - ETSEIB - Barcelona School of Industrial Engineering
Teaching unit: 749 - MAT - Department of Mathematics
Academic year: 2018
Degree: BACHELOR'S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2010). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN MATERIALS ENGINEERING (Syllabus 2010). (Teaching unit Compulsory)
ECTS credits: 6
Teaching languages: Catalan, Spanish

Coordinator: JUAN RAMÓN PACHA

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 the theoretical part of the classes, the module's more conceptual contents will be introduced, as well as basic examples related to these contents. In addition, some demonstrations, that will help us to understand the core of these concepts will be given.

In the same classes, the practical contents of the module will be developed. On the one hand, more elaborated examples, coming from the basic concepts already seen will be presented. On the other hand, practical calculus methods and tools, related to the different theoretical contents, will be discussed. Students' participation will be encouraged.

It is intended that the problems' collections are extensive enough for the students to complete their learning process.

Learning objectives of the subject

This subject's main objective is to provide the student with a sufficient solvency when using calculus tools with several variables as well as Laplace transform and Fourier series. Likewise, it is an objective that this solvency is not only manifested in the contents conceptual comprehension and in the ability to identify which tools are appropriate in each of the problems, but also in acquiring a certain calculus "fluency" and a good comprehension of the interaction of these theoretic concepts and the mathematical modelling of science and technology problems.

Specific skills: ability to address the mathematical problems that arise in the engineering. Ability to apply their knowledge on: Linear Algebra, Geometry, Differential and Integral Calculus, etc.
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### Study load

<table>
<thead>
<tr>
<th>Total learning time: 150h</th>
<th>Hours large group: 60h</th>
<th>Learning time: 80h</th>
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<tbody>
<tr>
<td></td>
<td>Hours medium group: 0h</td>
<td>Theory classes: 32h</td>
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<tr>
<td></td>
<td>Hours small group: 0h</td>
<td>Self study: 48h</td>
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<td>Guided activities: 0h</td>
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<td>Self study: 90h</td>
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### Content

#### 1.- Continuity and derivatives of functions with several variables

**Description:**

**Learning time:** 80h
- Theory classes: 32h
- Self study: 48h

#### 2.- Integration functions with several variables

**Description:**

**Learning time:** 50h
- Theory classes: 20h
- Self study: 30h

#### 3.- Laplace transform and Fourier's series.

**Description:**
Introduction. Laplace transform. Fourier's series. Applications

**Learning time:** 20h
- Theory classes: 8h
- Self study: 12h
Qualification system

The evaluation consists in the following activities:
- A partial exam in the middle of the semester (EP1) in the timetable set by the School for its realization.
- A partial exam in the second part of the course (EP2) on the date the School establishes for the final exam.
- An exam related with the practical work developed along the course (P). Its date and conditions will be announced well in advance.

The final mark (NF) is:

\[ NF = 0.4 \times EP1 + 0.5 \times EP2 + 0.1 \times P. \]

The re-evaluation consists in the following activity:

- An exam where all the program of the course will be assessed (ER) on the date the School establishes for its realization.

The final mark taking into account the exam where all the program of the course will be assessed (NR) is:

\[ NR = ER. \]

Regulations for carrying out activities

The evaluations EP1 and EP2 could be done with the help of a handwritten formulary. The allowed support material for the practical exam (P) will be announced well in advance.

Bibliography

Basic:

Complementary:

Others resources:
Students will be able to access a subject's website and a subject's Intranet in which all the necessary material considered suitable for autonomous learning will be uploaded.