250105 - FONMATEM - Mathematic Fundamentals

Coordinating unit: 250 - ETSECCPB - Barcelona School of Civil Engineering
Teaching unit: 751 - DECA - Department of Civil and Environmental Engineering
Academic year: 2018
Degree: BACHELOR'S DEGREE IN CIVIL ENGINEERING (Syllabus 2010). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN CIVIL ENGINEERING (Syllabus 2017). (Teaching unit Compulsory)
ECTS credits: 6 Teaching languages: Catalan, Spanish

Teaching staff

Coordinator: M. ROSA ESTELA CARBONELL
Others: ALBERT CREUS MIR, M. ROSA ESTELA CARBONELL, FRANCISCO JAVIER MARCOTE ORDAX, AGUSTIN MEDINA SIERRA

Opening hours

Timetable: Tuesday from 10:00 am to 12:00 am C2-205 module and hours to be arranged with individual teachers. eConsultes online

Degree competences to which the subject contributes

Specific:
3048. Ability to solve the types of mathematical problems that may arise in engineering. Ability to apply knowledge of: linear algebra; geometry; differential geometry; differential and integral calculus; differential equations and partial derivatives; numerical methods; numerical algorithms; statistics and optimisation.

Transversal:
591. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 1. Planning oral communication, answering questions properly and writing straightforward texts that are spelt correctly and are grammatically coherent.
597. EFFECTIVE USE OF INFORMATION RESOURCES - Level 1. Identifying information needs. Using collections, premises and services that are available for designing and executing simple searches that are suited to the topic.
600. SELF-DIRECTED LEARNING - Level 1. Completing set tasks within established deadlines. Working with recommended information sources according to the guidelines set by lecturers.
Students will learn to perform differential and integral calculus of a variable and to solve ordinary differential equations. Basic knowledge of elementary functions and trigonometry. They will also learn to analyse and solve mathematical problems encountered in engineering that involve these concepts.

On completion of the course, students will have acquired the ability to:
1. Analyse successions and series in engineering contexts and use, derive and integrate trigonometric functions;
2. Use differential calculus to solve maxima and minima problems related to simple engineering problems;
3. Solve integrals of one variable in relation to simple engineering problems.

Real numbers; Trigonometry; Successions and calculation of limits; Numerical series and convergence; Theory of functions, including analysis of continuity and limits; Differential calculus of functions of a real variable, including maxima and minima problems in simple engineering problems.
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<tr>
<th>Item 1. Basics</th>
<th>Learning time: 28h 47m</th>
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<td>Description:</td>
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<tr>
<td>Logic and set theory. Relations and applications</td>
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<td>Algebraic structures</td>
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<td>Proof methods</td>
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<td>Topology Problems</td>
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<td>Complex numbers</td>
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<td>Problems of complex numbers</td>
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<tr>
<th>Item 2. Vector Spaces</th>
<th>Learning time: 21h 36m</th>
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<tr>
<th>Item 3. Matrices and systems of linear equations</th>
<th>Learning time: 24h</th>
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### Item 4. Real functions of real variable

**Learning time:** 50h 24m
- Theory classes: 11h
- Practical classes: 7h
- Laboratory classes: 3h
- Self study: 29h 24m

**Description:**
- Basic definitions. Elementary functions
- Basic problems of real functions of real variable
- Trigonometry
- Trigonometry problems
- Limit of a function at a point
- Properties of finite limits
- Infinite Limits
- Problems functions limits
- Continuity. Uniform continuity
- Continuity theorems
- Problems of continuity
- Derivatives of elementary functions. Application of the calculation ends
- Extreme Problems
- Laboratory of elementary functions
- Calculation of integrals
- Calculation of integrals

### Directed activities

**Learning time:** 19h 12m
- Laboratory classes: 8h
- Self study: 11h 12m

**Description:**
- Directed activities
50% of the final mark correspond to classroom activities. The other 50% is obtained from a global test.

The final mark is the sum of the following partial marks:

Nc: classroom activities
NPG: overall rating test

N_{final} = 0.5 \times Nc + 0.5 \times NPG

Criteria for re-evaluation qualification and eligibility: Students who failed the ordinary evaluation and have regularly attended all evaluation tests will have the opportunity of carrying out a re-evaluation test during the period specified in the academic calendar. Students who have already passed the test or were qualified as non-attending will not be admitted to the re-evaluation test. The maximum mark for the re-evaluation exam will be five over ten (5.0). The non-attendance of a student to the re-evaluation test, in the date specified will not grant access to further re-evaluation tests. Students unable to attend any of the continuous assessment tests due to certifiable force majeure will be ensured extraordinary evaluation periods.

These tests must be authorized by the corresponding Head of Studies, at the request of the professor responsible for the course, and will be carried out within the corresponding academic period.

### Bibliography

**Basic:**


**Complementary:**


