250304 - FONMAT - Mathemetic Fundamentals

Degree competences to which the subject contributes

Students will learn to perform differential and integral calculus of one variable and to apply these techniques to specific scientific and technical problems and to geological engineering in general.

Upon completion of the course, students will be able to:

1. Use, derive and integrate trigonometric functions and analyse successions and series in engineering contexts;
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.
250304 - FONMAT - Mathematic Fundamentals

Real numbers; 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 and optimization; Integral calculus of functions of a real variable; Trigonometry

Working the concept of mathematical modeling applied to engineering.
Consolidate basic knowledge of algebra, trigonometry and geometry acquired in previous courses and deepen this knowledge.
Achieving the proper method of reasoning applied mathematics and mathematical proof of the theorems and results.
Practice with different methodologies show.
Learn the basic numerical sets, their properties and characterization.
To acquire basic knowledge in the field of linear algebra such as matrices, determinants, systems of linear equations and vector spaces.
To acquire basic knowledge in the field of calculus: functions, limits, continuity, derivatives and applications of derivatives.

Study load

<table>
<thead>
<tr>
<th>Total learning time: 150h</th>
<th>Hours large group:</th>
<th>32h 30m</th>
<th>21.67%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours medium group:</td>
<td>17h 30m</td>
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<td>11.67%</td>
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<tr>
<td>Hours small group:</td>
<td>10h</td>
<td></td>
<td>6.67%</td>
</tr>
<tr>
<td>Guided activities:</td>
<td>6h</td>
<td></td>
<td>4.00%</td>
</tr>
<tr>
<td>Self study:</td>
<td>84h</td>
<td></td>
<td>56.00%</td>
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</tbody>
</table>
### Content

<table>
<thead>
<tr>
<th>1. INTRODUCTION</th>
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<tbody>
<tr>
<td><strong>Learning time:</strong> 31h 12m</td>
</tr>
<tr>
<td>Theory classes: 6h</td>
</tr>
<tr>
<td>Practical classes: 4h</td>
</tr>
<tr>
<td>Laboratory classes: 3h</td>
</tr>
<tr>
<td>Self study: 18h 12m</td>
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</tbody>
</table>

**Description:**

<table>
<thead>
<tr>
<th>2. MATRICES. Determinants. Systems of linear equations</th>
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<tbody>
<tr>
<td><strong>Learning time:</strong> 24h</td>
</tr>
<tr>
<td>Theory classes: 6h</td>
</tr>
<tr>
<td>Practical classes: 3h</td>
</tr>
<tr>
<td>Laboratory classes: 1h</td>
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<tr>
<td>Self study: 14h</td>
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</tbody>
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**Description:**
## 3. Vector spaces and LINEAR APPLICATIONS

**Learning time:** 31h 12m  
- Theory classes: 7h  
- Practical classes: 4h  
- Laboratory classes: 2h  
- Self study: 18h 12m

**Description:**  
The vector space $\mathbb{R}^n$. Definition and properties. Other vector spaces. Linear combinations. Vector subspaces. Linear dependence and independence. Subspace generated. Bases and dimension; properties. Linear; definition and properties. Associated with a linear array: definition and properties.  
3.3 Exercises and Problems Item 3

## 4. Real functions of real variables.

**Learning time:** 57h 35m  
- Theory classes: 13h 30m  
- Practical classes: 6h 30m  
- Laboratory classes: 4h  
- Self study: 33h 35m

**Description:**  
Elementary functions. Definition, properties and graphical representation.  
Limit of a function at a point; properties. Infinite limits. Limits at infinity. Forms unknowns or uncertainties.  
Functionally equivalent. Asymptotes of a function.  
Antiderivades or primitive. Indefinite integral. Definition, properties and calculation.  
4.6 Exercises and Problems Item 4  
4.7 Laboratory Item 4
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**Qualification system**

AC: continuous assessment tests. They are two exams during the course and provide continuous assessment of the subject.

AS: review synthesis. There is a REVIEW of synthesis at the end of the semester.

HW: extra practice. Made during the course and serve as an indicator of student progress in achieving the knowledge, skills and abilities.

Examination Weight: AC: 0.3 + 0.3; AS: 0.4.

The exercises how to improve the HW grade for the course.

Criteria for re-evaluation qualification and eligibility: Students that 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.

**Regulations for carrying out activities**

The evaluation of the course is obtained only as a result of the weighted continuous assessment tests and test synthesis. If a student can not make any of these tests cause documentadament must ask explicit permission to sit final extraordinary exam.

**Bibliography**

**Basic:**


**Complementary:**