280632 - Fundamentals of Mathematics I

Coordinating unit: 280 - FNB - Barcelona School of Nautical Studies
Teaching unit: 749 - MAT - Department of Mathematics
Academic year: 2019
Degree: BACHELOR'S DEGREE IN MARINE TECHNOLOGIES (Syllabus 2010). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN NAVAL SYSTEMS AND TECHNOLOGY ENGINEERING (Syllabus 2010). (Teaching unit Compulsory)
Degree competences to which the subject contributes

Specific:
2. Ability to solve math problems that may arise in engineering. Ability to apply knowledge about: linear algebra, geometry, differential geometry to, differential and integral calculus, differential equations and partial differential, numerical methods, algorithmic numerical and statistical optimization.
3. Ability to solve math problems that may arise in the field of naval engineering technology. Ability to apply knowledge of: linear algebra, geometry, differential geometry, differential and integral calculus, differential equations and partial, numerical methods, numerical algorithms, statistical and optimization.

Transversal:
1. 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.

Teaching methodology

- Receive, understand and synthesize knowledge.
- Pose and solve problems.
- Develop reasoning and critical and defend it orally or in writing.
- Perform work individually and/or in group.

Learning objectives of the subject

- Solving mathematical problems arising in the field of engineering.
- To get the ability to apply knowledge about linear algebra and geometry.
- Develop the ability to solve abstract problems.
- Identify the objectives of the group and be able to develop a plan to achieve them.
- Identify the responsibilities of each component group and a commitment to the task assigned.
- Use the resources and services available to develop simple searches for information. Classification and summarize the
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Information collected.

<table>
<thead>
<tr>
<th>Study load</th>
<th>Total learning time: 150h</th>
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<tbody>
<tr>
<td></td>
<td>Hours large group:</td>
</tr>
<tr>
<td></td>
<td>30h</td>
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<tr>
<td></td>
<td>Hours medium group:</td>
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<tr>
<td></td>
<td>30h</td>
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<tr>
<td></td>
<td>Hours small group:</td>
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<tr>
<td></td>
<td>0h</td>
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<tr>
<td></td>
<td>Self study:</td>
</tr>
<tr>
<td></td>
<td>90h</td>
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## Content

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<th>Section</th>
<th>Learning time</th>
<th>Theory classes</th>
<th>Practical classes</th>
<th>Self study</th>
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<tr>
<td><strong>Real and complex numbers.</strong></td>
<td>29h</td>
<td>6h</td>
<td>6h</td>
<td>17h</td>
</tr>
<tr>
<td><strong>Vectors.</strong></td>
<td>29h</td>
<td>6h</td>
<td>6h</td>
<td>17h</td>
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<tr>
<td><strong>Matrices, determinants and systems of linear equations.</strong></td>
<td>15h</td>
<td>2h</td>
<td>3h</td>
<td>10h</td>
</tr>
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### Real and complex numbers.

**Description:**
- Real numbers: basic properties. Inequalities and absolute values. Intervals.
- Complex numbers: Basic operations, graphical representation.
- Newton's binomial.
- Polynomials. Factorization. Decomposition into simple fractions.
- Numerical Series: Convergence, Geometric and harmonic series. Series of positive terms, the convergence criteria. Alternating series, convergence.

### Vectors.

**Description:**
- Vectors: geometric vision of algebraic operations with vectors.
- The vector space $\mathbb{R}^n$: dependence and linear independence, bases and dimension, components of a vector.
- Analytical representation and coordinate systems into the three-dimensional space.

### Matrices, determinants and systems of linear equations.

**Description:**
- Applications.
### Linear Maps

**Learning time:** 29h  
- Theory classes: 6h  
- Practical classes: 6h  
- Self study: 17h  

**Description:**  

### Plane and spherical trigonometry

**Learning time:** 23h  
- Theory classes: 5h  
- Practical classes: 4h  
- Self study: 14h  

**Description:**  

### Probability

**Learning time:** 25h  
- Theory classes: 5h  
- Practical classes: 5h  
- Self study: 15h  

**Description:**  
The final grade, $N_{\text{final}}$, is highest of $N_{\text{mig}}$ and $N_{\text{pf}}$

$$N_{\text{final}} = \text{Maxim}(N_{\text{mig}}, N_{\text{pf}})$$

where: $N_{\text{mig}} = 0.40 \times N_{\text{ac}} + 0.60 \times N_{\text{pf}}$

$N_{\text{pf}}$: grade of final test,

$N_{\text{ac}}$: continuous grade.

The final test consists of the same theoretical questions about concepts related to the course' learning aims, and a set of problems that require the application of the methods studied. Its duration is 2-3 hours.

The continuous grade consist of one or two test (each one hour long), and the supervised activities carried out during the semester.

Reevaluation: If you have obtained a grade between 3 and 4.9, you can choose to reassessment will consist of a final test similar to the one described above.

### Regulations for carrying out activities

- If not done any of the continuous assessment activities, this activity will grade 0.
- Absent will be considered who are not present at the final test or perform any activities of continuous assessment.

### Bibliography

**Basic:**


**Complementary:**

