280639 - Mathematical Methods for Engineering

Degree competences to which the subject contributes

Specific:
1. 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.
2. 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.

Teaching methodology
- Receive, understand and summarize knowledge.
- Posing and solving problems.
- Developing arguments from a critical point of view and defending them.
- Doing work in group and individually.

Learning objectives of the subject
- To solve the mathematical problems that arise in engineering.
- To be able to apply the knowledge on differential geometry and vectorial calculus, differential equations, integral transforms and optimization.
- To develop the capacity of abstraction while solving problems.
- To recognize the aims of the group and to plan for being able to reach them.
- To identify the responsibilities of each member and assume the corresponding commitments.
280639 - Mathematical Methods for Engineering

**Study load**

<table>
<thead>
<tr>
<th>Total learning time: 225h</th>
<th>Hours large group: 40h</th>
<th>17.78%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours medium group: 50h</td>
<td>22.22%</td>
</tr>
<tr>
<td></td>
<td>Hours small group: 0h</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td>Guided activities: 9h</td>
<td>4.00%</td>
</tr>
<tr>
<td></td>
<td>Self study: 126h</td>
<td>56.00%</td>
</tr>
</tbody>
</table>
## Content

### Vector geometry

**Learning time:** 25h  
Theory classes: 10h  
Self study: 15h

**Description:**  

### curves, surfaces and solids

**Learning time:** 25h  
Theory classes: 10h  
Self study: 15h

**Description:**  
Parametrization. Tangent and normal vectors. Computation of lengths, areas and volumes.

### Scalar and vector fields

**Learning time:** 25h  
Theory classes: 10h  
Self study: 15h

**Description:**  

### Flux and circulation of vector fields

**Learning time:** 25h  
Theory classes: 10h  
Self study: 15h

**Description:**  
### Applications of vector calculus

<table>
<thead>
<tr>
<th>Learning time</th>
<th>15h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes</td>
<td>6h</td>
</tr>
<tr>
<td>Self study</td>
<td>9h</td>
</tr>
</tbody>
</table>

**Description:**

### Ordinary differential equations.

<table>
<thead>
<tr>
<th>Learning time</th>
<th>27h 30m</th>
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<tbody>
<tr>
<td>Theory classes</td>
<td>11h</td>
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<tr>
<td>Self study</td>
<td>16h 30m</td>
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**Description:**

**Related activities:**
(ENG)

**Specific objectives:**
(ENG)

### Integral transforms

<table>
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<tr>
<th>Learning time</th>
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<tbody>
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<td>Theory classes</td>
<td>12h</td>
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<tr>
<td>Self study</td>
<td>18h</td>
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</tbody>
</table>

**Description:**

### Partial differential equations

<table>
<thead>
<tr>
<th>Learning time</th>
<th>37h 30m</th>
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</thead>
<tbody>
<tr>
<td>Theory classes</td>
<td>15h</td>
</tr>
<tr>
<td>Self study</td>
<td>22h 30m</td>
</tr>
</tbody>
</table>

**Description:**
The final grade, $N_{final}$, is obtained from the results of partial exercises (exams, tests,...) and the rating of activities (exercises, assignments, ...) that will take place throughout the semester, according to the expression:

$$N_{final} = 0.90 \times N_{ex} + 0.10 \times N_{c}$$

where:  
- $N_{ex}$ = average of the ratings of the partial exercises  
- $N_{c}$ = rating of the course activities.

Any activity or exercise not presented have a score of 0 points.  
Reevaluation: If you have obtained a grade between 3 and 4.9, you can choose to reassessment will consist of a final test.

**Qualification system**

**Optimization.**

<table>
<thead>
<tr>
<th>Learning time: 15h</th>
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</thead>
<tbody>
<tr>
<td>Theory classes: 6h</td>
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<tr>
<td>Self study : 9h</td>
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<table>
<thead>
<tr>
<th>Description:</th>
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<tbody>
<tr>
<td>Definition and basics concepts. Linear programming. Simplex method.</td>
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<table>
<thead>
<tr>
<th>Related activities:</th>
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</thead>
<tbody>
<tr>
<td>(ENG)</td>
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</table>

<table>
<thead>
<tr>
<th>Specific objectives:</th>
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<tbody>
<tr>
<td>(ENG)</td>
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**Regulations for carrying out activities**

- The exams are required.  
- Not passed the exams will be recovered at the end of course exam.  
- The final exam will also be presented students who, having completed a partial wish to improve their grade.
Bibliography

Basic:


Complementary:

