Course guides  
**200151 - ALN - Numerical Linear Algebra**  

**Unit in charge:** School of Mathematics and Statistics  
**Teaching unit:** 751 - DECA - Department of Civil and Environmental Engineering.  
**Degree:** BACHELOR'S DEGREE IN MATHEMATICS (Syllabus 2009). (Compulsory subject).  
**Academic year:** 2021  
**ECTS Credits:** 7.5  
**Languages:** Catalan  

**LECTURER**  
Coordinating lecturer: SONIA FERNANDEZ MENDEZ  
Others:  
Segon quadrimestre:  
SONIA FERNANDEZ MENDEZ - M-A, M-B  
ABEL GARGALLO PEIRO - M-A, M-B  
ESTHER SALA LARDIES - M-A, M-B  

**DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES**  

**Specific:**  
1. CE-2. Solve problems in Mathematics, through basic calculation skills, taking in account tools availability and the constraints of time and resources.  
2. CE-3. Have the knowledge of specific programming languages and software.  
3. CE-4. Have the ability to use computational tools as an aid to mathematical processes.  

**Generical:**  
4. CB-1. Demonstrate knowledge and understanding in Mathematics that is founded upon and extends that typically associated with Bachelor's level, and that provides a basis for originality in developing and applying ideas, often within a research context.  
5. CB-2. Know how to apply their mathematical knowledge and understanding, and problem solving abilities in new or unfamiliar environments within broader or multidisciplinary contexts related to Mathematics.  
6. CB-3. Have the ability to integrate knowledge and handle complexity, and formulate judgements with incomplete or limited information, but that include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgements.  
7. CG-1. Show knowledge and proficiency in the use of mathematical language.  
8. CG-2. Construct rigorous proofs of some classical theorems in a variety of fields of Mathematics.  
9. CG-3. Have the ability to define new mathematical objects in terms of others already know and ability to use these objects in different contexts.  
10. CG-4. Translate into mathematical terms problems stated in non-mathematical language, and take advantage of this translation to solve them.  
12. CG-6 Detect deficiencies in their own knowledge and pass them through critical reflection and choice of the best action to extend this knowledge.  

**Transversal:**  
11. SELF-DIRECTED LEARNING. Detecting gaps in one's knowledge and overcoming them through critical self-appraisal. Choosing the best path for broadening one's knowledge.  

**TEACHING METHODOLOGY**  
(see Catalan version)  

**LEARNING OBJECTIVES OF THE SUBJECT**  
(see Catalan version)
STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>Hours small group</td>
<td>30.0</td>
<td>16.00</td>
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<tr>
<td>Hours large group</td>
<td>45.0</td>
<td>24.00</td>
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<tr>
<td>Guided activities</td>
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<td>4.00</td>
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<tr>
<td>Self study</td>
<td>105.0</td>
<td>56.00</td>
</tr>
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</table>

Total learning time: 187.5 h

CONTENTS

Linear systems of equations: direct methods

Description:

Full-or-part-time: 25h
Theory classes: 15h
Laboratory classes: 10h

Finite arithmetics and accuracy

Description:

Full-or-part-time: 5h
Theory classes: 3h
Laboratory classes: 2h

Eigenvalues and singular values

Description:

Full-or-part-time: 20h
Theory classes: 12h
Laboratory classes: 8h

Linear systems of equations: iterative methods

Description:

Full-or-part-time: 20h
Theory classes: 12h
Laboratory classes: 8h
Introduction to the use of numerical methods and applications

Description:

Full-or-part-time: 5h
Theory classes: 3h
Laboratory classes: 2h

GRADING SYSTEM

(see Catalan version)

BIBLIOGRAPHY

Basic:

Complementary: