UNIVERSIDADE DA CORUÑA

| Teaching Guide | | | | |
|---|---|---|---|---|
| Identifying Data | | | | 2016/17 |
| Subject (*) | Alxebra | | Code | 770G01006 |
| Study programme | Grao en Enxeñaría Eléctrica | | | |
| Descriptors | | | | |
| Cycle | Period | Year | Type | Credits |
| Graduate | 2nd four-month period | First | FB | 6 |
| Language | Galician | | | |
| Teaching method | Face-to-face | | | |
| Prerequisites | | | | |
| Department | Matemáticas | | | |
| Coordinador | Suarez Peñaranda, Vicente | E-mail | vicente.suarez.penaranda@udc.es | |
| Lecturers | Cao Rial, María Teresa<br>Suarez Peñaranda, Vicente | E-mail | teresa.cao@udc.es<br>vicente.suarez.penaranda@udc.es | |
| Web | | | | |
| General description | We described in this course basic concepts of linear algebra and differential geometry, whose exposure can be developed in step 3 are | | | |

| Study programme competences / results | |
|---|---|
| Code | Study programme competences / results |

| Learning outcomes | | | |
|---|---|---|---|
| Learning outcomes | Study programme competences / results | | |
| Modeling and solving mathematical problems in the field of engenengineering. | A6 | B1<br>B2<br>B3<br>B4<br>B6 | C1 |
| Possessing own scientific mathematical skills, enabling it to ask and answer some math questions. | A6 | B1<br>B2<br>B3<br>B4<br>B6 | C1 |
| Create linear models that approximate problems to solve. Having ability to apply knowledge of Linear Algebra and Differential Geometry. | A6 | B1<br>B2<br>B3<br>B4<br>B6 | C1 |
| Understand mathematical models that explain the behavior of a fluid in a 1-dimensional space. | A6 | B1<br>B2<br>B3<br>B6 | C1 |
| Knowing how to use numerical methods in solving some mathematical problems that arise. | A6 | B1<br>B2<br>B3<br>B6 | C1 |
| Knowing the thoughtful use of tools symbolic and numeric computation. | A6 | B4<br>B6 | |

| Contents | |
|---|---|
| Topic | Sub-topic |
| Path Integral | Paths in Rn. Reparameterizations. Line integrals of scalar functions. Applications of the integrals of scalar functions. Integrals of vector fields. Gradient type functions. Green theorem. |
| Surface integral | Cross product. Sufaces in R3. Area of a surface. Integral of a scalar function. Oriented surfaces. Integral of vector fileds. Divergence. Gauss Theorem. Curl. Stokes Theorem. |
| Diagonalization | Matrices: types and examples. Matrix operations. Matrix transpose. Symmetric and antisymmetric matrices. Determinant of a square matrix. Rank. Inverse matrix. |
| Vector spaces | The vector space Rn. Operations: vector addition, scalar multiplication. Vector subspaces. Direct sum. Linear combination, linear span. Linear independence. Spaning set. Basis and dimension. Theorems about basis. Coordinates, change of coordinates. |
| Linear maps | Linear maps. Properties of the linear maps. Kernel and Image of a linear map. Operations with linear maps. Matrix associated to a linear map. |

| Planning | | | | |
|---|---|---|---|---|
| Methodologies / tests | Competencies / Results | Teaching hours (in-person & virtual) | Student?s personal work hours | Total hours |
| Guest lecture / keynote speech | B2 B3 B4 C1 | 21 | 42 | 63 |
| Document analysis | B4 B6 | 0 | 8 | 8 |
| Problem solving | A6 | 20 | 20 | 40 |
| Mixed objective/subjective test | A6 B1 B4 C1 | 6 | 6 | 12 |
| Laboratory practice | A6 B4 B6 | 9 | 9 | 18 |
| Personalized attention | | 9 | 0 | 9 |
| (*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students. | | | | |

| Methodologies | |
|---|---|
| Methodologies | Description |
| Guest lecture / keynote speech | We present the contents of the subject. Examples of applications are developed and related activities are proposed. |
| Document analysis | We discuss the different notations in mathematics. The sources of information are commented: books, magazines, webpages. |
| Problem solving | With them we move from theory to practice. Specific problems of the subject developed in the lectures are solved. |
| Mixed objective/subjective test | They are useful to determine the degree of knowledge that students get at classes and with their personal study. It may consist of an explanation of any content of the course, the answer of test questions, the resolution of theoretical and practical issues and developing solutions to issues involving deep knowledge of the subject. |
| Laboratory practice | Its aim is to apply computer programs to solve problems commented in the lectures. |

| Personalized attention | |
|---|---|
| Methodologies | Description |
| Problem solving<br>Guest lecture / keynote speech<br>Laboratory practice | The personal attention allows to adapt the study to the level of knowledge and competence of each student. Individual attention of the students optimizes time spent studying and allows correct misconceptions. |

| Assessment | | | |
|---|---|---|---|
| Methodologies | Competencies / Results | Description | **Qualification** |

| | | | |
|---|---|---|---|
| Problem solving | A6 | We will formulate practical issues in which students have to seek a solution to a given problem. | 20 |
| Mixed objective/subjective test | A6 B1 B4 C1 | They are tests made for measuring the level of knowledge of the subject by students. They do not have a defined profile, as they can range from test questions in which the student must only choose one answer among the options proposed, or solving problems involving an action strategy or theoretical questions that reflect the degree of knowledge of the subject. | 75 |
| Laboratory practice | A6 B4 B6 | Students should know the functioning of a computer program that helps resolve mechanical problems raised previously. | 5 |

| Assessment comments |
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| The final grade of the subject consists of three parts:<br>i) Problem solving: It's made through written tests and the development of classes in the classroom, where the teacher assesses individually the degree of knowledge of the subject of each student. This part represents 20% of the grade.<br>ii) performing laboratory practice, where students will learn to use the software that provides the teacher. This part represents 5% or qualification.<br>iii) Mixed objective/subjective test. This part represents 75% of the grade for students, and it´s broken down as follows: 35% lessons 1 and 2, 35% lessons 3,4 and 5, 5% tasks related to laboratory practices.<br>Part-time students with academic dispensation are valued paragraph i) in official examinations, and 5% corresponding with activities related to laboratory practices of paragraph iii) by a practical test. |

| Sources of information | |
|---|---|
| Basic | - Besada Morais, M. y outros (2008). Calculo vectorial e ecuacións diferenciais. Servizo publicacións da Universidade de Vigo<br>- Granero Rodríguez, F. (1991). Álgebra y geometría analítica. McGraw-Hill<br>- Grossman, S. (1995). Álgebra lineal con aplicaciones. McGraw-Hill<br>- Guillem Borrell i Nogueras (2008). Introducción a Matlab y Octave. http://iimyo.forja.rediris.es/matlab/<br>- Nakos, G. e outros (1999). Álgebra lineal con aplicaciones. Thomson<br>- Roberto Benavent (2010). Cuestiones sobre Álgebra Lineal. Paraninfo |
| Complementary | - Ladra González y otros (2003). Preguntas test de álbegra lineal y cálculo vectorial. J.B.Castro Ambroa y Copybelén<br>- Prieto Sáez, E y otros (1995). Matemáticas I: economía y empresa. Centro de estudios Ramón Areces |

| Recommendations |
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| Subjects that it is recommended to have taken before |
| Cálculo/770G01001 |
| Subjects that are recommended to be taken simultaneously |
| Fisíca II/770G01007 |
| Subjects that continue the syllabus |
| Ecuacións Diferenciais/770G01011 |
| Other comments |
| <p> The student must know the content of the subjects of Mathematics studied at ESO and high school. Those students from Profesional Learning should study the basic concepts related to applications, functions and integration of real functions of real variable, which are contained in the curricula of high school, and are not in Profesional Learning. </p> |