UNIVERSIDADE DA CORUÑA

Teaching Guide				
Identifying Data				2015/16
Subject (*)	Alxebra		Code	770G02006
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	Ladra Gonzalez, Marcelino Eulogio	E-mail	marcelino.ladra@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
A6	Capacidade para a resolución dos problemas matemáticos que se poidan suscitar na enxeñaría. Aptitude para aplicar os coñecementos sobre: álxebra lineal; xeometría; xeometría diferencial; cálculo diferencial e integral; ecuacións diferenciais e en derivadas parciais; métodos numéricos; algorítmica numérica; estatística e optimización.
B1	Capacidade de resolver problemas con iniciativa, toma de decisións, creatividade e razoamento crítico.
B2	Capacidade de comunicar e transmitir coñecementos, habilidades e destrezas no campo da enxeñaría industrial.
B3	Capacidade de traballar nun contorno multilingüe e multidisciplinar.
B4	Capacidade de traballar e aprender de forma autónoma e con iniciativa.
B6	Capacidade de usar adecuadamente os recursos de información e aplicar as tecnoloxías da información e as comunicacións na enxeñaría.
C1	Expresarse correctamente, tanto de forma oral coma escrita, nas linguas oficiais da comunidade autónoma.
C6	Valorar criticamente o coñecemento, a tecnoloxía e a información dispoñible para resolver os problemas cos que deben enfrontarse.

Learning outcomes			
Learning outcomes	Study programme competences / results		
Modeling and solving mathematical problems in the field of engenengineering.	A6	B1 B2 B3 B4 B6	C1 C6
Possessing own scientific mathematical skills, enabling it to ask and answer some math questions.	A6	B1 B2 B3 B4 B6	C1 C6
Create linear models that approximate problems to solve. Having ability to apply knowledge of Linear Algebra and Differential Geometry.	A6 A9	B1 B2 B3 B4 B6	C1 C6

Understand mathematical models that explain the behavior of a fluid in a 1-dimensional space.	A6	B1 B2 B3 B6	C1 C6
Knowing how to use numerical methods in solving some mathematical problems that arise.	A6	B1 B2 B3 B6	C1 C6
Knowing the thoughtful use of tools symbolic and numeric computation.	A6	B4 B6	C6

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.
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.
Diagonalization	Invariant subspaces. Eigenvalues and eigenvectors. Characteristic polynomial. Diagonalizable endomorphism.

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	A9 B4 B6	0	7	7
Directed discussion	A6 A6 B1 B2 B3 B4 B6 B1 C1 C6 C1	12	12	24
Mixed objective/subjective test	A6 B1 B4 C1 C6	4	14	18
Laboratory practice	A6 A9 B4 B6	6	0	6
Problem solving	A6 C6	12	18	30
Personalized attention		2	0	2
(*)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.
Directed discussion	The students debate about how to solve problems. They discusse if the results achieved are meaningless.
Mixed objective/subjective test	Its aim is 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.
Problem solving	With them we move from theory to practice. Specific problems of the subject developed in the lectures are solved.

Personalized attention	
Methodologies	**Description**
Laboratory practice Guest lecture / keynote speech Directed discussion Problem solving	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**
Laboratory practice	A6 A9 B4 B6	Students should know the functioning of a computer program that helps resolve mechanical problems raised previously.	5
Mixed objective/subjective test	A6 B1 B4 C1 C6	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
Problem solving	A6 C6	We will formulate practical issues in which students have to seek a solution to a given problem.	20

Assessment comments
The final grade of the subject consists of three parts: 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. ii) performing laboratory practice, where students will learn to use the software that provides the teacher. This part represents 5% or qualification. iii) Mixed objective/subjective test. This part represents 75% of the grade for students, of which 5% is evidence of laboratory practices.

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

Recommendations
Subjects that it is recommended to have taken before
Subjects that are recommended to be taken simultaneously

Fisíca II/770G01007
Subjects that continue the syllabus
Ecuacións Diferenciais/770G01011
Other comments
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.