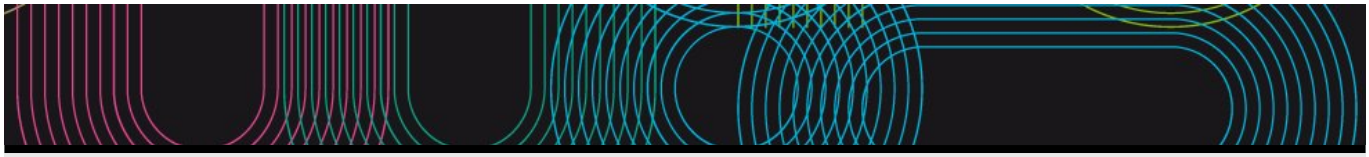

IDENTIFYING DATA

Mathematics: Mathematics and IT

Subject	Mathematics: Mathematics and IT			
Code	P03G370V01103			
Study programme	(*)Grao en Enxeñaría Forestal			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	9	Basic education	1st	1st
Teaching language	Spanish Galician			
Department				
Coordinator	Casas Mirás, José Manuel			
Lecturers	Casas Mirás, José Manuel			
E-mail	jmcasas@uvigo.es			
Web	http://http://faitic.uvigo.es/			
General description	The *asignatura is programmed so that the student purchase the necessary competitions to resolve problems of *índole mathematical that can present in the Forest Engineering, so that it purchase skill in the handle of programs of calculation, basic knowledges of Computing and management of the information, as well as in the handle of TIC.			

Competencies

Code	
B4	CG-04: Capacidade para comprender os seguintes fundamentos necesarios para o desenvolvemento da actividade profesional: Matemáticos.
C3	(*)CE-03: Capacidade para a resolución dos problemas matemáticos que poidan presentarse na enxeñaría. Aptitude para aplicar os coñecementos sobre: álxebra lineal; xeometría; cálculo diferencial e integral. Coñecementos básicos sobre ordenadores, sistemas operativos, bases de datos, programación e programas de cálculo de uso en enxeñaría.
D1	(*)CBI 1: Capacidade de análise e síntese.
D2	(*)CBI 2: Capacidade de organización e planificación.
D3	(*)CBI 3: Capacidade de comunicación oral e escrita tanto na lingua vernácula como en linguas estranxeiras.
D4	(*)CBI 4: Coñecementos básicos de informática.
D5	(*)CBI 5: Capacidade de xestión da información.
D6	(*)CBI 6: Adquirir capacidade de resolución de problemas.
D7	(*)CBI 7: Adquirir capacidade na toma de decisións.
D9	(*)CBP 2: Habilidades nas relacións interpersoais.
D10	(*)CBP 3: Recoñecer a diversidade e a multiculturalidade.
D11	(*)CBP 4: Habilidades de razoamento crítico.
D12	(*)CBP 5: Desenvolver un compromiso ético, que implique o respecto dos dereitos fundamentais e de igualdade entre homes e mulleres, e dos principios de igualdade de oportunidades, accesibilidade universal a persoas con discapacidade e educación para a paz.
D13	(*)CBS 1: Aprendizaxe autónoma.
D14	(*)CBS 2: Adaptación a novas situacións.
D15	(*)CBS 3: Creatividade.
D16	(*)CBS 4: Liderado.
D18	(*)CBS 6: Iniciativa e espírito emprendedor.
D19	(*)CBS 7: Motivación pola calidade.

Learning outcomes

Expected results from this subject	Training and Learning Results

Capacity for the resolution of the mathematical problems that can arise in the engineering. Capacity to apply knowledges of: linear algebra; geometry; differential calculation and integral; basic knowledges on computers, operating systems, databases, programming and programs of calculation of use in the engineering. The relation between competitions and results, and the weight of each competition inside the *asignatura show in the pdf attach. http://forestales.uvigo.es/sites/default/files/03%20*Matemat%20%20and%20*inf.Pdf#*overlay-*context=is/*content/competitions-and-resulted-of-learning-by-matter	B4	C3	D1 D2 D3 D4 D5 D6 D7 D9 D10 D11 D12 D13 D14 D15 D16 D18 D19

Contents

Topic	
Subjet 1. The body of complex numbers	The body of complex numbers. Representation of complex numbers. Module and argument. Euler's Formula. Operations with complex numbers in polar form: powers (De Moivre's formula), roots, exponentials, logarithms.
Subject 2. Vectorial spaces	The vectorial space Rn. Vectorial Subspaces . Linear combination. Dependency and linear independence. Vectorial spaces of finite dimension. Base and dimension. Rank.
Subject 3. Linear applications	Linear applications. Properties. Core and image of a linear application. Characterisation of the linear applications injectives and surjectives. Rank of a linear application. Matrix associated to a linear application.
Subject 4. Matrices	Definition and types of matrices. Vectorial space of the matrices mxn. Product of matrices. Regular matrix. Rank of a matrix. Calculation of the rank of a matrix and of the reverse matrix by means of elementary operations.
Subject 5. Determinants	Determinants Of a square matrix of order 2 and of order 3. Properties. Development by attachments. Calculation of the reverse matrix. Calculation of the rank of a matrix.
Subject 6. Systems of linear equations	Systems of linear equations: matrix form. Equivalent systems. Existence of solutions: theorem of Rouché-Frobenius. Homogeneous systems. Resolution of systems of linear equations: resolution by means of the methods of elimination of Gauss and Gauss-Jordan. Resolution of a system of Cramer. Resolution of a general system using the rule of Cramer.
Subject 7. Euclidean vectorial space	Scalar product. Norma. Distance. Orthogonality. Scalar product regarding a base. Orthogonal and orthonormal systems. Vectorial product. Mixed product. Areas and volumes.
Subject 8. Geometry	Three-dimensional affine space. The straight in the affine space. Equations of the straight. The plane in the affine space. Equations of the plane. Relations of incidence between straight and planes. Angles: of two straight, of two planes and of straight and plane. Distances: of a point to a plane, of a straight to a plane and of two straight that cross . Metric study of the conical.
Subject 9. Diagonalization Of endomorphisms and matrices	Vectors and own values. Subspaces Own. Characteristic polynomial. Diagonalization: Conditions. Polynomial nullifier. Theorem of Cayley-Hamilton. Applications.
Subject 10. Convergence in R.	Topology of the straight real: points distinguished, compact groups. Convergent successions in R. Operations with limits. Calculation of limits: indeterminations, rules of Stolz, of the arithmetical and geometrical averages and of the root. Numerical series. Geometrical and telescopic series. Series of positive terms. Criteria of convergence. Series alternated. Criterion of Abel. Absolute convergence. Sumation Of some elementary series.
Subject 11. Limit and continuity of functions of a real variable	Limit of a function in a point. Sequential limit. Properties of the limits. Calculation of limits. Continuity of real functions. Discontinuity: Types. Operations with continuous functions. Relative theorems to the global continuity: continuous image of a compact, theorem of Bolzano-Weierstrass, theorem of Bolzano: consequences. Continuity of the reverse function and of the compound function.

Subject 12. Differential calculation of a variable	Derived from a function in a point. Geometric interpretation of the concept of derivative. The differential. Derived function. Successive derivatives. Relationship between continuity and derivability. Calculation of derivatives: derived from the compound function and the inverse function. Theorems relating to derivable functions: Rolle's theorem, consequences; The mean value theorem, consequences; The rule of L'Hôpital, calculation of indeterminate limits. Taylor polynomials of a function. Taylor's theorem. Problems of highs and lows. Study of concavity and convexity. Turning points. Graphical representation of functions
Subject 13. Integration of functions of a variable	The Riemann integral: partitions, upper and lower sums, upper and lower integral, integral functions, the integral as sum limit. Properties. Theorem of the mean value. The fundamental theorem of integral calculus. Barrow Rule. Primitives. General methods of calculating primitives. Integrals improper. Geometric applications of the integral.
Subject 14. Informatics	Operating systems: classification, components, examples. Programming Fundamentals. Organization of archives. Methods of sorting and searching. Concept and types of databases.
LABORATORY PRACTICE AGENDA	
Practice 1. Introduction to the syntax of a symbolic calculation program.	Basic commands of a symbolic calculation program
Practice 2. Complex Numbers	Complex arithmetic in binomial form. Polar shape. Arithmetic in polar form
Practice 3. Vector Spaces	Operations with vectors. Linear independence of vectors and calculation of bases. Generator systems. Range of a vector system.
Practice 4. Linear Applications	Calculation of the associated matrix. Calculation of the kernel, image and rank
Practice 5. Matrices and determinants	Operations with matrices. Calculation of the determinant of a square matrix. Calculate the range of a matrix and the inverse matrix
Practice 6. Systems of linear equations	Resolution of linear systems. Cramer's Rule and Gauss and Gauss-Jordan Elimination Methods. Applications.
Practice 7. Euclidean Vector Space and Geometry	Calculation of the scalar product, vectorial and mixed. Calculation of areas, volumes, angles and distances. Conical curves
Practice 8. Diagonalization	Calculation of the eigenvalues and eigenvectors of a square matrix. Diagonalization of matrices. Applications
Practice 9. Convergence and Series	Inheritance limit. Application of the convergence criteria of series. Sum of series.
Practice 10. Functions	Calculating the limit of a function at a point. Graphical representation of functions. Study of continuity.
Practice 11. Derivation.	Derivation of functions. Calculation of tangent and normal lines. Problems of relative extremes. Developments in Taylor series. Local study of functions.
Practice 12. Integration	Calculation of primitives. Applications: calculation of areas, volumes, arc lengths, moments of inertia, etc
Subject 13. Informatics	Programming Fundamentals. Development and management of databases

Planning

	Class hours	Hours outside the classroom	Total hours
Introductory activities	1	0	1
Master Session	23	34.5	57.5
Troubleshooting and / or exercises	24	36	60
Laboratory practises	28	14	42
Autonomous practices through ICT	0	10	10
Autonomous troubleshooting and / or exercises	0	14	14
Classroom work	0	14	14
Long answer tests and development	4	0	4
Multiple choice tests	7	0	7
Troubleshooting and / or exercises	0	8	8
Jobs and projects	0	7.5	7.5

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Introductory activities	(*) Actividades encamiñadas a tomar contacto, reunir información sobre o alumnado e a presenta-la materia.

Master Session	(*) Exposición de contidos da materia. Empregarase a exposición en pizarra con apoio de sistemas audiovisuais. Competencias relacionadas: A1, A5, A56, B9, B10, B11, B12.
Troubleshooting and / or exercises	(*) Formulación, análise, resolución e debate de problemas ou exercicios relacionados coa temática da materia. Empregarase a exposición en pizara con apoio de medios audiovisuais e programas de cálculo. Competencias relacionadas: A1, A5, A56, B1, B2, B3, B4, B5, B6, B7, B9, B10, B11, B12.
Laboratory practises	(*) Resolución de problemas relacionados cos contidos teóricos mediante o emprego dun programa de cálculo simbólico, un xestor de base de datos e un programa de edición de textos. Competencias relacionadas: A1, A5, A56, B1, B2, B3, B4, B5, B6, B7, B9, B10, B11,B12, B14, B15, B16, B18, B19.
Autonomous practices through ICT	(*) Utilizaránse recursos disponibles en liña, como bases de datos, e empregaráse a plataforma institucional TEMA para o desenvolvemento e realización de diversas tarefas. Competencias relacionadas: A56, B1, B2, B3, B4, B5, B13, B14.
Autonomous troubleshooting and / or exercises	(*) Formulación, análise, resolución e debate de problemas ou exercicios relacionados coa temática da materia, por parte do alumnado. Proporcionaránse boletíns de problemas correspondentes aos temas programados, que o alumno debe resolver por si mesmo. Competencias relacionadas: A1, A5, A56, B1, B2, B4, B5, B6, B7, B9, B11, B13, B14, B15.
Classroom work	(*) Realización de tarefas autónomas relacionadas cos temas programados, que serán entregadas empregando a plataforma TEMA para seren avaliadas. Competencias relacionadas: A1, A5, A56, B1, B2, B4, B5, B6, B7, B9, B11, B13, B14, B15, B16, B18, B19.

Personalized attention

Methodologies	Description
Troubleshooting and / or exercises	
Laboratory practises	
Classroom work	
Autonomous practices through ICT	
Autonomous troubleshooting and / or exercises	

Tests	Description
Multiple choice tests	
Troubleshooting and / or exercises	
Jobs and projects	

Assessment

	Description	Qualification	Training and Learning Results		
Long answer tests and development	(*)Ten dúas partes: 1. Exame final de contidos teóricos. 2. Exame final de prácticas de laboratorio. Competencias avaliadas: A1, A5, A56, B1, B2, B3, B4, B5, B6, B7, B10, B12, B19	70	B4	C3	D1 D2 D3 D4 D5 D6 D7 D10 D12 D19
Multiple choice tests	(*)Resolución de probas pechadas consistentes en exercicios con varias respostas alternativas das que o alumno deberá sinalar a verdadeira. Resolución de problemas nas que, utilizando un sistema de cálculo simbólico, deberán proporcionar a resposta do programa ao exercicio correspondente. Competencias avaliadas: A1, A5, A56, B1, B3, B4, B6, B7, B10, B12, B13, B19	10	B4	C3	D1 D3 D4 D6 D7 D10 D12 D13 D19

Troubleshooting and / or exercises	(*)Resolución de boletíns de problemas e prácticas de laboratorio. Competencias avaliadas: A1, A5, A56, B1, B2, B3, B4, B6, B7,B9, B10, B12, B13, B14, B15, B16, B18	10	B4	C3	D1 D2 D3 D4 D6 D7 D9 D10 D12 D13 D14 D15 D16 D18
Jobs and projects	(*)Realización de proxectos abertos nos que é preciso empregar diferentes coñocementos adquiridos ao longo do curso. Competencias avaliadas: A1, A5, A56, B1, B2, B3, B4, B5, B6, B7, B9, B11, B12, B13, B14, B15, B16, B18, B19	10	B4	C3	D1 D2 D3 D4 D5 D6 D7 D9 D11 D12 D13 D14 D15 D16 D18 D19

Other comments on the Evaluation

Sources of information

Basic Bibliography

Complementary Bibliography

Grossman, S. I., **Álgebra Lineal con aplicaciones**, 1991,

Rojo, J., **Álgebra Lineal**, 2007,

Burgos, J. de, **Curso de Álgebra y Geometría**, 1980,

Luzarraga, A., **Problemas resueltos de Álgebra Lineal**,

Rojo, J. y Martín, I., **Ejercicios y problemas de Álgebra Lineal**, 2005,

Burgos, J. de, **Cálculo infinitesimal de una variable**, 1994,

Larson, R. E.; Hostetler, R. P. y Edwards, B. H., **Calculo Volumen I**, 2006,

Ayres, F. Jr., **Cálculo**, 2001,

Bradley, G. L. Y Smith, K. J.,, **Cálculo de una variable**, 1998,

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Martínez Salas, J., **Elementos de matemáticas**, 1992,

Franco Brañas, J. R., **Introducción al cálculo: problemas y ejercicios resueltos**, 2003,

García, A.; Gracía, F.; López, A.; Rodríguez, G. y de la Villa, A., **Cálculo I: teoría y problemas de análisis matemático de una variable**, 2007,

Granero, F., **Cálculo integral y aplicaciones**, 2001,

Rodríguez Riotorto, M., **Primeros pasos en Maxima**, 2008,

Cerrada Somolinos, J. A., **Fundamentos de programación con Modula-2**, 2000,

Prieto, A.; Lloris, A. y Torres, J. C., **Introducción a la Informática**, 2006,

Plasencia López, Z., **Introducción a la Informática**, 2006,

Rodríguez Riotorto, M, **Manual de Maxima**, 2005,

Alaminos Prats, J. , Aparicio del Prado, C., Extremera Lizana, J. , Muñoz Rivas, P. y Villena Muñoz, **Prácticas de ordenador con wxMaxima**, 2008,

Recommendations

Subjects that continue the syllabus

Mathematics: Overview of mathematics/P03G370V01203

Subjects that are recommended to be taken simultaneously

Physics: Physics I/P03G370V01102