



IDENTIFYING DATA

Graphic expression: Graphic expression

Subject	Graphic expression: Graphic expression			
Code	O07G410V01105			
Study programme	(*)Grao en Enxeñaría Aeroespacial			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	1st
Teaching language	Galician			
Department				
Coordinator	Pérez Vázquez, Manuel			
Lecturers	Pérez Vázquez, Manuel			
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General description	The main objective of this subject is to train students to manage and take advantage of systems and techniques of representation more employed actuality by the aerospace industry, which are based on geometry, be this: metric, projective, analytical, descriptive or computational. Knowledge of forms generation methods, its properties and management of the same in diverse contexts of engineering, so much in the plane how in the 3D space, requires a proper development of the capacities for analysis, synthesis and visualization (abstraction and idealization), as well as the utilization of the graphic language. Normalization is necessary for exhaustive definition of forms, components, objects, mechanisms or installations, in respective projects, it requires knowledge of basic rules on formats, lines, ways of representation, dimensioning, symbology or geometrical specifications (GPS). Training in any current graphic application that facilitate creation of 3D models, the consequent obtaining of planes, the assembly of components, the simulation and the movement, the interactiveness between different files or the parametric dimensioning, complete this approach.			

Competencies

Code				
A1	(*)Que os estudantes demostrasen posuír e comprender coñecementos nunha área de estudo que parte da base da educación secundaria xeral, e adóitase atopar a un nivel que, aínda que se apoia en libros de texto avanzados, inclúe tamén algúns aspectos que implican coñecementos procedentes da vangarda do seu campo de estudo			
C5				
D1	(*)Capacidade de análise, organización e planificación			
D3	(*)Capacidade de comunicación oral e escrita na lingua nativa			
D4	(*)Capacidade de aprendizaxe autónoma e xestión da información			
D6	(*)Capacidade de comunicación interpersonal			
D8	(*)Capacidade de razoamento crítico e autocrítico			

Learning outcomes

Expected results from this subject	Training and Learning Results			
New	A1	C5	D1 D3 D4 D6 D8	

Contents

Topic	
THEORY	.

1- Introduction to Standarization	1.1-Graphic in the Engineering for data visualization, communication and objects definition. 1.2-Normalization and Graphic Language. 1.3-Organisms of Normalization. 1.4-Basic Norms to obtain planes: formats, scales, lines and sights. 1.5-General Principles of Representation. Selection of sights and cuts. Rules. 1.6-European and American Systems. Adaptation to CAD systems.
2- Flat Curves and his applications	2.1-Conicals: traced, characteristic and applications. 2.2-Projective study of the conicals. 2.3-Rolling Curves. Applications. 2.4-Other curves: spirals, envelopes, evolutes. Applications. 2.5-Polygonal approach to flat curve. 2.6-Warped Curves. The helix. Evolution of the intrinsic trihedron
3- Fundamentals and Techniques of Representation Systems	3.1-Projective fundamentals of representation systems. Types of projection. 3.2-Move from one system to another. 3.3-Pairs, ternas and quaternaries. Invariants. 3.4-Projective forms. 3.5Homology and affinity. 3.6-Diedric System: measure of angles and distances. Basic operations for bodies representation. 3.7-Axonometric System, direct and indirect. Types of axonometrie. 3.8-Bounded plane system. Applications: topography and roofs.
4- Bodies visualization and representation	4.1-Bodies representation in diverse systems of representation. 4.2-Specific Operations to obtain sights in a determined direction, intersections and unseen parts. 4.3-Determination of true magnitudes by means of twists and changes of plane.
5- Regulated surfaces and his applications	5.1-General surfaces ranking. 5.2-Regulated surfaces : developable and warped. Applications. 5.3-Curved surfaces . The sphere. 5.4-Cuadratic surfaces. Applications. 5.5-Intersections between surfaces. 5.6-Polyhedric surfaces. Types, characteristic, elements of symmetry. 5.7Grouping of polyhedrons and space division.
6- Elements and forms of dimensioning	6.1Dimensioning. Basic elements. 6.2-General principles of dimensioning. 6.3-Systems of reference. 6.4-Types of dimensioning. Criteria. 6.5-Normative basic. 6.6-Functional dimensioning 6.7-Dimensional Tolerances . Adjustments.
7- Representation of normalized elements and ensemble.	7.1-Representation of normalized elements. Elements of union. Elements of transmission. Others. 7.2-Characteristic of the ensemble drawing. 7.3-The assambly. Representation of the joint. 7.4-Dimensions in the ensemble drawing. 7.5-List of pieces. 7.6-The assambly 3D in the computer, establishment of the relations between parts, animations, studies of movement and simulaci3n.
8- Bases of symbology and schematic representations in Engineering	12.1-Symbology in Engineering. Iconicity. 12.2-Schematic representations. 12.3-Applications. 12.4-Norms.
PRACTICES.	.
1- Computer aideded desig	Presentation of the program by the teacher, first day. Description of the main characteristic and possibilities of the tool. Exercises guided to the training and familiarization, with commands and fundamental functions. Direct generation of 3D models from which we will derive the sights and necessary cuts to the normalized definition 2D. Finally it make the assembly of components with the appropriate restrictions that allow the animation and simulation. Along the course will use the distinct types of dimensioning (drives, conducted and dependents of a mathematical equation or of a parameter) .

2- COMMON PRACTICAL

It will begin with a review of the geometrical basic constructions, handmade, that necessarily requires work at home. Each theoretical part will be supplemented with exercises to realize during the hours of practice, in the successive weeks, that students must to complete at home. In parallel they will realize the training in the application and will go resolving exercises in the computer in order to adquire capacity to elaborate the final work in the computer.

3- PRACTICAL WORK (TrP)

It proposes the realization of a practical work (TrP) to develop during the course, in groups of 1-3 students, by way of a small project related with the career (display, assamby or group of components that exert any function related with the aeroespacial thematic), in respect at the graphic part. The complexity varies accordance with the election of each group.

Planning

	Class hours	Hours outside the classroom	Total hours
Master Session	25	50	75
Tutored works	0	2.5	2.5
Group tutoring	0	2	2
Autonomous practices through ICT	0	4	4
Introductory activities	0	1.5	1.5
Practice in computer rooms	25	37.5	62.5
Long answer tests and development	2.5	0	2.5

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

Methodologies

	Description
Master Session	Active magistral sesión. Each thematic unit will be presented by the teacher and supplemented with the comments of the students, based in the general bibliography or in another specific bibliography that each one can adquire.
Tutored works	Guided by the professor in the selection and during the development.
Group tutoring	For orientation of the work, integration in the groups and resolution of doubts.
Autonomous practices through ICT	For resolution of complementary exercises out of class
Introductory activities	Presentation of the subject in the established date.
Practice in computer rooms	In the practical sessions will propose exercises to individual or collective resolve, by hand and/or with the computer, guided to the application of the theory and to achieve skills in the use of classics and automatics tools.

Personalized attention

Methodologies Description

Tutored works	Election by the group of students, guided and directed by the professor. Tracking in classes and in the common tutorial.
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Assessment

	Description	Qualification	Training and Learning Results		
Master Session	Proof of evaluation or common Examination, to realize in the date established by the centre, of theory and practical, of the contents treaties in the distinct sessions.	60	A1	C5	D1 D3 D4 D6 D8
Tutored works	With tracking of the professor. It values the assistance and participation.	10			D4 D6 D8
Autonomous practices through ICT	Resolution of exercises of autonomous form, that supplement the class.	10		C5	D1 D4 D8
Practice in computer rooms	Evaluation of the practices realized weekly.	20	A1	C5	D1 D4 D6

Other comments on the Evaluation

The continuous evaluation will include all the work developed in person or face-to-face, of the individual or group activities

planned. The subject is surpassed by continuous evaluation when reaching 5.00 points in each one of the parts. In case of not reaching 5.00 in each part, the matter can also be surpassed if in each of the parts exceeds 4.5 and the average is equal to or higher than 5.00.

In case of not following the process of continuous evaluation the student can only present itself to the final examination of the subject. Your qualification will be the one obtained in this examination.

For the July evaluation, the qualifications of the previously passed parties are maintained, and the unsuccessful ones must be recovered and they can be presented to the surpassed ones in order to improve the final grade.

Evaluation dates: according to the examination calendar officially approved by the School Board, which is published on its website: <http://aero.uvigo.es/gl/docencia/exames>

The practical part, if it is the case, could require some type of test outside these dates.

Ethical Commitment: The student is expected to exhibit appropriate ethical behavior. In case of detecting inappropriate ethical behavior (copying, plagiarism, use of unauthorized electronic devices, and others), the student will be considered not to meet the necessary requirements to overcome the subject matter. In such case the overall grade of this academic year will be suspended (0,0). If necessary, a further examination could be carried out to verify the acquisition of skills and knowledge by the student involved.

Sources of information

Basic Bibliography

AENOR, **Normas varias, actualizadas**, Segundo cada norma,

Félez Mindán, J., **Ingeniería Gráfica y Diseño**, Síntesis D.L., 2008

Izquierdo Asensi, F., **Geometría Descriptiva Superior y Aplicada**, 6ª, Ed. Dossat, 2013

Prieto Alberca, M., **Fundamentos Geométricos del Diseño en Ingeniería**, ADI, 1992

Complementary Bibliography

Félez Mindán, J., **Dibujo Industrial**, 3ª, Ed. Síntesis, 2000

Izquierdo Asensi, F., **Geometría Descriptiva**, 24ª, Ed. Paraninfo, 2000

Prieto Alberca, M., **Geometría Aplicada al Diseño**, ADI, 2010

Company, P.; Vergara, M; Mondragón, S., **Dibujo Industrial**, Universitat Jaume I, 2007

Recommendations

Other comments

It recommends to had studied the subjects of "Technical Drawing" in the bachelor's degree of Sciences and Technological.