



## IDENTIFYING DATA

### Graphic expression: graphic expression

Subject	Graphic expression: graphic expression			
Code	V12G420V01101			
Study programme	(*)Grao en Enxeñaría Biomédica			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	9	Basic education	1st	1st
Teaching language	Spanish Galician			
Department				
Coordinator	López Figueroa, Concepto Esteban Fernández Álvarez, Antonio			
Lecturers	Adán Gómez, Manuel Alegre Fidalgo, Paulino Corralo Domonte, Francisco Javier Fernández Álvarez, Antonio González Rodríguez, Elena López Figueroa, Concepto Esteban Patiño Barbeito, Faustino Roa Corral, Ernesto Troncoso Saracho, José Carlos			
E-mail	antfdez@uvigo.es esteban@uvigo.es			
Web	<a href="http://faitic.uvigo.es">http://faitic.uvigo.es</a>			
General description	The aim that pursues with this subject is to form to the student in the thematic relative to the Graphic Expression, so as to prepare for the handle and interpretation of the systems of representation more employed in the industrial reality and his basic technicians, enter him to the knowledge of the forms, generation and properties of the geometrical entities more frequent in the technician, including the acquisition of vision and space understanding, initiate him in the study of the appearances of technological character that influence in the Graphic Expression of the Engineering and enter him rationally in the knowledge and application of the Normalisation, so much in his basic appearances as in the specific. The subject will develop so that prepare to the student for the indifferent employment of traditional technicians and of new technologies of the information and communications.			

## Competencies

Code	
B1	CG4 Ability to solve problems with initiative and to visualize, communicate and transmit knowledge, skills and abilities in the field of biomedical engineering.
B3	CG3 Knowledge in basic and technological subjects that will enable students to learn new methods and theories, and provide them the versatility to adapt to new situations.
B6	CG6 Capacity for handling specifications, regulations and mandatory standards.
C5	CE5 Capacity for spatial vision and knowledge of the techniques of graphic representation, using traditional methods of metric geometry and descriptive geometry, and through the application of computer-aided design.
D2	CT2 Problems resolution.
D6	CT6 Application of computer science in the field of study.
D9	CT9 Apply knowledge.

## Learning outcomes

Expected results from this subject	Training and Learning Results
------------------------------------	-------------------------------

- Know, understand, and apply a body of knowledge about the basics of drawing and standardization of industrial engineering, in its broadest sense, while promoting the development of space capacity.	B1 B3	C5	D6
- Purchase the capacity for the abstract reasoning and the establishment of strategies and efficient procedures in the resolution of the graphic problems inside the context of the works and own projects of the engineering.	B1 B3	C5	D2
- Use the graphic communication between technicians, by means of the realisation and interpretation of planes in accordance with the Norms of Technical Drawing, involving the use of the new technologies.	B6	C5	D6 D9
□ Assume a favourable attitude to the permanent learning in the profession, showing proactive, participatory and with spirit of improvement.	B1		D9

## Contents

Topic	
Block 0. Computer-aided drawing 2D. Sketching, and application of Norms.	Introduction to the Computer-aided Drawing. Surroundings of work. Systems of Coordinates. You order of Drawing. Graphic entities. Helps to the drawing. References to entities. You order of Modification. You order of Visualisation. You order of Query. Impression and scales.
Block I 2D. Flat geometry.	0.2. Sketching, and application of Norms I review of previous knowledges.  Conical: definitions, focal and main circumferences, tangent line and normal in a point, tangent lines from an external point, own and improper.  Tangencies between straight and circumferences and between circumferences (26 cases). Tools of resolution: geometrical places, operations of dilatation and investment and power.  Technical curves: Trochoids: definition, traced and tangent line in a point. Other technical curves.
Block II 3D. Systems of representation.	Introduction: Types of projections. Invariants *proyectivos.  System *Diédrico: Foundations. Belonging and Incidence. Parallelism and *Perpendicularidad. Distances, Angles. Operations: Twists, Changes flatly and *Abatimientos. Surfaces: Polyhedral, Irradiated and of Revolution, Surfaces: Flat Sections, Development. Intersection of Surfaces. Foundations.  System of Bounded Planes: Foundations. Belonging and Incidence. Parallelism and *Perpendicularidad. Distances, Angles. *Abatimientos.  Axonometric system: Foundations. Axonometric scales. Types of *axonometrias: *trimétrica, *dimétrica and isometric.  System of Cavalier Perspective: Foundations.  System of Conical Perspective: Foundation.

Block III. Normalisation.

Generalities on the drawing:

- The drawing like language.
- Types of drawings: technicians and artistic.
- Technical drawings: architectural, topographical and industrial.
- Industrial drawing: \*Croquis, conjoint diagrams, \*despieces and geometrical drawing.

Normalisation of the drawing:

- Advantages of the normalisation.
- Difference between regulation, specification and norm.

Basic normalisation: formats, writing, types of line, scales, etc.

Representation normalised:

- basic Principles of representation. Methods of projection
- Seen. Seen particular: auxiliaries, interrupted, partial, local, turned, etc.
- Courts, Sections and Breaks: Specifications, types of cut, sections (knocked down, displaced), etc.
- \*Rayado of courts: types of line, orientation, etc.
- Conventionalisms: symmetrical pieces, repetitive elements, details, intersections, parts \*contiguas, etc.

\*Acotación:

- General principles of dimensioning.
- Types of \*acotación. Classification of the heights.
- Principles of \*acotación.
- Elements of \*acotación: Lines, extremes of lines, \*inscripciones, etc.
- Forms of \*acotación: series, parallel, by coordinates, etc.
- \*Acotación of particular elements: radios, diameters, spheres, arches, symmetries, chamfers, etc.
- Threads and threaded unions. Elements of a thread. Threaded elements. Classification of the threads. Representation of the threads. Threads normalised.
- \*Acotación Of threaded elements.
- Designation of the threads.

Drawings of group and \*despiece:

- Rules and agreements: reference to elements, material, numbering of planes, examples.
- \*Acotación Of groups. List of \*despiece.

Systems of tolerances and superficial finishings:

- Types of tolerances: dimensional and geometrical.
- Dimensional tolerances: linear and angular.
- Tolerances ISO: qualities, positions, types of adjust, etc.
- Systems of adjust. Examples.
- Indication of superficial finishings.

Representation of Elements Normalised. Diagrams.

**Planning**

	Class hours	Hours outside the classroom	Total hours
Lecturing	38	116	154
Problem solving	34	0	34
Seminars	4	0	4
Project based learning	0	27	27
Essay questions exam	2	0	2
Laboratory practice	4	0	4

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

**Methodologies**

	Description
Lecturing	Active master Session. Each thematic unit will be presented by the professor, complemented with the comments of the students with base in the bibliography assigned or another pertinent.



It is recommended for a suitable follow-up of the subject have of previous knowledges of drawing, to the level of the studies \*cursados in the \*Bachillerato of the Scientific Option-Technological.

In case of discrepancies between versions shall prevail spanish version of this guide.

---