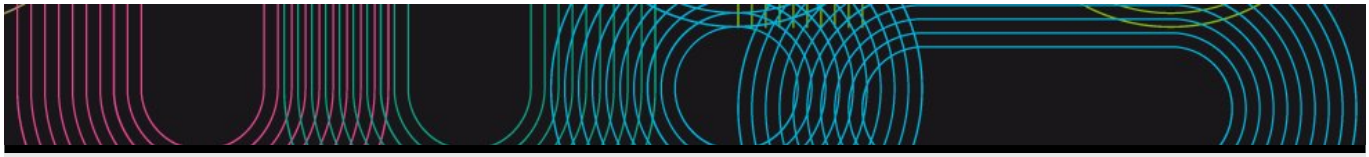

IDENTIFYING DATA				
Graphic expression: Fundamentals of engineering graphics				
Subject	Graphic expression: Fundamentals of engineering graphics			
Code	V12G363V01101			
Study programme	Grado en Ingeniería en Tecnologías Industriales			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	9	Basic education	1st	1st
Teaching language				
Department				
Coordinator	Troncoso Saracho, José Carlos Fernández Álvarez, Antonio			
Lecturers	Alegre Fidalgo, Paulino Comesaña Campos, Alberto Corralo Domonte, Francisco Javier Fernández Álvarez, Antonio González Rodríguez, Elena Patiño Barbeito, Faustino Troncoso Saracho, José Carlos			
E-mail	antfdez@uvigo.es tsaracho@uvigo.es			
Web	http://moovi.uvigo.gal/			
General description	The aim of this subject is to form to the student in the thematic relative to the Graphic Expression, so as to qualify him 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 *entes geometrical more frequent in the technician, including the acquisition of vision and space understanding and initiate him in the study of the appearances of technological character that *inciden in the Graphic Expression of the Engineering and enter him *racionalmente in the knowledge and application of the Normalisation, so much in his basic appearances as in the specific. The subject will develop so that it qualify to the student for the employment *indistinto of traditional technicians and of new technologies of the information and communications.			

Skills	
Code	
B3	CG3 Knowledge in basic and technological subjects that will enable them to learn new methods and theories, and equip them with versatility to adapt to new situations.
B4	CG4 Ability to solve problems with initiative, decision making, creativity, critical thinking and to communicate and transmit knowledge, skills and abilities in the field of Industrial Engineering.
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, comprise, and apply a group of knowledges on the foundations and normalisation of the drawing of industrial engineering, in his wider concept, *propiciando at the same time the development of the space capacity.	B3 B4	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.	B3 B4	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 *proactivo, participatory and with spirit of *superación.	B4		D9

Contents	
Topic	
Block 0. Computer-aided drawing 2D. *Croquizado, 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. 0.2. *Croquizado, and application of Norms
Block I 2D. Flat geometry.	I review of previous knowledges. Conical: definitions, focal and main circumferences, *tangente and normal in a point, *tangentes 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, outline and *tangente 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: #Sketch, 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 *contíguas, etc. *Acotación: - general Principles of dimensioning. - Types of *acotación. Classification of the heights. - Principles of *acotación. - Elements of *acotación: Lines, extremes of lines, *inscriciones, 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: - Types of tolerances: dimensional and geometrical. - Dimensional tolerances: linear and angular. - Tolerances ISO: qualities, positions, types of adjust, etc. - Systems of adjust. Examples.

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	Session *magistral active. 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.
Problem solving	They will pose exercises and/or problems that will resolve of individual way or *grupal.
Seminars	Realisation of activities of reinforcement to the learning by means of the resolution *tutelada of way *grupal of practical suppositions linked to the theoretical contents of the subject.

Project based learning	Realisation of activities that require the active participation and the collaboration between the students.

Personalized assistance

Methodologies	Description
Seminars	

Assessment

	Description	Qualification	Training and Learning Results
Essay questions exam	It will make a final examination that will cover the whole of the contents of the subject, so many theorists like practical, and that they will be able to include test type test, questions of reasoning, resolution of problems and development of practical cases. It demands reach a minimum qualification of 4,0 points on 10 possible to be able to surpass the subject.	65	B3 C5 D2 B4 D9
Laboratory practice	Along the *cuatrimestre, in determinate sessions of resolution of problems and exercises will pose problems or exercises for his resolution by the students and back delivery to the professor, that will evaluate them in accordance with the criteria that previously will have communicated to the students.	35	B4 C5 D2 D6 D9

Other comments on the Evaluation

&*lt;*p&*gt;&*amp;*nbsp;In second announcement will make to the student a theoretical proof-practical to evaluate his degree of acquisition of competitions, of analogous characteristics to the final examination, in which to surpass the subject will be necessary to reach a minimum qualification of 5,0 points on 10 possible.&*amp;*nbsp;&*lt;/*p&*gt;&*lt;*p&*gt;Ethical commitment: *Espérase that or present student a *comportamento ethical *axeitado. No case to detect a *comportamento *non ethical (copy, *plaxio, utilisation of electronic devices *non authorised, and *outros) *considerarase that or student *non gather you necessary requirements to surpass to matter. *Neste Case to global qualification no present academic course will be of suspense (0.0).&*lt;/*p&*gt;&*lt;*p&*gt;Responsible professors of groups:&*lt;/*p&*gt;&*lt;*p&*gt;Group To: Javier *Corralo *Domonte.&*lt;/*p&*gt;&*lt;*p&*gt;Group *B: Carlos *Troncoso *Saracho.&*lt;/*p&*gt;&*lt;*p&*gt;Group C: Antonio Fernández Álvarez.&*lt;/*p&*gt;&*lt;*p&*gt;Group D: Carlos *Troncoso *Saracho.&*lt;/*p&*gt;&*lt;*p&*gt;Group G: Ernesto *Roa Farmyard.&*lt;/*p&*gt;&*lt;*p&*gt;Group *H: Esteban López *Figueroa.&*lt;/*p&*gt;&*lt;*p&*gt;Group I:&*amp;*nbsp;&*amp;*nbsp;Faustino *Patiño *Barbeito.&*lt;/*p&*gt;&*lt;*p&*gt;Group *J: Ernesto *Roa Farmyard.&*lt;/*p&*gt;&*lt;*p&*gt;Group *K: Manuel Adán Gómez.&*lt;/*p&*gt;&*lt;*p&*gt;Group L: Faustino *Patiño *Barbeito.&*lt;/*p&*gt;&*lt;*p&*gt;&*amp;*nbsp;&*lt;/*p&*gt;

Sources of information

Basic Bibliography

Corbella Barros, David, **Trazados de Dibujo Geométrico 1**, Madrid 1970,

Ladero Lorente, Ricardo, **Teoría do Debuxo Técnico**, Vigo 2012,

Asociación Española de Normalización (AENOR), **Normas UNE de Dibujo Técnico**, Versión en vigor,

Félez, Jesús; Martínez, Mª Luisa, **DIBUJO INDUSTRIAL**, 3ª Edición, ISBN: 84-7738-331-6,

Casasola Fernández, Mª Isabel y otros, **Sistemas de representación I, Teoría y problemas**, ISBN 978-84-615-3553-8, Ed. Asociación de Investigación, 2011

Complementary Bibliography

López Poza, Ramón y otros, **Sistemas de Representacion I**, ISBN 84-400-2331--6,

Izquierdo Asensi, Fernando, **Geometría Descriptiva**, 24ª Edición. ISBN 84-922109-5-8,

Auria, José M.; Ibáñez Carabantes, Pedro; Ubieto Artur, Pedro, **DIBUJO INDUSTRIAL. CONJUNTOS Y DESPIECES**, 2ª Edición, ISBN: 84-9732-390-4,

Guirado Fernández, Juan José, **INICIACIÓN Á EXPRESIÓN GRÁFICA NA ENXEÑERÍA**, ISBN: 84-95046-27-X,

Ramos Barbero, Basilio; García Maté, Esteban, **DIBUJO TÉCNICO**, 2ª Edición, ISBN: 84-8143-261-X,

Manuales de usuario y tutoriales del software DAO empleado en la asignatura,

Giesecke, Mitchell, Spencer, Hill, Dygdon, Novak, Lockhart, **Technical Drawing with Engineering Graphics,**, 14ª, Prentice Hall, 2012

David A. Madsen, David P. Madsen, **Engineering Drawing & Design**, 5ª, Delmar Cengage Learning, 2012

Recommendations

Other comments

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, will prevail the version in Spanish of this guide.

Contingency plan

Description

=== EXCEPTIONAL MEASURES SCHEDULED ===
In front of the uncertain and unpredictable evolution of the sanitary alert caused by the *COVID-19, the University of Vigo establishes an extraordinary planning that will activate in the moment in that the administrations and the own institution determine it attending to criteria of security, health and responsibility, and guaranteeing the teaching in a no face-to-face stage or partially face-to-face. These already scheduled measures guarantee, in the moment that was prescriptive, the development of the teaching of a more agile and effective way when being known in advance (or with a wide *antelación) by the students and the *profesorado through the tool normalised and institutionalised of the educational guides.

=== ADAPTATION OF THE METHODOLOGIES ===
* educational Methodologies that keep

* educational Methodologies that modify

* Mechanism no face-to-face of attention to the students (*tutorías)

* Modifications (if they proceed) of the contents to give

* additional Bibliography to facilitate the car-learning

* Other modifications

=== ADAPTATION OF THE EVALUATION ===
* Test already made
Proof XX: [previous Weight 00%] [Weight Proposed 00%]
...

* Pending proofs that keep
Proof XX: [previous Weight 00%] [Weight Proposed 00%]
...

* Proofs that modify
[previous Proof] => [new Proof]

* New test

* additional Information