



Teaching Guide				
Identifying Data				2019/20
Subject (*)	Engineering drawing	Code	730G05003	
Study programme	Grao en Enxeñaría Naval e Oceánica			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	2nd four-month period	First	Basic training	6
Language	Spanish			
Teaching method	Face-to-face			
Prerequisites				
Department	Enxeñaría Naval e Industrial			
Coordinador	Álvarez García, Ana	E-mail	ana.alvarez1@udc.es	
Lecturers	Álvarez García, Ana Munín Doce, Alicia	E-mail	ana.alvarez1@udc.es a.munin@udc.es	
Web	<a href="https://campusvirtual.udc.es/moodle/">https://campusvirtual.udc.es/moodle/</a>			
General description	<p>The subject of graphic expression has a theoretical-practical nature and with it it is intended to ensure that the student:</p> <ul style="list-style-type: none"> <li>- Develop the ability to see, imagine, interpret and solve problems using a graphic language.</li> <li>- know the regulations and terminology of graphic expression in naval engineering.</li> <li>- Acquire skill in handling a CAD system (autocad).</li> </ul>			

Study programme competences / results	
Code	Study programme competences / results
A5	Have a capacity for the space vision and knowledge of the techniques of graphic representation, so much for traditional methods of metric geometry and descriptive geometry, as through the applications of design assisted by computer
B1	That the students proved to have and to understand knowledge in an area of study what part of the base of the secondary education, and itself tends to find to a level that, although it leans in advanced text books, it includes also some aspects that knowledge implicates proceeding from the vanguard of its field of study
B2	That the students know how to apply its knowledge to its work or vocation in a professional way and possess the competences that tend to prove itself by the elaboration and defense of arguments and the resolution of problems in its area of study
B4	That the students can transmit information, ideas, problems and solutions to a public as much specialized as not specialized
B5	That the students developed those skills of learning necessary to start subsequent studies with a high degree of autonomy
B6	Be able to carrying out a critical analysis, evaluation and synthesis of new and complex ideas.
C1	Using the basic tools of the technologies of the information and the communications (TIC) necessary for the exercise of its profession and for the learning throughout its life.
C2	Coming across for the exercise of a, cultivated open citizenship, awkward, democratic and supportive criticism, capable of analyzing the reality, diagnosing problems, formulating and implanting solutions based on the knowledge and orientated to the common good.
C5	Assuming the importance of the learning as professional and as citizen throughout the life.
C6	Recognizing the importance that has the research, the innovation and the technological development in the socioeconomic and cultural advance of the society.

Learning outcomes			
Learning outcomes			Study programme competences / results
Know, understand and use the techniques of graphic representation, spatial conception, standardization, naval design fundamentals, drawing plans and computer-aided applications that can solve graphically technical application problems.	A5	B1	C1
		B2	C2
		B4	C5
		B5	C6
		B6	



Contents	
Topic	Sub-topic
The following blocks or themes develop the contents established in the Verification Report card, which are:	Spatial vision development techniques. Metric and descriptive geometry. Graphic representation systems. Introduction to standardization. Computer assisted drawing.
1. SUBJECT TOPICS	1.1 Objective 1.2 Concept of the subject 1.3 Exhibition of the methodology 1.4 Exhibition of the program 1.5 Drawing instruments
2. BASIC GRAPHICAL EXPRESSION TECHNIQUES	2.1 Review of metric geometry and projective geometry 2.2 Descriptive geometry
3. REPRESENTATION TECHNIQUES. STANDARDIZATION	3.1 Presentation of plans 3.2 Presentation of the drawings 3.3 Sketch 3.4 Orthogonal views 3.5 Standardized views 3.6 Cuts and sections 3.7 Dimensioning 3.8 Dimensional tolerances 3.9 Graphic presentations
4. APPLICATIONS OF ENGINEERING	4.1 Drawing in Mechanical Engineering 4.1.1 Mechanical sets. Representation of mechanical assemblies. Quartering. Plans and definition of each piece. Standardized pieces. Explosion sets 4.2 Connection elements: 4.2.1 Detachable connections: Threaded connections: Terminology. Forms of thread profiles. Symbology and representation. Dimension. Threaded holes. Screws: types, representation. Nuts Fixing systems. Keyed links: Types. Representation and dimension 4.2.2 Fixed connections: Welding. Types. Representation 4.3 Springs: Types: compression, traction, torsion. Flat springs. Representation. Dimension 4.4 Bearings: Sliding and rolling bearings. Elements of a bearing. Classification. Representation. Dimension. Standardization. Lubrication. Obturation. Fixings 4.5 Gears: Use. Representation. Dimension
5. LAYOUT OF TECHNICAL DRAWINGS BY COMPUTER	5.1 Introduction to software 5.2 Coordinate system 5.3 Study of the orders of drawing, modification and visualization. 5.4 Representation of pieces
6. ELEMENTS OF SPACE GEOMETRY	6.1 Study of curves 6.2 Study of surfaces

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A5 B1 B2 B4 B5 B6 C1 C2 C5 C6	18	18	36
ICT practicals	A5 B1 B2 B4 B5 B6 C1 C5 C6	10	20	30



Aprendizaxe servizo	A5 B1 B2 B4 B5 B6 C1 C2 C5 C6	10	20	30
Laboratory practice	A5 B1 B2 B4 B5 B6 C1 C2 C5 C6	6	6	12
Problem solving	B1 B2 B4 B5 B6 C1 C2 C5 C6	18	18	36
Mixed objective/subjective test	A5 B1 B2 B4 B5 B6 C1 C2 C5 C6	1	1	2
Personalized attention		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	
Methodologies	Description
Guest lecture / keynote speech	Oral presentation complemented by the use of audiovisual media and the Introduction of some questions directed to the students, with the purpose of transmitting Knowledge and facilitate learning.
ICT practicals	It will be formulated the realization of a set of exercises in autocad.
Aprendizaxe servizo	Methodology that combines community service with learning in a single project, in which students are trained working on real needs of their environment in order to improve it. Students enrolled in the subject will be asked to participate in a service-learning activity with a collaborating entity. The student may choose between the service-learning activity or the assessable exercises of the practices through ICT, that is, this activity and the following are exclusive, so that students will only do one of them. The number of hours dedicated to this activity will therefore be the sum of the amount planned for each activity, that is, 20 hours of face-to-face work and 40 hours of autonomous work.
Laboratory practice	Problem solving. The realization of a set of exercises is proposed, which will be delivered weekly.
Problem solving	Problem solving. The realization of a set of exercises is proposed, which will be delivered weekly
Mixed objective/subjective test	A test is proposed at the end of the course, of an eminently practical nature, in which the criteria and skills acquired are reflected. The exercises for the evaluation will be applications of cases in which the answer must be expressed, mainly, in a graphic way. No partial evaluations are proposed, although systems may be established that allow the release of part of the matter.  If the student follows the continuous evaluation it will not be necessary to perform the test.

Personalized attention	
Methodologies	Description
ICT practicals	It will be developed in person in the classroom and in the office tutorials. It will also be done in a non-contact way through the Moodle platform and through email.
Mixed objective/subjective test	Also, throughout the course the teacher will be available to the student during tutorial hours to clarify any doubts that may arise. It is possible to arrange an appointment at another time through the teacher's email. Both in the internships through ICT and in the service-learning activity, students will have personalized and group tutorials to monitor their work. For students with academic dispensation will be developed in person at the office tutorials and may arrange an appointment at another time through the teacher's email.



Assessment			
Methodologies	Competencies / Results	Description	Qualification
Laboratory practice	A5 B1 B2 B4 B5 B6 C1 C2 C5 C6	Descriptive geometry + industrial drawing + Tests In the modality of continuous evaluation several works and tests related to the topics of the program will be carried out	20
ICT practicals	A5 B1 B2 B4 B5 B6 C1 C5 C6	Practices with autocad. Continuous evaluation and supervised jobs.	7
Mixed objective/subjective test	A5 B1 B2 B4 B5 B6 C1 C2 C5 C6	The test will evaluate the acquisition of criteria, which is derived from an adequate assimilation of the acquired knowledge, as well as the attainment of the necessary skill for a correct graphic representation. His character will be eminently practical. The level of execution required will be the same as in the work carried out during the course. The student who with the continuous assessment modality has demonstrated that he has an adequate base will be exempt from this part.	30
Aprendizaxe servizo	A5 B1 B2 B4 B5 B6 C1 C2 C5 C6	As mentioned in the planning section the activity "service-learning" and the activity "Practices through ICT" are exclusive, so students will choose between doing one or another activity, so that the grade corresponding will be the sum of the assigned to each activity, that is, 14% of the final grade.	7
Problem solving	B1 B2 B4 B5 B6 C1 C2 C5 C6	Descriptive geometry + industrial drawing + Tests In the modality of continuous evaluation several works and tests related to the topics of the program will be carried out.	36

Assessment comments
<p>1st call: the student who does not follow the continuous evaluation may do an objective test with a 100% grade.</p> <p>2nd call: the objective test will have a 100% rating.</p> <p>Students with academic emption are exempt from continuous evaluation. On the first and second chance, they must do one test with a 100% rating.</p>

Sources of information	
<b>Basic</b>	<ul style="list-style-type: none"> <li>- AENOR (2000). Dibujo técnico. Normas básicas. Madrid. AENOR</li> <li>- Chevalier, A. (2009). Dibujo industrial. Madrid : Limusa</li> <li>- Rodríguez de Abajo , F.J.; Álvarez Bengoa, V (2003). Dibujo industrial. San Sebastián. Donostiarra</li> <li>- Molero Vera, J. (2013). AutoCAD 2013: guía rápida. Barcelona : Inforbooks</li> <li>- Montañó La Cruz, F. (2015). AutoCAD 2015. Madrid: Anaya Multimedia</li> <li>- Saldaña Albillos, Marcelino. (1992). Dibujo técnico: 60 ejercicios resueltos (típicos del 1er curso). Madrid :ETSII, Sección de Publicaciones</li> <li>- Gomis Martí, José María. (1993). Ejercicios de dibujo técnico &amp;quot;curvas y superficies&amp;quot;. Valencia : Universidad Politécnica, Servicio de Publicaciones, D.L.</li> <li>- Defez García, Beatriz. (2010). Ejercicios de planos acotados en ingeniería. Valencia : Editorial de la UPV</li> <li>- Cobos Gutiérrez, C. (2003). Ejercicios de representación gráfica en ingeniería. Madrid : Tébar</li> <li>- Jiménez, I.; Calavera, C. (2011). Sistema Diédrico. Madrid: Paraninfo S.A.</li> </ul>
<b>Complementary</b>	<ul style="list-style-type: none"> <li>- Leiceaga, J. (1994). Normas básicas de dibujo técnico. Madrid. AENOR</li> <li>- González Vázquez, A.; Izquierdo Asensi, F.; Navarro de Zuvillaga, J. y Placencia Valero, J. (1983). Dibujo Técnico. Madrid, Anaya</li> <li>- Rodríguez de Abajo, F.J. (1994). Curso de Dibujo Geométrico y de Croquización. San Sebastián. Donostiarra</li> </ul> <p>Además de los textos que se indican, se proporcionan direcciones de páginas Web, elaboradas por otros docentes, que contienen material docente de utilidad, y son de acceso libre</p>



## Recommendations

Subjects that it is recommended to have taken before

Subjects that are recommended to be taken simultaneously

Subjects that continue the syllabus

## Other comments

In this subject, together with the acquisition of basic knowledge that allow to act with criteria, it is essential the personal exercise. This can not be replaced, nor the time needed to acquire the skill can be shortened. Therefore it is necessary to respect the time programmed for this activity. In fact, the number of hours indicated is the minimum that is considered essential. Given the importance of order and continuity in work, the teacher can be consulted on the approach and distribution of available time. Even though what is indicated below corresponds to the criteria of behaviour and attitude towards the issues raised by the professors in charge of this teaching during all the years in which we have taught these courses, by legal imperative we are obliged to specify specifically, the following: "To help achieve a sustained immediate environment and meet the objective of action number 5: " Healthy and environmental and social teaching and research "of the" Green Campus Ferrol Action Plan ":

- The delivery of the documentary works that are made in this matter:
- Will be requested in virtual format and / or computer support
- It will be done through Moodle, in digital format without the need to print them
- If it is necessary to make them on paper:

- Plastics will not be used
- Double-sided prints will be made.
- Recycled paper will be used.
- Printing of drafts will be avoided.

Further: A sustainable use of resources and the prevention of negative impacts on the natural environment must be made. The importance of ethical principles related to the values of sustainability in personal and professional behaviours must be taken into account. Gender perspective is incorporated into the teaching of this subject (non-sexist language will be used, bibliography of authors of both sexes will be used, intervention in class of students will be encouraged ...).

Work will be done to identify and modify prejudices and sexist attitudes, and the environment will be influenced to modify them and promote values of respect and equality. Discrimination situations must be detected and actions and measures will be proposed to correct them.



(\*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.