Teaching Guide					
Identifying Data					2021/22
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	https://campusvirtual.udc.es/moodle/				
General description	The subject of graphic expression has a theoretical-practical nature and with it it is intended to ensure that the student: - Develop the ability to see, imagine, interpret and solve problems using a graphic language. - know the regulations and terminology of graphic expression in naval engineering. - Acquire skill in handling a CAD system (autocad).				
Contingency plan	1. Modifications to the contents No changes will be made 2. Methodologies *Teaching methodologies that are maintained Practices through ICT (compute in the evaluation) *Teaching methodologies that are modified Master session, Laboratory practices (compute in the evaluation) Problem solving (compute in the evaluation) will be done synchronously, through TEAMS and Mixed test (to be performed synchronously, in person or through TEAMS depending on the epidemiological situation related to the coronavirus). 3. Mechanisms for personalized attention to students - E-mail: According to student needs and according to the published tutorial schedule. - Moodle: According to student needs and according to the published tutorial schedule. - Teams: According to students' needs and according to the published tutorial schedule. 4. Modifications in the evaluation *Evaluation observations: Evaluation methodologies and their weighting are maintained, except for their presence only if the epidemiological situation related to the coronavirus requires it. 5. Modifications to the bibliography or webgraphy No changes are made.				

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 B2 B4 B5 B6	C1 C2 C5 C6

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 and industry representation. 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. DIHEDRAL SYSTEM	4.1 Point and line 4.2 Planes and belonging between straight point and plane 4.3 Intersection, parallelism and perpendicularity 4.4 Tilting, turning and shifting 4.5 Distances and angles

5. APPLICATIONS OF ENGINEERING	5.1 Drawing in Mechanical Engineering 5.1.1 Mechanical sets. Representation of mechanical assemblies. Quartering. Plans and definition of each piece. Standardized pieces. Explosion sets 5.2 Connection elements: 5.2.1 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 5.2.2 Fixed connections: Welding. Types. Representation 5.3 Springs: Types: compression, traction, torsion. Flat springs. Representation. Dimension 5.4 Bearings: Sliding and rolling bearings. Elements of a bearing. Classification. Representation. Dimension. Standardization. Lubrication. Obturation. Fixings 5.5 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

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
Laboratory practice	A5 B1 B2 B4 B5 B6 C1 C2 C5 C6	16	24	40
Problem solving	B1 B2 B4 B5 B6 C1 C2 C5 C6	19	19	38
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.
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.

Personalized attention	
Methodologies	**Description**
ICT practicals Mixed objective/subjective test	It will be carried out face-to-face in the classroom and in the office tutorials. It will also be carried out in a non face-to-face manner through the virtual campus and by e-mail. In addition, throughout the course the teaching staff will be available to students during tutorial hours to clarify any doubts that may arise. It is possible to make an appointment at other times via the teaching staff's e-mail address. In ITC work placements, students will have personalised tutorials and group tutorials to monitor their work. For students with academic dispensation, this will be carried out in person in the office tutorials and an appointment can be arranged at other times via the teaching staff's e-mail address.

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.	14
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
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

1st call: continuous assessment will be followed. In order to pass the subject, students must participate in the classroom in the guided monitoring of all the proposed activities. Students who do not follow the continuous assessment may opt for a mixed test that will have a grade of 100%. 2nd call: the mixed test will have a 100% grade. Early sitting (December): the exam will be graded 100%. For students with academic dispensation and part-time students, the tests will be the same as those established for the rest of the students. In the second and early opportunity in December they will have to take a mixed test with a 100% grade. "The fraudulent completion of the tests or assessment activities shall be governed by article 14.4.which reads as follows:? Na realización de traballos, o plaxio e a utilización de material non orixinal, incluído aquel obtido a través da internet, sen indicación expresa da súa procedencia e, se é o caso, o permiso do seu autor/a, poderá ser considerada causa de cualificación de suspenso na actividade. Todo iso sen prexuízo das responsabilidades disciplinarias ás que puidese haber lugar tras o correspondente procedemento "

Sources of information	
Basic	- AENOR (2000). Dibujo técnico. Normas básicas. Madrid. AENOR - Chevalier, A. (2009). Dibujo industrial. Madrid : Limusa - Rodríguez de Abajo , F.J.; Álvarez Bengoa, V (2003). Dibujo industrial. San Sebastián. Donostiarra - Molero Vera, J. (2013). AutoCAD 2013: guía rápida. Barcelona : Inforbooks - Montaño La Cruz, F. (2015). AutoCAD 2015. Madrid: Anaya Multimedia - Saldaña Albillos, Marcelino. (1992). Dibujo técnico: 60 ejercicios resueltos (típicos del 1er curso). Madrid :ETSII, Sección de Publicaciones - Gomis Martí, José María. (1993). Ejercicios de dibujo técnico "curvas y superficies". Valencia : Universidad Politécnica, Servicio de Publicaciones, D.L. - Defez García, Beatriz. (2010). Ejercicios de planos acotados en ingenieria. Valencia : Editorial de la UPV - Cobos Gutiérrez, C. (2003). Ejercicios de representación gráfica en ingeniería. Madrid : Tébar - Jiménez, I.; Calavera, C. (2011). Sistema Diédrico. Madrid: Paraninfo S.A.
Complementary	- Leiceaga, J. (1994). Normas básicas de dibujo técnico. Madrid. AENOR - González Vázquez, A.; Izquierdo Asensi, F.; Navarro de Zuvillaga, J. y Placencia Valero, J. (1983). Dibujo Técnico. Madrid, Anaya - Rodríguez de Abajo, F.J. (1994). Curso de Dibujo Geométrico y de Croquización. San Sebastián. Donostiarra 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

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 correspondsto the criteria of behaviour and attitude towards the issues raised by theprofessors in charge of this teaching during all the years in which we havetaught these courses, by legal imperative we are obliged to specifyspecifically, the following: "To help achieve a sustained immediateenvironment and meet the objective of action number 5:" Healthy andenvironmental and social teaching and research "of the" Green CampusFerrol Action Plan ": Thedelivery of the documentary works that are made in this matter:? It will be done through virtual campus, 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 bemade. - Recycled paper will be used. - Printing of drafts will beavoided.Further: ? A sustainable use of resources and theprevention of negative impacts on the natural environment must be made. ? The importance of ethical principles relatedto the values ??of sustainability in personal and professional behaviours mustbe taken into   account. ? Genderperspective is incorporated into the teaching of this subject (non-sexistlanguage 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 modifyprejudices and sexist attitudes, and the environment will be influenced tomodify them and   promote values ??of respect and equality. ? Discrimination situations must bedetected and actions and measures will be proposed to correct them.? The full integration of students who, for physical, sensory, psychological or socio-cultural reasons, have difficulties in gaining adequate,   equal and beneficial access to university life will be facilitated.