



## Teaching Guide

Identifying Data					2017/18
Subject (*)	Engineering drawing	Code	730G05003		
Study programme	Grao en Enxeñaría Naval e Oceánica				
Descriptors					
Cycle	Period	Year	Type	Credits	
Graduate	1st four-month period	First	FB	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	E-mail	ana.alvarez1@udc.es		
Web	<a href="https://campusvirtual.udc.es/moodle/">https://campusvirtual.udc.es/moodle/</a>				
General description	<p>A asignatura de expresión gráfica ten un carácter teórico-práctico e con ela preténdese conseguir que o alumno:</p> <ul style="list-style-type: none"> <li>- desenvolva a capacidade de ver, imaxinar, interpretar e resolver problemas utilizando unha linguaxe gráfico.</li> <li>- coñeza a normativa e terminoloxía propia da expresión gráfica na ingeniería naval.</li> <li>- adquira destreza no manexo dun sistema CAD (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
A29	Knowledge of the processes of ship building
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
B3	That the students have the ability to bring together and to interpret relevant data (normally in its area of study) to emit judgments that include a reflection on relevant subjects of social, scientific or ethical kind
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.
C3	Understanding the importance of the enterprising culture and knowing the means within reach of the enterprising people.
C4	Recognizing critically the knowledge, the technology and the available information to solve the problems that they must face.
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.
C7	Capacidade de traballar nun ámbito multilingüe e multidisciplinar.

## Learning outcomes

Learning outcomes	Study programme competences / results



Entender e coñecer os principios fundamentais que rexen as construcións xeométricas.	A5 A29	B1 B2 B3 B4 B5 B6	C1 C2 C3 C4 C5 C6 C7
Adquirir destreza na croquización que permita de modo rápido e sinxelo plasmar ideas e á súa vez sexa canle de comunicación destas ideas.	A5 A29	B1 B2 B3 B4 B5 B6	C1 C2 C3 C4 C5 C6 C7
Entender e coñecer os principios fundamentais que rexen os sistemas de representación para interpretar e representar debuxos de Enxeñaría Naval.	A5 A29	B1 B2 B3 B4 B5 B6	C1 C2 C3 C4 C5 C6 C7
Desenvolver a capacidade espacial para poder crear, analizar, ver e traballar mentalmente con formas xeométricas.	A5 A29	B1 B2 B3 B4 B5 B6	C1 C2 C3 C4 C5 C6 C7
Coñecer e aplicar os principios de representación gráfica e normas de debuxo en Enxeñaría Naval	A5 A29	B1 B2 B3 B4 B5 B6	C1 C2 C3 C4 C5 C6 C7
Ser capaz de coñecer, comprender e utilizar programas de deseño asistido por ordenador para representar debuxos de Enxeñaría Naval. (Autocad)	A5 A29	B1 B2 B3 B4 B5 B6	C1 C2 C3 C4 C5 C6 C7

Contents	
Topic	Sub-topic
Los bloques o temas siguientes desarrollan los contenidos establecidos en la ficha de la Memoria de Verificación, que son:	Técnicas de desarrollo de visión espacial. Geometría métrica y descriptiva. Sistemas de representación gráfica. Introducción a la normalización. Dibujo asistido por ordenador.



1. TEMARIO DA MATERIA	<p>1.1 Obxectivos</p> <p>1.2 Concepto da materia</p> <p>1.3 Exposición da metodoloxía</p> <p>1.4 Exposición do programa</p> <p>1.5 Instrumentos de debuxo</p>
2. TÉCNICAS DE EXPRESIÓN GRÁFICA BÁSICAS	<p>2.1 Revisión de Xeometría métrica e xeometría proxectiva</p> <p>2.2 Xeometría descritiva</p>
3. TÉCNICAS DE REPRESENTACIÓN. NORMALIZACIÓN	<p>3.1 Presentación de planos</p> <p>3.2 Presentación de los dibujos</p> <p>3.3 Croquización</p> <p>3.4 Vistas ortogonales</p> <p>3.5 Vistas normalizadas</p> <p>3.6 Cortes y secciones</p> <p>3.7 Acotación</p> <p>3.8 Tolerancias dimensionales</p> <p>3.9 Presentaciones gráficas</p>
4. APLICACIÓNS DA ENXEÑARÍA	<p>4.1 Dibujo en la Ingeniería Mecánica</p> <p>4.1.1 Conjuntos mecánicos. Representación de conjuntos mecánicos. Despieces. Planos y definición de cada pieza. Piezas normalizadas. Conjuntos explosionados</p> <p>4.2 Elementos de unión:</p> <p>4.2.1 Uniones desmontables: Uniones roscadas: Terminología. Formas de los perfiles de rosca. Simbología y representación. Acotación. Agujeros roscados. Tornillería: tipos, representación. Tuercas. Sistemas de fijación. Uniones enchavetadas: Tipos. Representación y acotación</p> <p>4.2.2 Uniones fijas: Soldadura. Tipos. Representación</p> <p>4.3 Muelles: Tipos: de compresión, de tracción, de torsión. Muelles planos. Representación. Acotación</p> <p>4.4 Rodamientos: Soportes de deslizamiento y de rodadura. Elementos de un rodamiento. Clasificación. Representación. Acotación. Normalización. Lubricación. Obturación. Fijaciones</p> <p>4.5 Engranajes: Utilización. Representación. Acotación.</p>
5. TRAZADO DE DEBUXOS TÉCNICOS POR ORDENADOR	<p>5.1 Introducción ao software</p> <p>5.2 Sistema de coordenadas</p> <p>5.3 Estudio de ordénelas de debuxo, modificación e visualización.</p> <p>5.4 Representación de pezas</p>
6. ELEMENTOS DA XEOMETRÍA ESPACIAL	<p>6.1 Estudio de curvas</p> <p>6.2 Estudio de superficies</p>

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A29 A5 B1 B2 B3 B4 B5 B6 C1 C2 C3 C4 C5 C6 C7	20	20	40
ICT practicals	A5 A29 B1 B2 B3 B4 B5 B6 C1 C2 C3 C4 C5 C6 C7	20	29.8	49.8



Laboratory practice	A5 A29 B1 B2 B3 B4 B5 B6 C1 C2 C3 C4 C5 C6 C7	0.1	0	0.1
Supervised projects	A5 A29 B1 B2 B3 B4 B5 B6 C1 C2 C3 C4 C5 C6 C7	0.1	0	0.1
Problem solving	A29 B1 B2 B3 B4 B5 B6 C1 C2 C3 C4 C5 C6 C7	20	30	50
Objective test	A29 A5 B1 B2 B3 B4 B5 B6 C1 C2 C3 C4 C5 C6 C7	2	4	6
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	Due to the redistribution of teaching groups approved by the UDC for the Degree of Naval and Oceanic Engineering in the course 2017/2018 this methodology will not be applied.
Supervised projects	Due to the redistribution of teaching groups approved by the UDC for the Degree of Naval and Oceanic Engineering in the course 2017/2018 this methodology will not be applied.
Problem solving	They will propose a set of exercises that will be delivered weekly
Objective test	An end-of-course test, of eminently practical nature, is proposed, in which the criterion and skill acquired are reflected. The exercises for the evaluation will be applications of cases in which the answer must be expressed, mainly, graphically. Partial evaluations are not 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 carry out the objective test.

Personalized attention	
Methodologies	Description
ICT practicals Objective test	It will be developed in person in the classroom and in the tutorials of dispatch. It will also be done on a non-face-to-face basis through the Moodle platform and via e-mail.  Also, throughout the course and especially before the completion of the objective test the teacher will be available to the student during the hours of tutoring to clarify any questions that may arise. It is possible to arrange an appointment on another schedule through the teacher's email.

## Assessment



Methodologies	Competencies / Results	Description	Qualification
ICT practicals	A5 A29 B1 B2 B3 B4 B5 B6 C1 C2 C3 C4 C5 C6 C7	Prácticas con autocad. Evaluación continua y trabajos tutelados	14
Objective test	A29 A5 B1 B2 B3 B4 B5 B6 C1 C2 C3 C4 C5 C6 C7	The objective test will evaluate the acquisition of criteria, which is derived from an adequate assimilation of the acquired knowledge, as well as the achievement of the necessary skill for a correct graphic representation. Its character will be eminently practical. It will have an estimated duration of four hours. The level of execution required will be the same as in the work carried out during the course  The student who with the continuous evaluation modality has demonstrated that he / she has an adequate basis will not be obliged to perform this part.	30
Problem solving	A29 B1 B2 B3 B4 B5 B6 C1 C2 C3 C4 C5 C6 C7	Descriptive Geometry + Industrial Drawing + Testing  In order to consolidate the knowledge acquired in descriptive geometry and industrial drawing, tests will be carried out, the result of which will be computed in the evaluation.  In the mode of continuous evaluation will be carried out various works and tests related to the themes of the program.	56

#### Assessment comments

O alumno que non siga a avaliación continua poderá facer unha proba obxectiva cunha cualificación 100%.

Na convocatoria de xullo a proba obxectiva terá unha cualificación do 100%.

#### 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

&lt;P&gt; 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. &lt;/ P&gt;

(\*)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.