Teaching Guide				
Identifying Data				2022/23
Subject (*)	Expresión Gráfica		Code	770G02005
Study programme	Grao en Enxeñaría Eléctrica			
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 Industrial			
Coordinador	Arce Fariña, María Elena	E-mail	elena.arce@udc.es	
Lecturers	Arce Fariña, María Elena Fernández Ibáñez, María Isabel	E-mail	elena.arce@udc.es isabel.fibanez@udc.es	
Web				
General description	The aim of this subject is to train students in the field of Graphic Expression, in order to enable them to handle and interpret the most commonly used representation systems in the industrial field, to introduce them to the knowledge of the forms, generation and properties of the most frequent geometric entities, with an emphasis on the acquisition of spatial vision, to teach them the technological aspects that affect the field of Graphic Expression in Engineering and to initiate them in the knowledge and application of Standardisation. The structure and development of the subject enables students to be able to use traditional techniques as well as new tools and technologies.			

Study programme competences / results	
Code	Study programme competences / results
A9	Capacidade de visión espacial e coñecemento das técnicas de representación gráfica, tanto por métodos tradicionais de xeometría métrica e xeometría descritiva como mediante as aplicacións de deseño asistido por ordenador.
B1	Capacidade de resolver problemas con iniciativa, toma de decisións, creatividade e razoamento crítico.
B4	Capacidade de traballar e aprender de forma autónoma e con iniciativa.
B5	Capacidade para empregar as técnicas, habilidades e ferramentas da enxeñaría necesarias para a práctica desta.
B6	Capacidade de usar adecuadamente os recursos de información e aplicar as tecnoloxías da información e as comunicacións na enxeñaría.
B10	CB3 - Que los estudiantes tengan la capacidad de reunir e interpretar datos relevantes (normalmente dentro de su área de estudio) para emitir juicios que incluyan una reflexión sobre temas relevantes de índole social, científica o ética.
C3	Utilizar as ferramentas básicas das tecnoloxías da información e as comunicacións (TIC) necesarias para o exercicio da súa profesión e para a aprendizaxe ao longo da súa vida.

Learning outcomes			
Learning outcomes	Study programme competences / results		
To solve graphical problems that may arise in engineering.	A9	B1 B4 B5 B6 B10	C3
To develop skills and abilities that allow to express with precision, clarity and objectivity graphic solutions.	A9	B1 B4 B5 B6 B10	C3

To acquire the capacity of abstraction in order to be able to view an object from different positions in space.	A9	B1 B4 B5 B6 B10	C3

Contents	
Topic	**Sub-topic**
Spatial vision development techniques. Metric and descriptive geometry. Graphic representation systems.	- Introduction to development techniques and spatial vision. - Metric and descriptive geometry. - Graphic representation systems. - Sketching.
Introduction to standardization.	- Technical drawing and standardization. - Fundamentals of technical drawing (representation, views, cuts and sections, others). - Dimensioning. - Standard elements and assemblies. - Tolerance systems. - Symbology. - Scales and measurement.
Computer aided drafting.	- AutoCAD 2D practical activities. - AutoCAD 3D practical activities. - Plotting in AutoCAD practical activities. - Inventor practical activities.

Planning				
Methodologies / tests	**Competencies / Results**	**Teaching hours (in-person & virtual)**	**Student?s personal work hours**	**Total hours**
Guest lecture / keynote speech	A9 B1 B4 B5 B6 B10 C3	25	37.5	62.5
Mixed objective/subjective test	A9 B1 B4 B5 B6 B10 C3	4	16	20
Laboratory practice	A9 B1 B4 B5 B6 B10 C3	30	36	66
Personalized attention		1.5	0	1.5
(*)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	The subject will be taught in theoretical-practical modules of 1 hour. Prior to the day on which the subject will be taught, a list of the necessary prior knowledge and a summary of the concepts on which work will be done will be indicated, providing the corresponding bibliographic information. Each subject will begin with the teacher's exposition, who will help the student to extract the most relevant concepts, marking the pursued objectives. The essential theoretical aspects will be introduced to support the practical contents, which should prevail. Students and teachers will interact in an orderly way, proposing questions, making clarifications and exposing topics, works, concepts, or principles in a dynamic way.
Mixed objective/subjective test	There will be a final test that will cover all the contents of the course, both theoretical and practical, and may include multiple-choice tests, reasoning questions, problem solving and development of practical cases.

Laboratory practice	Practical activities will be carried out in a computer laboratory that includes the use of CAD software for the generation of drawings, assemblies and models. In the last weeks of the term, a final design and modelling practice (project) will be carried out in a group. The project will have a Service-Learning (SL) approach. SL is a method of linking learning with social engagement. That is, learning by doing service to the community. The objectives of the project are aligned with the following SDGs (Sustainable Development Goals and targets): - Goal 4. Quality Education. Target 4.4 - Goal 9. Industry, innovation and infrastructure. Targets 9.5 and 9.b - Goal 10. Reducing inequalities. Target 10.2 - Goal 12. Responsible production and consumption. Target 12.1 - Goal 13. Climate action. Target 13.3

Personalized attention	
Methodologies	**Description**
Laboratory practice Guest lecture / keynote speech	In the field of tutorial action, there are two types of actions: academic tutoring and personalized tutoring. In the first case, the students will have at their disposal hours of tutorials in which they can consult any doubt related to the contents, organization and planning of the course, with the development of the practices, etc. In the personalized tutorials, each student, individually, will be able to discuss with the professor any problem that is preventing him/her from following the course properly, in order to find some kind of solution between both of them. By combining both types of tutorial action, the aim is to compensate for the different learning rhythms through attention to diversity. The teachers of the subject will personally attend to the doubts and queries of the students, both in person, according to the schedule that will be published on the web page of the center, and through telematic means (e-mail, Moodle, etc.) under the modality of previous appointment.

Assessment			
Methodologies	**Competencies / Results**	**Description**	**Qualification**
Laboratory practice	A9 B1 B4 B5 B6 B10 C3	Exercises carried out in the computer classroom and final practice (project). The final practice (project), carried out in a group, will have a weight of 15%. The computer-aided design practical exercises will have a weight of 25%.	40
Mixed objective/subjective test	A9 B1 B4 B5 B6 B10 C3	The test will be of a practical nature and will consist of the resolution of a determined number of exercises and questions, which must cover a wide range of concepts. Attendance and participation in class will be assessed (exercises and tests carried out in the different sessions). Attendance and participation in class will have a weight of 5%, which will be computed together with the mixed test.	60

Assessment comments

In order to pass the course it will be mandatory:
Attendance at a minimum of 80% of the practical sessions. For these purposes, absences duly motivated by health issues will not be taken into account.Only 15% of absences from practical sessions without providing the corresponding justification will be considered.The laboratory practices represent 40% of the grade for the subject, and evaluate the contents related to computer-aided design. In the second opportunity, the Laboratory practices grade may be retained, as long as a grade equal to or higher than 5 points out of 10 has been obtained. The grade for the Laboratory practices will be calculated according to the following formula: (Laboratory practices grade * 0.25 + Project grade * 0.15) / 0.4.
The final evaluation of the student in the second opportunity will be based on the sum of the score given to the following parts:
Second chance mark= 0.6 * mixed test + 0.4 * practical test (computer-aided design). The mixed test will cover the totality of the contents of the subject.
In the case of second or successive enrollment, any parts passed in previous courses will not be retained, and the student must take them and pass them.
Students with recognition of part-time dedication and academic dispensation of exemption from attendance will communicate their situation to the lecturers of the subject at the beginning of the academic year, as established in the "Regulations governing the system of dedication to study of undergraduate students at the UDC" (Art.3.b and 4.5) and the "Rules for assessment, review and complaint of qualifications of undergraduate and master's degree studies" (Art. 3 and 8b).
ETHICAL COMMITMENT: Students are expected to behave ethically. Plagiarism in the performance of any of the evaluation activities will directly imply the qualification of failure "0" in the subject, in the corresponding opportunity.

Sources of information	
Basic	- Félez, J., Martínez,M.L. (2002). Dibujo Industrial.. Madrid: Síntesis - AENOR (2009). Dibujo Técnico. Madrid: AENOR - Clérigo Pérez (2001). Geometría Descriptiva.. León: Asociación de Investigación - Leiceaga Baltar, X.A. (1994). Normas básicas de dibujo técnico. Madrid: AENOR - Apilluelo, J.M., Ibáñez, P., Ubieto, P. (2005). Dibujo industrial. Conjuntos y despieces. Madrid: Paraninfo - Company, P. (2007). Dibujo industrial. Castelló de la Plana: Universitat Jaume I
Complementary	- Badiola de Miguel, A., Gutierrez Pellón, F.J. ((1998)). Dibujo: Ejercicios resueltos de selectividad.. San Sebastián. Donostiarra - González Monsalve, M., Palencia Cortés, J. ((1992)). Trazado Geométrico.. Utrera Grafitres. Sevilla.

Recommendations
Subjects that it is recommended to have taken before
Subjects that are recommended to be taken simultaneously
Subjects that continue the syllabus
Technical Office/770G01035 BIM and Intelligent Buildings/770G01053
Other comments
There are no prerequisites to take the course, although it is required that the student has a knowledge of technical drawing and geometry fundamentals at the level required in high school. It would also be advisable for the student to have a computer with Internet access and the appropriate computer applications.

(*)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.