Teaching Guide				
Identifying Data				2016/17
Subject (*)	Xeometría Descritiva		Code	670G01004
Study programme	Grao en Arquitectura Técnica			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	1st four-month period	First	FB	6
Language	Spanish			
Teaching method	Face-to-face			
Prerequisites				
Department	Tecnoloxía e Ciencia da Representación Gráfica			
Coordinador	Fernández Álvarez, Ángel José	E-mail	angel.fernandez.alvarez@udc.es	
Lecturers	Diaz Alonso, Jose Antonio Fernández Álvarez, Ángel José	E-mail	jose.diaza@udc.es angel.fernandez.alvarez@udc.es	
Web	euat.udc.es			
General description	Descriptive Geometry aims geometric rationalization of space issues. In the academic field, this is the unit that serves as a base for other specialized graphics disciplines such as Architectural Graphic Expression, Topography and Technical Projects and the use of Computer Aided Design and Computer Graphics. In the professional field, being able to read and understand construction plans is a basic skill in order to execute the work properly. This implies a knowledge of of representation methodology, whose base is the Descriptive Geometry. In the field of writing technical projects, Descriptive Geometry provides the academic training of the necessary spatial vision for the creation of the three dimensional final solution. Through plans and sketches, this course provides the theoretical foundation basics of the different representation systems. This, as well as providing students with the capability to develop their creativity and imagination, are the reasons why this course is an essential pillar in the Degree in Engineering Building. Furthermore, the contribution to professional practice is clear, in terms of representation, resolution and restitution of any space or 3D-element in the field of construction.			

Study programme competences / results	
Code	Study programme competences / results
A2	Adquirir os coñecementos fundamentais sobre os sistemas e aplicacións informáticas específicos e xerais utilizados no ámbito da edificación.
A6	Coñecer e aplicar os distintos sistemas de representación así como as técnicas e procedementos de expresión gráfica aplicados á edificación e ás construcións arquitectónicas.
B1	Capacidade de análise e síntese.
B4	Coñecementos de informática relativos ao ámbito de estudo.
B8	Capacidade para traballar nun equipo de carácter interdisciplinario.
B27	Capacidade de comunicación a través da palabra e da imaxe.
C1	Expresarse correctamente, tanto de forma oral coma escrita, nas linguas oficiais da comunidade autónoma.
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.
C4	Desenvolverse para o exercicio dunha cidadanía aberta, culta, crítica, comprometida, democrática e solidaria, capaz de analizar a realidade, diagnosticar problemas, formular e implantar solucións baseadas no coñecemento e orientadas ao ben común.
C5	Entender a importancia da cultura emprendedora e coñecer os medios ao alcance das persoas emprendedoras.
C6	Valorar criticamente o coñecemento, a tecnoloxía e a información dispoñible para resolver os problemas cos que deben enfrontarse.
C7	Asumir como profesional e cidadán a importancia da aprendizaxe ao longo da vida.
C8	Valorar a importancia que ten a investigación, a innovación e o desenvolvemento tecnolóxico no avance socioeconómico e cultural da sociedade.

Learning outcomes

Learning outcomes	Study programme competences / results		
Understanding the geometry as a graphic model able to establish spatial relationships that allow understanding, description and control of construction and architectural forms.	A2 A6	B1 B4 B8 B27	C1 C3 C4 C5 C6 C7 C8
Knowing and applying graphical representations used in building and architecture through different systems, procedures and techniques.	A2 A6	B1 B4 B8 B27	C1 C3 C4 C5 C6 C7 C8
Identifying and understanding spatial relationships and the connection between the real sensible space and geometric space represented.	A6	B1 B4 B8 B27	C1 C3 C4 C5 C6 C7 C8
Knowing the theoretical foundations of the different systems of graphic representation by applying them in building and architecture.	A2 A6	B1 B4 B8 B27	C1 C3 C4 C5 C6 C7 C8
Knowing the main bodies and geometric surfaces in constructive and architectural applications, both in terms of mathematical concept as analysis and graphical representation in major systems.	A2 A6	B1 B4 B8 B27	C1 C3 C4 C5 C6 C7 C8
Developing the ability known as "spatial imagination" so the student can "think space" (three-dimensional), an object represented in the plane (two dimensions), as well as being able to represent in the plane what has been previously imagined in space.	A2 A6	B1 B4 B8 B27	C1 C3 C4 C5 C6 C7 C8

Knowing the complements of plane, spatial or projective geometry in general, necessary for the theoretical development of the course.	A2 A6	B1 B4 B8 B27	C1 C3 C4 C5 C6 C7 C8
Knowing the terminology, fundamental concepts, conventions and theoretical principles that define the elements of Representation Systems in Building.	A6	B1 B4 B8 B27	C1 C3 C4 C5 C6 C7 C8
Knowing and applying methods and paths of Representation Systems used in Building and Architecture.	A2 A6	B1 B4 B8 B27	C1 C3 C4 C5 C6 C7 C8
Developing habits of clarity, simplicity and precision and the ability of understanding, analysing and synthesising knowledge and application of methods and paths of representation systems.	A2 A6	B1 B4 B8 B27	C1 C3 C4 C5 C6 C7 C8
Learning to evaluate the solution of chosen paths using logical, coherent and technical criteria.	A2 A6	B1 B4 B8 B27	C1 C3 C4 C5 C6 C7 C8
Applying the methods and layouts of each of the studied Representation systems to the resolution of practical exercises.	A2 A6	B1 B4 B8 B27	C1 C3 C4 C5 C6 C7 C8
Representing the primary geometric shapes in any position in space.	A2 A6	B1 B4 B8 B27	C1 C3 C4 C5 C6 C7 C8

Solving positional problems of intersections, parallelism, perpendicularity and metrical problems of distances and angles determination between various geometric elements.	A6	B1 B4 B8 B27	C1 C3 C4 C5 C6 C7 C8
Representing simple geometric shapes in different systems with special emphasis on the representation of elements and architectural, constructive or in any builgin applications.	A6	B1 B4 B8 B27	C1 C3 C4 C5 C6 C7 C8
Knowing the general principles of the Shadow Theory as geometric rationalization of the luminous phenomenon in the different systems of representation of architectural application.	A2 A6	B1 B4 B8 B27	C1 C3 C4 C5 C6 C7 C8
Applying the figured planes system (topographic projection) to graphic resolution of roofs, to the representation of the terrain and the resolution of topographies modified in the execution of earthworks and roads.	A2 A6	B1 B4 B8 B27	C1 C3 C4 C5 C6 C7 C8
Assessing the graphical representation in aspects of communication and reflection.	A2 A6	B1 B4 B8 B27	C1 C3 C4 C5 C6 C7 C8

Contents	
Topic	**Sub-topic**
Thematic Block I. DIHEDRAL REPRESENTATION SYSTEM: FUNDAMENTALS AND POSITIONAL PROBLEMS	Lesson 1. Introduction. Basics. Lesson 2. Fundamentals. Representation of point, line and plane. Lesson 3. Spatial basic geometric relations. Parallelism. Lesson 4. Intersections. Lesson 5. Perpendicularity

Thematic Block II DIHEDRAL REPRESENTATION SYSTEM: GRAPHICS METHODS AND METRIC PROBLEMS.	Lesson 6. Geometric Procedures (I): Change of planes of projection. Lesson 7. Geometric Procedures (II): Rotations. Lesson 8. Geometric Procedures (III): Plans' Abatment. Lesson 9. Distances. Lesson 10. Angles.
Thematic Block III DIHEDRAL REPRESENTATION SYSTEM: ANALYSIS AND REPRESENTATION OF SURFACES	Lesson 11. Representation of surfaces. Lesson 12. Regular polyhedra. Lesson 13. Radiating polyhedra: Pyramid and Prism. Lesson 14. Radiated Quadrics: Cone and Cylinder. Lesson 15. Representation of the Sphere.
Thematic Block IV. DIHEDRAL REPRESENTATION SYSTEM: INTERSECTION OF SURFACES AND THEORY OF SHADOWS	Lesson 16. Intersection of surfaces. Methods. Lesson 17. Architectural applications: vaults, domes and lunettes. Lesson 18. Shadow Theory applied to Diedral System.
Thematic Block V.- FIGURED PLANS SYSTEM (TOPOGRAPHICAL PROJECTION): FUNDAMENTALS	Lesson 19. Introduction. Fundamentals. Lesson 20. Representation of the plane. Lesson 21. Positional Problems: parallelism, perpendicularity, intersections. Lesson 22. Abatments. Metrical problems: distances and angles. Lesson 23. Representation of geometric surfaces.
Thematic Block VI.- FIGURED PLANS SYSTEM (TOPOGRAPHICAL PROJECTION): APPLICATIONS IN BUILDING. ROOFS. LAND REPRESENTATION.	Lesson 24. Graphical resolution of roofs. Lesson 25. Topographical and interventions surfaces on the ground: earthworks and road layout.

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A2 A6 B1 B4 B8 B27 C1 C3 C4 C5 C6 C7 C8	27	42	69
Problem solving	A2 A6 B1 B4 B8 B27 C1 C3 C4 C5 C6 C7 C8	27	45	72
Objective test	A2 A6 B1 B4 B8 B27 C1 C3 C4 C5 C6 C7 C8	6	0	6
Personalized attention		3	0	3

(*)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 and graphic presentation in the classroom supplemented by the optional use of audiovisual media and ICT as well as the introduction of questions to students in order to transmit knowledge and facilitate learning.
Problem solving	Students will face situation where they will solve a particular problem with multiple solutions using the knowledge we have worked in the lecture. Within this dynamic, interactive personalized attention will take place.
Objective test	Graphic test for the assessment of learning, whose distinctive feature is the ability to determine whether the answers are correct or not. It is a measuring element that allows to assess knowledge, abilities, skills, performance, attitudes, intelligence, etc. It is applicable for both diagnostic, formative and summative evaluation.

Personalized attention	
Methodologies	**Description**
Problem solving	The needs and questions of the students related to the study or similar topics with the course will be adressed, while giving them orientation, support and motivation throughout the learning process.

Assessment			
Methodologies	**Competencies / Results**	**Description**	**Qualification**
Objective test	A2 A6 B1 B4 B8 B27 C1 C3 C4 C5 C6 C7 C8	Graphic test for the assessment of learning, whose distinctive feature is the ability to determine whether the answers are correct or not. It is a measuring element that allows to assess knowledge, abilities, skills, performance, attitudes, intelligence, etc. It is applicable for both diagnostic, formative and summative evaluation.	100

Assessment comments
There will be three objective exams during the semester.These will contain similar exercises as the ones that are solved in class and will be used to maintain a continuous evaluation process. The first test will cover Blocks I and II (Diedral System), the second, Blocks III and IV (Diedral System) and the third V and VI (Figured Plans System-Topographical Representation). It is considered mandatory to attend both lectures and interactive and the students must meet certain minimum requirements for assistance to be able to do the tests. This assistance is established as a minimum of 80%. The objective three tests will be graded out of 10 points each. The final overall grade of these tests are determined by adding the scores of each one and divided by three. The minimun grade must be 5 in each test so the average can be done. In addition to attendance, participation and completion of supervised projects, tests may be required in order to properly assess the degree of assimilation of conceptual and procedural course content. The student will pass the course once the global average score is equal or greater than 5. Students who do not achieve the minimum score of 5 points will have to attend the oficial final exam for the course that will be held at the end of the semester (First Chance) according to the official calendar approved by School Board. It will keep the passed test objective scoring but for complete systems. This condition is linked to the current academic year and therefore these passing grades will be saved for the First Chance exam (January) and Second Chance exam (July) but only during the current course and not for the following academic year. The grading of the final exam and of the different tests , as well as the possible revision of the grade, will be done by the course teacher responsible for the group to which the student belongs. IMPORTANT NOTE. So that students can get a passing score on the final exams, it is mandatory to score in both exercises for the dihedral system and Topographical Projection (Planos Acotados System). A score of 0 in any of them would lead to the failing grade in the course.

Sources of information

Basic	- BARDÉS FAURA, Lluis; GIMÉNEZ RIBERA, José Manuel (1999). Geometría Descriptiva. Sistema Dièdric. Exercicis. Edicións UPC - BARDÉS FAURA, Lluis; GIMÉNEZ RIBERA, José Manuel (2001). Geometría Descriptiva. Plans acotats i perspectives. Exercicis. Edicións UPC - COBOS GUTIERREZ, Carlos (2001). Geometría para Ingenieros. Tomo I: Representación Diédrica. Tébar - COBOS GUTIERREZ, Carlos (2009). Geometría para Ingenieros. Tomo II: Sistema de Planos Acotados. Tébar - FERNÁNDEZ SAN ELÍAS, Gaspar (1999). Fundamentos del Sistema Diédrico. Universidad de León - FERNÁNDEZ SAN ELÍAS, Gaspar (2004). Sistema Acotado. Problemas y Aplicaciones. - FRANCO TABOADA, José Antonio (2011). Geometría Descriptiva para la representación arquitectónica. Vol. 1. Fundamentos. Santiago de Compostela: Andavira Editora - GENTIL BALDRICH, José María (1998). Método y aplicación de representación acotada y del terreno. - IZQUIERDO ASENSI, Fernando (Varias ediciones). Geometría Descriptiva. - MARTÍN MOREJÓN, Luís (1978-80). Geometría Descriptiva. Sistema Diédrico (2 vol). - RODRÍGUEZ DE ABAJO, F. J. (Varias ediciones). Geometría Descriptiva. Tomo I. Sistema Diédrico. - RODRÍGUEZ DE ABAJO, F. J. (Varias ediciones). Geometría Descriptiva. Tomo II. Sistema de Planos Acotados. - SÁNCHEZ GALLEGO, Juan Antonio (1997). Geometría Descriptiva. Sistemas de Proyección Cilíndrica. Edicións UPC - TAIBO FERNÁNDEZ, Ángel (2010). Geometría Descriptiva y sus aplicaciones. Tomo I. Punto, Recta y Plano.. Tébar - TAIBO FERNÁNDEZ, Ángel (2007). Geometría descriptiva y sus aplicaciones. Tomo II. Curvas y Superficies. Tébar
Complementary	- IZQUIERDO ASENSI, F. (). Construcciones Geométricas. - IZQUIERDO ASENSI, F. (). Fórmulas y Propiedades Geométricas. - IZQUIERDO ASENSI, F. (Varias Ediciones). Geometría Descriptiva Superior y Aplicada.

Recommendations
Subjects that it is recommended to have taken before
Subjects that are recommended to be taken simultaneously
Expresión Gráfica Arquitectónica I/670G01008
Subjects that continue the syllabus
Xeometría da Representación/670G01018
Other comments
By addressing the basics of graphical representation, it is recommended to study the subject of Descriptive Geometry prior or simultaneous to other subjects in the area of Architectural Graphic Expression.Prerequisites. It is recommended to have studied the subject of Technical Drawing in high school or equivalent training as it is considered that the student must be accustomed to using conventional instruments of graphical representation. They also should know the most basic aspects of the different systems of representation, especially Diedric System and basic flat geometry layouts (polygons, conic sections, elementary trigonometry, etc.).