Teaching Guide				
Identifying Data				2020/21
Subject (*)	Systems 2		Code	630G02039
Study programme	Grao en Estudos de Arquitectura			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	2nd four-month period	Fourth	Obligatory	6
Language	SpanishGalicianEnglish			
Teaching method	Face-to-face			
Prerequisites				
Department	Construcións e Estruturas Arquitectónicas, Civís e Aeronáuticas			
Coordinador	Dios Vieitez, Maria Jesus	E-mail	maria.jesus.dios@udc.es	
Lecturers	Dios Vieitez, Maria Jesus Muñoz Fontenla, Carlos M. Sánchez Iglesias, Santiago Santos VÁzquez, Angeles	E-mail	maria.jesus.dios@udc.es c.fontenla@udc.es santiago.sanchez@udc.es angeles.santos@udc.es	
Web	www.udc.es/etsa			
General description	The objectives of this subject will be to know and describe building services as components of a global system of the building and its relationship with urban networks. Moreover, the subject will be focused on understanding technical principles and functional schemes which it is based building services so that the student could reach the ability to analyze critically the requeriments and demands of building services; description of the installations components as well as to meet the requirements of technical codes.			
Contingency plan	1. Modifications to the contents 2. Methodologies *Teaching methodologies that are maintained *Teaching methodologies that are modified 3. Mechanisms for personalized attention to students 4. Modifications in the evaluation *Evaluation observations: 5. Modifications to the bibliography or webgraphy			

Study programme competences	
Code	Study programme competences
A16	"Ability to conceive, calculate, design, integrate in buildings and urban units and execute supply systems, water treatment and sewage, heating and air conditioning (T) "
A17	Ability to apply technical and construction standards and regulations
A20	Ability to assess the construction works
A22	Ability to project building and urban transformers and power supply systems, audiovisual communication, acoustic conditioning and artificial lighting
A23	Ability to maintain systems
A26	Adequate knowledge of the physical and chemical characteristics, production procedures, pathology and use of building materials
A29	Knowledge of administrative, management and professional procedures
A31	Knowledge of methods of measurement, assessment and expert´s report

A63	Development, presentation and public review before a university jury of an original academic work individually elaborated and linked to any of the subjects previously studied
B1	Students have demonstrated knowledge and understanding in a field of study that is based on the general secondary education, and is usually at a level which, although it is supported by advanced textbooks, includes some aspects that imply knowledge of the forefront of their field of study
B2	Students can apply their knowledge to their work or vocation in a professional way and have competences that can be displayed by means of elaborating and sustaining arguments and solving problems in their field of study
B3	Students have the ability to gather and interpret relevant data (usually within their field of study) to inform judgements that include reflection on relevant social, scientific or ethical issues
B4	Students can communicate information, ideas, problems and solutions to both specialist and non-specialist public
B5	Students have developed those learning skills necessary to undertake further studies with a high level of autonomy
B10	Knowing the physical problems, various technologies and function of buildings so as to provide them with internal conditions of comfort and protection against the climate factors in the context of sustainable development
B12	Understanding the relationship between people and buildings and between these and their environment, and the need to relate buildings and the spaces between them according to the needs and human scale
C1	Adequate oral and written expression in the official languages.
C3	Using ICT in working contexts and lifelong learning.
C4	Exercising an open, educated, critical, committed, democratic and caring citizenship, being able to analyse facts, diagnose problems, formulate and implement solutions based on knowledge and solutions for the common good
C5	Understanding the importance of entrepreneurial culture and the useful means for enterprising people.
C6	Critically evaluate the knowledge, technology and information available to solve the problems they must face
C7	Assuming as professionals and citizens the importance of learning throughout life
C8	Valuing the importance of research, innovation and technological development for the socioeconomic and cultural progress of society.

Learning outcomes			
Learning outcomes	Study programme competences		
"Ability to conceive, calculate, design, integrate in buildings and urban units and execute supply systems, water treatment and sewage, heating and air conditioning (T) "	A16		
Ability to apply technical and construction standards and regulations	A17		
Ability to assess the construction works	A20		
Ability to project building and urban transformers and power supply systems, audiovisual communication, acoustic conditioning and artificial lighting	A22		
Ability to maintain systems	A23		
Adequate knowledge of the physical and chemical characteristics, production procedures, pathology and use of building materials	A26		
Knowledge of administrative, management and professional procedures	A29		
Knowledge of methods of measurement, assessment and expert´s report	A31		
Development, presentation and public review before a university jury of an original academic work individually elaborated and linked to any of the subjects previously studied	A63		
Students have demonstrated knowledge and understanding in a field of study that is based on the general secondary education, and is usually at a level which, although it is supported by advanced textbooks, includes some aspects that imply knowledge of the forefront of their field of study		B1	
Students can apply their knowledge to their work or vocation in a professional way and have competences that can be displayed by means of elaborating and sustaining arguments and solving problems in their field of study		B2	
Students have the ability to gather and interpret relevant data (usually within their field of study) to inform judgements that include reflection on relevant social, scientific or ethical issues		B3	
Students can communicate information, ideas, problems and solutions to both specialist and non-specialist public		B4	
Students have developed those learning skills necessary to undertake further studies with a high level of autonomy		B5	

Knowing the physical problems, various technologies and function of buildings so as to provide them with internal conditions of comfort and protection against the climate factors in the context of sustainable development		B10	
Understanding the relationship between people and buildings and between these and their environment, and the need to relate buildings and the spaces between them according to the needs and human scale		B12	
Expressing themselves correctly, both orally and in writing, in the official languages of the autonomous region			C1
Using basic tools of information technology and communications (ICT) necessary for the exercise of the profession and for lifelong learning			C3
Exercising an open, educated, critical, committed, democratic and caring citizenship, being able to analyse facts, diagnose problems, formulate and implement solutions based on knowledge and solutions for the common good			C4
Understanding the importance of entrepreneurship and knowing the means available to the enterpreneur			C5
Critically evaluate the knowledge, technology and information available to solve the problems they must face			C6
Assuming as professionals and citizens the importance of learning throughout life			C7
Assessing the importance of research, innovation and technological development in the socio-economic advance of society and culture			C8

Contents	
Topic	**Sub-topic**
-Building Services in Architecture. -Project management for hydraulic systems (hot and cold water supply, waste water), air conditioning, electric conditioning, lighting, communication and fire safety. -Air conditioning installations: ventilation, heating, refrigeration. -Transport and special installations. -Safety installations. -Acoustic conditioning.	-Building Services in Architecture. -Project management for hydraulic systems (hot and cold water supply, waste water), air conditioning, electric conditioning, lighting, communication and fire safety. -Air conditioning installations: ventilation, heating, refrigeration. --Transport and special installations. -Safety installations. -Acoustic conditioning.

Planning				
Methodologies / tests	**Competencies**	**Ordinary class hours**	**Student?s personal work hours**	**Total hours**
Supervised projects	A16 A17 A20 A22 A23 A26 A29 A31 A63 B1 B2 B3 B4 B5 B10 B12 C1 C3 C4 C5 C6 C7 C8	14	30	44
Objective test	A16 A17 A20 A22 A23 A26 A29 A31 A63 B1 B2 B3 B4 B5 B10 B12 C1 C3	2	43	45
Workshop	A16 A17 A20 A22 A23 A26 A29 A31 A63 B1 B2 B3 B4 B5 B10 B12 C1 C3 C4 C5 C6 C7 C8	15	15	30
Guest lecture / keynote speech	A16 A17 A20 A22 A23 A29 A31 A63 B1 B3 B4 B5 B10 B12 C1 C3 C4 C5 C6 C7 C8	30	0	30
Personalized attention		1	0	1
(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.				

Methodologies	
Methodologies	**Description**
Supervised projects	A work related of the subject program will be realized. The objective is that the student defines the facilities that are studied in an architectural Project. These works or practicums are conceived like a natural extension of the theoretical classes. Works are contemplated from a double perspective: as an opportunity to broaden and deepen the theoretical concepts acquired and as an exercise of applying these same concepts to specific cases, in which the student can experience the value of the learned criteria. Final practicum will be delivering at the end of the semester. Practicum will be carried out individually or in small groups. Attendance to practical classes is compulsory. Supervised projects will be developed with the same project within the subject and Workshop 8 (1,5 ECTS practicum outside the workshop and 1,5 ECTS in the workshop 8)
Objective test	Continuous assessment method will be used taking into account: -attendance to classes, taking into account active attitude of the student in them. -preparation and presentation of practicum -exam of the subject At the end of the semester on the date indicated by Head of Studies will take the examination (objective test) of the subject.
Workshop	Supervised projects will be developed the same project as in systems 2 within workshop 8 (1,5 ECTS practicum outside the workshop and 1,5 ECTS in the workshop 8)
Guest lecture / keynote speech	Oral sessions/lectures consist of the exposition by the lecturer of different contents of the subject. In them, students will be able to interact with the lecturer by raising doubts or questions. Lecturer, if appropriate, can prepare teaching material that will constitute a guide to help the study of the subject, not exempt from the bibliography and, that does not suppose the minimum content of the subject. Attendance to theoretical classes is compulsory

Personalized attention	
Methodologies	**Description**
Supervised projects Workshop	Doubts raised by the student about theory and practical work will be answered.

Assessment			
Methodologies	**Competencies**	**Description**	**Qualification**
Guest lecture / keynote speech	A16 A17 A20 A22 A23 A29 A31 A63 B1 B3 B4 B5 B10 B12 C1 C3 C4 C5 C6 C7 C8	Attendance to theoretical and practical classes is essential and prior condition to qualify the exam and practicum (minimum 80%).	0

Supervised projects	A16 A17 A20 A22 A23 A26 A29 A31 A63 B1 B2 B3 B4 B5 B10 B12 C1 C3 C4 C5 C6 C7 C8	Final grade requires continuous attendance (minimum 80%) and have passed both the theoretical part (minimum 5 points) and the supervised project/practicum (minimum 5 points) of the subject. The final grade of the subject will be made up with the final exam (60%) and final grade of practicum (40%). In relation to the practicums, assessment will take into account the clarity, precision, conceptual rigor, appropriateness, environmental sensitivity, degree of problem solving and the integration of the facilities in the building. Assessment of this practicum is an integral part for the workshop assessment. This is because practicum is done in the same project (total assessment 40%). Due to the fact that a disgreggation is required for technical computer requirements it is marked 20%+20% but assessment could not be divided by parts (40%). The work done inside the workshop and the work done outside of the workshop could not assess separately. Here you can show this only for technical computer requirements.	20
Objective test	A16 A17 A20 A22 A23 A26 A29 A31 A63 B1 B2 B3 B4 B5 B10 B12 C1 C3	It will consist of an examination at the end of the semester concerning theoretical and practical contents of the subject.	60
Workshop	A16 A17 A20 A22 A23 A26 A29 A31 A63 B1 B2 B3 B4 B5 B10 B12 C1 C3 C4 C5 C6 C7 C8	Supervised projects will be developed in the same project that it is used in systems 2 within workshop 8 (1,5 ECTS of practicum outside the workshop and 1,5 ECTS inside the worshop 8). Assessment of the total part of the practicum will be 40%, it is mandatory that you pass the theoretical part of the exam. You have to pass the practical part in order to weight the final mark/grade (60% theory and 40% of practicum) Assessment of this practicum is an integral part for the workshop assessment. This is because practicum is done in the same project (total assessment 40%). Due to the fact that a disgreggation is required for technical computer requirements it is marked 20%+20% but assessment could not be divided by parts (40%). The work done inside the workshop and the work done outside of the workshop could not assess separately. Here you can show this only for technical computer requirements.	20

Assessment comments
By the same procedure, assessment in successive enrollments will be carried out. Assessment conditions are the same for the opportunity of June and July. Teaching to mobility students could be adapted, if the teacher considers it appropriate, to pedagogical conditions, special tests, as well as tests and evaluation exams. No passing partial qualifications (theory or practice, except for the July opportunity of the same academic year in which the partial qualification (theory or practice) will be saved. In order to pass the subject it is essential to pass the objective test, supervised project (practicum) and a minimum compulsory attendance to theoretical and practical classes. In accordance with the memory of the degree at the end of each semester, an Assessment Board of the workshop will be summoned. This board will analyzed the global outcomes and authorised to settle about punctual situations of its subject. Students who do not pass after these two opprtunities of each call, will have to attend the following year in projects subject. In this case, students, moreover the projects, they will develop the works related to those subjects that they did not pass. Students with projects subject passed and failing other subjects embedded within the workshop, they will have to present, at the following calls and with the corrections requested, works in the workshop that they took part. In accordance with the study curriculum, all the subjects belonging to the workshop must be attended at the same time in order to be assessed, at least in the first enrrolment. The non-compliance of this formal requirement will be marked as not submitted at the subject.

Sources of information	
Basic	Material docente elaborado, en su caso, por el profesor, que se dispondrá en la plataforma Moodle; este material constituye una guía de ayuda al estudio de la materia, no excluyente de la bibliografía y no supone contenido mínimo de la misma. ARANDA USON, A., 2010. Eficiencia energética en instalaciones y equipamiento de edificios. Zaragoza: Prensas Universitarias de Zaragoza. ARIZMENDI BARNES L.J.2004. Cálculo y normativa básica en los edificios. Pamplona:EUNSA ASOCIACION TECNICA ESPANOLA DE CLIMATIZACION Y REFRIGERACION (MADRID), 2010. Fundamentos de climatización: para instaladores e ingenieros recién titulados. Madrid: ATECYR. ATECYR (2006) , DTIE 2.02 Calidad del aire interior. Madrid: ATECYR CARRIER AIR CONDITIONING COMPANY, 2008. Manual de aire acondicionado: handbook of air conditioning system design. Barcelona: Marcombo. CEJUDO LOPEZ, J.M., 2009. Sistemas de climatización. Madrid: ATECYR. CODIGO TECNICO DE LA EDIFICACION, HE2,HE3,HE4,HE5,HS3, HS4,HS5,HR COLEGIO OFICIAL DE INGENIEROS DE TELECOMUNICACIÓN, 2011. Normativa de las infraestructuras comunes de telecomunicaciones (I.C.T.). Madrid: COIT. DOCAMPO REY P. y GARCIA CASAL W., 2006. Guía Práctica de energía solar. Santiago: Ediciones CAT-COAG Documentación Técnica de ventilación de ALDER VENTICONTROL Documentación Técnica de ventilación de SOLER & PALAU DURÁN MONTEJANO, S., 2008. Cálculos de instalaciones de fontanería, gas y calefacción. Madrid: Tornapunta. DOCAMPO REY P. y GARCIA CASAL W.,2006. Guía Práctica de energía solar. Santiago: Ediciones CAT-COAG ENTWISTLE, J., 2012. El detalle en el diseño contemporáneo de iluminación. Barcelona: Blume. FEIJO MUÑOZ J., 1991. Instalaciones eléctricas en Arquitectura. Valladolid: COA Valladolid FEIJO MUÑOZ J., 2001 .Instalaciones de climatización en Arquitectura, Valladolid, Universidad de Valladolid FEIJO MUÑOZ J.,1994. Instalaciones de Iluminación en Arquitectura. Valladolid: Universidad de ValladolidFERNANDEZ SALGADO, J. M ., 2011. Eficiencia energética en los edificios. Madrid: A. Madrid Vicente. ENTWISTLE, J., 2012. El detalle en el diseño contemporáneo de iluminación. Barcelona: Blume. FUMADO J. L .,2004. Las instalaciones de servicios en los edificios. Santiago: Ediciones CAT-COAG FUMADO J. L. y PARICIO I., (1999).El tendido de las instalaciones. Barcelona: Bisagra GAGO, A. y FRAILE, J., 2012. Iluminación con tecnología LED. Madrid: Paraninfo. GARCIA PÉREZ, J., 2007. Esquemas hidráulicos de calefacción, A.C.S. y colectores solares térmicos: 215 esquemas de principio para calefacción, A.C.S. y colectores solares térmicos, con sus criterios de diseño. Madrid: El Instalador. GARCIA VALCARCE A. y DIOS VIEITEZ M. J., 1997. Evacuación de aguas de los edificios. Pamplona: T6 GAS NATURAL, s. d. Manual de instalaciones receptoras de gas natural, Barcelona: Gas Natural IDAE ,2005. Guía Técnica del aprovechamiento de la luz natural en edificios .Madrid: IDAE INNES, M., 2012. Iluminación en interiorismo. Barcelona: Blume. Instrucción MI IP 003 Instalaciones de depósitos de gasóleo JUTGLAR, L. y MIRANDA, A.L., 2009. 1001 preguntas sobre el RITE. Barcelona: Marcombo. MARTIN SANCHEZ, F., 2008. Manual de instalaciones de calefacción por agua caliente: adaptado al Código Técnico de la Edificación y al nuevo RITE. Madrid: AMV. MARTÍN SÁNCHEZ, F., 2007. Nuevo manual de instalaciones de fontanería, saneamiento y calefacción: adaptado al Código Técnico de la Edificación. Madrid: A. Madrid Vicente. MIRANDA, A.L., 2007. Técnicas de climatización. México D.F: Marcombo. MATIAS MASESTRO I.R., y FERNANDEZ VALDIVIELSO,2005.Telecomunicaciones en la construcción. Pamplona: Universidad Pública de Navarra OSRAM, 2010. Sistemas de gestión de la iluminación (SGI). Torrejón de Ardoz: Osram. MARTÍN SÁNCHEZ, F., 2007. Nuevo manual de instalaciones de fontanería, saneamiento y calefacción: adaptado al Código Técnico de la Edificación. Madrid: A. Madrid Vicente. Real decreto sobre eficiencia energética en edificios (2013) Reglamento de instalaciones térmicas en edificios RITE 2007-2013 Reglamento Electrotécnico de baja Tensión e Instrucciones Complementarias Reglamento de instalaciones de proteccion contra el incedio (RIPCI) ,2010
Complementary	

Recommendations
Subjects that it is recommended to have taken before
Facilities 1/630G01030

Subjects that are recommended to be taken simultaneously
Projects 8/630G01036 Construction 6/630G01037 Structures 5/630G01038
Subjects that continue the syllabus
Systems 3/630G02050
Other comments

(*)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.