



| Teaching Guide | | | | |
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| Identifying Data | | | | 2022/23 |
| 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, Cívís e Aeronáuticas | | | |
| Coordinador | Dios Vieitez, Maria Jesus | E-mail | maria.jesus.dios@udc.es | |
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| 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. | | | |

| Study programme competences / results | |
|---------------------------------------|---|
| Code | Study programme competences / results |
| 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. |



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| 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 / results | | |
| "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 entrepreneur | | | 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 |



| 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 / Results | Teaching hours (in-person & virtual) | 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 | <p>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.</p> <p>Attendance to practical classes is compulsory.</p> <p>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)</p> |



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| Objective test | <p>Continuous assessment method will be used taking into account:</p> <ul style="list-style-type: none"> -attendance to classes, taking into account active attitude of the student in them. -preparation and presentation of practicum -exam of the subject <p>At the end of the semester on the date indicated by Head of Studies will take the examination (objective test) of the subject.</p> |
| 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 | <p>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.</p> <p>Attendance to theoretical classes is compulsory</p> |

Personalized attention

| Methodologies | Description |
|---------------------------------|--|
| Supervised projects Workshop | Doubts raised by the student about theory and practical work will be answered. |

Assessment

| Methodologies | Competencies / Results | 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 | <p>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.</p> <p>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 disgregation 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.</p> | 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 |



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| 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 workshop 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 disgregation 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 |
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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 analyze the global outcomes and authorized to settle about punctual situations of its subject. Students who do not pass after these two opportunities 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 enrollment. The non-compliance of this formal requirement will be marked as not submitted at the subject.

Sources of information



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| <p>Basic</p> | <p>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: Pressas 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 Valladolid FERNANDEZ 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&nbsp;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&nbsp;Complementarias Reglamento de instalaciones de proteccion contra el&nbsp;incendio (RIPCI) ,2010 &nbsp;</p> |
| <p>Complementary</p> | |

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.