



## Teaching Guide

Identifying Data					2020/21
<b>Subject (*)</b>	Smart cities. Emerging technologies for sustainable cities	<b>Code</b>	670526014		
<b>Study programme</b>	Mestrado Universitario en Edificación Sostible (Plan 2017)				
Descriptors					
<b>Cycle</b>	<b>Period</b>	<b>Year</b>	<b>Type</b>	<b>Credits</b>	
Official Master's Degree	2nd four-month period	First	Obligatory	3	
<b>Language</b>	Spanish				
<b>Teaching method</b>	Hybrid				
<b>Prerequisites</b>					
<b>Department</b>	Expresión Gráfica Arquitectónica				
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<b>General description</b>	<p>The emerging concept of Smart City encompasses multidisciplinary solutions that seek to improve the management of urban services using information technologies to ensure social and environmental sustainability.</p> <p>With a transversal vision in this matter, we seek to introduce the fundamental concepts of a Smart City, the concept of Internet of Things (IoT), the Big Data phenomenon, Cloud Computing technology and the visualization, analysis and processing of information in relation to the principles of sustainability, the new urban economy and the relationship with the citizen.</p>				



Contingency plan

NON-ATTENDANCE TEACHING METHOD ACTIONS COVID-19

1. Modifications to the contents

Contents are not modified.

2. Methodologies

\*Teaching methodologies that are maintained.

The methodologies proposed in the guide will be adapted to the situation of non-attendance motivated by the health crisis of COVID-19 through the use of the institutional telematic tools of teamwork available for conducting online seminars, as well as the use of the Moodle platform (Virtual Campus) and the use of email.

\*Teaching methodologies that are modified.

The "Master Session" methodology is replaced by online seminars (Microsoft Teams) with a more flexible and dynamic format with the possibility of student participation and resolution of doubts. Expository teaching will adapt to the new exceptional situation by using the Moodle platform (Virtual Campus) and using email. The monitoring and revision of the supervised works of the subject will be carried out through some telematic teamwork platform (Teams), organizing the activity in combination with the subject's Moodle platform (Virtual Campus) and the UDC email.

The methodologies corresponding to PERSONALIZED ATTENTION (tutoring) and the EVALUATION procedures are modified to adapt them to NON ATTENDANT context.

3. Mechanisms for personalized attention to students.

The personalized tutorial attention on informative or specific questions will preferably be carried out through the UDC institutional email, although the institutional telematic tools available for teamwork, such as Microsoft Teams, may also be used.

All the information on the subject in this non-classroom teaching period (activities, deliveries, evaluation, tutorial attention, ...) will be done through the subject's Moodle platform (Virtual Campus), so frequent consultation is recommended. by the students.

Tools: Moodle platform, UDC Email, Microsoft Teams.

Temporalization: The tutoring schedule of the face-to-face teaching period would be maintained with the flexibility marked by the exceptional nature of the situation caused by the health crisis of COVID-19.

Personalized attention will be carried out using the telematic tool that is considered most appropriate depending on the case.

4. Modifications in the evaluation.

Methodology: Tutored works. Rating weight: 100%.

Description: Development of works on any matter related to the contents of the subject.

\*Evaluation observations:

EVALUATION PROCEDURE NON-PRESENTIAL COVID-19

In order to be qualified, the timely delivery of all the proposed works will be mandatory.

The deliveries of the works will be done electronically through the Moodle platform of the subject (Virtual Campus).

In these deliveries, the corresponding indications of the professor responsible for the subject must be followed MANDATORILY.

VERY IMPORTANT: All the information on the evaluation procedures will be communicated through the Moodle platform of the subject (virtual campus), so frequent consultation of the subject is recommended.

Any query, clarification or incident related to the evaluation procedure should be brought to the attention of the teachers responsible for the subject as soon as possible. In all the deliveries and tests, the indications of the teachers responsible for the subject must be followed MANDATORILY.



5. Modifications to the bibliography or webgraphy.

The basic and complementary sources of information maintained in the initial teaching guide are maintained since the students have at their disposal on the Moodle platform of the subject (virtual campus) and on the web (online resources) all the necessary and sufficient documentation to the adequate study of the contents of the subject.



Study programme competences / results	
Code	Study programme competences / results
A14	CE14 Comprender e analizar os cambios producidos na sociedade do coñecemento que inflúen na organización das cidades e os procesos espaciais, económicos, culturais e sociais que se derivan deles.
A15	CE15 Coñecer e comprender os cambios, retos e oportunidades que facilitan as novas solucións tecnolóxicas para unha xestión da cidade integrada e sustentable.
A16	CE16 Coñecer as tecnoloxías e ferramentas básicas para a implementación e xestión dunha smart city
B1	CB01 Posuír e comprender coñecementos que acheguen unha base ou oportunidade de ser orixinais no desenvolvemento e/ou aplicación de ideas, a miúdo nun contexto de investigación.
B2	CB02 Saber aplicar os coñecementos adquiridos e a súa capacidade de resolución de problemas en contornas novas ou pouco coñecidos dentro de contextos máis amplos (ou multidisciplinares) relacionados coa súa área de estudo.
B3	CB03 Ser capaces de integrar coñecementos e enfrontarse á complexidade de formular xuízos a partir dunha información que, sendo incompleta ou limitada, inclúa reflexións sobre as responsabilidades sociais e éticas vinculadas á aplicación dos seus coñecementos e xuízos.
B4	CB04 Saber comunicar conclusións ?e os coñecementos e razóns últimas que as sustentan? a públicos especializados e non especializados dun modo claro e sen ambigüidades.
B5	CB05 Posuír as habilidades de aprendizaxe que permitan continuar estudando dun modo que haberá de ser en gran medida autodirixido ou autónomo.
B6	CG01 Capacidade de análise e síntese.
B8	CG03 Coñecementos informáticos relativos ao ámbito do programa formativo.
B9	CG04 Capacidade de xestión da información.
B10	CG05 Resolución de problemas.
B14	CG09 Razoamento crítico.
B15	CG10 Compromiso ético.
B16	CG11 Aprendizaxe autónoma.
B18	CG13 Creatividade.
B19	CG14 Iniciativa e espírito emprendedor.
B23	CG18 Orientación a resultados.
C1	CT01 Expresarse correctamente, tanto de forma oral como escrita, nas linguas oficiais da comunidade autónoma.
C2	CT03 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.
C5	CT05 Entender a importancia da cultura emprendedora e coñecer os medios ao alcance das persoas emprendedoras.
C6	CT06 Valorar criticamente o coñecemento, a tecnoloxía e a información dispoñible para resolver os problemas cos que deben enfrontarse.
C8	CT08 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	
		AC14	BC1 BC2 BC6 BC9 BC14 BC15
			CC1 CC6 CC8



	AC15	BC1 BC3 BC4 BC5 BC6 BC9 BC16 BC19 BC23	CC1 CC2 CC5 CC6 CC8
	AC16	BC1 BC2 BC6 BC8 BC9 BC10 BC14 BC18 BC23	CC2 CC5

Contents	
Topic	Sub-topic
Topic 1. INTRODUCTION	Urban transformations in the information and knowledge society: Smart Cities.
Topic 2. EMERGING TECHNOLOGIES	Emerging technologies: from Smart Building to Smart City.
Topic 3. INTERNET OF THINGS	Internet of Things (IoT): the interaction with the information of the environment.
Topic 4. OPEN DATA / BIG DATA	Technological infrastructures for the capture, processing and analysis of information.
Topic 5. VISUALIZATION	Data visualization and information tools.

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A14 A15 A16 B4 B5 B6 B14 B15 B16 C1 C5 C6	15	24	39
ICT practicals	A16 B1 B2 B6 B8 B9 B10 B16 B23 C2 C6	6	9	15
Seminar	A14 A15 A16 B4 B5 B6 B14 B16 B18 B19 C1 C5 C6	2	3	5
Supervised projects	A14 A15 A16 B1 B2 B3 B4 B6 B9 B14 B16 C1 C6 C8	0	15	15
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
Guest lecture / keynote speech	A clase maxistral é tamén coñecida como "conferencia", "método expositivo" ou "lección maxistral". Esta última modalidade adóitase reservar a un tipo especial de lección impartida por un profesor en ocasións especiais, cun contido que supón unha elaboración orixinal e baseada no uso case exclusivo da palabra como vía de transmisión da información á audiencia.



ICT practicals	Metodoloxía que permite ao alumnado aprender de forma efectiva, a través de actividades de carácter práctico (demostracións, simulacións, etc.) a teoría dun ámbito de coñecemento, mediante a utilización das tecnoloxías da información e as comunicacións. As TIC supoñen un excelente soporte e canle para o tratamento da información e aplicación práctica de coñecementos, facilitando a aprendizaxe e o desenvolvemento de habilidades por parte do alumnado.
Seminar	Técnica de traballo en grupo que ten como finalidade o estudo intensivo dun tema. Caracterízase pola discusión, a participación, a elaboración de documentos e as conclusións ás que teñen que chegar todos os compoñentes do seminario.
Supervised projects	Metodoloxía deseñada para promover a aprendizaxe autónoma dos estudantes, baixo a tutela do profesor e en escenarios variados (académicos e profesionais). Está referida prioritariamente á aprendizaxe do "como facer as cousas". Constitúe unha opción baseada na asunción polos estudantes da responsabilidade pola súa propia aprendizaxe. Este sistema de ensino baséase en dous elementos básicos: a aprendizaxe independente dos estudantes e o seguimento desa aprendizaxe polo profesor-titor.

### Personalized attention

Methodologies	Description
ICT practicals Seminar Supervised projects Guest lecture / keynote speech	Nas entrevistas periódicas e titorías que se establezan co alumno realizaranse as aclaracións correspondentes a todos aqueles aspectos que resulten de interese para mellorar a calidade do proceso de ensino-aprendizaxe, orientarase sobre os conceptos expostos nas sesións maxistras e farase un seguimento do traballo tutelado obrigatorio.

### Assessment

Methodologies	Competencies / Results	Description	Qualification
ICT practicals	A16 B1 B2 B6 B8 B9 B10 B16 B23 C2 C6	Valorarase a participación activa e o aproveitamento do alumnado nas prácticas que se realicen sobre os contidos da materia a través de ferramentas TIC.	10
Supervised projects	A14 A15 A16 B1 B2 B3 B4 B6 B9 B14 B16 C1 C6 C8	Valorarase a adecuación dos traballos realizados polo alumno aos criterios e orientacións expostos polo profesor.	80
Guest lecture / keynote speech	A14 A15 A16 B4 B5 B6 B14 B15 B16 C1 C5 C6	Valorarase a participación activa do alumnado nas sesións maxistras.	10

### Assessment comments

In order to obtain a positive evaluation in the subject the student must attend at least 80% of the classes (lectures, workshops, seminars, ...). In order to be qualified, the delivery in time and form of all the proposed works will be mandatory. In addition to the assistance, participation and performance of supervised works, the tests considered necessary may be carried out in order to properly assess the degree of assimilation of the conceptual and procedural contents of the subject. SPECIFIC OBSERVATIONS STUDENTS ONLINE LEARNING MODE (NON-PRESENTIAL) The teaching methodologies, the learning activities and the evaluation criteria and methodologies corresponding to the students of the MUES in their modality of "on line" learning will be adapted to the specific characteristics of this type of teaching, promoting an autonomous and active learning.

### Sources of information



<p><b>Basic</b></p>	<ul style="list-style-type: none"> <li>- SIMONE NOVECK, Beth (2015). Smart Citizens, Smarter State: The Technologies of Expertise and the Future of Governing. Harvard University Press</li> <li>- TOWNSEND, Anthony M. (2013). Smart Cities: Big Data, Civic Hackers, and the Quest for a New Utopia. New York: W. W. Norton Inc.</li> <li>- de WAAL, Martijn (2014). The City as Interface: How New Media Are Changing the City. Rotterdam: NAI010 Publishers</li> <li>- PICON, Antoine (2015). Smart Cities: A Spatialised Intelligence. Wiley</li> <li>- GOLDSMITH, Stephen; CRAWFORD, Susan (2014). The Responsive City: Engaging Communities Through Data-Smart Governance. San Francisco, CA: Jossey-Bass (Wiley)</li> <li>- JACOBS, Jane (2011). Muerte y vida de las grandes ciudades. Editorial Gustavo Gili</li> <li>- MITCHELL, William J. (2001). E-topia: Vida urbana, Jim, pero no la que nosotros conocemos. Editorial Gustavo Gili</li> <li>- FERNÁNDEZ, Manu (2016). Descifrar las Smart Cities. ¿Qué queremos decir cuando hablamos de Smart Cities?. Me Gusta Escribir</li> <li>- VV.AA. (2013). SMART CITY. Hacia la gestión inteligente. Marcombo</li> <li>- BATTY, Michael (2013). The New Science of Cities. MIT Press</li> <li>- VV.AA. (2017). Smart Cities: Foundations, Principles, and Applications. Wiley</li> <li>- DEL RIVERO, Marieta (2017). Smart Cities. Una visión para el ciudadano. LID</li> <li>- FINQUELIEVICH, Susana (2016). I-Polis. Ciudades en la era de Internet. Diseño Editorial</li> </ul>
<p><b>Complementary</b></p>	

<b>Recommendations</b>	
<b>Subjects that it is recommended to have taken before</b>	
Advanced information management in building: BIM and GiS/670526006	
Advanced technologies of graphic representation in building/670526007	
Introduction to the Master thesis: methodology and research planning/670526004	
<b>Subjects that are recommended to be taken simultaneously</b>	
<b>Subjects that continue the syllabus</b>	
Master Thesis/670526027	
<b>Other comments</b>	

(\*)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.