Teaching Guide					
Identifying Data					2021/22
Subject (*)	Smart cities. Emerging technologies for sustainable cities			Code	670526014
Study programme	Mestrado Universitario en Edificación Sostible (Plan 2017)				
Descriptors					
Cycle	Period	Year		Type	Credits
Official Master's Degree	2nd four-month period	First		Obligatory	3
Language	Spanish				
Teaching method	Face-to-face				
Prerequisites					
Department	Expresión Gráfica Arquitectónica				
Coordinador	Fernández Álvarez, Ángel José		E-mail	angel.fernandez.alvarez@udc.es	
Lecturers	Fernández Álvarez, Ángel José		E-mail	angel.fernandez.alvarez@udc.es	
Web	euat.udc.es				
General description	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. 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.				

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 MANDATORYLY.
	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 MANDATORYLY.

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	
Code	**Study programme competences**
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 críticamente o coñecemento, a tecnoloxía e a información dispoñíble 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**		
Understand and analyze the changes produced in the knowledge society that influence the organization of cities and the spatial, economic, cultural and social processes that derive from them.	AC14	BC1 BC2 BC6 BC9 BC14 BC15	CC1 CC6 CC8

Know and understand the changes, challenges and opportunities that facilitate new technological solutions for a smart, integrated and sustainable city management.	AC15	BC1 BC3 BC4 BC5 BC6 BC9 BC16 BC19 BC23	CC1 CC2 CC5 CC6 CC8
Know the basic technologies for the implementation of the Smart City.	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**	**Ordinary class hours**	**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	The master class is also known as "lecture", "exposition method" or "master lesson". This last modality is usually reserved for a special type of lesson taught by a teacher on special occasions, with content that involves an original elaboration and based on the almost exclusive use of the word as a means of transmitting information to the audience.

ICT practicals	Methodology that allows students to learn effectively, through practical activities (demonstrations, simulations, etc.) the theory of a field of knowledge, through the use of information and communication technologies. ICTs are an excellent support and channel for the treatment of information and practical application of knowledge, facilitating learning and the development of skills by students.
Seminar	Group work technique that aims to intensively study a topic. It is characterized by discussion, participation, the preparation of documents and the conclusions that all the components of the seminar have to reach.
Supervised projects	Methodology designed to promote the autonomous learning of students, under the tutelage of the teacher and in varied settings (academic and professional). It refers primarily to learning "how to do things." It is an option based on the assumption by students of responsibility for their own learning. This teaching system is based on two basic elements: the independent learning of the students and the monitoring of this learning by the teacher-tutor.

Personalized attention	
Methodologies	**Description**
ICT practicals Seminar Supervised projects Guest lecture / keynote speech	In the periodic interviews and tutorials that are established with the student, the corresponding clarifications will be made to all those aspects that are of interest to improve the quality of the teaching-learning process, it will be oriented on the concepts exposed in the master sessions and a monitoring of compulsory supervised work.

Assessment			
Methodologies	**Competencies**	**Description**	**Qualification**
ICT practicals	A16 B1 B2 B6 B8 B9 B10 B16 B23 C2 C6	The active participation and use of the students in the practices that are carried out on the contents of the subject through ICT tools will be valued.	10
Supervised projects	A14 A15 A16 B1 B2 B3 B4 B6 B9 B14 B16 C1 C6 C8	The suitability of the work carried out by the student to the criteria and guidelines set by the teacher will be assessed.	80
Guest lecture / keynote speech	A14 A15 A16 B4 B5 B6 B14 B15 B16 C1 C5 C6	The active participation of the students in the lectures will be valued.	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.Students who do not turn in their work on the date indicated will be classified as NOT PRESENTED in the final evaluation of the First Chance. In no case will term extensions be established.The delivery of the work for the final evaluation in the Second Chance will be carried out in the Moodle application of the subject with the same conditions set for the delivery of the First Chance (digital copy of the final work in doc / odt and pdf formats). The date of this delivery will be communicated in advance through the Moodle platform and this last term will be non-extendable.In these deliveries, the corresponding indications of the teaching staff responsible for the subject must be followed.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.

Sources of information

Basic	- SIMONE NOVECK, Beth (2015). Smart Citizens, Smarter State: The Technologies of Expertise and the Future of Governing. Harvard University Press - TOWNSEND, Anthony M. (2013). Smart Cities: Big Data, Civic Hackers, and the Quest for a New Utopia. New York: W. W. Norton Inc. - de WAAL, Martijn (2014). The City as Interface: How New Media Are Changing the City. Rotterdam: NAi010 Publishers - PICON, Antoine (2015). Smart Cities: A Spatialised Intelligence. Wiley - GOLDSMITH, Stephen; CRAWFORD, Susan (2014). The Responsive City: Engaging Communities Through Data-Smart Governance. San Francisco, CA: Jossey-Bass (Wiley) - JACOBS, Jane (2011). Muerte y vida de las grandes ciudades. Editorial Gustavo Gili - MITCHELL, William J. (2001). E-topia: Vida urbana, Jim, pero no la que nosotros conocemos. Editorial Gustavo Gili - FERNÁNDEZ, Manu (2016). Descifrar las Smart Cities. ¿Qué queremos decir cuando hablamos de Smart Cities?. Me Gusta Escribir - VV.AA. (2013). SMART CITY. Hacía la gestión inteligente. Marcombo - BATTY, Michael (2013). The New Science of Cities. MIT Press - VV.AA. (2017). Smart Cities: Foundations, Principles, and Applications. Wiley - DEL RIVERO, Marieta (2017). Smart Cities. Una visión para el ciudadano. LID - FINQUELIEVICH, Susana (2016). I-Polis. Ciudades en la era de Internet. Diseño Editorial
Complementary	

Recommendations
Subjects that it is recommended to have taken before
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
Subjects that are recommended to be taken simultaneously
Subjects that continue the syllabus
Master Thesis/670526027
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.