Teaching Guide				
Identifying Data				2020/21
Subject (*)	Efficiency Lighting Systems		Code	770523007
Study programme	Mestrado Universitario en Eficiencia e Aproveitamento Enerxético			
Descriptors				
Cycle	Period	Year	Type	Credits
Official Master's Degree	1st four-month period	First	Optional	3
Language	SpanishGalicianEnglish			
Teaching method	Face-to-face			
Prerequisites				
Department	Enxeñaría Industrial			
Coordinador	Rivas Rodriguez, Juan Manuel	E-mail	m.rivas@udc.es	
Lecturers	Rivas Rodriguez, Juan Manuel	E-mail	m.rivas@udc.es	
Web	moodle.udc.es/			
General description	Being able to learn , use and design artificial lighting systems optimizing their energy consumption.			
Contingency plan	1. Changes in content No modification will be made to the content 2. Methodologies * Teaching methodologies that are maintained Master Session, Practices, Tutored Works, Mixed Test * Teaching methodologies that are modified 3. Mechanisms for personalized attention to students Both the master session and the practices will be carried out through the Microsoft Teams platform. Tutoring schedules are maintained through the Microsoft Teams platform and email. 4. Modifications in the evaluation The mixed test and practical tests will be carried out through the Moodle platform. * Evaluation observations: The minimum necessary to pass the subject are maintained in those methodologies that have not been modified. 5. Modifications of the bibliography or webgraphy No modifications will be made			

Study programme competences	
Code	Study programme competences
A1	Análise e aplicación de metodoloxías e normativa para unha xestión eficiente da enerxía.
A2	Análisis e implantación de medidas de ahorro y eficiencia energética en los sectores industrial, terciario y residencial.
A4	Análisis de consumos energéticos y de su costes asociados.
A12	Capacidad para la toma de decisiones en un entorno tecnológico donde los materiales se utilicen en aplicaciones de eficiencia
B1	Que los estudiantes sepan aplicar los conocimientos adquiridos y su capacidad de resolución de problemas en entornos nuevos o poco conocidos dentro de contextos más amplios (o multidisciplinares) relacionados con su área de estudio.
B2	Que los estudiantes sean capaces de integrar conocimientos y enfrentarse a la complejidad de formular juicios a partir de una información que, siendo incompleta o limitada, incluya reflexiones sobre las responsabilidades sociales y éticas vinculadas a la aplicación de sus conocimientos y juicios.
B3	Poseer y comprender conocimientos que aporten una base u oportunidad de ser originales en el desarrollo y/o aplicación de ideas, a menudo en un contexto de investigación.
B6	Buscar y seleccionar alternativas considerando las mejores soluciones posibles.

B7	Desarrollar las capacidades de análisis y síntesis; fomentar la discusión crítica, la defensa de argumentos y la toma de conclusiones.
B8	Incorporar el vocabulario propio para expresarse con precisión en una comunicación efectiva, tanto escrita como oral.
B11	Adquirir nuevos conocimientos y capacidades relacionados con el ámbito profesional del máster.
B13	Aplicar los conocimientos teóricos a la práctica
B14	Aplicar conocimientos de ciencias y tecnologías avanzadas a la práctica profesional o investigadora de la eficiencia
B16	Valorar la aplicación de tecnologías emergentes en el ámbito de la energía y el medio ambiente.
B18	Plantear y resolver problemas, interpretar un conjunto de datos y analizar los resultados obtenidos; en el ámbito de la eficiencia energética y la sostenibilidad.
C1	Adquirir la terminología y nomenclatura científico-técnica para exponer argumentos y fundamentar conclusiones.
C2	Fomentar la sensibilidad hacia temas medioambientales.
C3	Aplicar una metodología que fomente el aprendizaje y el trabajo autónomo.
C4	Desarrollar el pensamiento crítico
C5	Adquirir la capacidad para elaborar un trabajo multidisciplinar

Learning outcomes			
Learning outcomes	Study programme competences		
Known lighting technologies and their energy efficiency .	AJ2 AJ4 AJ12	BC1 BC2 BC3 BC11	CC1
Is able to design control circuits for LED lighting devices	AJ1 AJ12	BC6 BC7 BC13 BC14 BC18	CC4 CC5
Know and can handle the characteristics of LED lighting devices	AJ2 AJ12	BC1 BC2 BC13 BC14 BC16 BC18	
Knows and can interpret the quantitative parameters of lighting process.	AJ1 AJ2 AJ4	BC6 BC7 BC8 BC11	CC2 CC3 CC4
It is able to design LED lamps	AJ1	BC6 BC7 BC13 BC14 BC18	CC3 CC4

Contents	
Topic	Sub-topic
Lighting Basics	- Basic concepts - Units - Normative
Lighting Technologies	- Lamps. - Auxiliary electrical equipment . - Luminaries .

LED lighting devices	- Light-emitting semiconductor junction features. - Types of LED light. - Parameters of operation and efficiency. - Lifetime
LED control circuits	- Protections. - Power Management . - Smart lighting .
LED lamp design	- Directionality and geometry. - Reliability . - Electromagnetic compatibility (EMC).

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student?s personal work hours	Total hours
Case study	A12 B1 B2 B6 B13 B14 C1	3	0	3
Laboratory practice	A1 A4 B1 B6 B7 B13 B16 B18 C5 C4	7	27	34
Objective test	B13	2	0	2
Supervised projects	A1 A2 A4 A12 B3 B1 B2 B6 B7 B8 B11 B13 C1 C2 C3 C4 C5	2	20	22
Guest lecture / keynote speech	A2 A12 B3 B7 B8 B11 B16 C1 C2 C3 C4 C5	8	0	8
Directed discussion	A12 B3 B1 B2 B6 B7 B8 B13 B18 C1 C2 C3 C4	3	0	3
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
Case study	They will take place in the classroom. Solutions from differents brands will be analyzed.
Laboratory practice	The student will have to deliver a report. This will be graded by the teacher and represents 30 % of the total evaluation. You can do it both in person and by simulation via telematics.
Objective test	Written test which represents 40 % of the total mark
Supervised projects	They can be one or more . They represent the remaining 30 % of the grade.
Guest lecture / keynote speech	By the teacher in the classroom.
Directed discussion	The teacher may grant extra score and will be added to 100 % of the grade .

Personalized attention	
Methodologies	Description
Supervised projects Laboratory practice	It will take place in class during laboratory practices . The work will be individual and supervised by the teacher. In supervised projects will be done in the teacher's office.

Assessment			
Methodologies	Competencies	Description	**Qualification**
Objective test	B13	Final written test	40

Supervised projects	A1 A2 A4 A12 B3 B1 B2 B6 B7 B8 B11 B13 C1 C2 C3 C4 C5	One or more . They will be qualified by the teacher of the subject	30
Laboratory practice	A1 A4 B1 B6 B7 B13 B16 B18 C5 C4	At the end of each practice the student must send a report to be qualified	30

Assessment comments
You must be obtained at least 40 % of the mark in each of the parts (objective test , homework and practices) to average between them and to pass the subject .

Sources of information	
Basic	- Alfonso Gago Calderón (2012). Iluminación con tecnología LED. Paraninfo - IDAE (2001). Guía Técnica de Eficiancia Energética en Iluminación. Madrid - IDAE
Complementary	

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