UNIVERSIDADE DA CORUÑA

Teaching Guide				
Identifying Data				2020/21
Subject (*)	Emerging Manufacturing Technologies Workshop		Code	770538022
Study programme	Máster Universitario en Informática Industrial e Robótica			
Descriptors				
Cycle	Period	Year	Type	Credits
Official Master's Degree	2nd four-month period	First	Optional	3
Language	Spanish			
Teaching method	Face-to-face			
Prerequisites				
Department	Enxeñaría Naval e Industrial			
Coordinador	Tobar Vidal, María José	E-mail	maria.jose.tobar@udc.es	
Lecturers	Amado Paz, José Manuel Ramil Rego, Alberto Tobar Vidal, María José	E-mail	jose.amado.paz@udc.es alberto.ramil@udc.es maria.jose.tobar@udc.es	
Web				
General description	Introduction to the programming environment of an industrial robotic system: languages, simulation and operation. Features of its configuration and movement. Application to an additive manufacturing system by laser through direct energy deposition (Laser DED)			
Contingency plan	1. Modifications to the contents No changes 2. Methodologies *Teaching methodologies that are maintained Seminars: Through virtual institutional platform Tutored works: Tutoring through virtual institutional platform. *Teaching methodologies that are modified Laboratory practices: Programming practices limited to the offline environment / simulation 3. Mechanisms for personalized attention to students Institutional platform (mail, moodle, teams) 4. Modifications in the evaluation No attendance required. 100% of the qualification associated to supervised work. *Evaluation observations: 5. Modifications to the bibliography or webgraphy No changes.			

Study programme competences	
Code	Study programme competences
A7	CE07 - Capacidad para definir, diseñar y proyectar sistemas de producción automatizados y control avanzado de procesos
A9	CE09 - Capacidad para el uso, simulación y diseño de sistemas mecánicos empleados en entornos robóticos y/o industriales
A10	CE10 - Capacidad para el uso, simulación e implementación de tecnologías de fabricación tradicionales o emergentes empleados en sistemas robóticos y/o industriales

B2	CB7 - 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
B5	CB10 - Que los estudiantes posean las habilidades de aprendizaje que les permitan continuar estudiando de un modo que habrá de ser en gran medida autodirigido o autónomo.
B6	CG1 - Buscar y seleccionar alternativas considerando las mejores soluciones posibles
B13	CG8 - Aplicar los conocimientos teóricos a la práctica
B18	CG13 - Plantear y resolver problemas, interpretar un conjunto de datos y analizar los resultados obtenidos; en el ámbito de la informática industrial y la robótica
C1	CT01 - Adquirir la terminología y nomenclatura científico-técnica para exponer argumentos y fundamentar conclusiones
C2	CT02 - Fomentar la sensibilidad hacia temas sociales y/o medioambientales
C3	CT03 - Aplicar una metodología que fomente el aprendizaje y el trabajo autónomo

Learning outcomes			
Learning outcomes	Study programme competences		
Saber identificar y usar tecnologías emergentes de fabricación	AC7 AC9	BC2 BC5 BC6 BC13	CC1 CC2 CC3
Saber implementar aplicaciones de la informatica industrial a las tecnologias de fabricación	AC9 AC10	BC2 BC5 BC6 BC13 BC18	CC1 CC2 CC3
Saber implementar aplicaciones de robótica las tecnologias emergentes de fabricación	AC9 AC10	BC2 BC5 BC6 BC13 BC18	CC1 CC2 CC3

Contents	
Topic	Sub-topic
Identify and use emerging manufacturing technologies	-Laser material processing -Processing systems - DED Additive manufacturing (by laser directed energy deposition)
Implementation of industrial computing applications and robotics to emerging manufacturing technologies	Programming of industrial robots for manufacturing -Axis positioning systems -Robotic arms

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student?s personal work hours	Total hours
Seminar	A7 A9 B2 B5 B6 C1 C2 C3	11	16.5	27.5
Laboratory practice	A10 B2 B5 B6 B13 B18	11	16.5	27.5
Supervised projects	A10 B2 B5 B6 B13 B18	2	17	19
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**
Seminar	Keynote sessions on subject contents
Laboratory practice	Offline / online programming practices using tools and programming environments of a system with an industrial robotic arm used in manufacturing technologies
Supervised projects	Work based on the development and implementation of the suitable programming precedures for a manufacturing process example.

Personalized attention	
Methodologies	**Description**
Supervised projects Laboratory practice	The activity with the laboratory equipment and the work development will be carried out with the help and supervision of the personnel of the research teams.

Assessment			
Methodologies	**Competencies**	**Description**	**Qualification**
Seminar	A7 A9 B2 B5 B6 C1 C2 C3	Attendance to 80% of the sessions is necessary	15
Supervised projects	A10 B2 B5 B6 B13 B18	Aspects such as the scope and complexity of the work will be taken into account, as well as its originality.	70
Laboratory practice	A10 B2 B5 B6 B13 B18	Attendance to 80% of the sessions is necessary	15

Assessment comments
Partial-time students will be evaluated in the same terms as those of full-time students. Evaluation criteria in second opportunity will be the same as in first oportunity. There is not academic exemption for class attendance in this subject

Sources of information	
Basic	- Olaf Diegel, Axel Nordin, Damien Motte (2019). A Practical guide to design for additive manufacturing / . Singapur, Springer - Gebhardt, Andreas (2016). Additive manufacturing : 3D printing for prototyping and manufacturing. Munich ; Hanser Publishers - Brandt, Milan. (2016). Laser Additive Manufacturing : Materials, Design, Technologies, and Applications.. Kent : Elsevier Science, - Toyserkani, Ehsan. (2005). Laser cladding. Boca Raton : CRC Press - Miranda Colorado, Roger (2016). Cinemática y dinámica de robots manipuladores. [Barcelona] : Marcombo - Ollero Baturone, Aníbal. (2001). Robótica manipuladores y robots móviles.. Barcelona] : Marcombo - John J. Craig. (2006). Robótica. México : Prentice Hall,
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

1. The delivery of the documentary works for this subject: 1.1. Will be requested in virtual format and / or computer support. 1.2. Will be done through Moodle, in digital format avoiding the need of printing.1.3. If made on paper: -Do not use plastics. -Double sided printing will be made. -Recycled paper will be used. -The printing of drafts will be avoided.2. Sustainable use of resources and prevention of harm to the natural environment must be observed.