



Teaching Guide

Teaching Guide				
Identifying Data				2020/21
Subject (*)	Programming Fundamentals		Code	631G02561
Study programme	Grao en Tecnoloxías Mariñas			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	1st four-month period	Fourth	Optional	6
Language	SpanishGalician			
Teaching method	Hybrid			
Prerequisites				
Department	Enxeñaría de Computadores			
Coordinador	Vidal Paz, Jose	E-mail	jose.vidal.paz@udc.es	
Lecturers		E-mail		
Web	moodle.udc.es/			
General description				
Contingency plan	1. Modifications to the contents 2. Methodologies *Teaching methodologies that are maintained *Teaching methodologies that are modified 3. Mechanisms for personalized attention to students 4. Modifications in the evaluation *Evaluation observations: 5. Modifications to the bibliography or webgraphy			

Study programme competences

Code	Study programme competences
A2	CE2 - Capacidade para a dirección, organización e operación das actividades obxecto das instalacións marítimas no ámbito da súa especialidade.
A13	CE13 - Levar a cabo automatizacións de procesos e instalacións marítimas.
A14	CE14 - Avaliación cualitativa e cuantitativa de datos e resultados, así como a representación e interpretación matemáticas de resultados obtidos experimentalmente.
A15	CE15 - Manexar correctamente a información procedente da instrumentación e sintonizar controladores, no ámbito da súa especialidade.
A16	CE16 - Ensambalar e realizar tarefas básicas de mantemento e reparación de equipos informáticos. Instalar e manexar sistemas operativos e aplicacións informáticas. Instalar e realizar as tarefas básicas de xestión de redes de ordenadores, no ámbito da súa especialidade.
A17	CE17 - Modelizar situacións e resolver problemas con técnicas ou ferramentas físico-matemáticas.
A18	CE18 - Redacción e interpretación de documentación técnica.
A20	CE20 - Ser capaz de identificar, analizar e aplicar os coñecementos adquiridos nas distintas materias do Grao, a unha situación determinada formulando a solución técnica máis axeitada dende o punto de vista económico, ambiental e de seguridade.
A67	CE57 - Facer funcionar os ordenadores e redes informáticas a bordo dos buques
A69	CE59 - Manter e reparar os sistemas de control automático da máquina propulsora principal e das máquinas auxiliares
B2	CT2 - Resolver problemas de forma efectiva.
B5	CT5 - Traballar de forma colaboradora.



B8	CT8 - Versatilidade.
B9	CT9 - Capacidade para a aprendizaxe de novos métodos e teorías, que lle doten dunha gran versatilidade para adaptarse a novas situacións.
C3	C3 - 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	C5 - Entender a importancia da cultura emprendedora e coñecer os medios ao alcance das persoas emprendedoras.
C7	C7 - Asumir como profesional e cidadán a importancia da aprendizaxe ao longo da vida.
C9	CB1 - Demostrar que posúen e comprenden coñecementos na área de estudo que parte da base da educación secundaria xeneral, e que inclúe coñecementos procedentes da vangardia do seu campo de estudo
C10	CB2 - Aplicar os coñecementos no seu traballo ou vocación dunha forma profesional e poseer competencias demostrables por medio da elaboración e defensa de argumentos e resolución de problemas dentro da área dos seus estudos
C11	CB3 - Ter a capacidade de reunir e interpretar datos relevantes para emitir xuízos que inclúan unha reflexión sobre temas relevantes de índole social, científica ou ética
C12	CB4 - Poder transmitir información, ideas, problemas e solucións a un público tanto especializado como non especializado.
C13	CB5 - Ter desenvolvido aquelas habilidades de aprendizaxe necesarias para emprender estudos posteriores con un alto grao de autonomía.

Learning outcomes			
Learning outcomes		Study programme competences	
Using a structured programming language	A13 A15	B8 B9	C3
Knowing the steps to build a program and its main components	A13 A17		
Knowing the control structures of the structured programming and the differences among them	A13		
Knowing how to develop programs to solve small- and medium-size problems	A2 A13 A16 A17 A20	B2 B5 B8 B9	C3 C9 C10 C11 C13
Building correct, well-organized and documented programs	A13 A16 A17 A18 A67		C3 C11 C12
Acquiring good habits linked to programming	A18	B5 B8 B9	C3 C5 C7 C11 C12 C13
Knowing the different ways to organise data: variables, constants, arrays, structs, pointers.	A13 A14		
Ser capaz de depurar e reprogramar sistemas de control automático	A67 A69		

Contents	
Topic	Sub-topic
1. INTRODUCTION	1.1. MICROCONTROLLERS 1.2. PROGRAMMING LANGUAGE



2. TYPES AND EXPRESSIONS	2.1. DATA TYPES 2.2. OPERATORS 2.3. EXPRESSIONS
3. CONTROL FLOW	3.1. SEQUENTIAL 3.2. ALTERNATIVE 3.3. REPETITIVE
4. FUNCTIONS	4.1. RETURN VALUE 4.2. ARGUMENTS 4.3. INITIALIZATION 4.4. RECURSIVITY
5. DATA STRUCTURES	5.1. ARRAYS 5.2. POINTERS 5.3. STRUCTS
6. OBJECT ORIENTED PROGRAMMING	6.1. OBJECTS, ATRIBUTES AND METHODS 6.2. CLASSES AND INHERITANCE 6.3. POLYMORPHISM
7. LIBRARIES	7.1. SPECIFIC LIBRARIES FOR MICROCONTROLLERS
8. CONTROL POR MICROCONTROLADOR	8.1. CONTROL DO SISTEMA DE PROPULSIÓN 8.2. CONTROL DOS SISTEMAS AUXILIARES

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student?s personal work hours	Total hours
Laboratory practice	A13 A14 A15 A16 A17 A20 A67 A69 B2 B8 B9 C3	7	14	21
Supervised projects	A2 A13 A14 A15 A16 A18 A20 A67 A69 B2 B5 B8 B9 C3 C5 C7 C9 C10 C11 C12 C13	14	28	42
Guest lecture / keynote speech	A17 B9 C5 C7	21	21	42
Personalized attention		45	0	45
(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.				

Methodologies	
Methodologies	Description
Laboratory practice	A series of exercises will be proposed so that the student learns to develop simple algorithms. Thus, the student will be able to solve the problems that arise to him, using for this the control structures and basic data types of a programming language.
Supervised projects	A supervised project, related to his professional field, will be proposed. It will allow the student to integrate the knowledge acquired not only in this subject, but also in other subjects of the degree.
Guest lecture / keynote speech	The lecturer will describe the contents of each topic, relating them to the concepts previously acquired. Then he will develop the theoretical contents using slides and practical examples.

Personalized attention	
Methodologies	Description



Guest lecture / keynote speech	In the laboratory practice sessions, the students will be advised in the resolution of the proposed exercises.
Laboratory practice	Students will also be advised during the development of the supervised project that has to be carried out throughout the course.
Supervised projects	In the lectures, the professor will resolve the doubts that arise so that the student can assimilate the concepts studied and relate them correctly to those seen in previous topics.

Assessment			
Methodologies	Competencies	Description	Qualification
Laboratory practice	A13 A14 A15 A16 A17 A20 A67 A69 B2 B8 B9 C3	Resolution and submission of the laboratory exercises.	30
Supervised projects	A2 A13 A14 A15 A16 A18 A20 A67 A69 B2 B5 B8 B9 C3 C5 C7 C9 C10 C11 C12 C13	Realization, presentation and defense of the supervised project.	70

Assessment comments
The evaluation criteria present in table A-III/6 of the STCW Code, and included in the Quality Assurance System, will be taken into account when designing and carrying out the evaluation.

Sources of information	
Basic	- Antonakos, J.L. y Mansfield Jr., K.C. (2004). Programación Estructurada en C. Prentice Hall - García Carballeira, F.; Calderón Mateos, A.; Carretero Pérez, J.; Fernández Muñoz, J. y Pérez Menor, (2003). Problemas Resueltos de Programación en Lenguaje C. Thomson - Torrente Artero, O. (2016). El Mundo Genuino-Arduino. Curso Práctico de Formación. RC Libros
Complementary	- Kernighan, B.W. y Ritchie, D.M. (1991). El Lenguaje de Programación C. Prentice Hall - Stroustrup, B. (2013). The C++ Programming Language. Pearson - Banzi, M. y Shiloh, M. (2016). Introducción a Arduino. Anaya - Ganazhapa, B.O. (2016). Arduino. Guía Práctica. RC Libros

Recommendations
Subjects that it is recommended to have taken before
Regulation and Control Fundamentals/631G02257
Digital Electronics/631G02364
Power and Analogue Electronics/631G02363
Networks and Communications/631G02366
Sensors and Instrumentation/631G02369
Subjects that are recommended to be taken simultaneously
Electronic Communication Systems and Navigation Aids/631G02457
Electronic Systems for Data Acquisition/631G02562
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.