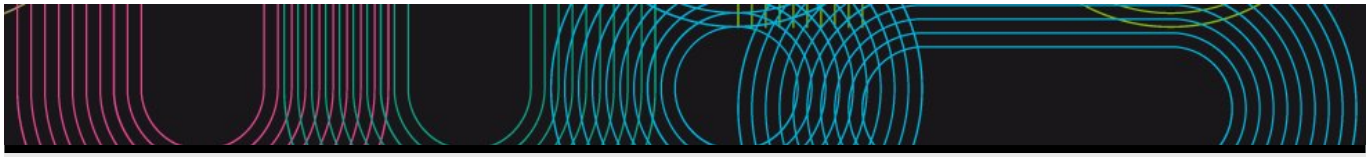

IDENTIFYING DATA				
Critical software development				
Subject	Critical software development			
Code	O07M189V01206			
Study programme	Máster Universitario en Sistemas Aéreos no Tripulados			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	1st	2nd
Teaching language	#EnglishFriendly Spanish			
Department				
Coordinator	González Jorge, Higinio			
Lecturers	González Jorge, Higinio González de Santos, Luis Miguel			
E-mail	higiniog@uvigo.es			
Web	http://www.galiciadrones.es/			
General description	This subject shows the fundamentals for software development in critical applications such as drone-autopilots.			

Skills	
Code	
A3	That students are able to integrate knowledge and face the complexity of making judgments based on information that, being incomplete or limited, includes reflections on the social and ethical responsibilities linked to the application of their knowledge and judgments.
A4	That students know how to communicate their conclusions -and the ultimate knowledge and reasons that support them- to specialized and non-specialized audiences in a clear and unambiguous manner.
A5	That students possess the learning skills that will enable them to continue studying in a manner that will be largely self-directed or autonomous.
B3	That students acquire the ability to analyze the needs of a company in the field of unmanned aerial systems and determine the best technological solution for it.
B4	That students acquire the knowledge to develop unmanned aerial systems and plan specific operations, depending on the existing needs and apply the existing technological tools.
B5	That students are able to apply, in the field of unmanned aerial systems, the principles and methodologies of research such as literature searches, data collection, data analysis and interpretation, as well as the presentation of conclusions, in a clear, concise and rigorous manner.
C1	Knowledge about the main systems, on-board instruments and control station of an unmanned aircraft, as well as their influence on safety.
C3	Ability to interact with other technical teams in the engineering field for the planning of operations with unmanned aerial systems.
C4	Ability to develop a technical project in the field of unmanned aerial systems engineering.
D2	Ability to communicate orally and in writing in Galician.
D6	Ability to work as part of a team.
D7	Organizational and planning skills.
D8	Capacity for analysis and synthesis.
D9	Critical thinking skills and creativity.

Learning outcomes	
Expected results from this subject	Training and Learning Results

To know, understand, analyze, evaluate and synthesize software development in aerospace projects.	A3 A4 A5 B3 B4 B5 C1 C3 C4 D2 D6 D7 D8 D9
To know and analyze the importance of software in missions with unmanned systems.	A3 A4 A5 B3 B4 B5 C1 C3 C4 D2 D6 D7 D8 D9
To know the main standards for software development.	A3 A4 A5 B3 B4 B5 C1 C3 C4 D2 D6 D7 D8 D9
Know, understand, analyze, evaluate and synthesize the role of software in the systems engineering process.	A3 A4 A5 B3 B4 B5 C1 C3 C4 D2 D6 D7 D8 D9
To know the main components for the operation of a software-based system.	A3 A4 B3 B4 B5 C1 C3 C4 D2 D6 D7 D8 D9

Contents
Topic
1. On board autopilot.
2. Real-time operating systems.
3. Concurrent systems.
4. Software engineering for unmanned aerial systems.
5. Software requirements for unmanned aerial systems.
6. Use of packages for telemetry and telecommand.
7. Verification and validation. Standards.
8. Simulation tools.
9. Autopilot design and implementation project

Planning	Class hours	Hours outside the classroom	Total hours
Lecturing	14	14	28
Practices through ICT	28	94	122
*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies	Description
Lecturing	
Practices through ICT	

Personalized assistance	
Methodologies	**Description**
Lecturing	Tutorials by e-mail and videoconference.
Practices through ICT	Tutorials by e-mail and videoconference.

Assessment						
	Description	Qualification	Training and Learning Results			
Lecturing	Multiple-choice tests.	50	A3 A4 A5	B3 B4 B5	C1 C3 C4	D2 D6 D7 D8 D9
Practices through ICT	Exercises deliveries.	50	A3 A4 A5	B3 B4 B5	C1 C3 C4	D2 D6 D7 D8 D9

Other comments on the Evaluation

Sources of information
Basic Bibliography
Complementary Bibliography
Castillo, Pedro, **Modelling and control of mini-flying machines**, Springer, 2005
Fahlstraom, Paul Gerin, **Introduction to UAV systems**, John Wiley & Sons, 2012

Recommendations