Universida_{de}Vigo

Subject Guide 2023 / 2024

IDENTIFYIN	G DATA				
Fundament	als of unmanned aerial syste	ems			
Subject	Fundamentals of				
	unmanned aerial				
	systems				
Code	O07M174V01101				
Study	Máster				
programme	Universitario en				
	Operaciones e				
	Ingeniería de				
	Sistemas Aéreos no				
	Tripulados				
Descriptors	ECTS Credits		Choose	Year	Quadmester
	6		Mandatory	1st	1st
Teaching	#EnglishFriendly				
language	Spanish				
Department					
Coordinator					
Lecturers					
E-mail					
Web	http://aero.uvigo.es				
General	This subject aims to introduce t	he basic foundations	that underlie the f	light of any UA	V: Aerodynamics, Flight
description	Mechanics, and Propulsion. Its c	operating principles a	re described and t	he general con	cepts are reviewed.

International students may request teachers: a) materials and bibliographic references to follow the subject in English, b) attend tutorials in English, c) tests and evaluations in English.

Tra	ining and Learning Results
Cod	e
A1	Possess and understand knowledge that provides a basis or opportunity to be original in the development and / or application of ideas, often in a research context
A2	That students know how to apply the knowledge acquired and their ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their area of study
A3	That the students be able to integrate knowledge and face the complexity of formulating judgments from information, which being incomplete or limited, includes reflections on social and ethical responsibilities linked to the application of their knowledge and judgments
B1	That students acquire general knowledge in unmanned aircraft systems engineering
B3	That students acquire the capabilities to analyze the needs of a company in the field of unmanned aerial systems and determine the best technological solution for the same
B4	That the students acquire the knowledge to develop unmanned aerial systems or to plan specific operations, depending on the existing needs and to apply the existing technological tools
B5	That students know and be able to apply the principles and methodologies of research, such as bibliographical searches, data collection and analysis and interpretation thereof, as well as the presentation of conclusions, in a clear, concise and rigorous way
C1	Knowledge of the main systems, the on board instruments and the control station of a non-manned aircraft, as well as its influence on security
D2	Ability to communicate orally and in writing in Galician
D8	Ability of analysis and synthesis
D9	Capacity for critical reasoning and creativity
Exp	ected results from this subject
Exp	ected results from this subject Training and Learning Results

Páxina 1 de 3

Learn the main aerodynamic principles, flight mechanics and propulsion employed in UAV	A1	
, , , , , , , , , , , , , , , , , , ,	A2	
	A3	
	B1	
	B3	
	B4	
	B5	
	C1	
	D2	
	D8	
	D9	
Contents		
Tonic		

Historical approximation to unmanned aerial vehicles.
Ranking of the aircraft and his systems of propulsion.
Terrestrial infrastructures.
Management of aerial traffic.
Legal environment.
Principles of flight.
Aircraft performance.
General description of fixed wing aircraft . Controls of flight. Structure.
Main instruments and systems.
General description of helicopters. Controls of flight. Main instruments and
systems.
Multicopters.
Compresivility.
Viscosity.
Limit layer and turbulence.
Reynolds number.
Mach number.
Bernoulli's equation
ISA.
Airfoils in incompresible flow. Flat plate. Cilinder.
Kutta condition. Prandtl.
Propellers: Theory of Froude; theory of the element of shovel. Propellerr
adaptation.
Aero jets.
Push power, specific impulse and control of push in electric propulsion.
Basic flight equations.
Cruisse flight, ascend, descent and gliding.
Banking.
Wind effect.
Actuators.
Stability and control.

Planning			
	Class hours	Hours outside the	Total hours
		classroom	
Lecturing	21	40	61
Problem solving	21	45	66
Problem and/or exercise solving	3	0	3
Report of practices, practicum and external practices 0		20	20
*The information in the planning table is for g	uidance only and does no	t take into account the hete	erogeneity of the students.

Methodologies	
	Description
Lecturing	Content presentation using audiovisual means. The contents will be upload to the e-learning platform.
Problem solving	Content presentation using audiovisual means. The contents will be upload to the e-learning platform.

Personalized assistance		
Methodologies	Description	
Lecturing	e-mail and one-to-one tutorials	

Assessment						
	Description	Qualification	٦ י	Trair	ing a	nd
				earnir	ід ке	Suits
Problem solving	(*)Los alumnos para aprobar deben entregar todos los informes de prácticas y problemas requeridos durante el curso. Todos deben alcanzar de forma individual una nota mínima de un 5 sobre 10.	80	A1 A2 A3	B1 B3 B4	C1	D2 D8 D9
	En la evaluación ordinaria, se requiere una evaluación de 5 sobre 10 para considerar el examen aprobado.			53		
	En la evaluación extraordinaria, los alumnos deben entregar todos aquellos informes de prácticas y problemas que no alcanzasen de forma individual una nota mínima de un 5. Igualmente, se requiere una evaluación de 5 sobre 10 para considerar el examen aprobado.					
Report of practices, practicum and external practices		20	A1 A2 A3	B1 B3 B4 B5	C1	D2 D8 D9

Other comments on the Evaluation

Students will deliver all the required reports during the course. All have to reach at least a 5/10 score to pass. In June evaluation, a 5/10 is needed for students to pass the exam.

In July evaluation, a 5/10 score is also needed in the exam, as well as having scored a 5/10 on required reports.

Sources of information
Basic Bibliography
Complementary Bibliography
Jeffrey D. Barton, Fundamentals of small unmanned aircraft flight,
Aviation Civil Aviation Organization, Unmanned aircraft systems,
Mouhamed Abdulla, Jaroslav V. Svoboda, Luis Rodrigues, Avionics made simple,
Bon Dewitt, Unmanned aerial systems for mapping ,
Sergio Esteban Ronceso, Fundamentos de Ingeniería Aeroespacial,
John Anderson, Fundamentos de aerodinámica, 6, McGraw Hill, 2017
Miguel Ángel Gómez Tierno, Mecánica de vuelo , 2, Garceta, 2012
Antonio Esteban Oñate, Conocimientos del avión , 1, Paraninfo, 2007
Recommendations
Subjects that continue the syllabus

Radio communication and navigation systems/007M174V01103

Subjects that are recommended to be taken simultaneously

Unmanned aerial systems operations/O07M174V01102