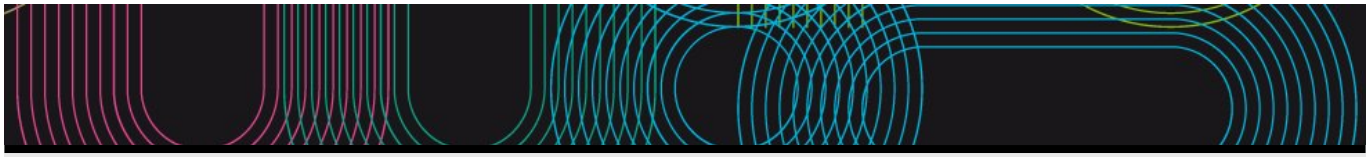

IDENTIFYING DATA				
(*)Satélites				
Subject	(*)Satélites			
Code	V05M145V01311			
Study programme	(*)Máster Universitario en Enxeñaría de Telecomunicación			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	5	Optional	2nd	1st
Teaching language	English			
Department				
Coordinator	Aguado Agelet, Fernando Antonio			
Lecturers	Aguado Agelet, Fernando Antonio Pérez Fontán, Fernando			
E-mail	faguado@tsc.uvigo.es			
Web	http://faitic.uvigo.es			
General description	The contents of this course cover the basics of satellite standards, system engineering, the different segments of satellite systems, an introduction to product assurance and assembly, integration and verification procedures as well as an introduction to satellite operations. The course will be entirely conducted in English; the use of Spanish or Galego will be optionally allowed in the last exam.			

Competencies	
Code	
A2	CB2 Students must apply their knowledge and ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study.
B3	CG3 The ability to lead, plan and monitor multidisciplinary teams.
B4	CG4 The capacity for mathematical modeling, calculation and simulation in technological centers and engineering companies, particularly in research, development and innovation tasks in all areas related to Telecommunication Engineering and associated multidisciplinary fields.
C18	CE18/RAD1 Capacity of elaborating, strategic planning, direction, coordination and technical and economic management of spatial projects applying spatial systems engineering standards, with knowledge of the processes a satellite operation.

Learning outcomes	
Expected results from this subject	Training and Learning Results
To know and apply ECSS management space project standards.	C18
To know the basics of the system engineering applied to space projects.	A2 B3 C18
To know the mission life cycle of a space mission.	A2 C18
To know the documentation generated in each engineering phase in a space mission	A2 B3 C18
To know and ellaborate the main technical studies and budgets in a space mission.	B3 B4 C18
To know applicable methodologies and standards to product assurance (PA) and Assembly, Integration and Verification (AIV) procedures in a space project.	A2 B3 C18
To know the basics of satellite operation procedures and standards	C18

Contents

Topic	
International space project standards	ECSS, NASA, INCOSE.
Space project life cycle	Documentation and reviews.
Segments of a satellite project	- Space Segment. - Ground Segment. - User Segment. - Launchers.
Satellite subsystems	- Communication. - Mechanical & Thermal. - Power. - ADCS. - Propulsion. - On-board computer.
Product Assurance and Assembly, Integration and Verification Procedures in a space project.	- Product Assurance (PA) in space projects. - Assembly, Integration and Verifications (AIV) plans and procedures in space projects.
Introduction to satellite operations	- Telemetry and Telecommand definition. - Operation procedures.

Planning

	Class hours	Hours outside the classroom	Total hours
Master Session	19	57	76
Seminars	10	20	30
Short answer tests	1	18	19

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Master Session	We describe the different aspects of the subject providing all the necessary educational material.
Seminars	Every student will apply the theoretical knowledge to different practical tasks covering the main part of the contents of the subject with the help of the software suites.

Personalized attention

Methodologies	Description
Master Session	The students will have the opportunity to attend tutorial hours with the university lecturers in the schedule that will be established and published in the subject web-page. They may also send their queries by email.
Seminars	The students will have the opportunity to attend tutorial hours with the university lecturers in the schedule that will be established and published in the subject web-page. They may also send their queries by email.

Assessment

	Description	Qualification	Training and Learning Results		
Master Session	The evaluation will be based on the documentation written by the student for a proposed project.	45	A2	B3	C18
Seminars	The students will perform simulations using the Satellite Toolkit (STK) software. The evaluation will be based on the students' assistance to the seminars, his or her participation on the seminars and a final report.	35	A2	B4	C18
Short answer tests	A final test to complement the evaluation of the contents presented in the master sessions. The test will be individual with time limit.	20			C18

Other comments on the Evaluation

Sources of information

James R. Wertz, David F. Everett and Jeffery J. Puschell, **Space Mission Engineering: The New SMAD**, 4,

http://www.ecss.nl,

http://www.incose.org/,

NASA Systems Engineering Handbook, SP-2007-6105. Rev 1,

Peter Fortescue (Editor), John Stark (Editor), Graham Swinerd (Editor), **Spacecraft Systems Engineering**, 3,

http://help.agi.com/StartTraining/StartTraining.htm,

Recommendations

Subjects that it is recommended to have taken before

(*)Deseño de Circuitos Electrónicos Analóxicos/V05M145V01106
(*)Comunicacións Móbiles e sen Fíos/V05M145V01313