



## IDENTIFYING DATA

### Systems engineering and aerospace communications

Subject	Systems engineering and aerospace communications			
Code	007G410V01925			
Study programme	(*)Grao en Enxeñaría Aeroespacial			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	3rd	2nd
Teaching language	#EnglishFriendly Spanish			
Department				
Coordinator	Isasi de Vicente, Fernando Guillermo			
Lecturers	Isasi de Vicente, Fernando Guillermo			
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Web	http://aero.uvigo.es			
General description	Introduction to the engineering of systems and to the systems of communications with aerospace vehicles. International students may request from the teachers: a) materials and bibliographic references in English, b) tutoring sessions in English, c) exams and assessments in English.			

## Competencies

Code	
A3	That the students have the capability to gather and interpret relevant data (usually within their area of study) to issue judgments that include a reflection on relevant social, scientific or ethical issues
A5	That the students develop those learning capabilities necessary to undertake further studies with a high degree of autonomy.
B1	Capability for design, development and management in the field of aeronautical engineering (in accordance with what is established in section 5 of order CIN / 308/2009), aerospace vehicles, aerospace propulsion systems, aerospace materials, airport infrastructures, air navigation infrastructures and space management, air traffic and transport management systems.
B4	Verification and certification in the field of aeronautical engineering that aim, in accordance with the knowledge acquired (in accordance with what is established in section 5 of order CIN / 308/2009), aerospace vehicles, aerospace propulsion systems, aerospace materials, airport infrastructures, air navigation infrastructures and space management, air traffic and transport management systems.
C19	Applied knowledge of: science and technology of materials; mechanics and thermodynamics; fluid mechanics; aerodynamics and flight mechanics; navigation and air traffic systems; aerospace technology; theory of structures; airborne transportation; economy and production; projects; environmental impact.
D2	Leadership, initiative and entrepreneurship
D3	Capability of oral and written communication in native language
D4	Capability of autonomous learning and information management
D5	Capability to solve problems and draw decisions
D6	Capability for interpersonal communication
D8	Capability for critical and self-critical reasoning
D13	Sustainability and environmental commitment. Equitable, responsible and efficient use of resources

## Learning outcomes

Expected results from this subject	Training and Learning Results
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- Understanding of the concept of engineering of systems.	A3	B1	C19	D2
- Understanding, knowledge and application of the national and international standards applied to the aerospace engineering.	A5	B4		D3
				D4
- Compression, knowledge of the systems of communications in aerospace vehicles				D5
				D6
				D8
				D13

## Contents

Topic	
Concept of Engineering of Systems	Need of an engineering of systems. Simple examples
Standard nations and Internaciones of Engineering of Systems in Aerospace projects	Study of the most used standards in: aerial Systems spatial Systems common Points
Application to national and international projects of Engineering of Systems.	Examples: aerial System: commercial aerial navigation spatial System: nano-hammer satellites
Introduction	Basic concepts of aerial navigation and communications
Direction finding	Principles Applications
VOR	Principle of operation Description Use
DME/TACAN	Principle of operation Description Use
ILS	Principle of operation Description Use
Primary radar	Principle of operation Description Use
Secondary radar	Principle of operation Description Use
GPS	Principle of operation Description Use
Augmented reality systems	Principle of operation Description Use

## Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	30	75	105
Laboratory practical	20	22	42
Problem and/or exercise solving	3	0	3

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

## Methodologies

	Description
Lecturing	Lecture with help of blackboard and computer. These lectures treat about the theory of the subject. With this methodology work the competitions CG1, CG4, CB3, CB5, CE19, CT8 and CT5. This is a grupal activity.
Laboratory practical	Use of simulators of systems of communications and/or navigation. Use of basic tools in the engineering of systems. With this methodology work the competitions CG1, CG4, CB3, CE19, CT2, CT4, CT5, CT6, CT11 and CT13. It is a grupal.activity.

## Personalized assistance

Methodologies	Description
Lecturing	Students can use tutorization time at professor's office. Tutorization timetable is published at faculty's web page at course start.
Laboratory practical	In the practices of laboratory the student can ask professor to resolve doubts. Beside, the students can make use of tutorization time at professor's office. The schedule for tutorization at professor's office established at the start of course and it is published at faculty's web page.

Assessment		Qualification Training and Learning Results				
	Description					
Laboratory practical	(*)Preguntas de o profesor sobre a marcha e avaliación de o traballo de laboratorio.	20	A5 B4	B1 C19 B4	D4 D5 D6 D8 D13	
Problem and/or exercise solving	(*)Exame de resolución de problemas e/ou preguntas breves sobre a materia explicada en as clases magistrais. Faranse dous exames de avaliación continua durante o curso: un a metade de curso en o que se preguntará polo que se deu ata o momento. O peso de este exame será de 40% de a nota final. Para os alumnos que obteñan un 3/10 ou máis haberá un segundo exame antes de acabar o curso con un 40% de peso e as mesmas condicións que o anterior. Si o alumno non obtivo máis de 3/10 en os dous exames, con unha media superior a 5/10 ou ben desexe mellorar nota presentándose ao final, poderá facelo en o día fixado por a escola para os exames de a asignatura.	80	A3 A5	B1 B4 C19	D4 D5 D8	

#### Other comments on the Evaluation

In the case that a student failed more than 20% of practice sessions, he / she will not be able to pass the subject by continuous evaluation. The second edition of the minutes will evaluate the whole subject. In the case that he / she prefers and has done laboratory practices and obtained more than a 3/10 in them, the student can do only the theoretical part. This theoretical part weighs 80% of the mark, the other 20% will be the mark obtained during the course. If the student has not practiced, they may be asked in a written exam or in the laboratory, weighing the mark of practices by 20% and the theory of 80%. Students who officially resign to the continuous assessment, the mark obtained in a corresponding exam will represent 100% of the qualification. The evaluation test calendar officially approved by the EEAE Center Board is published on the website <http://aero.uvigo.es/gl/docencia/exames>

#### Sources of information

##### Basic Bibliography

Alexander V. Nebylov/ Joseph Watson, **Aerospace Navigation Systems**, 1, Wiley, 2016

ETSIA/EUITA/EIAE, **Sistemas y Equipos electrónicos para la navegación aérea**, 1, ETSIA/EUITA/EIAE,

##### Complementary Bibliography

NASA, **System engineering handbook**, Rev. 1,

Benjamin S. Blanchard, **SYSTEM ENGINEERING MANAGEMENT**, 5, Wiley, 2016

#### Recommendations