Universidad Europea

1. BASIC INFORMATION

Course	Aerospace Technology
Degree program	Degree in Aerospace and Aircraft Engineering
School	School of Architecture, Engineering and Design
Year	First Year
ECTS	6 ECTS
Credit type	Mandatory
Language(s)	English
Delivery mode	Face-to-face
Semester	First Semester
Academic year	2020/2021
Coordinating professor	Rubén Dapica Tejada

2. PRESENTATION

This course belongs to the "Aerospace systems and infrastructures" module:

- Aerospace Technology 6 ECTS (first year)
- Navigation Systems I 6 ECTS (first year)
- Navigation Systems II 6 ECTS (second year)
- Air Transport 6 ECTS (second year)

The purpose of this subject is for students to acquire a broad and general knowledge of Aerospace Engineering that allows them to assimilate and understand the basics of the different subjects that underlie their area of knowledge, especially Fluid Mechanics, Thermodynamics, Aerodynamics, Flight Mechanics, Structures, Propulsion and Orbital Mechanics.

At the end of the subject the student should be able to:

- Conceptualize and correctly solve a diverse set of aerospace engineering problems at an introductory level
- Form a big picture that connects the different branches of Aerospace Engineering
- Have a sound engineering knowledge basis to address with guarantees the subjects of the following courses.

3. COMPETENCIES AND LEARNING OUTCOMES

Core Competencies:

- CB1. That students have demonstrated knowledge and understanding in a field of study that part of the basis of general secondary education, and is usually found at a level that, while supported by advanced textbooks, includes some aspects of knowledge of the forefront of their field of study.

Cross-curricular Competencies:

- CT1. Ability for the design, development and management in the field of aeronautical engineering whose objective is, in accordance with the knowledge acquired in accordance with section 5 of Orden Ministerial CIN / 308/2009, aerospace vehicles.
- CT6. Ability to participate in test flights to take measurements of take-off distance, climb speed, stall speed, manoeuvrability, and landing performances.
- CT12. Knowledge of basic subjects and technologies, which will enable him/her to learn new methods, theories and technologies, as well as to give him/her great versatility to adapt to new situations (autonomous learning).
- CT18. Commit to fulfill the tasks entrusted (Responsibility)*
- CT19. Work in interdisciplinary teams, providing the greatest effectiveness on the basis of cooperation, assuming their role within the team, establishing good relationships and exchanging information, and practicing the culture of peace and solidarity (Teamwork)*

*Competency to be developed at level 2: Internalization and skillful competence management.

Specific Competencies:

- CE10. To understand how aerodynamics forces determine flight dynamics, and the influence of variables involved in flight phenomena.
- CE18. Appropriate knowledge applied to engineering of: basics of fluid mechanics; basic principles of flight control and automation; main characteristics and physical and mechanical properties of materials.
- CE19. Applied knowledge of: the science and technology of materials, mechanics and thermodynamics, fluid mechanics, aerodynamics and flight mechanics, navigation and air traffic, aerospace technology, theory of structures, air transport, economy and production projects; impact on environment

Learning Outcomes:

- Conceptualize an engineering problem, propose the approach to solve it, and find the best solution, based on a series of requirements, and previous information. All this related to the competences of this module.
- Move parts of an engineering problem to the laboratory, and use this resource as support to solve it.

The table below shows the relationship between the competences that are developed in the subject and the learning outcomes that are pursued:

Competencies	Learning Outcomes
CB1, CT1, CT6, CT12, CT12, CE10, CE18, CE19	Conceptualize an engineering problem, propose the approach to solve it, and find the best solution, based on a series of requirements, and previous information. All this related to the competences of this module.
CB1, CT1, CT18, CT19, CE10, CE18	Move parts of an engineering problem to the laboratory, and use this resource as support to solve it.

4. CONTENT

The subject matter is divided into five learning units:

Unit 1. Foundations

- 1.1 Introduction to Aerospace Engineering
- 1.2 Aircraft Architecture and Classification. Introduction to aeronautical structures.
- 1.3 Fundamental Physics. Aerostatics.

- 1.4 Atmospheric and Space Environment. The International Standard Atmosphere. Altimetry.

Unit 2. Basic Aerodynamics
- 2.1 2D Aerodynamics
- 2.2 3D Aerodynamics

Unit 3. Basic Mechanics of Flight
- 3.1 Performance
- 3.2 Stability and Control

Unit 4. Introduction to Propulsion
- 4.1 Basic concepts
- 4.2 Propeller Engines
- 4.3 Jet Engines
- 4.4 Rocket Engines

Unit 5. Introduction to Space Flight
- 5.1 Introduction to Orbital Mechanics
- 5.2 Space Systems Architecture and Classification
- 5.3 Space Missions

5. TEACHING-LEARNING METHODOLOGIES

The types of teaching-learning methodologies used are indicated below:
- Survey of objectives and interests
- Lecture-based class
- Laboratory practices
- Research by groups or problem solving by groups
- Designs
- Field experiences, conferences, visits to companies and institutions

6. LEARNING ACTIVITIES

Listed below are the types of learning activities and the number of hours the student will spend on each one:

Campus-based mode:

Learning activity	Number of hours
Lecture-based class	20
Integrative team work	60
Self-study	50
Mentoring, academic monitoring and assessment	20
TOTAL	**150**

Online mode:

Learning activity	Number of hours
Lecture-based class	20
Integrative team work	60
Self-study	50
Mentoring, academic monitoring and assessment	20
TOTAL	**150**

7. ASSESSMENT

Listed below are the assessment systems used and the weight each one carries towards the final course grade:

Assessment system	Weight
Exams, tests and other knowledge tests	35%
Elaboration of articles and reports	30%
Alternative evaluation techniques	15%
Field experiences, conferences and visits	10%
Cross-curricular skills (rubrics)	10%

In the Virtual Campus, when you access the subject, you will be able to consult in detail the evaluation activities that you must carry out, as well as the delivery dates and the evaluation procedures of each one of them.

7.1. First exam period

The evaluation of the subject in Ordinary Session is based on the grades obtained in the next evaluation items that will be assessed taking into account the weights (percentages) indicated below:

- Exam: 35%
- Team Project Report (individual): 30%
- Attendance: 15% (10% labs + 5% lectures)
- Virtual visit: 10%
- Cross-curricular Skills (team evaluation): 10%

An **attendance** record (face-to-face or virtual) greater than or equal to 50% is an essential requirement to be allowed to take the final exam in the first exam period.

To pass the course in the first exam period, the student must meet all the following conditions as a minimum:

- A grade greater than or equal to 5.0 out of 10.0 in the **final grade** (weighted average) of the course.
- A grade greater than or equal to 5.0 out of 10.0 in the **final exam**
- A grade greater than or equal to 5.0 out of 10.0 in the **project**

When the minimum required to perform the weighted average of the evaluable activities is not met (the minimum is not reached in any of the above points), the final grade will be:

- the weighted average if its value is less than or equal to 4
- 4 if the weighted average value is greater than 4

The grade in first exam period will be considered as **NP** (not presented) when the student has not submitted any evaluable activity of those that are part of the weighted average.

7.2. Second exam period

The assessment of the subject in second exam period is based on the grades obtained in the next evaluation items that will be assessed taking into account the weights (percentages) indicated below:

- Exam: 35%
- Individual Project Report: 30%
- Virtual visit: 10%
- Cross-curricular Skills: 10%
- Attendance compensatory activity: 15%

Those items that were passed in the first exam period will not have to be submitted again, and they will be taken into account for the final grade in the extraordinary session. In this session, activities not passed in the first exam period must be delivered, or those that were not delivered.

To pass the course in the second exam period, the student must meet all the following conditions as a minimum:

- A grade greater than or equal to 5.0 out of 10.0 in the **final grade** (weighted average) of the subject.
- A grade greater than or equal to 5.0 out of 10.0 in the **final exam**
- A grade greater than or equal to 5.0 out of 10.0 in the **project**
- A grade greater than or equal to 5.0 out of 10.0 in the **attendance compensatory activity**

When the minimum required to perform the weighted average of the evaluable activities is not met (the minimum is not reached in any of the above points), the final grade will be:

- the weighted average if its value is less than or equal to 4
- 4 if the weighted average value is greater than 4

The grade in extraordinary session will be considered as **NP** (not presented) in this session when the student has not submitted any new activity with respect to what was submitted in the ordinary session.

8. SCHEDULE

This section indicates the timeline with delivery dates of evaluable activities of the subject:

Assessable activities	Deadline
1. Attendance to Labs and Lectures	Throughout the course
2. Virtual visit	Week 13
3. Project	Week 14
4. Team evaluation	Week 15
5. Final Exam	Week 16

This schedule may be subject to changes for logistical reasons relating to the activities. The student will be notified of any change as and when appropriate.

9. BIBLIOGRAPHY

- Introduction to Flight. Sixth Edition. John D. Andersson, Jr. Mc Graw Hill, 2016.
- Introducción a la Ingeniería Aeroespacial. 2ª Edición. Sebastian Franchini y Óscar Lopez. Garceta, 2011.
- Fundamentals of Aerospace Engineering. 2nd Edition. An introductory course to aeronautical engineering. Manuel Soler, Manuel Soler [Ed.], 2017.
- Introduction to Aerospace Engineering with a Flight Test Perspective. Stephen Corda. John Wiley & Sons Ltd. 2017.

10. DIVERSITY MANAGEMENT UNIT

Students with specific learning support needs:

Curricular adaptations and adjustments for students with specific learning support needs, in order to guarantee equal opportunities, will be overseen by the Diversity Management Unit (UAD: Unidad de Atención a la Diversidad).

It is compulsory for this Unit to issue a curricular adaptation/adjustment report, and therefore students with specific learning support needs should contact the Unit at unidad.diversidad@universidadeuropea.es at the beginning of each semester.