

1. BASIC INFORMATION

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|-------------------------------|--|
| Course | Flight mechanics |
| Degree program | Degree in Aerospace Engineering of aircrafts |
| School | Arquitectura, Ingeniería y Diseño |
| Year | Third |
| ECTS | 6 |
| Credit type | Compulsory |
| Language(s) | English |
| Delivery mode | Face to face |
| Semester | Second |
| Academic year | 2019-20 |
| Coordinating professor | Raul Carlos Llamas |

2. PRESENTATION

This course belongs to the “Aerospace vehicles II” module:

- Aeronautical Structures and Vibration 6 ECTS (third year)
- Aerodynamics and Aeroelasticity 6 ECTS (third year)
- Space Vehicles and Missiles 6 ECTS (third year)
- Flight Mechanics 6 ECTS (third year)
- Aerospace Vehicle Maintenance and Certification 6 ECTS (third year)
- Aircraft design 6 ECTS (fourth year)

In the Flight Mechanics subject the following topics are covered: Physics of Flight, analysis of the stability, controllability and flight performance of aerospace vehicles. Additionally, aircraft performance studies to calculate the power required to fly, the fuel consumption, range, endurance and take-off and landing field lengths are carried out.

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 that will knowledge of the forefront of their field of study.

Cross-curricular competencies:

CT13: Ability to use tools to search for library resources or information (information retrieval).

CT20: Take decisions, in advance, on what is need to be done, who should do it, and how it should be done.

Specific competencies:

CE23: Adequate knowledge and applied to Engineering of: Flight physical phenomena, flight characteristics and control, aerodynamics forces, propulsive forces, performances, and stability.

CE24: Adequate knowledge and applied to Engineering of: aircraft systems, and automatic flight control systems of aerospace vehicles

CE25: Adequate knowledge and applied to Engineering of: Calculation methods Design and Program Management of aircraft; the use of experimental aerodynamics and the most significant parameters in the theoretical application; the management of experimental techniques, equipment and measuring instruments discipline; the simulation, design, analysis and interpretation of experimental and flight operations; the maintenance systems and certifications of aircraft.

CE26: Applied knowledge of: aerodynamics, mechanics, and thermodynamics, flight mechanics, engineering of aircrafts (fixed and rotatory wings), and theory of structures.

Notes: UNIQUE LEVEL: Competence developed at one level. Level 1 (N1): awareness about the importance of competences and basic application of it to several situations. Level 2(N2): interiorization and skillful handling of competences. Level 3 (N3): Full interiorization and handling of competences at any needed situation.

Learning outcomes:

LO27: To design diverse parts and elements of aerospace vehicles

LO28: To develop software for control

LO20: To conduct studies by integrating the technologies and engineering procedures which are developed in the competencies of this modules

LO21: From a series of requirements, and prior information, to conceptualize an engineering problem, proposes an approach to solve it, and obtain the better solution. All this related to the competencies of this module

LO22: To transfer some parts of an engineering problem to the laboratory, and utilize this resource as support to resolve it

4. CONTENT

- Aerodynamic and propulsive forces
- Performances
- Stability and static control
- Performances of high-speed aircraft
- Stability and dynamic response of the open-chain airplane

5. TEACHING-LEARNING METHODOLOGIES

The types of teaching-learning methodologies used are indicated below:

- Lecture-based class
- Integration of team work
- Self-study
- Mentoring, academic monitoring and assessment

6. LEARNING ACTIVITIES

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

| Type of educational activity | Number of hours |
|---|-----------------|
| Lecture-based class | 20 h |
| Integration of team work | 60 h |
| Self-study | 50 h |
| Mentoring, academic monitoring and assessment | 20 h |
| TOTAL | 150 h |

7. ASSESSMENT

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

| Assessment criteria | Weight (%) |
|--|------------|
| 1. Exam, test and other type of assessment. | 30%-35% |
| 2. Reports, articles and informs. | 15%-30% |
| 3. Alternative system of assessment. | 15%-30% |
| 4. Conferences, company-tour visit and experiences in situ | 10%-10% |
| 6. Transversal skills (rubric) | 10%-15% |

When you access the course on the *Campus Virtual*, you'll find a description of the assessment activities you have to complete, as well as the delivery deadline and assessment procedure for each one.

7.1. First exam period

The academic evaluation is continuous and consistent with the methodology and objectives of the subject.

In ordinary period it will consist of:

- exams and tests, with a weight of 50% on the final mark
- individual assignments, with a weight of 50%, where transversal competencies and the elaboration of reports will be evaluated

The grade will be considered as NP (Not Presented) when the student has not delivered any evaluable activity of which they are part of the weighted average.

7.2. Second exam period

Evaluation activities for the second exam period are:

Minimum requirements to pass:

- 5 out of 10 in final exam
- 5 out of 10 in the exercise(s)

The grade will be considered as NP (Not Presented) when the student has not delivered any evaluable activity of which they are part of the weighted average.

8. BIBLIOGRAPHY

The basic reference textbook is:

PHILLIPS, W, *Mechanics of Flight*, Wiley. 2nd ed. 2009, ISBN-10: 0470539755

Additional references will be given during the course and will include other relevant textbooks, research papers and general literature (e.g. current events, accident reports, etc...)

9. 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.

PLAN INSTITUCIONAL DE EVALUACIÓN DE APRENDIZAJES POR COVID-19

FICHA DE ADAPTACIÓN DE LAS ACTIVIDADES FORMATIVAS Y DE EVALUACIÓN

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|--|
| Asignatura/Módulo MECANICA DEL VUELO |
| Titulación/Programa INGENIERÍA AEROESPACIAL |
| Curso (1º-6º) 3º |
| Grupo (s) TODOS |
| Profesor/a RAUL LLAMAS |
| Docente coordinador (C. Asignatura, C. Titulación, C. Prácticas, C. TFG, Director de Programa PG) |

| Actividad formativa descrita en la Guía de aprendizaje | Actividad formativa adaptada a formato a distancia |
|---|---|
| GLIDER DESIGN (WEIGHT 10%) | SIN CAMBIOS |
| 777 PERFORMANCE ASSESSMENT (WEIGHT 25%) | SIN CAMBIOS |
| 737 SITUATION ASSESSMENT (WEIGHT 15%) | SIN CAMBIOS |
| ONLINE TEST (WEIGHT 20%) | SIN CAMBIOS |
| FINAL EXAM (WEIGHT 30%) | SIN CAMBIOS |
| | |
| | |

| Actividad de evaluación presencial planificada según Guía | | NUEVA actividad de evaluación que se propone (a distancia) | |
|---|--|--|----------------|
| Descripción de la actividad de evaluación presencial original | NO HAY CAMBIOS | Descripción de la nueva actividad de evaluación | NO HAY CAMBIOS |
| | Los contenidos a los que da respuesta la nueva prueba han de ser los mismos. Especificar: | | |
| Contenido desarrollado (temas) | Los resultados de aprendizaje a los que da respuesta la nueva prueba han de ser los mismos. Especificar: | | |
| Resultados de aprendizaje desarrollados (consultar Guía de aprendizaje de la asignatura/módulo) | Especificar: | | |
| Duración aproximada | | Duración aproximada y fecha | |
| Peso en la evaluación | | Peso en la evaluación | |
| Observaciones | | | |