



## IDENTIFYING DATA

### Mechanics of flight

Subject	Mechanics of flight			
Code	007G410V01924			
Study programme	Grado en Ingeniería Aeroespacial			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4th	1st
Teaching language	#EnglishFriendly Spanish			
Department				
Coordinator	Navarro Medina, Fermín			
Lecturers	Navarro Medina, Fermín			
E-mail	fermin.navarro.medina@uvigo.es			
Web	http://aero.uvigo.es			
General description	Flight mechanics include the study of the performance, stability, and static and dynamic control of aerospace vehicles (focusing on fixed-wing aircraft in this course), as well as flight qualities and tests. English Friendly subject: 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	
A2	That the students know how to apply their knowledge to their work or vocation in a professional way and that they possess the competences that are usually demonstrated through the elaboration and defense of arguments and the resolution of problems within their area of study
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.
B6	Capability to participate in flight testing programs for take-off and landing distances, ascent speeds, loss speeds, maneuverability and landing capacities.
C23	Appropriate knowledge applied to engineering: physical phenomena of flight, its qualities and its control, aerodynamics, propulsive forces, active control and stability.
C26	Applied knowledge of aerodynamics; mechanics and thermodynamics, flight mechanics, aircraft engineering (fixed and rotary wings), theory of structures.
C31	Appropriate knowledge applied to engineering: physical phenomena of air defense systems, their qualities and their control, stability and automatic control systems.
C33	Applied knowledge of aerodynamics, flight mechanics, air defense engineering (ballistics, missiles and air systems), space propulsion, material science and technology, structure theory.
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
D11	Show motivation for quality with sensitivity towards subjects within the scope of the studies

## Learning outcomes

Expected results from this subject	Training and Learning Results			
Knowledge of the most stood out appearances of the qualities of flight and the essays in flight of the aircraft	A5	B6	C23 C33	D8 D11
Knowledge, understanding, application, analysis and synthesis of the performances, the stability and control static and dynamic of the aircraft.	A2 A3		C26 C31	D3 D4 D5 D6

<b>Contents</b>	
Topic	
1. Introduction to the mechanics of flight.	1.1. Introduction to the mechanics of flight. 1.2. Systems of reference and angles in mechanics of flight. 1.3. General equations of the movement.
2. Performances of gliders and aeroplanes propulsados by aerorreactores and by alternative engines.	2.1. Performances of gliders 2.2. Performances of aeroplanes propulsados by aerorreactores in horizontal rectilinear flight 2.3. Performances of aeroplanes propulsados by aerorreactores in another type of flights 2.4. Performances of aeroplanes propulsados by alternative engines 2.5. Performances in takeoff and landing
3. Stability and static and dynamic control	3.1. Stability and longitudinal static control 3.2. Stability and lateral static control-directional 3.3. Introduction to the stability and dynamic control
4. Introduction to the Qualities of Flight and to the Essays in Flight.	4.1. Introduction to the Qualities of Flight and to the Essays in Flight.

<b>Planning</b>			
	Class hours	Hours outside the classroom	Total hours
Problem solving	15	0	15
Lecturing	28	0	28
Autonomous problem solving	0	97.5	97.5
Mentored work	4	0	4
Problem and/or exercise solving	3	0	3
Objective questions exam	2.5	0	2.5

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

<b>Methodologies</b>	
	Description
Problem solving	Resolution of problems and/or exercises that treat punctual appearances of the contents of the subject, developed by the professor and/or the students in the classroom.
Lecturing	Exhibition of a subject by part of the professor according to a previously established script
Autonomous problem solving	Study of the student of autonomous form, with the support of the professor if like this it requires it according to the procedures established by the university
Mentored work	The work tutelado consists in the preparation of a project of design of an aircraft using the concepts learnt during the subject of mechanics of flight. It will be necessary on the other hand review key ideas of the subject of aerodynamics and aeroelasticidad. The work is of preparation grupal.

<b>Personalized assistance</b>	
Methodologies	Description
Mentored work	The work tutelado consists in the preparation of a project of design of an aircraft using the concepts learnt during the subject of mechanics of flight. It will be necessary on the other hand review key ideas of the subject of aerodynamics and aeroelasticidad. The work is of preparation grupal.
Autonomous problem solving	Study of the student of autonomous form, with the support of the professor if like this it requires it according to the procedures established by the university

Assessment						
	Description	Qualification	Training and Learning Results			
Mentored work	The work tutelado consists in the preparation of a project of design of an aircraft using the concepts learnt during the subject of mechanics of flight. It will be necessary on the other hand review key ideas of the subject of aerodynamics and aeroelasticidad. The work is of preparation grupal.	25	A2	B6	C23	D4
			A3		C26	D5
			A5		C31	D6
			C33		D8	
						D11
Problem and/or exercise solving	Approach of problems to study and resolve in the classroom on the contents of the subject, to make by the student individually and/or in group	15	A2	B6	C23	D3
			A3		C26	D4
			A5		C31	D5
			C33		D6	
						D8
						D11

Objective questions exam	Resolution of problems and/or conceptual questions on the contents of the subject	60	A2 A3 A5	B6  	C23 C26 C31 C33	D3 D4 D5 D8 D11
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## Other comments on the Evaluation

### Continuous assessment

To surpass the subject in the first assessment is required to obtain a mark upper to 5 points on 10 in the average mark of the continuous assessment during the development of the classes and the examination in the official date. The mark of the examination in official date has to be upper to 5 points on 10. The final mark will be calculated according to the percentages indicated. The scored activities of the continuous assessment will take place during the lecturing hours of the subject, so that it requires the regular attendance to the classes by part of the students.

The calendar of proofs of assessment approved officially by the Board of Centre EEAE is published in the web

<http://aero.uvigo.es/gl/docencia/exames>

The maximum duration of the examination will be 3 hours if there is not interruption, or of 5 hours if there is an intermediate pause (being a maximum of 3 hours for each part).

### Extraordinary examination

The student has to attend to the extraordinary examination of all the contents of the subject, that will be 100% of the mark, if the final mark of continuous assessment is lower that 5 points on 10. Besides, they have to attend the extraordinary examination in the following cases:

- They did not make or deliver any of the scored activities of the continuous assessment inside the terms and dates established.
- They obtained an mark lower than 5 points over 10 in the final examination of continuous assessment .

## Sources of information

### Basic Bibliography

Gómez Tierno M.A., Pérez Cortés M., and Puentes Márquez C., **Mecánica del vuelo**, 2, Ibergarceta Publicaciones S.L., 2012

### Complementary Bibliography

PHILLIPS W., **Mechanics of Flight**, 2, John Wiley & Sons Ltd, 2009

Hull D.G., **Fundamentals of Airplane Flight Mechanics**, 1, Springer, 2007

## Recommendations

### Subjects that it is recommended to have taken before

Aerodynamics and aeroelasticity/O07G410V01923

## Contingency plan

### Description

=== EXCEPTIONAL MEASURES SCHEDULED ===

In front of the uncertain and unpredictable evolution of the sanitary alert caused by the \*COVID-19, the University of Vigo establishes an extraordinary planning that will activate in the moment in that the administrations and the own institution determine it attending to criteria of security, health and responsibility, and guaranteeing the teaching in a no face-to-face stage or partially face-to-face. These already scheduled measures guarantee, in the moment that was prescriptive, the development of the teaching of a more agile and effective way when being known in advance (or with a wide \*antelación) by the students and the professor through the tool normalised and institutionalised of the educational guides.

=== ADAPTATION OF THE METHODOLOGIES ===

\* educational Methodologies that keep

ALL, adapted to the available technological resources (remote campus, virtual blackboard, etc). The work \*tutelado also can carry out on-line, without more than substituting the meetings \*grupales and the sessions \*tutorizadas with the the face-to-face professor by telematic.

\* Educational methodologies that modify  
ANY

\* no face-to-face Mechanism of attention to the students (\*tutorías)  
virtual Dispatch of the remote campus

\* Modifications (if they proceed) of the contents to give  
ANY

\* additional Bibliography to facilitate the car-learning  
Can use the same \*bibliografía

\* Other modifications

### === ADAPTATION OF THE EVALUATION ===

In the case that the teaching have to give to distance from some moment of the \*cuatrimestre, distinguish two cases:

\*\*\* That all the proofs \*evaluables already have been made in the moment of the change to teaching to distance:

- it Tests Examination of objective questions: 60%
- it Tests Work \*tutelado: 25%
- it Tests Resolution of problems and/or exercises: 15%

\*\*\* That there are pending proofs to make:

\* Proofs \*evaluables slopes to make in the moment of change to teaching to distance, that keep his percentages of evaluation:

- it Tests Examination of objective questions: [previous Weight 60%] [Weight Proposed 60%]
- Tests Work \*tutelado: [previous Weight 25%] [Weight Proposed 25%]

\* Proofs \*evaluables slopes to make in the moment of change to teaching to distance, that modify mildly:

- it Tests Resolution of problems and/or exercises: [previous Weight 15%] [Weight Proposed 15%]. In case of impossibility to make them in the classroom, the problems will deliver in shape of bulletin to deliver, with a date established in the moment of the delivery.

\* New proofs  
NO new exams

\* additional Information

will inform of the links and the keys to access to the virtual classroom and to the virtual dispatch. The tutoring sessions will make in the virtual dispatch, after previous agreement of the date and hour via mail.

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