



1. General information

Course: AEROESPACE PROPULSION**Type:** CORE COURSE**Degree:** 403 - UNDERGRADUATE DEGREE PROGRAMME IN AEROSPACE ENGINEERING**Center:** 303 - E.DE INGENIERÍA INDUSTRIAL Y AEROESPACIAL DE TOLEDO**Year:** 4**Main language:** Spanish**Use of additional languages:****Web site:****Code:** 56732**ECTS credits:** 6**Academic year:** 2023-24**Group(s):** 40**Duration:** First semester**Second language:****English Friendly:** Y**Bilingual:** N**Lecturer:** JOSÉ IGNACIO NOGUEIRA GORIBA - Group(s): 40

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2. Pre-Requisites

Not established

3. Justification in the curriculum, relation to other subjects and to the profession

Not established

4. Degree competences achieved in this course

Course competences

Code	Description
CA01	Ability to carry out bibliographic searches, use databases and other sources of information for its application in tasks related to Technical Aeronautical Engineering.
CA02	Ability to efficiently design experimentation procedures, interpret the data obtained and specify valid conclusions in the field of Aeronautical Technical Engineering.
CA03	Ability to autonomously select and carry out the appropriate experimental procedure, operating the equipment correctly, in the analysis of phenomena within the scope of Engineering.
CA04	Ability to select advanced tools and techniques and their application in the field of Aeronautical Technical Engineering.
CA05	Knowledge of the methods, techniques and tools as well as their limitations in the application for the resolution of problems typical of Aeronautical Technical Engineering.
CA06	Ability to identify and assess the effects of any solution in the field of Aeronautical Technical Engineering within a broad and global context and the ability to interrelate the solution to an engineering problem with other variables beyond the technological field, which must be considered.
CB02	Apply their knowledge to their job or vocation in a professional manner and show that they have the competences to construct and justify arguments and solve problems within their subject area.
CB03	Be able to gather and process relevant information (usually within their subject area) to give opinions, including reflections on relevant social, scientific or ethical issues.
CB04	Transmit information, ideas, problems and solutions for both specialist and non-specialist audiences.
CB05	Have developed the necessary learning abilities to carry on studying autonomously
CE02	Understanding and command of the basic concepts of the general laws of mechanics, thermodynamics, fields and waves and electromagnetism and their application to solve engineering problems.
CE05	Capacity for spatial vision and knowledge of graphic representation techniques, both by traditional methods of metric geometry and descriptive geometry, and through computer-aided design applications.
CE08	knowledge of the thermodynamic cycles that generate mechanical power and thrust.
CE19	Applied knowledge of: materials science and technology; mechanics and thermodynamics; fluid mechanics; aerodynamics and mechanics of flight; air traffic and navigation systems; aerospace technology; structure theory; air Transport; economy and production; Projects; environmental impact.
CE20	Knowledge applied to Engineering of: The fundamentals of sustainability, maintainability and operability of space systems.
CE21	Knowledge applied to Engineering of: The fundamentals of fluid mechanics that describe flow in any regime and determine pressure distributions and aerodynamic forces.
CE22	Knowledge applied to Engineering: The concepts and laws that govern internal combustion, its application to rocket propulsion.
CE26	Applied knowledge of: aerodynamics; flight mechanics, air defense engineering (ballistics, missiles and air systems), space propulsion, materials science and technology, structural theory.
CG01	Capacity for the design, development and management in the field of aeronautical engineering that have as their object, in accordance with the knowledge acquired as established in section 5 of order CIN/308/2009, aerospace vehicles, propulsion systems aerospace, aerospace materials, airport infrastructures, air navigation infrastructures and any space, traffic and air transport management system.
CG02	Planning, drafting, direction and management of projects, calculation and manufacturing in the field of aeronautical engineering that have as their object, in accordance with the knowledge acquired as established in section 5 of order CIN/308/2009, aerospace vehicles, aerospace propulsion systems, aerospace materials, airport infrastructures, air navigation infrastructures and any space, traffic and air transport management system.
CG03	Installation, operation and maintenance in the field of aeronautical engineering that have as their object, in accordance with the knowledge acquired as established in section 5 of order CIN/308/2009, aerospace vehicles, aerospace propulsion systems, materials

CG04	aerospace, airport infrastructure, air navigation infrastructure and any space, traffic and air transport management system, Verification and Certification in the field of aeronautical engineering that have as their object, in accordance with the knowledge acquired as established in section 5 of order CIN/308/2009, aerospace vehicles, aerospace propulsion systems, aerospace materials , airport infrastructures, air navigation infrastructures and any space, traffic and air transport management system.
CG07	Ability to analyze and assess the social and environmental impact of technical solutions.
CG08	Knowledge, understanding and ability to apply the necessary legislation in the exercise of the profession of Aeronautical Technical Engineer.
CT01	Knowledge of technical vocabulary of subjects related to aerospace engineering, in a second foreign language.
CT03	Correct use of oral and written communication.
CT04	Knowledge of ethical commitment and professional ethics.

5. Objectives or Learning Outcomes

Course learning outcomes

Description

Knowledge of the design strategy of turbomachinery associated with propulsion systems.

Knowledge of the bleeding and equipment associated with the different propulsion systems.

Knowledge of the problems associated with the equipment of the propulsion system of vehicles in the aerospace field.

Knowledge of the problem and calculations associated with the external and internal fluid dynamics and aerodynamics of the different equipment and systems of vehicles in the aerospace field.

Knowledge of the devices and geometries conditioned by aerodynamics in the different aircraft systems.

6. Units / Contents

Unit 1:

Unit 2:

Unit 3:

Unit 4:

Unit 5:

Unit 6:

Unit 7:

Unit 8:

7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures	CA01 CA02 CA03 CA04 CA05 CA06 CB02 CB03 CB04 CB05 CE02 CE05 CE08 CE19 CE20 CE21 CE22 CE26 CG01 CG02 CG03 CG04 CG07 CG08 CT01 CT03 CT04	1.6	40	N	-	
Laboratory practice or sessions [ON-SITE]	Practical or hands-on activities	CA01 CA02 CA03 CA04 CA05 CA06 CB02 CB03 CB04 CB05 CE02 CE05 CE08 CE19 CE20 CE21 CE22 CE26 CG01 CG02 CG03 CG04 CG07 CG08 CT01 CT03 CT04	0.24	6	N	-	
Practicum and practical activities report writing or preparation [OFF-SITE]	Cooperative / Collaborative Learning	CA01 CA02 CA03 CA04 CA05 CA06 CB02 CB03 CB04 CB05 CE02 CE05 CE08 CE19 CE20 CE21 CE22 CE26 CG01 CG02 CG03 CG04 CG07 CG08 CT01 CT03 CT04	0.6	15	Y	Y	
Study and Exam Preparation [OFF-SITE]	Self-study	CA01 CA02 CA03 CA04 CA05 CA06 CB02 CB03 CB04 CB05 CE02 CE05 CE08 CE19 CE20 CE21 CE22 CE26 CG01 CG02 CG03 CG04 CG07 CG08 CT01 CT03 CT04	3	75	N	-	
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	CA01 CA02 CA03 CA04 CA05 CA06 CB02 CB03 CB04 CB05 CE02 CE05 CE08 CE19 CE20 CE21 CE22 CE26 CG01 CG02 CG03 CG04 CG07 CG08 CT01 CT03 CT04	0.4	10	N	-	
Final test [ON-SITE]	Assessment tests	CA01 CA02 CA03 CA04 CA05 CA06 CB02 CB03 CB04 CB05 CE02 CE05 CE08 CE19 CE20 CE21	0.16	4	Y	Y	

		CE22 CE26 CG01 CG02 CG03 CG04 CG07 CG08 CT01 CT03 CT04					
		Total:	6	150			
Total credits of in-class work: 2.4			Total class time hours: 60				
Total credits of out of class work: 3.6			Total hours of out of class work: 90				

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System			
Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Assessment of problem solving and/or case studies	20.00%	20.00%	
Practicum and practical activities reports assessment	10.00%	10.00%	
Final test	70.00%	70.00%	
Total:	100.00%	100.00%	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences).

9. Assignments, course calendar and important dates	
Not related to the syllabus/contents	
Hours	hours
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	6
Practicum and practical activities report writing or preparation [AUTÓNOMA][Cooperative / Collaborative Learning]	15
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	4
Unit 1 (de 8):	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	8
Study and Exam Preparation [AUTÓNOMA][Self-study]	15
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2
Unit 2 (de 8):	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Study and Exam Preparation [AUTÓNOMA][Self-study]	4
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	.5
Unit 3 (de 8):	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Study and Exam Preparation [AUTÓNOMA][Self-study]	3
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	.5
Unit 4 (de 8):	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	8
Study and Exam Preparation [AUTÓNOMA][Self-study]	15
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2
Unit 5 (de 8):	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Study and Exam Preparation [AUTÓNOMA][Self-study]	4
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	.5
Unit 6 (de 8):	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	8
Study and Exam Preparation [AUTÓNOMA][Self-study]	15
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2
Unit 7 (de 8):	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Study and Exam Preparation [AUTÓNOMA][Self-study]	4
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	.5
Unit 8 (de 8):	
Activities	Hours
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	2
Practicum and practical activities report writing or preparation [AUTÓNOMA][Cooperative / Collaborative Learning]	15
Study and Exam Preparation [AUTÓNOMA][Self-study]	8
Global activity	
Activities	hours

Class Attendance (theory) [PRESENCIAL][Lectures]	32
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	8
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	12
Practicum and practical activities report writing or preparation [AUTÓNOMA][Cooperative / Collaborative Learning]	30
Study and Exam Preparation [AUTÓNOMA][Self-study]	68
Total horas: 150	

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
	https://arc.aiaa.org/journal/jpp					ISSN 0748-4658
	https://www.sciencedirect.com/journal/propulsion-and-power-research					Open Access since 2012; ISSN 2212-540X
WILSON D.G. Y KORAKIANITIS T.	THE DESIGN OF HIGH-EFFICIENCY TURBOMACHINERY AND GAS TURBINES	MIT Press		0-13-312000-7	1998	