

Course guide

220033 - TFM - Manufacturing Technology and Maintenance

Last modified: 19/04/2023

Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 712 - EM - Department of Mechanical Engineering.

Degree: BACHELOR'S DEGREE IN AEROSPACE VEHICLE ENGINEERING (Syllabus 2010). (Compulsory subject).

Academic year: 2023 **ECTS Credits:** 4.5 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: José Antonio Ortiz Marzo

Others: José Antonio Ortiz Marzo
Rio Cano, Carlos (Pràctiques QT)

PRIOR SKILLS

Students should have mathematical problems solving ability, basic technical drawing capabilities and knowledge about science and technology of aerospace materials.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

CE21. Adequate and applied knowledge in engineering: fundamentals of sustainability, maintainability, and operability of aerospace vehicles. (Specific technology module: Aircraft)

Transversal:

02 SCS NE. SUSTAINABILITY AND SOCIAL COMMITMENT - Level 3. Taking social, economic and environmental factors into account in the application of solutions. Undertaking projects that tie in with human development and sustainability.

TEACHING METHODOLOGY

The teaching methodology is divided in three parts:

- Theoretical contents sessions.
- Lab sessions or Problem solving sessions.
- Autonomous work and homeworks.

In the theoretical sessions the professor will present the theoretical concepts

In the lab sessions, students will practice the knowledge acquired setting practical experiments or solving problems under the supervision of the professor. Possible visit to a company.

In each module a selfstudy time is required in order to assimilate the concepts and resolve the proposed exercises .

LEARNING OBJECTIVES OF THE SUBJECT

The main goal is to provide the tools and knowledge need to successfully develop any project related to aircraft and aerospace vehicles maintenance and production. In the class, all the contents related to design, manufacturing, maintenance and management, control and quality of aircrafts manufacturing will be covered.

STUDY LOAD

Type	Hours	Percentage
Hours large group	31,0	27.56
Self study	67,5	60.00
Hours small group	14,0	12.44

Total learning time: 112.5 h

CONTENTS

Quality control

Description:

In this module the student will learn the requirements of aerospace parts manufacturing in particular its quality especifications and how to control this quality requirements during the manufacturing process.

Specific objectives:

Aerospace requirements

Quality control: Metrology (measurement and verification), calibration, roughness.

Related activities:

Activity 1 - 2 - 3 - 5

Full-or-part-time: 23h

Theory classes: 10h

Laboratory classes: 3h

Self study : 10h

Basic Manufacturing Technologies I

Description:

This module the main aerospace manufacturing processes related to machining operations will be covered.

Specific objectives:

Knowledge of Machining operations (Turning, Drilling, Reaming, Threading) and Machine-tool.

Related activities:

Activity 1-2-4-5

Full-or-part-time: 31h

Theory classes: 12h

Practical classes: 4h

Self study : 15h

Basic Manufacturing Technologies II

Description:

This module the main aerospace manufacturing processes related to joining metal parts will be covered (Welding, Bonding estructural) and Prototyping technologies of plastic materials.

Specific objectives:

Theoretical and practical knowledge of component fixing processes and prototyping technics.

Related activities:

Activity 1-2-3-5

Full-or-part-time: 27h 30m

Theory classes: 12h

Practical classes: 3h

Self study : 12h 30m

Quality management in Aerospace Manufacturing

Description:

This module will cover all the processes needed to guarantee the quality and innovation in the maintenance and manufacturing of aerospace parts.

Specific objectives:

Accreditation and standardization.

Traceability.

Management of nonconformities. Audits.

Continuous improvement, aircraft certification.

Inspection and Maintenance.

Related activities:

Activity 1-2-4-5

Full-or-part-time: 31h

Theory classes: 12h

Laboratory classes: 4h

Self study : 15h



ACTIVITIES

THEORY SESSIONS

Description:

Description in class of the theoretical contents of the subject

Specific objectives:

After these classes, the student should have consolidated and acquired all the knowledges enumerated in the general learning goals of subject.

Material:

Basic and specific bibliography
Atenea Handouts

Delivery:

This activity is graded through two written exams: midterm (activity 3) and final (activity 4)

Full-or-part-time: 60h

Theory classes: 40h

Self study: 20h

LAB SESSIONS

Description:

In this activity the student will set up practical experiments related to the subject contents

Specific objectives:

Improve and use concepts related to aerospace metrology, machining and aircraft maintenance.

Material:

Bibliography and Lab guide.

Delivery:

Lab report by group.

It represents a part of the continuous assessment of the subject.

Full-or-part-time: 21h 30m

Practical classes: 7h 30m

Laboratory classes: 14h

MIDTERM EXAM

Description:

Individual test related to the acquired contents.

Specific objectives:

Contents related to module 1 and 2.

Material:

Exam and handouts provided

Delivery:

Solved exam is handed to the professor

It is part of continuous evaluation systems

Full-or-part-time: 12h

Theory classes: 2h

Self study: 10h



FINAL EXAM

Description:

Individual test related to the acquired contents.

Specific objectives:

Contents related to module 3 and 4

Material:

Exam and handouts provided

Delivery:

Solved exam is handed to the professor

It is part of continuous evaluation systems

Full-or-part-time: 12h

Theory classes: 2h

Self study: 10h

PROBLEM/WORK PROPOSED

Description:

Solve a practical problem and work proposed in ATENEA in order to fix the contents developed in the theoretical sessions.

Specific objectives:

Active learning through problems and projects.

Material:

Problem/Work posted in ATENEA

Delivery:

Handout the solution of problem/work by group, through ATENEA

Full-or-part-time: 7h

Theory classes: 2h

Self study: 5h

GRADING SYSTEM

Activity 2 (Lab sessions), weight: 20%

Activity 3 (Midterm test), weight: 30%

Activity 4 (Final test), weight: 30%

Activity 5 (Proposal Homework/Work), weight: 20%

The result of unsatisfactory Activity 3 (partial exam) can redirect through a written test to be held on the day fixed for the final exam scheduled on the same track (3 hours). This test can be accessed by students with a grade of less than 5 self assessment). The rating of the test will be between 0 and 10, will have the weight corresponding to that activity. The grade for the application of renewal replace the initial qualification provided that it is superior.

EXAMINATION RULES.

All activities are compulsory.



BIBLIOGRAPHY

Basic:

- Kalpakjian, S.; Schmid, S.R. Manufactura, ingeniería y tecnología [on line]. 7ª ed. México [etc.]: Pearson Educación, 2014 [Consultation: 20/09/2022]. Available on: https://www.ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=5323.
- Campbell, F.C. Manufacturing technology for aerospace structural materials [on line]. Amsterdam: Elsevier, 2006 [Consultation: 20/09/2022]. Available on: <https://www.sciencedirect-com.recursos.biblioteca.upc.edu/book/9781856174954/manufacturing-technology-for-aerospace-structural-materials>. ISBN 1856174956.

RESOURCES

Other resources:

Throughout the course, Internet links are given to check and copies of articles to read that complement the explanations given in class.