Universitat Autònoma de Barcelona

2023/2024

Maintenance, Maintainability and Reliability

Code: 101740
ECTS Credits: 6

Degree	Type	Year	Semester
2501233 Aeronautical Management	OT	4	1

Contact

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Teaching groups languages

You can check it through this link. To consult the language you will need to enter the CODE of the subject.
Please note that this information is provisional until 30 November 2023.

Prerequisites

Basic statistical knowledge is recommended as well as the ability to read (and understand) technical texts in English.

Objectives and Contextualisation

It is widely known by professionals in the industrial sector that the incorporation of Reliability, Availability and Maintainability characteristics in the design stage of a system and its components is the best way to ensure that this system has an adequate long-term cost-effectiveness ratio. Under this motivation, this subject aims to study the main theoretical foundations associated with the concepts of reliability, availability and maintainability, and their relationship with the effectiveness of the systems.Likewise, the concept of airworthiness and the European EASA regulations will be studied in what refers to Maintenance Centers Part 145 and Airworthiness Organizations (CAMO). Additionally, its application will be applied to practical cases.

Competences

- Apply specific software for solving problems in the aeronautical sector.
- Communication.
- Identify, develop and maintain the necessary resources to meet the tactical and operative needs inherent to air transport activities.
- Personal attitude.
- Personal work habits.
- Thinking skills.

- Use knowledge of the fundamental principles of mathematics, economics, information technologies and psychology of organisations and work to understand, develop and evaluate the management processes of the different systems in the aeronautical sector.
- Work in teams.

Learning Outcomes

1. Accept and respect the role of the various team members and the different levels of dependence within the team.
2. Carry out system-reliability studies.
3. Communicate knowledge and findings efficiently, both orally and in writing, both in professional situations and with a non-expert audience.
4. Critically assess the work done.
5. Develop critical thought and reasoning.
6. Develop curiosity and creativity.
7. Develop independent learning strategies.
8. Develop scientific thinking skills.
9. Develop systemic thinking.
10. Develop the ability to analyse, synthesise and plan ahead.
11. Draw up a maintenance plan for a system.
12. Generate innovative and competitive proposals in professional practice.
13. Identify the principles behind system reliability and maintainability.
14. Identify, manage and resolve conflicts.
15. Make decisions.
16. Make efficient use of ICT in communicating ideas and results.
17. Manage a system's maintenance operations.
18. Manage information, critically appraising innovations in the field, and analyse future trends.
19. Manage time and available resources. Work in an organised manner.
20. Prevent and solve problems.
21. Use specific software for maintenance management.
22. Work cooperatively.
23. Work independently.

Content

PART I: BASICS OF MAINTENANCE

1. Fundamental concepts of Maintenance
1.1. Time of life
1.2. reliability function
1.3. half life
1.4. failure rate
1.5. Entropy of systems
1.6. Thermodynamics applied to systems

2. Process Maintenance
2.1. Limited Life Components
2.2. Unlimited life components
2.3. Modifications
2.4. Component Upgrade

PART II: COMPONENTS IN AIRCRAFT

3. ANALYSIS OF MAINTENANCE COMPONENTS BY PROCESSES
3.1. Hard Time Components
3.2. On Condition Components

4. STATISTICAL ANALYSIS OF COMPONENTS
4.1. Components in Condition Monitoring
4.2. Statistical component tracking systems

5. MSG WORK GROUPS
5.1. Definition of the Maintenance Steering Group
5.2. Development of MSG over the year

PART III: AIRCRAFT MAINTENANCE UNDER EASA REGULATIONS

6. AIRCRAFT MAINTENANCE PROGRAMS
6.1. Basic definitions
6.2. Maintenance intervals
6.3. Analysis of pre-flight, post-flight and line maintenance
6.4. Hourly maintenance analysis
6.5. Analysis of maintenance cycles
6.6. Preventive Maintenance
6.7. Scheduled maintenance
6.8. Corrective maintenance
6.9. Aircraft maintenance manuals. Practical examples of different aircrat

7. EUROPEAN AIRCRAFT MAINTENANCE REGULATIONS (I)
7.1. Introduction to Regulation 2042/2003
7.2. Regulations applicable to EASA Centers Part 145
7.3. Organization Part 145 Centers and Postholders
7.4. EOM elaboration
7.5. Scope and Qualifications of Part 145 Centers

8. EUROPEAN AIRCRAFT MAINTENANCE REGULATIONS (II)
8.1. Regulation for the Continuous Airworthiness Maintenance Organizat

8.2. Organization CAMO

8.3. Organization Managers and Postholders
8.4. CAME elaboration
8.5. New applicable regulations

8.6. CAO Party

9. EUROPEAN AIRCRAFT MAINTENANCE REGULATIONS (III)
9.1. Definition Qualification and Qualification
9.2. Analysis Part 66 Aircraft Maintenance Technicians licenses

PART IV: ANALYSIS OF PART 145 AND CAMO MANUALS

10. MANUAL PRODUCTION PROCEDURE
10.1. MOE for organizations Part 145
10.2. CAME for organizations CAMO / CAO
10.3. Application examples in real cases

11. REVIEW OF SCIENTIFIC ARTICLES ON AIRWORTHINESS AND MAINTENANCE
11.1. Articles on maintenance management in the aeronautical industry
11.2. Articles on continuing airworthiness management in the aviation inc

Methodology

Teaching will be offered on campus or in an on-campus and remote hybrid format depending on the number of students per group and the size of the rooms at 50% capacity.

The methodology of the subject is based on a combination of theoretical and practical classes. During the theoretical classes, the professor will present the fundamental concepts of the assignment, whereas, in the practical classes, students will be those who, working individually or in small groups, will carry out the activities and exercises proposed during the course.

Will be encouraged to work in collaborative groups, the use of ICTs, and also the use of specialized software (eg: R, MINITAB, Excel, SREMS, SAEDES, etc.).

The proposed teaching methodology may undergo some modifications according to the restrictions imposed by the health authorities on on-campus courses.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Practical sessions (Classroom & Labs)	24	0.96	4, 8, 9, 10, 6, 5, 11, 2, 12, 17, 18, 13, 14, 15, 20, 22, 21
Theoretical sessions	26	1.04	3, 8, 9, 10, 6, 5, 11, 2, 16, 17, 18, 13, 21
Type: Supervised			
Tutorship	18	0.72	7, 10, 6, 5, 11, 2, 12, 17, 18, 13, 20, 23, 21
Type: Autonomous			
Study	80	3.2	1, 4, 3, 7, 11, 2, 17, 19, 13, 15, 20, 22, 23, 21

Assessment

The proposed evaluation activities may undergo some changes according to the restrictions imposed by the health authorities on on-campus courses.

See description in Spanish or Catalan

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Lab practices	40%	0	0	1, 4, 3, 8, 9, 7, 10, 6, 5, 11, 2, 16, 17, 19, 13, 15, 20, 22, 23, 21
Problem-solving	20%	0	0	1, 4, 3, 8, 9, 7, 10, 6, 5, 11, 2, 16, 12, 17, 19, 18, 13, 14, 15, 20, 22, 23, 21
Theoretical exams	40%	2	0.08	4, 3, 8, 9, 7, 10, 6, 5, 11, 2, 12, 17, 19, 18, 13, 15, 20, 23

Bibliography

- González Fernández, Francisco Javier. Teoría y Práctica del Mantenimiento Industrial Avanzado. FC (Fundación Confemetal) Editorial, Madrid, 2003.
- Kister, Timothy C. & Hawkins, Bruce. Maintenance Planning and SchedulingHandbook.Elsevier, Oxford, 2006.
- Sols, Alberto. Fiabilidad, Mantenibilidad, Efectividad. Un Enfoque Sistémico. Publicaciones de la Universidad Pontificia Comillas, Madrid, 2000.
- Wolstenholme, Linda C. Reliability Modelling. A Statistical Approach. Chapman & Hall/CRC, 1999.

Software