

## Course guide

### 330100 - GM - Maintenance Management

Last modified: 07/09/2026

**Unit in charge:** Manresa School of Engineering  
**Teaching unit:** 712 - EM - Department of Mechanical Engineering.

**Degree:** BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Optional subject).  
BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Optional subject).  
BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2016). (Optional subject).  
BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2016). (Optional subject).  
BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2016). (Optional subject).  
BACHELOR'S DEGREE IN MINING ENGINEERING (Syllabus 2016). (Optional subject).  
BACHELOR'S DEGREE IN AUTOMOTIVE ENGINEERING (Syllabus 2017). (Optional subject).  
BACHELOR'S DEGREE IN MINERAL RESOURCE ENGINEERING AND MINERAL RECYCLING (Syllabus 2021). (Optional subject).

**Academic year:** 2026    **ECTS Credits:** 6.0    **Languages:** English

#### LECTURER

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**Coordinating lecturer:** HÉCTOR SANZ FRAILE

**Others:** JOSE ORTUÑO MARTIN - ESTEBAN PEÑA PITARCH

#### DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

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**Specific:**

1. Knowledge and skills for maintenance management.
2. Increase their opinions and those of third parties in a logical and coherent way in multilingual contexts. Use technical-scientific terminology related to maintenance management in different languages, especially English.
3. Write technical reports and projects related to the maintenance of products, industrial machines and facilities.

**Transversal:**

4. TEAMWORK - Level 3. Managing and making work groups effective. Resolving possible conflicts, valuing working with others, assessing the effectiveness of a team and presenting the final results.
5. THIRD LANGUAGE. Learning a third language, preferably English, to a degree of oral and written fluency that fits in with the future needs of the graduates of each course.

#### TEACHING METHODOLOGY

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- Teaching methodology: Participatory sessions focused on the analysis and application of real maintenance service tender documents. Students will take an active role in the interpretation and development of a comprehensive maintenance contract, from the initial tender phase to the final handover of services. Key concepts such as preventive, corrective, statutory, and operational maintenance will be introduced and applied. The course follows a hands-on, practice-oriented approach, enabling students to identify the critical components of maintenance management and to design a realistic and implementable maintenance plan.
- Learning activities: Completion of tasks and problem-solving exercises in class, including submission of supporting reports, both individually and in groups.
- Autonomous and guided work: Time dedicated to self-study, task preparation, and team projects, supported by academic tutoring when needed.
- Assessment methods: Written exams, submission of practical assignments and reports, and active participation in applied sessions.

## LEARNING OBJECTIVES OF THE SUBJECT

Upon completion of this course, the student must be able to:

- Acquire basic theoretical knowledge about maintenance management.
- Apply the main tools and methodology that facilitate, in each of the phases of industrial maintenance, the fulfillment of objectives in order to achieve the satisfaction of customer needs.
- Model maintenance systems.
- Plan, manage and analyze maintenance management.

## STUDY LOAD

| Type              | Hours | Percentage |
|-------------------|-------|------------|
| Hours large group | 30,0  | 20.00      |
| Hours small group | 30,0  | 20.00      |
| Self study        | 90,0  | 60.00      |

**Total learning time:** 150 h

## CONTENTS

### Content Title 1: Introduction to Maintenance Management

#### Description:

The maintenance function, maintenance action areas and their organization. Types and levels of maintenance. Advantages, disadvantages and applications of each type of maintenance.

#### Related activities:

A1.

#### Full-or-part-time: 10h

Theory classes: 3h

Laboratory classes: 1h

Self study : 6h

### Content Title 2: Team Management

#### Description:

Equipment classification, machine dossier, machine historical file, type of spare parts and other materials.

#### Related activities:

A2.

#### Full-or-part-time: 10h

Theory classes: 3h

Laboratory classes: 1h

Self study : 6h

### Content Title 3: Human Resources Management

**Description:**

Maintenance Organization Chart. Functions. Cash. Staff training. Work climate: TPM. Maintenance Outsourcing. Safety at work.

**Related activities:**

A3.

**Full-or-part-time:** 10h

Theory classes: 3h

Laboratory classes: 1h

Self study : 6h

### Content Title 4: Job Management

**Description:**

Establishment of a maintenance plan. Failure Modes and Effects Analysis (FMEA). Maintenance planning and scheduling. Planning and scheduling of works. Execution of works.

**Related activities:**

A4.

**Full-or-part-time:** 10h

Theory classes: 3h

Laboratory classes: 1h

Self study : 6h

### Content Title 5: Corrective Maintenance

**Description:**

Bankruptcy analysis in mechanical components. Analysis of breakdowns in process machines. Mechanisms and forms of wear. Surface treatment techniques. Analysis for system breakdowns. Tools for breakdown analysis.

**Related activities:**

A5.

**Full-or-part-time:** 40h

Theory classes: 12h

Laboratory classes: 4h

Self study : 24h

### Content Title 6: Preventive Maintenance

**Description:**

Definition and basic principles. Parameters for state control. Establishment of a preventive maintenance system. Preventive maintenance techniques.

**Related activities:**

A6.

**Full-or-part-time:** 40h

Theory classes: 12h

Laboratory classes: 4h

Self study : 24h



### Content Title 7: Predictive Maintenance

**Description:**

Definition and basic principles. Parameters for state control. Establishment of a predictive maintenance system. Predictive maintenance techniques.

**Related activities:**

The implementation of a preventive maintenance system will be designed.

**Full-or-part-time:** 30h

Theory classes: 9h

Laboratory classes: 3h

Self study : 18h

## ACTIVITIES

### TITLE OF ACTIVITY 1: ANALYSIS OF A MAINTENANCE CONTRACT

**Description:**

Students will examine a real technical specification document related to a maintenance service contract, with the aim of identifying the operational needs and resources required for proper contract execution.

**Specific objectives:**

Upon completion of this activity, students should be able to interpret a technical maintenance tender document and understand how to initiate its management in a structured and effective way.

**Material:**

Tender notice and specific technical requirements

**Delivery:**

Students must prepare a report of the practice carried out, according to the instructions indicated and deliver to the teacher in the set time.

The evaluation of this activity together with the other activities will form part of the evaluation as specified in the corresponding section of the qualification system.

**Full-or-part-time:** 4h

Laboratory classes: 1h

Self study: 3h

## TITLE OF ACTIVITY 2: TEAM MANAGEMENT

**Description:**

A model for the classification of equipment, machine dossier, machine historical file, type of spare parts and other materials will be created.

**Specific objectives:**

Once the activity is finished, the student must be able to manage the maintenance teams.

**Material:**

Practice guide (available on the digital Campus) and teacher's notes.

**Delivery:**

Students must prepare a report of the practice carried out, according to the instructions indicated and deliver to the teacher in the set time.

The evaluation of this activity together with the other activities will form part of the evaluation as specified in the corresponding section of the qualification system.

**Full-or-part-time:** 4h

Laboratory classes: 1h

Self study: 3h

## TITLE OF ACTIVITY 3: MANAGEMENT OF HUMAN RESOURCES

**Description:**

Creation and interpretation of a maintenance organization chart.

**Specific objectives:**

Once the activity is finished, the student must be able to interpret any maintenance flowchart.

**Material:**

Practice guide (available on the digital Campus) and teacher's notes.

**Delivery:**

Students must prepare a report of the practice carried out, according to the instructions indicated and deliver to the teacher in the set time.

The evaluation of this activity together with the other activities will form part of the evaluation as specified in the corresponding section of the qualification system.

**Full-or-part-time:** 4h

Laboratory classes: 1h

Self study: 3h

#### TITLE OF ACTIVITY 4: JOB MANAGEMENT

**Description:**

Study of an AMFE model.

**Specific objectives:**

Once the activity is finished, the student must be able to size axes.

**Material:**

Practice guide (available on the digital Campus) and teacher's notes.

**Delivery:**

Students must prepare a report of the practice carried out, according to the instructions indicated and deliver to the teacher in the set time.

The evaluation of this activity together with the other activities will form part of the evaluation as specified in the corresponding section of the qualification system.

**Full-or-part-time:** 10h

Laboratory classes: 1h

Self study: 9h

#### TITLE OF ACTIVITY 5: CORRECTIVE MAINTENANCE

**Description:**

Study of a corrective maintenance model.

**Specific objectives:**

Once the activity is finished, the student must be able to study and create a corrective maintenance.

**Material:**

Practice guide (available on the digital Campus) and teacher's notes.

**Delivery:**

Students must prepare a report of the practice carried out, according to the instructions indicated and deliver to the teacher in the set time.

The evaluation of this activity together with the other activities will form part of the evaluation as specified in the corresponding section of the qualification system.

**Full-or-part-time:** 12h

Laboratory classes: 3h

Self study: 9h

#### TITLE OF ACTIVITY 6: PREVENTIVE MAINTENANCE

**Description:**

Study of a predictive maintenance model.

**Specific objectives:**

Once the activity is finished, the student must be able to study and create preventive maintenance.

**Material:**

Practice guide (available on the digital Campus) and teacher's notes.

**Delivery:**

Students must prepare a report of the practice carried out, according to the instructions indicated and deliver to the teacher in the set time.

The evaluation of this activity together with the other activities will form part of the evaluation as specified in the corresponding section of the qualification system.

**Full-or-part-time:** 12h

Laboratory classes: 3h

Self study: 9h

#### TITLE OF ACTIVITY 7: PREDICTIVE MAINTENANCE

**Description:**

Study of a preventive maintenance model.

**Specific objectives:**

Once the activity is finished, the student must be able to study and create predictive maintenance.

**Material:**

Practice guide (available on the digital Campus) and teacher's notes.

**Delivery:**

Students must prepare a report of the practice carried out, according to the instructions indicated and deliver to the teacher in the set time.

The evaluation of this activity together with the other activities will form part of the evaluation as specified in the corresponding section of the qualification system.

**Full-or-part-time:** 11h

Laboratory classes: 2h

Self study: 9h

## GRADING SYSTEM

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Any academic fraud, plagiarism or use or possession of unauthorised means in an assessment activity leads to a mark of zero (0) for the affected test or assignment. Furthermore, in accordance with the University's regulations, if disciplinary proceedings are initiated the subject is recorded as "Pending Assessment" until a decision is reached. These incidents are managed in accordance with the [Action Framework for Academic Integrity in Assessment at the UPC](#).

- Submission of proposed problems and activities: 30% of the final grade.
- First individual continuous assessment test: 35% of the final grade.
- Second individual continuous assessment test: 35% of the final grade.

Thus, the Grade for Written Tests (GWT) will be calculated as:

$$\text{GWT} = 35\% (\text{First test}) + 35\% (\text{Second test}) + 30\% (\text{Problems and activities submission})$$

The partial written tests are eliminatory. If the student obtains a  $\text{GWT} \geq 5$ , they will be exempt from taking the final exam.

Students who do not pass the course through continuous assessment, or those who wish to improve their grade, will have a second opportunity through a final written exam.

In this case, the Final Exam Grade (FEG) will be calculated as:

$$\text{FEG} = 70\% (\text{Final exam}) + 30\% (\text{Problems and activities submission})$$

## EXAMINATION RULES.

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- In solving the proposed problems, students must apply the content covered in class. They may clarify doubts or difficulties with the instructor before the submission deadline. This deadline will be communicated in advance, and no submissions will be accepted after the due date.
- Submitted reports must be entirely original. Plagiarism or copying, either partial or total, will result in the failure of both the activity and the course. Responsibility for the activity lies with all group members; therefore, if plagiarism is detected, all participants involved, both those copying and those allowing copying, will be equally penalised.
- For the problem set submissions, any partial or total copying of solutions will lead to a failing grade for the activity. Students are expected to protect their personal data and academic materials.
- If a student is found to have copied during a written exam, they will receive a failing grade for the course.
- No formula sheets or notes may be used during any written exams (midterms or final), unless explicitly authorised in advance.

## BIBLIOGRAPHY

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### Complementary:

- Mobley, R. K., ed. Maintenance engineering handbook [on line]. 8th ed. New York: McGraw-Hill, 2014 [Consultation: 12/09/2025]. Available on: <https://www-accessengineeringlibrary-com.recursos.biblioteca.upc.edu/content/book/9780071826617>. ISBN 9780071826617.
- Kelly, A.; Harris, M. J. Management of industrial maintenance. London: Butterworths, 1987. ISBN 040801377X.
- Bloch, H. P.; Geitner, F. K. Machinery failure analysis and troubleshooting [on line]. 2nd ed. Houston: Gulf, 1994 [Consultation: 25/11/2022]. Available on: <https://www-sciencedirect-com.recursos.biblioteca.upc.edu/book/9780123860453/machinery-failure-analysis-and-troubleshooting>. ISBN 0872012328.
- Monchy, F. Teoría y práctica del mantenimiento industrial. Barcelona: Masson, 1990. ISBN 8431105240.
- Navarro Elola, L.; Pastor Tejedor, A. C.; Mugaburu Lacabrera, J. M. Gestión integral de mantenimiento [on line]. Barcelona: Marcombo, 1997 [Consultation: 27/05/2022]. Available on: <https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?docID=3185475>. ISBN 8426711219.