340220 - TMDM-E7P09 - Maintenance and Diagnosis Techniques for Electric Engines and Drives

Coordinating unit: 340 - EPSEVG - Vilanova i la Geltrú School of Engineering
Teaching unit: 709 - EE - Department of Electrical Engineering
Academic year: 2017
Degree: BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Teaching unit Optional)
ECTS credits: 6
Teaching languages: Catalan, Spanish

Teaching staff
Coordinator: JOSE ANTONIO SANCHEZ LOPEZ

Degree competences to which the subject contributes

Specific:
1. CE33. Knowledge of different types of industrial maintenance and techniques of diagnosis of breakdowns.

Transversal:
2. SELF-DIRECTED LEARNING - Level 3. Applying the knowledge gained in completing a task according to its relevance and importance. Deciding how to carry out a task, the amount of time to be devoted to it and the most suitable information sources.

Teaching methodology

In the theory classes, expose and develop the theoretical concepts of the matters scheduled. In the theoretical classes apart from the corresponding explanations will develop activities to encourage participation, discussion and critical analysis by students.
- In class exercises plan and solve problems relating to the matters addressed.
- Within hours of laboratory students perform practices that are required and delivered the related report of the activity along with appropriate calculations and critical considerations.
- There will be a group work during the year related to a specific topic of the course.

Learning objectives of the subject

It is intended that the student knows the importance of representing the industrial maintenance of production systems and support the different techniques that can be used to detect faults, besides the study of reliability of components, equipment and systems that form a production system.
### Study load

<table>
<thead>
<tr>
<th>Total learning time: 150h</th>
<th>Hours large group: 45h 30.00%</th>
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<tr>
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<td>Hours medium group: 0h 0.00%</td>
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<td></td>
<td>Hours small group: 15h 10.00%</td>
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<td></td>
<td>Guided activities: 0h 0.00%</td>
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<td>Self study: 90h 60.00%</td>
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| **Basic principles of the industrial maintenance** | **Learning time:** 24h 30m  
Theory classes: 9h 30m  
Self study : 15h |
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<tbody>
<tr>
<td><strong>Description:</strong></td>
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</table>
1.1 Introduction to the maintenance.  
1.2 Type of maintenance.  
1.3 Study of the lack.  
1.4 Analysis of maintenance costs.  
1.5 Data to gather. |
| **Related activities:** | Theory classes 1, 2,3,4,5 |
| **Specific objectives:** | To present the purpose the maintenance, the types of maintenance according to the characteristics of the industrial system and the tools for its control. |

| **Reliability** | **Learning time:** 38h  
Theory classes: 6h  
Practical classes: 7h 30m  
Self study : 24h 30m |
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<tr>
<td><strong>Description:</strong></td>
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2.1 Concepts of reliability.  
2.2 Reliability with constant failure rate. Exponential model.  
2.3 Reliability with nonconstant failure rate. Weibull model.  
2.4 Reliability of systems. |
| **Specific objectives:** | To apply the calculation of reliability in concepts of industrial maintenance. |
# Techniques of measurement

**Description:**
- 3.1 Electronic equipment.
- 3.2 Equipment for the analysis of the isolation.
- 3.2 Transducers.

**Specific objectives:**
To know the different techniques to measure the most important parameters that they are used in the maintenance.

<table>
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<tr>
<th>Techniques of measurement</th>
<th>Learning time: 15h</th>
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<tbody>
<tr>
<td></td>
<td>Theory classes: 6h</td>
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<td>Self study: 9h</td>
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<table>
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<tr>
<th>Analysis of vibrations</th>
<th>Learning time: 35h</th>
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<tr>
<td></td>
<td>Theory classes: 6h</td>
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<td></td>
<td>Laboratory classes: 8h</td>
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<td>Self study: 21h</td>
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**Description:**
- 4.1 Analysis of vibrations.
- 4.2 Analysis of the characteristics.
- 4.3 Interpretation of the data.

**Specific objectives:**
To introduce the techniques of the analysis of vibrations applied to the maintenance.
### Other techniques of maintenance

**Description:**
- 5.1 Thermography.
- 5.2 Analysis of currents.
- 5.3 Acoustics.

**Specific objectives:**
To use the different techniques from maintenance that exist at the moment within the market, to be able to apply most suitable in each case.

**Learning time:** 27h 30m
- Theory classes: 8h
- Practical classes: 4h
- Self study: 15h 30m

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### Implantation of a maintenance system

**Description:**
- 6.1 Description of the plant.
- 6.2 Steps to implement the system.
- 6.3 Selection of the techniques.
- 6.4 Organization of the implantation.
- 6.5 Valuation of the system.

**Specific objectives:**
To plan the implantation of a system of maintenance from an example being followed the correct steps, so that their implantation is effective.

**Learning time:** 6h
- Theory classes: 2h
- Self study: 4h

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### Qualification system

\[ NF = 0.30 \ C_1 + 0.5 \ C_2 + 0.1 \ 0.1 \ P + T \]

- \( C_1 \) = Note of the partial test.
- \( C_2 \) = Note of the final test.
- \( P \) = Practical Note.
- \( T \) = Work in group.
Bibliography

Basic:


Complementary: