205063 - Dynamic Analysis of Structures

Coordinating unit: 205 - ESEIAAT - Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 737 - RMEE - Department of Strength of Materials and Structural Engineering
Academic year: 2017
Degree: MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2013). (Teaching unit Optional)
MASTER'S DEGREE IN AERONAUTICAL ENGINEERING (Syllabus 2014). (Teaching unit Optional)
ECTS credits: 3  
Teaching languages: English

Teaching staff
Coordinator: Weyler Perez, Rafael
Others: Hernández Rojas, Súilio Eliud
Guanchez Reyes, Edinson

Teaching methodology
Theoretical and practical sessions in which the instructor introduces the theoretical basis of the concepts, methods and results and illustrates them with examples appropriate to facilitate their understanding, and problem-based learning sessions. The instructor will provide the syllabus and monitoring of activities (ATENEA).

Learning objectives of the subject

a

Study load

<table>
<thead>
<tr>
<th>Total learning time: 75h</th>
<th>Hours large group:</th>
<th>27h</th>
<th>36.00%</th>
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<tbody>
<tr>
<td>Hours medium group:</td>
<td>0h</td>
<td>0.00%</td>
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<td>Hours small group:</td>
<td>0h</td>
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<td>Guided activities:</td>
<td>0h</td>
<td>0.00%</td>
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<tr>
<td>Self study:</td>
<td>48h</td>
<td>64.00%</td>
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## Content

### Module 1: Equation of motion of discrete systems

**Learning time:** 10h  
Theory classes: 4h  
Self study: 6h

**Description:**

**Related activities:**
Theoretical and practical sessions.

### Module 2: Free Vibration

**Learning time:** 22h  
Theory classes: 8h  
Self study: 14h

**Description:**
Eigenvalues, Eigenvector, Modes of vibration, Orthogonality Relations. Modal analysis. systems of n degrees of freedom

**Related activities:**
Theoretical and practical sessions.

### Module 3: Forced Vibration

**Learning time:** 25h  
Theory classes: 9h  
Self study: 16h

**Description:**
Principal coordinates, response to harmonic load, resonance, critical damping. response to seismic movements, Modal Analysis, Spectral Analysis, Directional Combination. Systems of n degrees of freedom.

**Related activities:**
Theoretical and practical sessions.
Module 4: Software Applications

Description:
2d and 3d models, frame element, area element, finite element method applications, materials, sections, system loads, rigid and flexible diaphragms, vibrations functions, spectrum cases, spectral analysis, dynamic response of buildings.

Related activities:
Theoretical and practical sessions.

Learning time: 18h
Theory classes: 6h
Self study: 12h

Qualification system
Partial exam 25 %
Final Exam 40 %
Task assignments 20 %
Proposed activity 15 %

Bibliography