### 250704 - Structural Dynamics

**Coordinating unit:** 250 - ETSECCPB - Barcelona School of Civil Engineering  
**Teaching unit:** 751 - DECA - Department of Civil and Environmental Engineering  
**Academic year:** 2019  
**Degree:** MASTER'S DEGREE IN STRUCTURAL AND CONSTRUCTION ENGINEERING (Syllabus 2015). (Teaching unit Optional)  
**ECTS credits:** 5  
**Teaching languages:** Spanish

#### Degree competences to which the subject contributes

**Specific:**
- 13364. To conceive and design civil and building structures that are safe, durable, functional and integrated into its surroundings.  
- 13365. Designing and building using traditional materials (reinforced concrete, prestressed concrete, structural steel, masonry, wood) and new materials (composites, stainless steel, aluminum, shape memory alloys?).  
- 13369. To apply methods and advanced design software and structural calculations, based on knowledge and understanding of forces and their application to the structural types of civil engineering.

**General:**
- 13360. To conceive, design, analyze and manage structures or structural elements of civil engineering or building, encouraging innovation and the advance of knowledge.  
- 13361. To develop, improve and use conventional materials and new construction techniques to ensure the safety requirements, functionality, durability and sustainability.

#### Learning objectives of the subject

**Study load**

<table>
<thead>
<tr>
<th><strong>Total learning time:</strong> 125h</th>
<th>Hours large group: 19h 30m 15.60%</th>
<th>Hours medium group: 9h 45m 7.80%</th>
<th>Hours small group: 9h 45m 7.80%</th>
<th>Guided activities: 6h 4.80%</th>
<th>Self study: 80h 64.00%</th>
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## Content

<table>
<thead>
<tr>
<th>Topic</th>
<th>Learning time</th>
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<tbody>
<tr>
<td>Basis of structural dynamics</td>
<td>6h 14m</td>
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<tr>
<td>Formulation of the equation of motion. Dynamic response of a system of 1 DoF</td>
<td>39h 21m</td>
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<tr>
<td>Formulation of the equation of motion. Dynamic response of a system with N DoF</td>
<td>33h 36m</td>
</tr>
<tr>
<td>Introduction to the dynamics of non-linear structure</td>
<td>14h 23m</td>
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- **Theory classes:**
  - Basis of structural dynamics: 2h 36m
  - Formulation of the equation of motion. Dynamic response of a system of 1 DoF: 4h 42m
  - Formulation of the equation of motion. Dynamic response of a system with N DoF: 6h
  - Introduction to the dynamics of non-linear structure: 4h

- **Practical classes:**
  - Basis of structural dynamics: 4h 42m
  - Formulation of the equation of motion. Dynamic response of a system of 1 DoF: 4h 42m
  - Formulation of the equation of motion. Dynamic response of a system with N DoF: 6h
  - Introduction to the dynamics of non-linear structure: 1h

- **Laboratory classes:**
  - Basis of structural dynamics: 7h
  - Formulation of the equation of motion. Dynamic response of a system of 1 DoF: 7h
  - Formulation of the equation of motion. Dynamic response of a system with N DoF: 2h
  - Introduction to the dynamics of non-linear structure: 1h

- **Self study:**
  - Basis of structural dynamics: 3h 38m
  - Formulation of the equation of motion. Dynamic response of a system of 1 DoF: 22h 57m
  - Formulation of the equation of motion. Dynamic response of a system with N DoF: 19h 36m
  - Introduction to the dynamics of non-linear structure: 8h 23m
**Bibliography**

**Basic:**


**Complementary:**

