

205052 - Design and Behavior of Special 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: 2019
 Degree: MASTER'S DEGREE IN AERONAUTICAL ENGINEERING (Syllabus 2014). (Teaching unit Optional)
 MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2013). (Teaching unit Optional)
 MASTER'S DEGREE IN SPACE AND AERONAUTICAL ENGINEERING (Syllabus 2016). (Teaching unit Optional)
 ECTS credits: 3 Teaching languages: English

Teaching staff

Coordinator: Weyler Perez, Rafael
 Others: Guanchez Reyes, Edinson
 Hernández Rojas, Suilio Eliud

Teaching methodology

The instructor introduces the theoretical concepts associated with the behavior of special structures with examples and practical sessions for a better understanding. The analysis and design methods are explained using practical cases combined with last generation software's.

The practical sessions are focused on solving numerical examples and propose solutions for real cases associated with design and construction of special structures for engineering applications.

Learning objectives of the subject

Study load

Total learning time: 75h	Hours large group:	27h	36.00%
	Hours medium group:	0h	0.00%
	Hours small group:	0h	0.00%
	Guided activities:	0h	0.00%
	Self study:	48h	64.00%

205052 - Design and Behavior of Special Structures

Content

<p>Module 1: Introduction</p>	<p>Learning time: 4h Theory classes: 2h Self study : 2h</p>
<p>Description: Definitions and terminology, behavior of special structures, design philosophy, design requirements, engineering applications, state of art on design processes for non-conventional structures, introduction to software capabilities, suggested readings.</p> <p>Related activities: Theoretical and practical sessions.</p>	
<p>Module 2: Analysis and design of long span structures (Reinforced and Prestressed Concrete)</p>	<p>Learning time: 17h 30m Theory classes: 6h 30m Self study : 11h</p>
<p>Description: Basic concepts, typical construction procedures, structural behavior, elastic properties of materials. Flexural, shear and combined stresses analysis. Design process for practical purposes. Advantages and limitations regarding the using of concrete for long span structures. Introduction to analysis and design of bridges for industrial purposes. Analysis of real cases using last generation software.</p> <p>Related activities: Theoretical and practical sessions</p>	
<p>Module 3: Analysis and design of long span structures (Steel and Composite Structures)</p>	<p>Learning time: 17h 30m Theory classes: 6h 30m Self study : 11h</p>
<p>Description: Basic concepts, elastic properties of materials. Flexural, shear and combined stresses analysis. Structural behavior of long span trusses and non-prismatic elements. Typical construction process. Advantages and limitations. Introduction to hangars design and industrial facilities such as: pipe-racks, platforms and conveyors supports. Analysis of real cases using last generation software.</p> <p>Related activities: Theoretical and practical sessions</p>	

205052 - Design and Behavior of Special Structures

<p>Module 4: Analysis and design of slender structures (Steel, concrete and composite materials)</p>	<p>Learning time: 12h Theory classes: 4h Self study : 8h</p>
<p>Description: Basic concepts, behavior of slender structures, stability considerations. Wind loads analysis. Engineering applications (electrical towers, chimneys, monopoles for lighting, antennas, mast structures). Analysis of real cases using last generation software.</p> <p>Related activities: Theoretical and practical sessions</p>	
<p>Module 5: Analysis and design of laminar structures.</p>	<p>Learning time: 18h Theory classes: 6h Self study : 12h</p>
<p>Description: Basic concepts related to shell and plate theories, mechanical behavior of shells, structural analysis, physical modelling, recent advances in computation and structural design, analysis of membrane structures. Structural behavior of shells and grid structures. Introduction to Finite Element Analysis (FEM). Engineering applications (silos, bins, tanks, vessels, vaults and domes). Analysis of real cases using last generation software.</p> <p>Related activities: Theoretical and practical sessions</p>	
<p>Module 6: Foundations</p>	<p>Learning time: 6h Theory classes: 2h Self study : 4h</p>
<p>Description: Typical behavior of shallow and deep foundations. Loads considered on analysis process. Sizing considerations of foundations for special structures. Design and construction recommendations. Typical foundations for engineering applications (long span structures, slender structures, silos, bins, tanks, vaults and domes). Analysis of real cases using last generation software</p> <p>Related activities: Theoretical and practical sessions</p>	



205052 - Design and Behavior of Special Structures

Qualification system

Final Exam 40%
Task Assignments 20%
Proposed activity 40%

Bibliography