

## SUBJECT TEACHING GUIDE

G594 - Theory and Analysis of Structures

Degree in Energy Resources Engineering

Academic year 2021-2022

1. IDENTIFYING DATA					
Degree	Degree in Energy Resources Engineering			Type and Year	Compulsory. Year 3
Faculty					
Discipline	Subject Area: Mining Pre-Technology Module: Training in Common with the Mining Branch				
Course unit title and code	G594 - Theory and Analysis of Structures				
Number of ECTS credits allocated	6	Term	Semester based (2)		
Web					
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. TRANSPORTES Y TECNOLOGIA DE PROYECTOS Y PROCESOS				
Name of lecturer	JOKIN RICO ARENAL				
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Other lecturers	NOEMI BARRAL RAMON				

### 3.1 LEARNING OUTCOMES

- Once the course has been passed, students will have achieved:  
 Acquire a set of basic knowledge in the field of construction.  
 Analyze, discuss and properly solve a particular problem relating to the use of concrete with practical criteria.  
 Solve calculation and design elements, being able to check the capacity.

### 4. OBJECTIVES

The objectives of the course are focused on the acquisition of basic knowledge in the field of construction, the promotion of student's skills to analyze, discuss and solve a particular problem related to the use of concrete, with practical criteria, and the calculation and design of elements, checking their expected performance.

## 6. COURSE ORGANIZATION

### CONTENTS

1	<p>PART I: THE CONCRETE.</p> <p>Concrete components.</p> <p>Features concrete.</p> <p>Properties of concrete, fresh and hardened</p> <p>Retraction.</p> <p>Influence of temperature.</p> <p>Durability.</p> <p>Concrete dosage.</p> <p>General.</p> <p>Water-cement ratio.</p> <p>Particle size distribution of the aggregate.</p> <p>Consistency.</p> <p>Mixture proportions.</p> <p>Corrections and essays.</p> <p>Laying works</p> <p>Transport.</p> <p>Concreting in adverse weather conditions.</p> <p>Discharge and placement.</p> <p>Compacting and curing.</p> <p>Concrete joints.</p> <p>Armor.</p> <p>Geometric and mechanical characteristics.</p> <p>Rebars</p> <p>Welding of steels.</p>
2	<p>BLOCK II: CALCULATION OF SECTIONS.</p> <p>Section calculations by using the classic method.</p> <p>Basic assumptions.</p> <p>Allowable stresses.</p> <p>Simple and combined bending.</p> <p>Simple and compound traction and compression.</p> <p>Biaxial bending.</p> <p>Section calculations by the Calculation Method at break.</p> <p>Foundation.</p> <p>Domains deformation.</p> <p>Equilibrium equations and compatibility.</p> <p>Calculation of rectangular sections by him parabola-box diagram.</p> <p>Sections for simplified calculation methods.</p> <p>Method rectangular diagram.</p> <p>It simplified method stop time. Rectangular sections.</p>

3	<p>PART III: CALCULATION OF STRUCTURES OF SPECIAL INTEREST mining and energy.          Foundations. Dimensioning as reinforced concrete structures.          Types of shoes          Isolated and continuous low wall footings. Predimensioning and armor.          Stresses transmitted to ground.          Foundation slabs.          Piles, types and pilot systems. Analysis and design of pile caps.          Industrial flooring.          Retaining walls.          Dimensioning as reinforced concrete structure.          Typology.          Bracket walls. Pre-dimensioning and calculation as concrete structure.          Derricks and pylons.</p>
4	<p>SECTION IV: earthmoving equipment associated with the execution of structures:          Expansion teams, leveling and compacting.</p>

#### 7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Written exam	Written exam	Yes	Yes	60,00
Test/exam	Written exam	No	Yes	20,00
work	Work	No	Yes	20,00
TOTAL				100,00
Observations				
The final exam will be divided into the two main parts belonging to theory and exercises. It is necessary to pass both individual parts in order to get through the whole subject.				
Observations for part-time students				
Part-time students will be evaluated according to the Regulations of the University of Cantabria. They have the option of performing the partial exams the day of the final exam.				

#### 8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC
"EAE. Instrucción del acero estructural". Gobierno de España. Ministerio de Fomento. 2012. Recurso electrónico:
<a href="http://www.fomento.gob.es/NR/rdonlyres/DB0980EB-1915-4175-8EBA-A77B93052A33/109486/OKLibro_Acero_EAE.pdf">http://www.fomento.gob.es/NR/rdonlyres/DB0980EB-1915-4175-8EBA-A77B93052A33/109486/OKLibro_Acero_EAE.pdf</a>
"EHE-08. Instrucción del hormigón estructural". Gobierno de España. Ministerio de Fomento. 2011. Recurso electrónico:
<a href="http://www.fomento.gob.es/NR/rdonlyres/029BEBAG-A895-40E4-BA9F-FD0D75E3B865/107241/5EHE2008ultimo.pdf">http://www.fomento.gob.es/NR/rdonlyres/029BEBAG-A895-40E4-BA9F-FD0D75E3B865/107241/5EHE2008ultimo.pdf</a>
"Ciencia de la construcción". Odone Belluzi. Versión de Manuel Velázquez Velázquez. 1967.
"Cálculo de estructuras de cimentación". J. Calavera. 2000.
"Muros de contención y muros de sótano". J. Calavera. 2001.
"Hormigón armado". Pedro Jiménez Montoya. 2000.
"Hormigón armado". Alfredo Paez. 1986.
"Tratado de construcción: lo que debe saber el proyectista". Enrique Rodón. 1978.
Apuntes proporcionados por los profesores.

