

# Teaching guide

## IDENTIFICATION DATA

Title:	Degree in Architecture		
Knowledge Branch:	Engineering and architecture		
Faculty / School:	Higher Polytechnic School		
Subject:	Geology, Geotechnics and Foundations		
Guy:	Mandatory	ECTS credits:	6
Course:	5	Code:	3755
Teaching period:	Tenth semester		
Matter:	Structures		
Module:	Technical		
Type of teaching:	Face-to-face		
Idiom:	Castilian		

Total hours of student dedication: 150

Teaching team	Email
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## COURSE DESCRIPTION

The subject of Geology, Geotechnics and Foundations deals with the design and calculation of foundations, according to CTE DB SE C, based on the geotechnical characteristics of the terrain. In the set of subjects of design and structural calculation appears for the first time a non-chosen structural material, the soil, which will condition substantially the typology of the foundation.

The student will learn to identify the different types of terrain, project foundations appropriate to the support and establish models of foundation-ground interaction on which the dimensioning of the

Direct foundations

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Deep foundations  
Foundations and containment structures.

The student will learn to

Determine the techniques and tests necessary for the reconnaissance of land  
Define and quantify the characteristics and parameters of the terrain that affect the foundations  
Choose types of foundations appropriate to the characteristics of the terrain

Size foundations

Direct Shoes  
Slabs  
Deep Pilotage  
Containment. Cantilever walls  
Basement walls  
Screens

and will experiment in estimating results with rapid methods of approximation to them.

## OBJECTIVE

Know how to identify the characteristics of the land that will support the building and project and size a type of foundation appropriate to the characteristics of the foundation and the structure, meeting the criteria established in current regulations.

This subject must empower the student to judge the suitability of the structures projected in a way coherent with the adequate foundations to the existing terrain avoiding random choices or criteria superficial giving a social value to their activity.

## PRIOR KNOWLEDGE

To take this signature it is advisable

In general, having passed the subjects of mathematics, physics and structures (I, II, III and IV) corresponding to the previous courses of the degree.

In particular, the following sections should be handled with ease

Assessment of loads.  
 Characteristic stresses in starts of the vertical structure  
 Ultimate and service limit states.  
 Application of the safety concept

The previous knowledge together with that acquired in the course of this subject will give the student a global vision of the same within the general context of this area of knowledge.

## CONTENTS

UNIT 1.- Rocks and soils. Origin. Classification. Properties  
 UNIT 2.- Recognition of the terrain. The geotechnical study  
 UNIT 3.- Criteria for the choice of foundations  
 UNIT 4.- Surface foundations. Footings, slabs  
 UNIT 5.- Deep foundations. Piles  
 UNIT 6.- Containment structures. Walls and screens  
 UNIT 7.- Deontology and legislation (II)

UNIT 1.- Rocks and soils.  
     The origin of the soil.  
     Soil classification.  
     Physical properties  
         Basic parameters  
         Identification parameters.

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        Structural parameters.  
     Correlations  
 UNIT 2.- Recognition of the terrain. The geotechnical study  
     Recognition techniques  
         Prospecting  
         Field trials  
         Sampling  
         Laboratory tests  
     The geotechnical study. Generalities  
         Methodology  
         Programming  
 UNIT 3.- Criteria for the choice of foundations  
     Foundation-building typological influence  
     Conditions imposed by nearby buildings  
     Conditions of use of the different types of foundations

- Foundations on heterogeneous terrain
- Influence of the water table
- Special foundation cases.
- UNIT 4.- Surface foundations. Footings, slabs
  - Shoes.
    - Types. Isolated, combined, dividing, corner
    - Actions on footings
    - Geotechnical pre-dimensioning. Plant. Stability. Seating
    - Structural dimensioning. Singing. Rigidity. Armed.
    - Brace beams and centering beams. Concept and dimensioning.
  - Slabs
    - Typologies
    - Calculation method selection
    - Land-Slab interaction.
      - Rigid slabs
      - Intermediate slabs
      - Flexible slabs
- Seating
- UNIT 5.- Deep foundations. Piles
  - Types of piles.
  - Classification
  - Pile groups
  - Actions on the piles.
  - Structural stop
  - Geotechnical sizing. Sinking load
    - Resistance per shaft and tip
- Seating
- Structural dimensioning. Piles, pile caps, beams
- UNIT 6.- Containment structures. Walls and screens
  - Types of containment structures
  - Determination of thrusts
  - Geotechnical sizing. Allowable stress and stability
  - Structural dimensioning.
- Topic 7.- Deontology and legislation
  - Professional performance
  - Professional structures. The Colleges of Architects
  - Professional civil liability

## FORMATION ACTIVITIES

1. Face-to-face activities
  - 1.1. Exhibition classes. In each topic, the teacher will address the theoretical concepts that are necessary to know. The students will participate in the debate on the issues discussed and the teacher will clarify the doubts that these raise.
  - 1.2. Carrying out exercises. Practical exercises will be proposed to help understand the application of each concept. The class exercises will be carried out, as appropriate, by the teacher with an explanation for the

set of students, by a student or a group of students supported by the teacher and with simultaneous explanation for all students or for each student individually with follow-up permanent and resolution of individual doubts by the teacher.

1.3. Evaluation controls. During the course, at least two evaluation controls will be carried out to verify the assimilation by the students of the concepts discussed.

Both the exercises and the assessment controls can be substituted, for all students or for those students who request it and its characteristics are adapted to the teacher's judgment, for work of development and conclusions of the topics discussed. The purpose, process and temporal development will be set by the teacher or proposed by the student and accepted by the teacher. The development of the work will be monitored and ongoing support from the teacher. This subject lends itself especially to this alternative path that, with the necessary predisposition of the student, it will provide a deeper understanding of the issues treated, a more flexible route through the subject without the tensions of deliveries and exams but will require the student a greater responsibility and surely also more personal work.

#### 1.4. Tutorials

1.4.1. Personalized. Individualized attention to the student in order to clarify the doubts that this does not reach understand during your personal study.

1.4.2. Group. Attention to groups of students who require additional help on specific issues for the follow-up of the subject.

#### 2. Non-contact activities

2.1. Resolution of exercises proposed by the teacher to be carried out outside the classroom, relying on the theoretical knowledge acquired and the experience of similar exercises carried out in class

The teacher, after reviewing the exercises, will communicate to the students the individual errors made and will perform group corrections highlighting the most common mistakes.

2.2. Preparation, by groups of students, on topics or exercises for their presentation in class. The attention and assimilation of what was explained in class through

-Preparation by groups of short summaries of partial topics of the subject. It will be especially valued the preparation of tables of dimensioning results obtained from computerized calculations with spreadsheets or programs

-The preparation of models in Excel for solving exercises so that once the solution of a case, the results of similar cases can be obtained avoiding the repetition of operations and favoring faster acquisition of experience.

23. If it is possible to access a work in progress appropriate to the level of the course, it will be considered, as an activity complementary, a visit to it to be able to see on the ground what the physical reality of the models is like structural analysis. Otherwise, the structural analysis of a simple work will be carried out in class. built.

Training activities, as well as the distribution of working times, may be modified and adapted according to the different scenarios established following the indications of the authorities sanitary.

## DISTRIBUTION OF WORKING TIMES

PRESENIAL ACTIVITY

SELF-EMPLOYED / ACTIVITY NO

## PRESENTIAL

60 hours

Lecture classes  
 Performing exercises  
 Carrying out evaluation controls

90 hours

Realization of tutorials  
 Theoretical practical study, individual or in group  
 Assistance to site visits

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**COMPETENCES****Basic skills**

That students have demonstrated that they possess and understand knowledge in an area of study that is part of the base of general secondary education, and is usually found at a level that, although supported by textbooks advanced, also includes some aspects that involve knowledge from the forefront of your field of study

That students know how to apply their knowledge to their work or vocation in a professional way and possess the competencies that are usually demonstrated through the elaboration and defense of arguments and the resolution of problems within your study area

That students have the ability to gather and interpret relevant data (usually within their area study) to make judgments that include a reflection on relevant issues of a social, scientific or ethical nature

That students can transmit information, ideas, problems and solutions to an audience as much specialized as well as non-specialized

That students have developed those learning skills necessary to undertake studies posterior with a high degree of autonomy

**General competences**

Analytical, synthetic, reflective, critical, theoretical and practical thinking capacity.

Ability to solve problems and make decisions.

Ability to apply procedures.

Understanding of the problems of structural design, construction and engineering related to the building projects.

Adequate knowledge of the industries, organizations, regulations and procedures to capture the projects in buildings and to integrate plans into planning.

**Specific skills**

Ability to conceive, calculate, design, integrate in buildings and urban complexes and execute solutions of foundation (T).

Aptitude to apply technical and construction standards.

Adequate knowledge of the mechanics of solids, continuums and soil, as well as the qualities plastic, elastic and resistance of heavy construction materials.

Knowledge of deontology, collegiate organization, professional structure and civil liability.

## LEARNING OUTCOMES

- The student knows how to define the methodology and programming of a geotechnical study
- Knows to classify a soil according to its parameters and establish correlations
- Demonstrates criteria to say about the type of foundation to be projected
- Knows to size geotechnically and structurally surface foundations using footings and slabs.

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- Know the design and dimensioning of deep foundations by piloting.
- Knows to design and size containment structures by means of walls.
- Knows to design and size containment structures using screens by simplified methods.
- Know the procedures for the evaluation of settlements and deformations.
- Distinguish good practices in professional performance
- Know the professional structures and particularly the Associations of Architects.
- He knows that there is a civil liability derived from his professional performance

## LEARNING ASSESSMENT SYSTEM

The subject can be approved:

PER COURSE (Continuous assessment):

- Credit regular attendance: It is essential to attend at least 80% of the classes.
- Demonstrating sufficient knowledge of the subject throughout the course  
This sufficiency will be accredited by obtaining a grade equal to or greater than 5 as a weighted average of the result of the partial qualifications obtained from:
  - The 2 control exams that will be held in the semester (65% of the overall grade). The first one will deal with topics 1 to 4 and the second with topics 5 through 7. These controls can be

substituted, for all students or for those students who request it with a previous work sufficiently accredited in the opinion of the teacher, for development work and conclusions of the exercises made. The purpose, process and temporal development will be set by the teacher or proposed by the student and accepted by the teacher. The development of the work will have continuous monitoring and support from the teacher.

-The exercises to be carried out at home (25% of the overall rating)

A minimum of four and a maximum of six exercises will be carried out.

The delivery of at least 75% of the exercises proposed is mandatory. In case of no deliver an exercise your score will be 0 and will average with the remaining three.

An exercise will be considered delivered when it is delivered in a timely manner and in accordance with established in each statement, which will also include the evaluation criteria.

For the evaluation purposes, late deliveries or exercise improvements will not be accepted. delivered. However, if they are carried out, they can be analyzed in the individual or group tutorial spaces.

The score of exercises performed at home will only be considered if it serves to increase the score of the control exams.

-Active and relevant participation in the theoretical and practical classes. (10% on the overall qualification)

The subject, for the purposes of continuous assessment, will be divided into two parts defined by each of the evaluation controls. One or both parts may be approved per course.

However, the approval of one of the parties is not possible if the global conditions of assistance and delivery of exercises.

If one of the parties is not passed per course, the student must attend it in the examination of the ordinary call and, where appropriate, the extraordinary call. In case of exceeding it, the qualification obtained will average with the accredited one for the part passed per course to obtain their global qualification. In case of not passing in these exams the pending part will have to take the whole subject again.

-Both the exercises and the assessment controls can be substituted, for all students or for those students who request it and its characteristics are adapted to the teacher's judgment, for work of development and conclusions of the topics discussed. The purpose, process and temporal development will be set by the teacher or proposed by the student and accepted by the teacher. The development of the work will be monitored and continuous support from the teacher who will inform the student periodically about the assessment of their work and results. For this, they will be set at the beginning of the work and, depending on it, some temporary milestones in which will verify the proper orientation and quality of the same, level of development and provisional qualifications guidance.

#### EVALUATION IN ORDINARY CALL

Students who do not pass the course or do not take it may opt for an exam in the ordinary call. From According to what is indicated in the previous section, it must be submitted to one or both parties into which the course.

The grade of the students who take the course as a whole will be the one obtained in the exam for the case of students who have not completed the course.

In the case of students who, having taken the course, have not passed it, their grade will be an average weighted exam grade (80%) with that obtained during the course for the exercises carried out in home (20%). This average will not be applied if the result is lower than the exam grade.

The student approved by course, in its two parts, may take this exam to improve their grade.

Your exam will deal with the entirety of the subject. As a result of this test, you will also be able to download

Note, do not fail, if the exam grade is 20% lower than the one accredited per course.

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In this subject, the student has always been allowed to have books, notes, exercises and worksheets.

Excel type calculation since what is intended is that it is able to answer the questions raised in the same conditions that it will do in the future in the professional field. For this reason, in the event that face-to-face exams are not possible, exams may be carried out in a remote system, video surveillance and recorded, with a common statement with personalized parameters, which gives the test a sufficient degree of reliability as has already been verified.

Faced with the same situation of impossibility of conducting face-to-face examinations and depending on the part that been passed by course, it will be possible to substitute the exam for the completion of a work, proposed by the teacher, on the pending agenda. The authorship of the work will be endorsed by means of a brief oral questionnaire made and recorded telematically.

#### EVALUATION IN EXTRAORDINARY CALL

The conditions to pass the subject in the extraordinary call as well as the qualification criteria



are the same as in the ordinary call both in face-to-face exams and those carried out by systems remote.

## **BIBLIOGRAPHY AND OTHER RESOURCES**

### **Basic**

-Theoretical-practical notes of the course written and provided by Professor Andrés Rubio Morán

Applied course of foundations. José María Rodríguez Ortiz. COAM and COAYAT publications service Murcia.

Calculation of foundation structures. Jose Calavera. Editorial Intemac

Retaining walls and basement walls. Jose Calavera. Editorial Intemac

Technical Building Code Structural Safety (DB-SE)

Technical building Code. Structural safety. Foundation (DB-SE C)

### **Complementary**

Soil mechanics and foundations. Vol 1 and 2. Fernando Muzas. School of Building Foundation

Geotechnics and foundations. Vol 1, 2 and 3. José Antonio Jiménez Salas. Bellisco editions