Teaching guide

IDENTIFICATION DETAILS

Degree:	Architecture
Scope	Architecture, construction, building and urban planning, and civil engineering
Faculty/School:	Higher Polytechnic School
Course:	STRUCTURES III
Type:	Compulsory
ECTS credits:	6
Year:	4
Code:	3747
Teaching period:	Eighth semester
Subject:	Structures
Module:	Technician
Teaching type:	Classroom-based
Language:	Spanish
Total number of student study hours:	150

SUBJECT DESCRIPTION

The STRUCTURE III course focuses on the design and testing of reinforced concrete sections in accordance with the EHE-08 standard

The student will learn to check them and size the assembly before

Ultimate Boundary States:

Under normal requests
By Pandeo
Under tangential requests

Service limit states:

Fissure:
Arrow:

The student will remember the analysis necessary to obtain requests and pre-dimensioning of sections, now applying it to the case of simple concrete structures and, later, will check the validity of the sections:

Under normal requests
Axil stress Verification of the section and dimensioning of the longitudinal reinforcement
Bending moment Verification of the section and dimensioning of the longitudinal reinforcement
By Pandeo Section Check

Under tangential requests
Shear stress Verification of the section and dimensioning of the transverse reinforcement
Punching Verification of the section and dimensioning of the punching reinforcement
Torque torque Verification of the section and dimensioning of the torsion reinforcement
Adhesion Assembly Test
Anchor Assembly Test

Service limit states:

Crack: Checking the armed section
Arrow: Checking the armed section

and you will experiment in estimating results with rapid methods of approximating them.

GOAL

Know how to size and assemble with precision and to be able to estimate in a simplified way with sufficient approximation the concrete sections, compatible with the architecture, that are capable of withstanding the acting forces with admissible deformations and complying with the criteria established in current regulations.

This subject should empower the student to judge the suitability of concrete and its sections to appropriate structural typologies, dimensions and forms of work, avoiding random choices or superficial criteria, giving a social value to their activity.

PRIOR KNOWLEDGE

To study this subject, it is advisable to:

In general, having passed the subjects of mathematics, physics and structures (I and II) corresponding to the

previous courses of the career.

In particular, the following sections must be handled with ease

Function resolution. Derivative. Functional maximums and minimums. Graphical representation.
Linear transformations. (change of coordinates)
Basic curves: parabola
Obtaining the demands produced by actions in bar structures
Boundary States. Application of the security concept

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

COURSE SYLLABUS

TOPIC 1.- Testing and assembly of unidirectional slabs (joists and honeycomb plates)
TOPIC 2.- Moment testing of beams subject to flexion. Longitudinal truss design. Adhesion and anchoring
TOPIC 3.- Shear testing of beams subject to bending. Transverse armour design
TOPIC 4.- Punching test on slabs. Punching reinforcement design.
TOPIC 5.- Torsional testing of beams. Torsion armor design
TOPIC 6.- Calculation of deformations in beams. Cracked and uncracked sections.
TOPIC 7.- Verification of the section and design of braces.
TOPIC 8.- Buckling testing of compressed parts. TOPIC 9.- Verification of sections and assembly of parts subject to simple compression and composite, straight and deflected compression. Simplified method.

EDUCATION ACTIVITIES

1. In-person activities. Online activity is not considered.
1.1. Exhibition classes. In each topic, the teacher will address the theoretical concepts that it is necessary to know. The students will participate in the debate on the issues discussed and the teacher will clarify any questions they may raise.
1.2. Performing exercises. Practical exercises will be proposed to help understand the application of each concept. The class exercises will be carried out, as the case may be, by the teacher with an explanation for all the students, by a student or a group of students supported by the teacher and with simultaneous explanation for the group of students or by each student individually with permanent monitoring and resolution of individual doubts by the teacher. Emphasis will be placed on acquiring knowledge about action-dimensions-requests-sections relationships.
1.3. Evaluation controls. During the course, at least two evaluation checks will be carried out to verify the students' assimilation of the concepts discussed. Both the exercises and the evaluation controls can be replaced, for the whole of the students or for those students who request it and their characteristics are adapted, in the opinion of the teacher, by development work and conclusions of the topics covered. 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 supported continuously by the teacher. This course lends itself especially to this alternative path, which, with the necessary predisposition of the student, will provide them with a deeper

knowledge of the issues covered, a more flexible route through the subject without the tensions of delivery and exams, but will require greater responsibility from the student and surely also more personal work. Students interested in following this alternative process should report it to the teacher within the first two weeks from the start of the course.
1.4. Tutorials
1.4.1. Personalized. Individualized attention to the student in order to clarify doubts that the student does not understand during their personal study.
1.4.2. From a group. Attention to groups of students who need additional help on specific issues for the monitoring of the subject.
Tutoring will take place only during the teaching period, outside of which the student works autonomously while the teaching staff performs organizational tasks, faculty meetings, preparation of subjects, etc.
2. Non-face-to-face activities
2.1. Resolution, individually or in groups, of exercises proposed by the teacher to be carried out outside the classroom, based on the theoretical knowledge acquired and the experience of similar exercises carried out in class. The teacher, after reviewing the exercises, will inform the students of the individual errors committed and will make group corrections highlighting the most common errors.
2.2. Preparation, by groups of students, on topics or exercises for presentation in class. Attention to and assimilation of what has been explained in class will be encouraged by -The preparation by groups of brief summaries of partial topics of the subject. Special value will be given to the preparation of tables of dimensional results obtained from computerized calculations with sheets or calculation programs -The preparation of models in Excel for solving exercises so that once the solution of a case has been completed, the results of similar cases can be obtained, avoiding the repetition of operations and promoting a faster acquisition of experience.
2.3. If it is possible to access a work in progress appropriate to the level of the course, a visit to it will be proposed, as a complementary activity, to be able to see in the field what the physical reality of structural analysis models is like. Otherwise, the structural analysis of a simple work already built will be carried out in class.

DISTRIBUTION OF WORK TIME

TEACHER-LED TRAINING ACTIVITIES	INDIVIDUAL WORK
60 Horas	90 Horas

SKILLS

Basic Skills

Students must have demonstrated knowledge and understanding in an area of study that is founded on general secondary education. Moreover, the area of study is typically at a level that includes certain aspects implying knowledge at the forefront of its field of study, albeit supported by advanced textbooks

Students must be able to apply their knowledge to their work or vocation in a professional manner and possess skills that can typically be demonstrated by coming up with and sustaining arguments and solving problems within their field of study.

Students must have the ability to gather and interpret relevant data (usually within their field of study) in order to make judgments that include reflections on pertinent social, scientific or ethical issues

Students must be able to convey information, ideas, problems and solutions to both an expert and non-expert audience

Students must have developed the learning skills needed to undertake further study with a high degree of independence

Capacity for analytical, synthetic, reflective, critical, theoretical and practical thought.

Ability to solve problems and to take decisions.

Ability to apply procedures.

An understanding of the problems involved in structural design, construction and engineering associated with building projects.

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Specific skills

Ability to: Conceive, calculate, design, integrate into buildings and urban complexes and execute building structures. (T)

Adequate knowledge of the mechanics of solids, continuous media and soil, as well as of the plastic, elastic and resistance qualities of heavy-duty materials.

LEARNING RESULTS

The sections are correctly and judiciously sized.

We know how to calculate, define and represent the longitudinal reinforcement of concrete beams and slabs.

The adhesion and anchoring conditions are known to be verified.

We know how to calculate, define and represent the transverse reinforcement of concrete beams and punching beams in slabs.

We know how to calculate, define and represent the torsional reinforcement of concrete beams.

It is known to check the cracking of a concrete beam.

We know how to obtain the arrow from a concrete beam

We know how to size the section and assemble pillars and braces using simplified methods.

LEARNING APPRAISAL SYSTEM

The course can be approved:
BY COURSE (Continuous Assessment):
-Proving regular attendance: It is essential to attend at least 80% of 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 grades obtained from: -The 2 control exams that will be taken in the semester (65% of the overall grade). The first one will be on topics 1 and 2 and the second on topics 3 and 4. -The exercises to be performed at home, individually or in groups, (25% of the overall score) A minimum of four exercises will be performed. The delivery of 75% of the proposed exercises is mandatory. If you do not submit an exercise, your score will be 0 and will be averaged with the rest. An exercise will be considered delivered when it is delivered in a timely and timely manner in accordance with what is established in each statement. With a view to the evaluation, late deliveries or improvements to the exercises delivered will not be accepted. However, if they are carried out, they can be analyzed in individual or group tutorial spaces. The score of the exercises performed at home will only be considered if it serves to increase the score of the control exams. The grade of the exercises carried out in a group will be the same for all the components of the group, unless the tests that the teacher can carry out show a significantly unequal participation of one or more of its components.
-Active and relevant participation in theoretical and practical classes. (10% of the overall grade)
The subject, for the purpose of continuous evaluation, will be divided into two parts defined by each of the evaluation controls. One or both parts may be approved per course. However, approval by one of the parties is not possible if the global conditions for assistance and delivery of exercises are not met. If one of the parts is not passed per course, the student must take the exam of the ordinary call or, where appropriate, of the extraordinary call. To pass a single pending part in any of the official calls, a minimum score of 6 points will be required. This grade will be averaged with the accredited grade for the part passed per course to obtain your overall grade. If you do not pass these exams, the pending part must be taken again.
EVALUATION IN ORDINARY CALL Students who do not pass the course or do not take it may be eligible for an exam in the ordinary call. As indicated in the previous section, you must submit yourself to one or both parts into which the subject is divided. The grade of the students who take the whole subject will be that obtained in the exam. You cannot pass the course in parts in the official exams if you do not already have one approved part per course. Students who pass the course in both parts may take the official exam in the first call to improve their grade. Your exam will focus on the totality of the subject. As a result of this exam, you can also lower your grade, not fail, if the exam score is 20% lower than the accredited score per course.
EVALUATION IN AN EXTRAORDINARY CALL. The conditions for passing the subject in the extraordinary call as well as the qualification criteria are the same as in the ordinary call.
In this subject, students are allowed to use books, notes, exercises and spreadsheets like Excel during the exams,

since the intention is to be able to answer the questions posed under the same conditions as they will do in the future in the professional field without the memory to remember formulation or operational repetitiveness acquiring a fundamental character in the result of the test. However, the use of applications that automatically provide the conceptual and/or quantitative result of some question (s) requested in the statements, as well as any form of plagiarism, is prohibited. Plagiarism, as well as the use of illegitimate means in evaluation tests, will be sanctioned in accordance with the University's Evaluation Regulations and Coexistence Regulations. In the case of remote tests, any violation of the general protocol established by the university or specific to the subject is prohibited and, if this occurs, the official regulations of the UFV existing for this purpose will apply to the student.

ETHICAL AND RESPONSIBLE USE OF ARTIFICIAL INTELLIGENCE

1.- The use of any Artificial Intelligence (AI) system or service shall be determined by the lecturer, and may only be used in the manner and under the conditions indicated by them. In all cases, its use must comply with the following principles:
a) The use of AI systems or services must be accompanied by critical reflection on the part of the student regarding their impact and/or limitations in the development of the assigned task or project.
b) The selection of AI systems or services must be justified, explaining their advantages over other tools or methods of obtaining information. The chosen model and the version of AI used must be described in as much detail as possible.
c) The student must appropriately cite the use of AI systems or services, specifying the parts of the work where they were used and describing the creative process followed. The use of citation formats and usage examples may be consulted on the Library website(https://www.ufv.es/gestion-de-la-informacion_biblioteca/).
d) The results obtained through AI systems or services must always be verified. As the author, the student is responsible for their work and for the legitimacy of the sources used.
2.- In all cases, the use of AI systems or services must always respect the principles of responsible and ethical use upheld by the university, as outlined in the Guide for the Responsible Use of Artificial Intelligence in Studies at UFV. Additionally, the lecturer may request other types of individual commitments from the student when deemed necessary.
3.- Without prejudice to the above, in cases of doubt regarding the ethical and responsible use of any AI system or service, the lecturer may require an oral presentation of any assignment or partial submission. This oral evaluation shall take precedence over any other form of assessment outlined in the Teaching Guide. In this oral defense, the student must demonstrate knowledge of the subject, justify their decisions, and explain the development of their work.

BIBLIOGRAPHY AND OTHER RESOURCES

Basic

Andres Rubio Moran. Professor of the subject -Theoretical-practical course notes written and provided by Professor Andrés Rubio Morán

José Calavera Project and calculation of concrete structures. Volumes I and II INTEMAC ISBN: 9788488764058 (José Calavera Project and calculation of concrete structures. Volumes I and II INTEMAC ISBN: 9788488764058 , ||Pedro Jiménez Montoya Reinforced Concrete Ed. Gustavo Gili. ISBN: 9788425223075)

Ministry of Housing. Government of Spain Technical Code for Building Structural Security (DB-SE) BOE ISBN: 9788430971701

Ministry of the Presidency, Relations with the Courts and Democratic Memory Structural Code BOE ISBN: 9788449810640

Additional

Salvadori and Heller Structures for Architects Ed. The Island ISBN: 950-9575-14-3