ISEL
INSTITUTO SUPERIOR DE ENGENHARIA DE LISBOA

DEC
ÁREA DEPARTAMENTAL DE ENGENHARIA CIVIL

Course file

Study cycle	BACHELOR IN CIVIL ENGINEERING		
Course	STRUCTURAL ANALYSIS	Mandatory	☒
		Optional	☐
Course scientific area	CIVIL ENGINEERING	Category	C

Course category: B - Basic; C - Core Engineering; E - Specialization; P - Complementary.

Year: 2nd	Semester: 4th		ECTS: 5,5		Total: 148
Contact time	T: 22,5	TP: 45	PL:	S:	OT:

T - Lectures; TP - Theory and practice; PL - Lab Work; S - Seminar; OT - Tutorial Guidance.

Course Director	**Title**	**Position**
António José Carrasquinho de Freitas	Especialista	Professor Adjunto

Learning objectives (knowledge, skills and competences to be developed by students)

(max. 1000 characters)

1. To acquaint students in the calculation of statically indeterminate structures using classical methods and initiate them in the automatic computation;

2. To analyze statically indeterminate plane structures using the Force and Displacements;

3. Influence lines. Moving loads efforts;

4. Using wide spread computer codes for the computation of forces and displacements in statically indeterminate plane structures.

Syllabus

(max. 1000 characters)

1. Force method

- Terms of the compatibility equation. Flexibility matrix and indeterminate unknowns. Resolution of structures with drawn diagrams and calculation of displacements;

- Symmetric structures and symmetrical loads and anti-symmetrical;

2. Displacement method

- Degree of kinematic indeterminacy;

- Tables of stiffness. Terms of the compatibility equation. Stifness matrix and kinematic unknowns;

- Solving structures by the displacement method;

3. Influence lines

- Notion of influence line;

- Influence line of displacements. Theorems of reciprocity;

- Cinematic process. Müller-Breslau principle;

- Influence lines in isostatic structures: beams, Geber-beams, trusses and plane frames;

- Examples;

4. Automatic computation of structures

- Solution of structures using the computer codes;

- Critical analysis and comparison of results with classical methods.

Demonstration of the consistency between the syllabus and the course objectives

(max. 1000 characters)

Chapter 1, 2 and 3 allow students to achieve objective 1, 2 and 3.

Chapters 4 allow students to achieve objective 4.

Teaching methodology (evaluation included)

(max. 1000 characters)

The teaching methodology is based on theoretical and theoretical-practical lessons; first the theoretical concepts are presented followed by the resolution of practical problems and/or the development of computer applications which help students to understand the various topics.

ASSESSMENT:

CONTINUOUS ASSESSMENT - 2 partial tests + 1 practical assignment (could valorize the final grade)

NF = (T1 + T2) / 2

ASSESSMENT BY EXAM (1st or 2nd) - 1 exam + 1 practical assignment (could valorize the final grade)

NF = E

Representing:

NF - final grade

T1 - grade of 1st test

T2 - grade of 2nd test

E - exam grade

The written tests (partial test or exams) have duration of 3:00. The minimum partial test grade is 8,0, but the average of tests must be higher than 10, such as the grade of the exam.

Demonstration of the consistency between teaching methodology and the course learning objectives

(max. 3000 characters)

This course is based on theoretical-practical lessons; first the theoretical concepts are presented followed by the resolution of practical problems which is a good methodology to students learn the main concepts of teaching. Students must develop examples using commercial computer applications in order to consolidate the learning concepts under study.

The assessment scheme using partial tests (continuous assessment) or final exams allow to measure if the knowledge assimilation has been achieved, while the practical assignment allows assessing progress in gaining knowledge and skills development by students.

Main Bibliography

(max. 1000 characters)

José Carlos Sussekind, “Curso de Análise Estrutural”, 5.ª Ed.

Ghali e A.M. Neville (1997) - “Structural Analysis. A Unified Classical and Matrix Approach”. Ed. Chapman and Hall.

Jonh F. Fleming (1997) - “Analysis of Structural Systems”. Ed. Prentice Hall.

William Weaver, Jr and James M. Gere (1990) - “Matrix of Framed Structures”. Ed. Van Nostrand Reinhold.

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