

Course file

Study cycle	BACHELOR IN CIVIL ENGINEERING		
Course	Strength of Materials II	Mandatory	<input checked="" type="checkbox"/>
		Optional	<input type="checkbox"/>
Course scientific area	CIVIL ENGINEERING	Category	C

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

Year: 2nd	Semester: 4th	ECTS: 4,0		Total: 108
Contact time	T: 22,5	TP: 22,5	PL:	S: OT:

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

Course Director	Title	Position
Luciano Carmo Jacinto	Doutor	Professor Adjunto

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

(max. 1000 characters)

To supply the complementary elements of mechanics of materials that allow the students to understand the acquired knowledge and relate it with real professional problems.

Design of statically determinate and indeterminate beams, considering displacements and stress; design of columns subject to buckling.

Syllabus

(max. 1000 characters)

ELASTIC METHODS

Elastic deflection in statically determinate and indeterminate beams. Elastic curve. Determination of beam slope and deflection (Moment-Curvature Equation, Singularity Functions, Mohr's theorems).

BUCKLING.

Instability phenomenon. Critical buckling load and critical stress. Euler's formula. Effective length of the column. Slenderness ratio. Buckling global coefficient method according to EC3.

ENERGY METHODS

Work. Axial strain energy. Shear Strain energy. Torsional strain energy. Bending Strain energy. Castigliano's

theorem. Betti-Rayleigh reciprocal theorem. Maxwell's reciprocal theorem. Determination of beam slope and deflection. Statically indeterminate beams.

Principal of virtual work. Determination of beam slope and deflection.

Demonstration of the consistency between the syllabus and the course objectives

(max. 1000 characters)

The design of statically determinate and indeterminate beams, considering displacements and stress, is supported by Elastic Methods and Energetic Methods Chapters.

The design of columns subject to buckling is supported by Buckling Chapter.

Teaching methodology (evaluation included)

(max. 1000 characters)

Expository method via projection of transparencies and use of the board. Questioning method, promoting discussion. Methodology for objectives expressed in the resolution of exercises during the practical classes.

Assessment: Continuous assessment (written global test) or Written Examination (two (2) season).

The course approval requires at least a grade of 9.5/20.

The rules for carrying out any evaluation are included in the general regulations of the ISEL.

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

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This course is directed to the design and calculation of structures and beams, using methods that require practice.

The presentation of the theoretical program content and the promotion of problem solving during class, promoting discussion among students and with the teacher, allows for clarification of any doubt and a good understanding of the issues of the several chapters of the program.

Main Bibliography



INSTITUTO SUPERIOR DE ENGENHARIA DE LISBOA



ÁREA DEPARTAMENTAL DE ENGENHARIA CIVIL

(max. 1000 characters)

Course booklet (theoretical and practical parts)

Beer, F. P., Johnston Jr, E. R., DeWolf, J. T., D. F. Mecânica dos materiais. McGraw Hill Portugal, 2003

Massonnet, Charles et Cescotto, Serge. "Mécanique des matériaux". De Boeck Université, (1994)

Stiopin, P. A - Resistência dos Materiais. Moscou: Editorial Mir (1976)

Willems, Nicholas, John T. Easley, and Stanley T. Rolfe. "Resistência dos materiais." São Paulo: McGraw (1983).

Branco, Carlos Moura. "Mecânica dos materiais." Lisboa: Fundação Calouste Gulbenkian (1998).