

Course file

Study cycle	BACHELOR IN CIVIL ENGINEERING		
Course	RETAINING STRUCTURES AND FOUNDATIONS	Mandatory	<input checked="" type="checkbox"/>
		Optional	<input type="checkbox"/>
Course scientific area	CIVIL ENGINEERING	Category	E

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

Year: 3rd	Semester: 5th	ECTS: 4,0		Total: 108
Contact time	T:	TP: 45	PL:	S: OT:

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

Course Director	Title	Position
João Candeias Portugal	Doutor	Professor Adjunto

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

(max. 1000 characters)

The approval in the course Retaining Structures and Foundations assumes that the student reaches a level of knowledge capable to provide the following technician-scientific abilities: - capability of retaining structures design in accordance with Eurocode 7 (objective 1); - capability of shallow foundations design in accordance with Eurocode 7 (objective 2); - capability of slope design in accordance with Eurocode 7 (objective 3).

Syllabus

(max. 1000 characters)

1. EUROCODE 7

Introduction. Design– EQU, STR, GEO, UPL e HYD limits states. Design approaches DA1, DA2 e DA3

2. RETAINING STRUCTURES

Retaining structures– active and passive earth pressure. Rankine’s theory. Coulomb’s theory. External loading; seismic action. Analysis and design to the ultimate state limit of sliding and overturning. Design example. Water influence

3. SHALLOW FOUNDATIONS

Shallow Foundations: Bearing capacity theories. Design under drained and undrained conditions. Eurocode 7 formulation. Design examples. Effect of ground water on bearing capacity. Soils multilayers

4. SLOPE STABILITY

Infinite slope methods of analysis. Water influence. Finite slope methods of analysis: Methods of Taylor, Fellenius and Bishop. Water influence.

Demonstration of the consistency between the syllabus and the course objectives

(max. 1000 characters)

Chapters 1 and 2 allow students to achieve objective 1.

Chapters 1 and 3 allow students to achieve objective 2.

Chapters 1 and 4 allow students to achieve objective 3.

Teaching methodology (evaluation included)

(max. 1000 characters)

The teaching methodology is based on the resolution of real problems concerning the design of retaining structures, shallow foundations and slopes, using case studies.

ASSESSMENT BY EXAM (1st or 2nd) with 2h30m duration

FORMULA FOR FINAL GRADE COMPUTATION

$$FG = EG = 0,30 \times TG + 0,70 \times PG$$

FG – Final Grade,

EG - 1st ou 2nd Exam Grade,

TG – Grade of Exam Theory Part (0 to 20),

PG – Grade of Exam Practice Part (0 to 20).

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

(max. 3000 characters)

In the course Retaining Structures and Foundations it is taught the classical theories for earth pressure calculations and its application to the geotechnical design of retaining structures. The design methods for shallow foundations to the ultimate states are also taught and the slope stability analysis methods. All the subjects are taught in accordance with Eurocode 7, adjusted to the practice, and in order to prepare the

student for the application of this knowledge in the resolution of real problems in the geotechnical area. The teaching methodology is based on the resolution of real problems concerning the design of retaining structures, shallow foundations and slopes, using case studies:

Retaining structures - resolution of 10 design problems (objective 1)

Shallow foundations - resolution of 4 design problems (objective 2)

Slope stability - resolution of 5 design problems (objective 3)

Main Bibliography

(max. 1000 characters)

PRESCRIBED BOOKS:

BUDHU, M., "SOIL MECHANICS AND FOUNDATIONS", JOHN WILEY & SONS, 2nd Edition, 2006.

COURSE NOTES:

PEREIRA, C.S., "FUNDAÇÕES – ELEMENTOS TEÓRICOS", EDIÇÃO AEIST, 2005

"FUNDAÇÕES – ENUNCIADOS DOS PROBLEMAS DAS AULAS PRÁTICAS", EDIÇÃO AEIST, 2006

"FUNDAÇÕES – FORMULÁRIO", EDIÇÃO AEIST, 2006