Polytechnic Institute of Coimbra (P COIMBRA 02)
Coimbra Institute of Engineering - ISEC
Civil Engineering Department

ECTS CATALOGUE

The main language of instruction at Coimbra Institute of Engineering is Portuguese. However, some courses from degree and master degree can be offered in English and/or with a tutorial support in English.

The ECTS catalogue includes subject contents in English Language. Students can choose subjects from this Catalogue to the study plan proposal (Learning Agreement) to be analyzed carefully by the Departmental Coordinators and to be adjusted, after student's arrival, if necessary.

This ECTS catalogue contains information which is valid for this academic year. ISEC reserves the right to adjust the courses offered during the academic year and is not responsible for typing errors or printing mistakes.

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Polytechnic Institute of Coimbra (P COIMBRA 02)
Coimbra Institute of Engineering - ISEC
Civil Engineering Department

ECTS CATALOGUE

.

Bachelor Civil Engineering Course

Old Code	New Code	Title - Portuguese	Title - English	ECTS	Term
	1.º ano / 1st Year				
908904	60020356	Desenho e Métodos Gráficos	Computer Aided Design Drawing	4	Fall
908943	60021057	Fisica	Physics	5	Fall
908903	60020333	Informática	Computer Application in Civil Engineering	5	Fall
908941	60021032	Matemática I	Calculus I	6	Fall
908908	60020410	Materiais de Construção I	Construction Materials I	5	Fall
908944	60021068	Mecânica Aplicada	Applied Mechanics	5	Fall
908907	60020395	Desenho de Sistemas Construtivos	Technical Drawing	5	Fall
908942	60021043	Matemática II	Calculus II	6	Spring
908911	60020457	Materiais de Construção II	Construction Materials II	5	Spring
908915	60020515	Métodos Estatísticos	Statistical Methods	4	Spring
908919	60020591	Resistência dos Materiais I	Mechanics of Materials I	5	Spring
908916	60020537	Topografia	Surveying	5	Spring
	2.º ano / 2nd Year				
908917	60020552	Construções Civis I*	Housing I*	5	Fall
908925	60020717	Hidráulica Geral I	Hydraulics I	5	Fall
908918	60020574	Introdução à Geotecnia	Geotechincs	5	Fall
908912	60020479	Métodos Numéricos	Numerical Analisys	5	Fall
908939	60020992	Qualidade, Higiene e Segurança	Quality, Health and Security	5	Fall
908922	60020651	Resistência dos Materiais II	Mechanics of Materials II	5	Fall
908923	60020673	Análise de Estruturas	Analysis of Structures	5	Spring
908926	60020739	Betão Armado I	Reinforced Concrete Structures I	5	Spring
908920	60020616	Construções Civis II*	Housing II*	5	Spring
908930	60020818	Economia e Gestão	Economics and Management	5	Spring
908928	60020772	Hidráulica Geral II	Hydraulics II	5	Spring
908921	60020638	Mecânica dos Solos	Soil Mechanics	5	Spring
	3.º ano / 3rd Year				
908929	60020794	Betão Armado II**	Reinforced Concrete Structures II**	5	Fall
908932	60020854	Estradas e Segurança Rodoviária	Highway Design and Safety	5	Fall
908924	60020690	Fundações I	Foundations I	5	Fall
908935	60020919	Gestão de Operações I	Operations Management I	5	Fall
908931	60020835	Hidráulica Aplicada I	Applied Hydraulics I	5	Fall
908933	60020871	Planeamento e Gestão Urbanísticos	Land Use Planning and Management	5	Fall
908927	60020750	Fundações II	Foundations II	5	Spring
908938	60020970	Gestão de Operações II	Operations Management II	5	Spring
908934	60020893	Hidráulica Aplicada II	Applied Hydraulics II	5	Spring
908936	61000455	Projecto de Estruturas Correntes***	Current Structural Design***	5	Spring
908937	60020953	Rodovias Municipais	Municipal Roads	5	Spring
908940	60021010	Sistemas de Informação Geográfica	Geographic Information Systems	5	Spring

*These subjects are related to Portuguese Legislation. Not recommended for all nationality's students (exceptions: Spain, Italy)
**Requires knowledge on Reinforced Concrete Structures
***Requires knowledge on Reinforced Concrete Structures and Analysis of Structures

Instituto Superior de Engenharia de Coimbra
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Signature of Teacher:

Licenciatura – BsC *Engenharia Civil*

Licenciatura – BsC *Civil Engineering*

Academic Year: **2018/19**

Program Contents

Course Unit HYDRAULICS 1

Specialization (s) CIVIL ENGINEERING (HYDRAULICS, WATER RESOURCES)

Subject type Specialty Sciences **Research Area**

Year 2 **Semester** 1 **ECTS** 5

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures		
Theoretical-Practical Lectures	3	42
Practical-Laboratoty Lectures	0,5	7
Tutorial Orientation	0,5	7
Project		
Total of Working Hours		130

Unaccompanied Working Hours

Activity Type	Total Hours
Study	61
Works / Group Works	10
Project	
Evaluation	3
Additional	

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures			
Theoretical-Practical Lectures	Pedro Nuno Madeira Afonso	PhD	Professor
Practical-Laboratoty Lectures	Luísa Lourenço Ribeiro	PhD	Professor
Tutorial Orientation	Pedro Nuno Madeira Afonso	PhD	Professor
Project			

Responsible(s) Lecturer (s) Pedro Nuno Madeira Afonso

Goals

On successful completion of this module, students will have:
The ability to identify a hydraulic problem;
The ability to analyze and valuate hydraulic situations and to solve them by using appropriate tools.

Skills

On successful completion of this module, students will have developed a range of generic skills spanning: hydraulic analysis; team work; numerical analysis; data analysis.

Program Contents

1. FLUID PROPERTIES
   1.1. Basic units
   1.2. Properties involving the mass or weight of the fluid

1.3. Viscosity
1.4. Elasticity
1.5. Surface tension
1.6. Vapor pressure

2. FLUID STATICS
   2.1. Pressure
   2.2. Pressure variation with elevation
   2.3. Pressure measurements
   2.4. Hydrostatic forces on plane surfaces
   2.5. Hydrostatic forces on curved surfaces
   2.6. Buoyancy

3. FLUID KINEMATICS
   3.1. Velocity and flow visualization
   3.2. Rate of flow
   3.3. Acceleration
   3.4. Continuity equation
   3.5. Laminar and turbulent flow

4. FLUID DYNAMICS
   4.1. Bernoulli's equation
   4.2. Concept of the hydraulic and energy grade lines
   4.3. Application of Bernoulli's equation
   4.4. Hydraulic power. Pumps and turbines
   4.5. Rotation and vorticity
   4.6. Separation and its effects on pressure variation
   4.7. Boundary layer

5. MOMENTUN PRINCIPLE
   5.1. The momentum equation
   5.2. Applications of the momentum equation

6. DIMENSIONAL ANALYSIS AND SIMILITUDE
   6.1. Dimensional analysis
   6.2. The Buckingham Π theorem
   6.3. Determination of Π terms
   6.4. Common dimensionless numbers in hydraulics
   6.5. Modeling and Similitude
      6.5.1. Theory of models
      6.5.2. Model scales
      6.5.3. Some typical model studies
      6.5.4. Distorted models

7. FLOW IN PIPES
   7.1. Shear-stress distribution across a pipe section
   7.2. Laminar flow in pipes
   7.3. Criterion for laminar or turbulent flow in a pipe
   7.4. Turbulent flow in pipes

Bibliography

CIVIL ENGINEERING HYDRAULICS – 5th Edition. Nalluri & Featherstone's. Wiley- Blackwell, 2009

Signature of Teacher: _____

ENGINEERING FLUID MECHNICS. John A. Roberson, Clayton T. Crowe. John Wiley & Sons
FUNDAMENTALS OF FLUID MECHANICS. Bruce R. Munson, Donald F. Young, Theodore H. Okiishi. John Wiley & Sons
HIDRÁULICA, A. Carvalho Quintela, Fundação Calouste Gulbenkian;
HIDRÁULICA GERAL, Armando Lencastre, Edição do Autor;

Access Conditions and Attendance Excuse

All students enrolled in the course can go to the exam.
The examinations of the students with special statuses, who did not attend the laboratory classes, due to the impossibility of attending classes at the available timetables, will be quoted for 20 values.

Conditions for Exam Admission

All students enrolled in the course can go to the exam.

Evaluation Method

- The student is evaluated by written exam, at the end of the academic period (1 in the normal period and 1 in the time of appeal) and laboratory work;
- The exam is quoted for 18 values, consisting of 2 parts:
  Theoretical part ..... 7 values
  Practical part ..... 11 values
- The laboratory component is quoted for 2 values.

Minimum ratings:
The student has to obtain the minimum classification of 2 values in the theoretical part (2 values in 7). The student who does not meet this minimum will be considered to have failed.

Elements of consultation in examinations:
The theoretical part is without consultation;
The practical part is with form consultation provided by the teacher.

Conditions for Results Improvement

The student who presents for improvement of classification will carry out the examination correspond to the time in which they present, quoted for 18 values. The classification of the exam will be added to the note of the laboratory part.

10-9-2018

Date

Signature from the lecturer responsible for the course

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher: 

Licenciatura – BsC Engenharia Civil (Português)

Licenciatura – BsC Civil Engineering (Inglês)

Academic Year: **2018/2019**

Program Contents

Course Unit: STRENGTH OF MATERIALS 2

Specialization (s) MECHANICS OF THE STRUCTURES

Subject type Engineering Sciences **Research Area** Civil Engineering

Year 2 **Semester** 1 **ECTS** 5

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures	-	-
Theoretical-Practical Lectures	3,5	49
Practical-Laboratoty Lectures	-	-
Tutorial Orientation	0,5	7
Project	-	-

Unaccompanied Working Hours

Activity Type	Total Hours
Study	69
Works / Group Works	-
Project	-
Evaluation	5
Additional	-

Total of Working Hours

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	Hugo Sérgio Sousa Costa	PhD	Assistant Professor
Theoretical-Practical Lectures	-		
Practical-Laboratoty Lectures	Hugo Sérgio Sousa Costa	PhD	Assistant Professor
Tutorial Orientation	-		
Project			

Responsible(s) Lecturer (s) Hugo Sérgio Sousa Costa

Goals

Provide the fundamentals of the mechanical behavior of deformable solids. To study the behavior of solids when subjected to different loading states, interpreting and calculating the specific stresses and deformations produced by the loads. Derive formulas and equations that allow to predict the mechanical behavior of the materials. Provide methodologies for analysis of stresses and deformations in linear parts subject to axial stress and bending. To develop the fundamental concepts of design and verification of the safety of structures subject to different internal forces.

Skills

1. General competences
1.1 decision-making capacity
1.2 capacity for expression and communication
1.3 ability to ensure quality
2. Generic competences
2.1 ability to apprehend, analyze and synthesize
2.2 problem-solving ability
2.3 ability to apply knowledge and adapt to new situations
2.4 capacity to carry out autonomous and group work
2.5 development of autonomy in learning
2.6 ability to predict and issue judgments
3. Specific competences
3.1 know the theoretical and practical bases that support the design of structures

Program Contents

I - Bending deformations
- 1. Introduction
- 2 Deformations due to bending moment
- 2.1 Equation of the deformed axis
- 2.2 Differential equations of bending beams
- 2.3 Integration of the elastic line

II - Deviated bending and combined bending-axial force
- 1 Deviated bending
- 2 Combined bending-axial force
- 3 Combined plan bending-axial force
- 3.1 Problem presentation
- 3.2 Calculation of stresses
- 3.3 Eccentric axial force and notion of central nucleus
- 3.4 Importance of axial force in compression
- 3.5 Materials without tensile strength
- 4 Combined deviated bending-axial force
- 4.1 Calculation of stresses
- 4.2 Central nucleus

III - Uniform torsion
- 1. Introduction
- 2 Beams of circular section
- 2.1 Kinematics
- 2.2 Static and constitutive law
- 3 Torsion test and resistance of parts subject to uniform torsion
- 4 Types of cross-section
- 5 Sections
- 6 Open thin-walled sections
- 6.1 Rectangular Section
- 6.2 Any Section
- 7 Closed thin-walled sections (Bredt formulas)
- 7.1 Behavior difference
- 7.2 One cell and several adjacent cells
- 7.3 Equilibrium of the shear stress flow
- 8 Rational shape of the torsion cross sections

IV – Shear force
- 1 Introduction
- 2 Slip force
- 2.1 Position of the problem
- 2.2 Slip force Formula
- 3 Thin-walled sections
- 4 Open thin-walled sections
- 4.1 General expression for the calculation of stresses
- 4.2 U and I Sections
- 5 Shear Center

V - Instability phenomena
- 1. Introduction
- 2 Bending of compressed elements
- 2.1 Generalities
- 2.2 The problem of Euler
- 2.3 Conditions of support different from those of the Euler problem
- 3 Slenderness
- 3.1 Buckling length
- 3.2 Critical stress and slenderness
- 3.3 Checking the safety of axially compressed parts: buckling curves
- 3.4 Euler curve; analysis of Eurocode 3 curves

Bibliography

Frey F. Analyse des strucutres et millieux continus – Statique appliqué. Traité de Génie Civil de l'École polytechnique fédérale de Lausanne, Vol. 1, Presses polytechniques et universitaires romandes, 1994.

Frey F. Analyse des strucutres et millieux continus – Mécanique des structures. Traité de Génie Civil de l'École polytechnique fédérale de Lausanne, Vol. 2, Presses polytechniques et universitaires romandes, 1994.

Branco CAGM. Mecânica dos materiais. Fundação calouste Gulbenkian, 1985.

Beer FP e Johnston Jr ER. Resistência dos materiais. McGraw-Hill, 1989.

Massonet C e Cescotto S. Mécanique des matériaux. Biblioteque des Universités – Genie Civil, De Boeck-Wesmael, 1994.

Dias da Silva V. Mecânica e resistência dos materiais. Zuari – edição de livros técnicos Lda., 1999

Access Conditions and Attendance Excuse

Not applicable

Conditions for Exam Admission

Not applicable

Evaluation Method

Students will be examined through:

a) - performing a final written exam for quotation of 20 values (with consulting of the formulas provided in the exam and 1 page A4 written by the student, only with formulas, which will be delivered together with the exam);
b) - optional evaluation of continuous evaluation, with frequency exam, with part of the program (objectives and conditions defined and approved by the teacher), with a global classification of 12 values, complemented with the final exam (only with resolution of the complementary programmatic part, which will then be quoted for 8 values and in which it will be necessary to obtain a minimum of 50% of quotation); students who attend and do not pass will be evaluated in the final exam (normal and / or resource), quoted for 20 values.

Students are allowed to develop optional practical works in the lab and to present work reports, which will have a quotation of 4 values, being the exam component of 16 values.

Erasmus students who do not speak Portuguese or Spanish will be evaluated in the components of continuous assessment (objectives and conditions defined by the teacher) and the final exam, both in English.

It is foreseen to carry out a written or oral examination for students who request special examinations.

Conditions for Results Improvement

In accordance with the general rules

Date

10-09-2018

Signature from the lecturer responsible for the course

(Hugo Sérgio Sousa Costa)

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Academic Year: **2018/2019**

Licenciatura em Engenharia Civil

BsC in Civil Engineering

Program Contents

Course Unit GEOTECHNICS

Specialization (s) GEOTECHNICS AND FOUNDATIONS

Subject type **Research Area** Civil Engineering

Year 2nd **Semester** 1st **ECTS** 5

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures		
Theoretical-Practical Lectures	2.5	35
Practical-Laboratoty Lectures	1.0	14
Tutorial Orientation	0.5	7
Project		

Unaccompanied Working Hours

Activity Type	Total Hours
Study	57
Works / Group Works	12
Project	
Evaluation	5
Additional	

Total of Working Hours 130

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures			
Theoretical-Practical Lectures	Luis Manuel Araújo Santos	PhD	Prof. Adjunto
Practical-Laboratoty Lectures	Maria Margarida Cerdeira Coelho e Silva	MSc	Prof. Adjunta
Tutorial Orientation	Maria Margarida Cerdeira Coelho e Silva	MSc	Prof. Adjunta
Project			

Responsible(s) Lecturer (s) Luis Manuel Araújo Santos

Goals

At the end of this course it is expected that the student will be able to:

- To know the different types of rocks and soils.
- To carry out basic soil tests.
- To know the main methods of in-situ investigations.

Skills

Generic:

- Ability for acquisition and application of knowledge and for solving problems
- Ability for individual work and for team work.
- To know basic characteristics of soils and appropriate tests to characterize them..
- Specific:

To know theoretical and practical concepts of Engineering Geology, Soil Mechanics and Rocks Mechanics and to apply them in solving problems of structures and geotechnical works.

Program Contents

1. Rock analysis and classification
   Composition of the Earth. Rock-forming minerals. Rock groups: igneous, sedimentary and metamorphic rocks. Mechanical and chemical weathering. Geotechnical Classification of rock weathering.

2. Soil analysis and classification
   The origin of soils. Weight-Volume relationships in soils. Particle size analysis. Plasticity of fine-grained soils. Soil description and classification. Unified Soil Classification System (ASTM D 2487-06) and Classification of Soils for Highway Construction Purpose (ASTM D 3282-93).

3. *In situ* investigations
   Desk study.
   Field reconnaissance. Excavations and bore-hole drilling. Geophisical surveys. Sampling

Bibliography

- Required supplies, support material and Powerpoint presentations for the theoretical part, the exercises and the laboratory tests are provided during the lessons or in the Moodle platform.
- Blyth, F. *(1974). A Geology for Engineers. 6th edition, E*d. Edward Arnold. London..
- Das, B. M. (2006). *Principals of geotechnical engineering. 6th edition, Ed. Cengage Learning. USA.*

Access Conditions and Attendance Excuse

All the students are admitted to final examination. No intermediate tests in English are planned.

All the students must attend laboratory classes.

Conditions for Exam Admission

Only students who have attended Laboratory classes will be admitted to the examination.

Students admitted to the first call exam will have to make their previous registration in Moodle, until two working days before the date of the final exam.

At the beginning of the examination, they should present a identification document.

No mobile phones are allowed during evaluations.

Evaluation Method

Laboratory classes (**30% of the final mark**):
One written test, in class: rock samples to describe ant identify
Two small works, in class: moisture content, unit weight of soil
Two test reports, at home, team work: particle size analysis and Atterberg limits

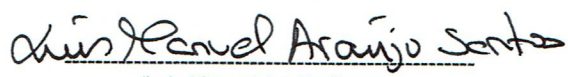
Exam (**70% of the final mark**):
Written exam in English at the end of the term (two examination periods) with theoretical questions and practical exercises.

Conditions for Results Improvement

Date

2018/09/06

Signature from the lecturer responsible for the course



(Luis Manuel Araújo Santos)

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Lecturer's signature: _____

Licenciatura – BsC – Engenharia Civil

Licenciatura – BsC - Civil Engineering

Academic Year: **2018/2019**

Program Contents

Course Unit HOUSING I

Specialization (s)

Subject type **Research Area**

Year 2.º **Semester** 1.º **ECTS** 5

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures		
Theoretical-Practical Lectures	3.5	49
Practical-Laboratory Lectures		
Tutorial Orientation	0.5	7
Project		

Unaccompanied Working Hours

Activity Type	Total Hours
Study	
Works / Group Works	
Project	
Evaluation	
Additional	

Total of Working Hours 130

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures			
Theoretical-Practical Lectures	Rui Ferreira	MSc	Adjunct Professor
Practical-Laboratory Lectures			
Tutorial Orientation	Rui Ferreira	MSc	Adjunct Professor
Project			

Responsible(s) Lecturer (s) Rui Ferreira

Goals
Analysis and study of the thermal and acoustic behavior in buildings.

Skills
Selecting abilities and constructive solutions that assure efficient buildings energy, presenting good conditions acoustics, of illumination, natural ventilation and waterproofing. Regulations and the national norms.
Executing thermal and acoustics behavior projects.

Program Contents

1. Functional requirements in buildings;
2. Thermal behaviour in buildings;
3. Acoustic behaviour in buildings

Lecturer's signature:_____

Bibliography

Sebenta da disciplina
Piedade, A. C. Canha da, "Exigências humanas e funcionais nas edificações", IST
Regulamento geral das edificações urbanas (RGEU)
Henriques, Fernando «Humidade em paredes» LNEC.
Viegas, João C. «CED 4 - Ventilação natural de edifícios de habitação» LNEC.
Vários «CAD 6 - Ventilação e qualidade do ar interior» LNEC.
Santos, Carlos e Matias, Luís, "Coeficientes de transmissão térmica de elementos da envolvente dos edifícios", ITE 50, LNEC
Regulamento de desempenho energético dos edifícios de habitação (REH)
Patrício, Jorge "Acústica nos edifícios", Verlag Dashofer
Regulamento geral do ruído (RGR)
Regulamento dos Requisitos Acústicos dos Edifícios (RRAE)

Access Conditions and Attendance Excuse

Conditions for Exam Admission

All students have access to exam.

Evaluation Method

Housing UC can be performed by tests to be carried out during the semester or by final written examination.

Conditions for Results Improvement

Date	Signature from the lecturer responsible for the course
05-09-2018	

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher: João Branco

Licenciatura – BsC ***Engenharia Civil (9089)***

Licenciatura – BsC ***Civil Engineering (9089)***

Academic Year: **2018 / 2019**

Program Contents

Course Unit NUMERICAL METHODS (908912)

Specialization (s) COMMON FORMATION

Subject type Mathematics **Research Area** Basic Sciences

Year 2º **Semester** 1º **ECTS** 5

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures		
Theoretical-Practical Lectures	3.5	49
Practical-Laboratoty Lectures	0.5	7
Tutorial Orientation		
Project		

Unaccompanied Working Hours

Activity Type	Total Hours
Study	71
Works / Group Works	
Project	
Evaluation	
Additional	3

Total of Working Hours 130

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	João Ricardo de Oliveira Branco	PHD	Adj. professor
Theoretical-Practical Lectures	João Ricardo de Oliveira Branco	PHD	Adj. professor
Practical-Laboratoty Lectures			
Tutorial Orientation			
Project			

Responsible(s) Lecturer (s) João Ricardo de Oliveira Branco

Goals

- Perform basic concepts or theory of errors.
- Apply concepts related to the numerical resolution of nonlinear equations, polynomial interpolation, numerical integration, numerical resolution of initial value problems and iterative resolution of linear systems.

Skills

- Understand the limitation of analytical techniques to solve mathematical problems.
- Understand why numerical errors exist and how they can be controlled.
- Choose and use of the most effective numerical methods to solve mathematical problems and interpret the results.
- Use numerical methods to solve problems on Civil Engineering.
- Implement and use computational scripts, using Matlab.
- Use free mathematical software.

Signature of Teacher: José Branco

Program Contents

1. Theory of errors (brief remarks).
2. Roots of nonlinear equations.
- Introduction.
- Location of roots. Graphical method and Bolzano's theorem.
- Bisection and Newton's methods. Error. Stopping criteria.
- Computational implementation using Matlab.
- Applications to Civil Engineering.

3. Polynomial interpolation.
- Introduction.
- Uniqueness of the interpolating polynomial.
- Interpolating polynomial: Lagrange's and Newton's forms. Interpolation error.
- Inverse polynomial interpolation.
- Computational aspects using Matlab.
- Applications to Civil Engineering.

4. Numerical integration.
- Introduction.
- Trapezoidal and Simpson's rules. Errors.
- Computational implementation using Matlab.
- Applications to Civil Engineering.

5. Numerical integration of ordinary differential problems of first order initial value.
- Introduction.
- Euler and second order Runge-Kutta methods. Errors.
- Computational implementation using Matlab.

6. Iterative methods for solving linear systems.
- Introduction.
- Jacobi's and Gauss-Seidel's methods.
- Computational aspects using Matlab.

Bibliography

- J. R. Branco, *Numerical Methods – Slides,* Coimbra Institute of Engineering, 2014 (english version).
- J. R. Branco, *Numerical Methods – Exercise book,* Coimbra Institute of Engineering, 2018/2019 (english version).
- J. R. Branco, *Numerical Methods – A first look on Matlab,* Coimbra Institute of Engineering 2018/2019 (english version).
- S. C. Chapra, R. P. Canale, *Numerical Methods for Engineers*, McGraw-Hill, fifth edition, 2006.

Access Conditions and Attendance Excuse

Not applicable.

Conditions for Exam Admission

Any student enrolled at this curricular unit has access to an examination.

Evaluation Method

Evaluation will be carried out through written examination and will include two components:
- Practical component: Problem solving, using the calculator. Theoretical and explanatory questions.
- Laboratory component: Problem solving, using mathematical software (MatLab and Geogebra).

Evaluation can be done during the semester (distributed assessment), through 2 tests, each quoted to 10 values, and also at regular season and appeal season (final assessment).

i) The result of the distributed evaluation will be given by the sum of the results of the 2 tests and replaces the evaluation of the regular season. Student will be approved if final result, rounded, is greater or equal than 10 values and the result of each test is greater or equal than 3.5 values (out of 10).
ii) On evaluation by exam, student will be approved if final result, rounded, is greater or equal than 10 values (out of 20).

Conditions for Results Improvement

According to "REACTA - *Regulamento de Avaliação de Conhecimentos e Transição de Ano dos Estudantes das Licenciaturas do Instituto Superior de Engenharia de Coimbra".*

Date	**Signature from the lecturer responsible for the course**
September 12th, 2018	José Ricardo de Oliveira Branco

Signature of Teacher:

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Licenciatura – BsC *_Engenharia Civil*

Licenciatura – BsC *Civil Engineering*

Academic Year: **2018/2019**

Program Contents

Course Unit CALCULUS II

Specialization (s) LINEAR ALGEBRA

Subject type Basic Science **Research Area** Mathematics

Year 1 **Semester** 2 **ECTS** 6

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures		
Theoretical-Practical Lectures	5	70
Practical-Laboratoty Lectures		
Tutorial Orientation		
Project		

Unaccompanied Working Hours

Activity Type	Total Hours
Study	83,5
Works / Group Works	
Project	
Evaluation	2,5
Additional	

Total of Working Hours 156

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures			
Theoretical-Practical Lectures	Carla Fidalgo	PhD	Adj. Professor
Practical-Laboratoty Lectures			
Tutorial Orientation			
Project			

Responsible(s) Lecturer (s) Carla Fidalgo

Goals

- Solve 1st order linear differential systems of differential equations.
- Perform basic matrix operations.
- Compute matrix determinants, eigenvalues and eigenvectors.
- Understand and apply concepts related to vector spaces.
- Solve and interpret linear systems using matrix theory.
- Understand the importance of linear algebra and analytic geometry in engineering.
- Recognize the importance of the algorithms in linear algebra.

Skills

- Develop algorithms using a logical and structured reasoning.
- Base problem solving on mathematics.
- Compare, with criticism, the results obtained by analytical means with the ones obtained by computational means.
- Select appropriately the accessible information (from monographs, textbooks, web, …).
- Expose, using documents, the problems' solution in a clear and simple way.
- Explain the concepts and problems' solution in an appropriated way.
- Solve practical problems with autonomy using, not only the subjects treated in the class, but also other related topics.

Program Contents

1. **Introduction to the study of ordinary differential equations**
   Differential Equations of first order: differential equations of separate variables; linear differential equation of first order;
   Linear Differential Equations of order *n:* Basic definitions. Linear homogeneous equations with constant coefficients. Nonhomogeneous equations.
2. **Matrices and Linear Systems**
   Introduction; Matrix operations and their properties; Row echelon form and rank; Classification and geometry of linear systems; Gaussian elimination; Homogeneous systems; Matrix inversion: Gauss-Jordan method;
3. **Determinants**
   Definition and properties; Cramer's rule.
4. **Linear Spaces**
   Definition, Examples and Properties; Subspaces; Linear combinations; Linear expansion; Linear independence; Basis and dimension.
5. **Linear transformations**
   Definition and examples
   The Kernel and the Range of a Linear Transformation
   Matrix of a linear transformation
6. **Eigenvalues**
   Eigenvalues, eigenvectors and their properties; Diagonalization; Cayley-Hamilton Theorem.

Bibliography

ANTON, H. - *Elementary Linear Algebra*, John Wiley & Sons, Inc, 2000.
BOYCE, W. and DIPRIMA, R., *Elementary Differential Equations and Boundary Value Problems*, Wiley.
BRAUN. M., *Differential Equations and Their Applications*:*an introduction to applied mathematics* (4th Ed.), Springer, N. Y..
CABRAL, I., PERDIGÃO, C. and SANTIAGO, C., *Álgebra Linear – Teoria, Exercícios resolvidos e Exercícios propostos com soluções*, Escolar Editora, 2009.
CARREIRA, A. and PINTO, G. – *Cálculo Matricial – Teoria Elementar*, Ciência e Técnica, 1999.
FIDALGO, C. - *Álgebra Linear*, Instituto Superior de Engenharia de Coimbra.
GOUVEIA, M. L. e ROSA, P. M., *Apontamentos de Análise Matemática II*, Departamento de Física e Matemática, ISEC, 2006.
GRAHAM, A. - *Matrix Theory and Applications for Engineers*, Ellis Horwood Limited, 1979.
JAMES, G. - *Modern Engineering Mathematics*, Prentice Hall, 2000.
KREYSZIG, E., Advanced Engineering Mathematics (8th Ed.), Wiley.
PINTO, G.; MONTEIRO, A.; MARQUES, C. – *Álgebra Linear e Geometria Analítica. Problemas e Exercícios*, McGraw-Hill, 2001. ISBN-13: 9789728298661.
NICHOLSON, W. – *Elementary Linear Algebra with Applications*, PWS Publishing Company, 1986. ISBN-13: 9780871509024.
RODRIGUES, R. – Notas Teóricas de Análise Matemática, DFM, ISEC
SANTANA, A.; QUEIRÓ, J. – Introdução à Álgebra Linear, Gradiva, 2010. ISBN 9789896163723
ZILL, D., *A First Course in Differential Equations with Modelling Applications* (7th Ed.), Brooks/Cole.

Access Conditions and Attendance Excuse
Not applicable

Conditions for Exam Admission
All students enrolled in accordance with the ISEC's rules may take the exam.

Evaluation Method
Final Exam: 100%.
The approval requires the acquisition of at least 9.5 values and the marks above 17 are subject to an oral exam.

Conditions for Results Improvement
According to the rules defined by ISEC

Date	**Signature from the lecturer responsible for the course**
11/01/2019	

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher:

Licenciatura – BsC Engenharia Civil

Licenciatura – BsC Civil Engineering

Academic Year: **2018/2019**

Program Contents

Course Unit MECHANICS OF MATERIALS I

Specialization (s) STRUCTURAL MECHANIC AND STRUCTURES

Subject type **Research Area** Civil Engineering

Year 1º **Semester** 2º **ECTS** 5,0

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures	-	-
Theoretical-Practical Lectures	3,5	49
Practical-Laboratoty Lectures	-	-
Tutorial Orientation	0,5	7
Project	-	-
Total of Working Hours		130

Unaccompanied Working Hours

Activity Type	Total Hours
Study	47
Works / Group Works	22
Project	-
Evaluation	5
Additional	-

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures Theoretical-Practical Lectures Practical-Laboratoty Lectures	Victor José Dias de Almeida Magalhães	Master	Prof. Adj.
Tutorial Orientation Project	Victor José Dias de Almeida Magalhães	Master	Prof. Adj.

Responsible(s) Lecturer (s) Victor José Dias de Almeida Magalhães

Goals

Provide the fundamentals of mechanical behavior of deformable solids. Studying the behavior of solids when they are subjected to different loading, with calculate the stresses and specific deformations produced by actions. Ability to know the formulations and equations that allow to predict the mechanical behavior of materials. Provide methodologies for analysis of stresses and deformations in linear parts subject to axial stress and bending. Develop the fundamental concepts of design and verification of structures subject to axial stress and bending

Skills

Transversal skills: i) decision-making capacity, ii) capacity of communication and expression, iii) capacity to ensure quality
Generic skills: i) ability of learn, analysis and synthesis, ii) troubleshooting capacity, iii) ability to apply knowledge and adaptation to new situations, iv) ability to perform autonomous work and group work, v) development of autonomy in learning, vi) ability to predict and issue judgments.
Specific skills: i) know the theoretical basis and practices for design of structures (metal, masonry, wood, reinforced concrete or prestressed) and study of connections; 3.2 recognize, diagnose and prevent structural pathologies in constructions.

Program Contents

The classes will be taught in Portuguese, being referred to the following contents
Chapter 1 - Concept of tension and principle of equivalence.
Chapter 2 - Linear elasticity: constitutive relations; fundamental problems; Saint-Venant problem.

Signature of Teacher: _____

Chapter 3 - Tension and compression in the linear elements; Isostatic problems; thermal effects; hiperstatic problems; structures with different materials.
Chapter 4 – Shear forces analysis on the connections nodes of structures.
Chapter 5 - Linear elastic bending; straight and biaxial bending; calculation of stresses. Straight bending parts consisting of different materials.

Bibliography

1. FREY, F. (1990) – Analyse des structures et milieux continus: Statique Appliqué. Traité de Génie Civil de l'École polytechnique fédérale de Lausanne, Lausanne Vol. 1, Presses polytechniques et universitaires romandes, 1994.
2. Frey F. Analyse des strucutres et millieux continus – Mécanique des structures. Traité de Génie Civil de l'École polytechnique fédérale de Lausanne, Vol. 2, Presses polytechniques et universitaires romandes, 1994.
3. TIMOSHENKO, S. e GERE, J. (1983) – Mecânica dos Sólidos. Volumes I e II. Livros Técnicos e Científicos.
4. Branco CAGM. Mecânica dos materiais. Fundação Calouste Gulbenkian, 1985.
5. Beer FP e Johnston Jr ER. Resistência dos materiais. McGraw-Hill, 1989
6. Massonet C e Cescotto S. Mécanique des matériaux. Biblioteque des Universités – Genie Civil, De Boeck-Wesmael, 1994.
7. Dias da Silva V. Mecânica e resistência dos materiais. Zuari – edição de livros técnicos Lda., 1999
8. Meriam J.L., Kraige L.G.; "Engeneering Mechanics - Statics", John Wiley & Sons, Inc.
9. Bibliography in the library and appointments with problems prepared by teachers and others, available on the internet and in Moodle.

Access Conditions and Attendance Excuse

Not applicable

Conditions for Exam Admission

Students may perform tests of discipline, if they are properly registered on academic services, and with the name registered on the sheet of classifications

Evaluation Method

The evaluation of the students will be done by means of a final written exam (E_{final}), of obligatory character, and to be carried out in the dates defined institutionally.
- Evaluation in the final written test (E_{final}):
The final exam will have the maximum quotation of 20 values and will be divided into two parts:
1st part - fundamental problems (quotation of 5.0 values)
2nd part - problems applied (quotation of 15,0 values).
The student must obtain a minimum grade of 3.0 values in the 1st part - fundamental problems.
In cases where the students do not obtain the minimum classification in the part of fundamental problems, the part of problems applied will not be corrected and will be assigned a final grade of 5.0 values.

An intermediate test ($A_{intercalar}$), optional and not dispensing the final exam, may be performed.
The grade of the intermediate test can only be considered if the grade of the final exam (obligatory) corresponds to at least 50% of the total quotation of the exam. In this case the final grade may equal: $0.40 \times A_{intercalar} + 0.60 \times E_{final}$.

No query elements are allowed, and the use of mobile phones, laptops or any other portable equipment not authorized by the teacher is strictly prohibited.
The exam may be written and presented in English for students who request it in advance.

Conditions for Results Improvement

It is expected to carry out special evaluations for students who request additional test or special tests. These exams are to be defined by indication of the academic services. The teacher may suggest that these tests are in the form of written exam, oral exam or by presentation and defense of works to be done by the students.

Date

17-01-2019

Signature from the lecturer responsible for the course

Victor José Dias de Almeida Magalhães

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher:

Licenciatura em Engenharia Civil BsC

Degree in Civil Engineering – BsC

Academic Year: **2018/19**

Program Contents

Course Unit SURVEYING

Specialization (s)

Subject type **Research Area** Interdisciplinary

Year 1st **Semester** 2nd **ECTS** 5

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures		
Theoretical-Practical Lectures	2	28
Practical-Laboratoty Lectures	1,5	21
Tutorial Orientation	0,5	7
Project		

Total of Working Hours 130

Unaccompanied Working Hours

Activity Type	Total Hours
Study	60
Works / Group Works	12,5
Project	
Evaluation	2
Additional	

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures			
Theoretical-Practical Lectures	Maria Margarida Coelho e Silva	Master	
Practical-Laboratoty Lectures	Maria Margarida Coelho e Silva	Master	
Tutorial Orientation	Maria Margarida Coelho e Silva	Master	
Project			

Responsible(s) Lecturer (s) Maria Margarida Coelho e Silva

Goals

Knowing the concepts of cartography and topography to interpreting, positioning and representing entities.

Skills

Knowing the theoretical and practical concepts of cartography and topography to interpreting, positioning and representing entities. Know and use instruments to perform topographic surveys and implementation of points on the ground works.

Program Contents

1. Introduction to geodetic basic definition. Coordinates Systems
2. Angles measurement, horizontal and vertical angles. Theodolite, sources of errors.
3. Distance measurement-direct and indirect measurements electronic distance measurement, Use of total station
4. Plane surveying: irradiation, triangulation.
5. Leveling – trigonometric leveling and direct leveling.
6. Introduction to Global Positioning Systems.

Signature of Teacher:_____

Bibliography

Uren J. , Price B., Surveying for Engineers, Fifth Edition, Palgrave, 2010

Anderson, James M., Mikhail Edward, (1998):"Surveying Theory and Practice", 7th ed., McGraw Hill

Mikhail, A.; Surveying Theory and Practice Seventh Edition; McGraw-Hill 1998

Evaluation Method

75% Exam + 25% Practical work group

Margarida Coelho e Silva

Date

21.01.2019

Signature from the lecturer responsible for the course

Instituto Superior de Engenhana de Coimbra
www.isec.pt

Signature of Teacher:

Licenciatura – BsC Engenharia Civil

Licenciatura – BsC *Civil Engineering*

Academic Year: 2018/2019

Program Contents

Course Unit STATISTICAL METHODS

Specialization (s)

Subject type Basic Sciences **Research Area** Mathematics

Year 1st **Semester** 2nd. **ECTS** 4

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures		
Theoretical-Practical Lectures	2,5	35
Practical-Laboratoty Lectures	0,5	7
Tutorial Orientation		
Project		

Unaccompanied Working Hours

Activity Type	Total Hours
Study	45
Works / Group Works	14
Project	
Evaluation	3
Additional	

Total of Working Hours 104

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures			
Theoretical-Practical Lectures	Maria Filomena Palmeira de Araújo Canova	Master Sciences	Prof. Coordenador
Practical-Laboratoty Lectures	Maria Filomena Palmeira de Araújo Canova	Master Sciences	Prof. Coordenador
Tutorial Orientation			
Project			

Responsible(s) Lecturer (s) Maria Filomena Palmeira de Araújo Canova

Goals

Provide the fundamentals of Statistics and Probability required to study, analyze and interpret data and models with application in the engineering areas and in particular in the civil engineering area.

Skills

With success in this course unit, the student should be able to apply fundamental knowledge of descriptive statistics, correlation and linear regression, calculate probabilities of different random events, identify the main probability distributions, and construct confidence intervals for one unknown parameter in several distributional situations. In the end students should be able to use techniques and tools that allow a statistical analysis of real data and interpretation of results in problems in engineering area, including the use of statistical software.

Program Contents

Data Types. Methods of Collecting and Presenting Data. Samples, Populations and Randomness.
Probability and Probability Distributions.
Probability of an event. Applying the Probability Rules. Conditional Probability and independent events.
Random variables. Discrete and continuous variables. The mean and the variance of a random variable. Moments of a random variable. Pairs of discrete variables. Joint distribution and correlation.
Probability Distributions. Probability distribution of a discrete random variable and probability distribution of a continuous random variable. Some special probability distributions: binomial, Poisson, uniform and exponential. The Normal distribution. The Centarl limit theorem. Applications.
Statistical Inference. Sampling distribution. Point and interval estimates of population parameters. Confidence Intervals. Linear Regression. Straight-Line Models. Regression-Concepts and Assumptions. Correlation. Using statistical software in Statistics Analysis.

Bibliography

Lecture notes and exercises sheets of the theoretical-practical and laboratory classes- *moodle.isec.pt*
Guimarães, R.C. e Cabral J., Estatística (2009), 2.ª edição – *Mc Graw Hill*
Montgomery, Douglas C. e Runger, George C. (2004) – Applied Statistics and Probability for Engineers, 4th Edition, *Wiley*
Murteira, B. J., **Ribeiro**, C. S., **Andrade e Silva**, J. e **Pimenta**, (2002) – Introdução à Estatística, McGraw Hill
Pedrosa, A. e **Gama**, S. (2018) – Introdução Computacional à Probabilidade e Estatística, *Porto Editora*
Reis, Elizabeth and all (2015), Estatística Aplicada 1, 6ª edição, *Edições Sílabo*
Reis, Elizabeth and all (2019), Estatística Aplicada 2, 6ª edição, *Edições Sílabo*
Robalo, A. (2017), Estatística – Exercícios, Vol I, *Edições Sílabo*
Robalo, A. (2018), Estatística – Exercícios, Vol II, *Edições Sílabo*
Ross, Sheldon M. (2009) – Introduction to Probability and Statistics for Engineers and Scientists, 4rd Edition. *Elsevier/Academic Press, Burlington, MA.*

Access Conditions and Attendance Excuse

Not applicable.

Conditions for Exam Admission

Access to the exam is allowed to all students enrolled in the Course Unit.

Evaluation Method

Assessment can be either distributed or by a final exam evaluation during the 1st or 2nd exam´s period.
Distributed evaluation consists of two intermediate tests (50%), with duration of 1h15m.
The student will be approved if the grade of each test is superior or equal 20% and the grade total is superior or equal 50%.
Alternatively, or in the case the student did not succeed the distributed evaluation, the assessment is made through a final exame (100%). Successful requires a minimum of 50%.
The 1st test will take place in 25-29/03/2019 week and the 2nd test in the last week of classes (27-31/05/2019).

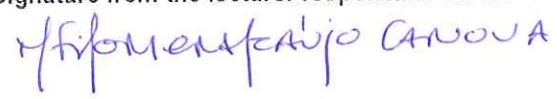
Conditions for Results Improvement

In accordance with the legislation in force, REACTA.

Date

2018.01.20

Signature from the lecturer responsible for the course



Instituto Superior de Engenharia de Coimbra
www.isec.pt

Lecturer's signature:_____

Licenciatura – BsC – Engenharia Civil

Licenciatura – BsC - Civil Engineering

Academic Year: **2018/2019**

Program Contents

Course Unit CONSTRUCTION MATERIALS II

Specialization (s)

Subject type **Research Area**

Year 1.º **Semester** 2.º **ECTS** 5

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures		
Theoretical-Practical Lectures	2.5	35
Practical-Laboratory Lectures	1	14
Tutorial Orientation	0.5	7
Project		

Unaccompanied Working Hours

Activity Type	Total Hours
Study	43
Works / Group Works	28
Project	
Evaluation	3
Additional	

Total of Working Hours 130

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures			
	Rui Manuel dos Santos Ferreira	MSc	Adjunct Professor
Theoretical-Practical Lectures			
	Carlos António Marques Lemos	MSc	Assistant
	Rui Manuel dos Santos Ferreira	MSc	Adjunct Professor
Practical-Laboratory Lectures			
	Carlos António Marques Lemos	MSc	Assistant
	Rui Manuel dos Santos Ferreira	MSc	Adjunct Professor
Tutorial Orientation			
	Carlos António Marques Lemos	MSc	Assistant
Project			

Responsible(s) Lecturer (s) Rui Ferreira

Goals

Characterize and select components of mortars and concretes according to their properties and intended applications.

Skills

Establish the composition of concrete and mortar on currents and special constructions.
Recognize the characteristics of the mortars and concretes and know how to apply them.
Determine in laboratory the main characteristics of the constituents for mortar and concrete.
Characterize mortar and concrete both the fresh and hardened state.

Lecturer's signature:_____

Program Contents

Mineral aggregates
- Types of aggregates
- Determination of particle size distributions

Binders for concrete and mortar
- General properties
-Gypsum
- Air lime
- Hydraulic lime
- Portland Cement

Mortars and concretes
- Composition and manufacture
- Methods to study the composition of mortar and concrete
- Characterization of mortars and concretes in the fresh state
- Mechanical properties of mortars and concrete

1.

Bibliography

- LOURENÇO, Jorge, "Formulação de betões"; ISEC.
- LOURENÇO, Jorge, "Caderno das Teórico-práticas", ISEC.
- LOURENÇO, Jorge, "Determinações de massas volúmicas de inertes e ligantes e de absorções e humidades de inertes", ISEC / SIKA, 1992.
- VÉNUAT, M., "Ciments et bétons", Presses Universitaires Françaises, Paris.
- VÉNUAT, M., "La pratique des ciments, mortier et bétons", ed. Moniteur, Paris.
- PETRUCCI, E., " Concreto de cimento portland", Ed. Globo, Porto Alegre.
- Apresentações das aulas teórico-práticas e das aulas práticas-laboratoriais.

Access Conditions and Attendance Excuse

Conditions for Exam Admission

Students obtain frequency in the course unit if, when they are regularly enrolled, they do not exceed the limit of absences established for the laboratory-practical classes, 1/3 of the classes really taught.
Students with the status of worker-student are exempt from the requirement of minimum frequency.

Evaluation Method

The Curricular Unit of Construction Materials II can be realized by tests. The first test to be taken during the semester, the day and time to be marked, and the second test to be taken on the day and hour of the examination of the normal time. The first test will focus on the mortars and concrete constituents, the second will focus on mortars and concretes. Each test will have a weight of 50%.
The assessment may also be done by a final written examination covering the whole subject matter.
Except in cases provided for by law, at least 2/3 of the laboratory classes are required.
All those who choose to perform the frequencies no longer have access to the normal exam season, will only have access to the resource exam season.

Conditions for Results Improvement

Students can improve their grades or have access to a second chance exam under the conditions defined in the operating regulation of ISEC.

Date

11-01-2019

Signature from the lecturer responsible for the course

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher:_____

Licenciatura – BsC __Engenharia Civil_____(Português)

Licenciatura – BsC __ Civil Engineering _____(Inglês)

Academic Year: **_2018_/_2019_**

Program Contents

Course Unit APPLIED MECHANICS

Specialization (s) STRUCTURAL MECHANIC AND STRUCTURES

Subject type **Research Area** Civil Engineering

Year 1º **Semester** 1º **ECTS** 5,0

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures		
Theoretical-Practical Lectures	3,5	49
Practical-Laboratoty Lectures		
Tutorial Orientation	0,5	7
Project		

Unaccompanied Working Hours

Activity Type	Total Hours
Study	70
Works / Group Works	
Project	
Evaluation	4
Additional	

Total of Working Hours 130

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures			
Theoretical-Practical Lectures	João Paulo Martins Gouveia	Master	Prof. Adj.
Practical-Laboratoty Lectures			
Tutorial Orientation	João Paulo Martins Gouveia	Master	Prof. Adj.
Project			

Responsible(s) Lecturer (s) João Paulo Martins Gouveia

Goals

The applied mechanics examines the response of structures systems requested by external forces. Statics is the area of mechanics in which studying the action of loads (forces and moments) in physical systems in static equilibrium. The students should be able to (i) understand the fundamentals of static equilibrium and (ii) compute the internal forces of a structure subjected to a combination of external loads.
At the end of this course, students must be:
- understand the static equilibrium of systems forces in two dimensions, types of support and with the concept of structural mechanics;
- understand the structural shapes and characteristics;
- propose and solve simple structural problems, including trusses, beams and structures
- calculate the internal forces in isostatic structures

Skills

1. Transversal skills: i) decision-making capacity, ii) capacity of communication and expression, iii) capacity to ensure quality
2. Generic skills: i) ability of learn, analysis and synthesis, ii) troubleshooting capacity, iii) ability to apply knowledge and adaptation to new situations, iv) ability to perform autonomous work and group work, v) development of autonomy in learning, vi) ability to predict and issue judgments
3. Specific skills: i) know the theoretical bases and practices related to the project of structures: steel, masonry, wood and reinforced concrete, ii) recognize, diagnose and prevent structural pathologies in construction

Program Contents
The classes will be taught in Portuguese, being referred to the following contents

Chapter 1 – Static
Basis for vector analysis. 1.2 Introduction of the concepts of static equilibrium of structural systems. 1.3 Concepts of forces, moment, and resulting of actions. Static equilibrium: forces and moment. 1.4 Analysis of static degree of structures. Supports and connections types' structural analysis (parts of structures and external supports). 1.5 Calculation of reactions in supports. Interior forces in linear elements: axial forces, shear forces, bending moment, torque moment. Sign conventions and relationship between load, shear and bending moment and between load and axial force. 1.6 Calculation of efforts on the elements of truss structures. 1.7 Diagrams of internal forces in linear elements: the normal diagrams; diagrams of shear forces; diagrams of bending moments.

Chapter 2 – Introduction of Geometry of Mass
2.1 Characterization areas: determination of centers of mass, static moments, moments of inertia and products of inertia, relative to the axes. Steiner theorem: moments and products of inertia on parallel axes. 2.2 Inertial moments of lines and of the areas. Principal Axes and Principal Moments of Inertia.

Bibliography
1. Beer P. Ferdinand, Johnston Jr. Russel; ''Mecânica Vectorial para Engenheiros - Estática"; - 6 edição; McGraw Hill.
2. Meriam J.L., Kraige L.G.; "Engeneering Mechanics - Statics", John Wiley & Sons, Inc.
3. Hibbeler; "Estática"; LTC
4. Frey F. Analyse des strucutres et millieux continus – Statique appliqué. Traité de Génie Civil de l'École polytechnique fédérale de Lausanne, Vol. 1, Presses polytechniques et universitaires romandes, 1994.
5. Riley WF, Sturges LD. Engineering mechanics: statics. John Wiley & Sons, 1996.
6. Appointments with problems prepared by teachers and others, available on the internet and in Moodle

Access Conditions and Attendance Excuse
Not applicable

Conditions for Exam Admission
Students may perform tests of discipline, if they are properly registered on academic services, and with the name registered on the sheet of classifications

Evaluation Method
The evaluation of students will be made by the written exam to perform on the defined institutional dates and the presentation of individual work of personal study and research about contents (TEPP). It is also considered the frequency of attendance at lessons. The student can suggest work or evidence of extra evaluation according to indication and teaching instruction (realization and test of scale model of structures with descriptive poster presentation or documents with resolution of problems).

- Information concerning the written exam:
  All students will be assessed by the written exam (with TEPP-works query written by the student and to deliver along with the evidence). The exams forms will be divided into two parts: fundamental problems (5.0values) and applied problems (15.0values). The student must obtain a minimum rating of 3.0 on the values of fundamental problems. In cases where students do not obtain the minimum rating at the fundamental problems, the part of applied problems will not be corrected and will be assigned a final grade of 3.0 values. During the written test, are not allowed to use mobile phones or image and communication equipment or any other portable equipment not authorized by the professor for supervision of the examination.

- Information about TEPP-works:
  According to the contents, the student can be resolve exercises and problems, presented in template form (the document given by a teacher). The originals of these works manuscripts shall be returned to the teacher in role in each week. Later, the student must make available the pdf of the work performed for all students. The classification will have the maximum of 5 values.

- Information concerning by regular attendance at lessons:
  This classification will have the maximum of 1 value, being defined and weighted according to the number of lesson.

- Information about methodology for extra evaluation:
  It is considered the possibility of evaluating for frequency works (works written or test of evaluation on subject taught), to be held during the academic period and class schedule. Also, it is possibility of evaluating for practice works (scale model of structures with descriptive poster presentation or documents with resolution of problems). This work, is performed by group of 2 students, with the design/construction of model, being evaluated the total weight and subsequently subjected to load test for evaluation of permissible force (the technical detail for achievement of proof of loads will be described by the teacher). The evaluation is made after the descriptive document delivery, and the classification will have the maximum value of 4.0values allocated on the basis of weight and strength.

Signature of Teacher:_____

- Information about final classification:
  For the definition of the final classification shall be achieved by the sum of the evaluation of the written exam and all parts of work realized, and the value of the written test will be converted to be added the values obtained in the other components for evaluation.

Conditions for Results Improvement

It is expected to carry out special character evaluations of students with request additional test or special tests. This exams can be defined by indication of the academic services. The teacher may suggest that these tests are in the form of written exam, oral exam or for presentation and defense of works that can be done.

Date	**Signature from the lecturer responsible for the course**
10 Setembro 2018	*(João Paulo Gouveia)*

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher: _____

Licenciatura – BsC Engenharia Civil (Português)

Licenciatura – BsC Civil Engineering (Inglês)

Academic Year: 2018 / 2019

Program Contents

Course Unit PHYSICS

Specialization (s) COMMON TRAINING

Subject type Mandatory **Research Area** Física

Year 1 **Semester** 1 **ECTS** 5.0

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures		
Theoretical-Practical Lectures	3	42
Practical-Laboratoty Lectures	0,75	10,5
Tutorial Orientation	0,25	3,5
Project		

Unaccompanied Working Hours

Activity Type	Total Hours
Study	57
Works / Group Works	14
Project	
Evaluation	3
Additional	

Total of Working Hours 130

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures			
Theoretical-Practical Lectures	Jorge Miguel Tavares Couceiro de Sousa	PhD	Adjunct Professor
Practical-Laboratoty Lectures	Victor José Dias de Almeida Magalhães	PhD	Adjunct Professor
Tutorial Orientation			
Project			

Responsible(s) Lecturer (s) Jorge Miguel Tavares Couceiro de Sousa

Goals
To provide students with the skills listed below.

Skills
Tansversal Skills:

T8: To know the fundamental concepts, principles and laws in the area of Mechanics, namely, systems of forces, rigid bodies, as well as of Fluid Mechanics;
- T8.1: Know how to apply the acquired knowledge in concrete practical situations;
- T8.2: Ability to interpret and discuss the numerical expression and physical meaning of the results of laboratory experiments.

Program Contents

1. Unit Systems
    - Magnitudes and SI base and derived units;
    - Equations of dimensions and principle of dimensional homogeneity;
    - SI units used in Engineering;
    - Change of system of units.
2. Vector Calculus
    - Scalars and vectors;
    - Graphical representation of vectors;
    - Bound, sliding and free vectors;
    - Graphical operations with free vectors: multiplication by a scalar, addition and subtraction;
    - Unit vectors;
    - Projection of a vector along an arbitrary direction;
    - Cartesian representation of vectors: components of a vector, position vector, module of a vector, directing cosines;
    - Analytical operations with vectors: multiplication of a vector by a scalar, addition and subtraction of vectors, dot product, cross product, scalar triple product, and derivative of a vector.
3. Systems of Forces
    - Newton's laws;
    - Types of forces;
    - Torque of a force with respect to a point and an axis;
    - Resultant force and resultant torque;
    - Force couple and torque of a force couple;
    - Equivalent systems of forces;
    - Reduction of a system of forces to a minimum system: concurrent forces (Varignon's Theorem), coplanar forces and parallel forces;
    - Central axis of a system of forces.
4. Introduction to Statics
    - Free body diagram;
    - Systems of forces in equilibrium.
5. Rotation Dynamics
    - Angular momentum of a particle: motion in a surface, circular motion; angular momentum conservation theorem;
    - Angular momentum of a rigid body;
    - Moment of inertia: principal axis of inertia and Steiner's theorem;
    - Derivation of the equation of the rotational dynamics of the rigid body;
    - Kinetic energy of a rigid body: translational and rotacional kinetic energy.
6. Fluid Mechanics
    - The concept of fluid, density and pressure;
    - Pressure in a fluid (fundamental principle of hydrostatics), equilibrium of a fluid element and pressure and hydrostatic forces;
    - Equilibrium of a fluid element and pressure in a fluid (fundamental principle of hydrostatics);
    - Pressure gauges;
    - Buoyancy (Arquimedes' principle);
    - Pascal's law and hydraulic press;
    - Current lines and flow regimes: laminar and turbulent;
    - Mass and volume flow: continuity equation;
    - Bernoulli's equation (ideal fluids);
    - Viscosity (real fluids), Poiseuille's Law and Stokes' Law;
    - Reynolds's number;
    - Surface tension.

Signature of Teacher: 

Bibliography

- Miguel Couceiro and Milton Macedo, *Theoretical support texts and presentations* (in Portuguese), ISEC;
- Miguel Couceiro, Milton Macedo and Susete Fetal, *Proposed and solved exercise sheets* (in Portuguese), ISEC;
- Anthony Bedford, Wallace Fowler, *Statics*, Addison-Wesley, SI Edition;
- Anthony Bedford, Wallace Fowler, *Dynamics*, Addison-Wesley, SI Edition;
- Frank M. White, *Fluid Mechanics*, McGraw-Hill International Editions, 4th Edition;
- B. N. Taylor, *The International System of Units (SI)*, NIST Special Publication 330, 2001 Edition. (http://physics.nist.gov/Pubs/SP330/sp330.pdf);
- B. N. Taylor and C. E. Kuyatt, *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*, NIST Technical Note 1297, 1994 Edition. (http://physics.nist.gov/Pubs/guidelines/TN1297/tn1297s.pdf).

Access Conditions and Attendance Excuse

Not applicable.

Conditions for Exam Admission

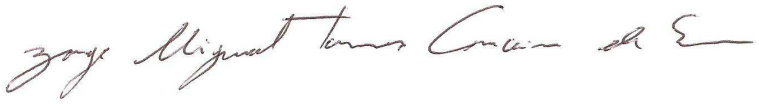
In order to have access to the final exam, students will have to obtain approval to the laboratory component (minimum of 2.00 in 4.00 values).
Students covered by the statute of the student worker (Law no. 07/2009, Law no. 59/2008 and the ISEC regulation of the student worker) who, due to their working hours, cannot attend the laboratory classes, will have to arrange with the teacher of the practical laboratory classes, an appropriate time for the practical classes.
The grade obtained in the laboratory component is valid for any of the examination seasons of the academic year in which it was obtained.

Evaluation Method

The evaluation is carried out by: practical laboratory works, regulated by the annexed rules, and final written examinations that are compulsory or optional that are contained in the regulations in force in ISEC.
Students who obtain a grade of 2.00 or more in the practical laboratory works will obtain approval if $C = E \times 0.8 + P \geq 9.50$, where E is the final exam classification, from 0 to 20 values, and P is the classification of practical laboratory works (0 to 4 values). Otherwise, the final classification will be C if $C < 9.00$, or 9 if $C \geq 9.50$.
The exams are with consultation of an A4 sheet with arbitrary content.

Conditions for Results Improvement

All students are allowed to improve their classification according to the rules in force in ISEC.

Date	**Signature from the lecturer responsible for the course**
07/09/2018	

Rules of Practical Classes

Academic Year of 2018/2019

1. In the first week of classes, students are enrolled in groups (of two or three) and informed of the schedule for the practical works.
2. Four practical works will be carried out, consisting of:
   2.1. Experimental determination of the volume of an object immersed in a fluid by determination of the bouncy exerted on it, and determination of the surface tension of a fluid;
   2.2. Calibration of a dynamometer and experimental setup of a concurrent force system at equilibrium using two masses, the dynamometer and an angular scale;
   2.3. Experimental determination of the average air flow velocity using the Bernoulli's equation and a Venturi-like tube, determination of the local air flow velocity using a Pitot tube, and determination the drag coefficient of a sphere;
   2.4. Experimental determination of the moment of inertia of: a rotational apparatus, point particles and cylinders.
3. In order to have access to each laboratory work, each group must deliver and obtain approval on a pre-report (available on the course website), which is similar in nature to the final report, but with data pre-acquired by the teachers. Any doubts concerning the pre-reports and the practical works must be clarified by students, prior and in time, in the office hours of the teachers of laboratory classes.
4. At the end of each practical work, and during the practical class, each group will present a single report of the work done, which will be graded between 0 and 1 values, the classification of the practical works being the sum of the classifications of the four works (therefore with a maximum of 4 values).
5. Unrealized work is graded with 0 values. In those situations where the work is carried out by a group in which one or more elements are missing, missing elements will have a grade of zero in that work.
6. Any situation not covered by these rules will be dealt directly with the teacher responsible for the discipline.

September 7, 2018

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher:

Licenciatura – BsC _em Engenharia Civil

Licenciatura – BsC Civil Engineering

Academic Year: **2018/2019**

Program Contents

Course Unit	CALCULUS I
Specialization (s)	CALCULUS
Subject type	Basic science
Research Area	Mathematics
Year	1
Semester	1
ECTS	6

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures		
Theoretical-Practical Lectures	5h30m	77
Practical-Laboratoty Lectures		
Tutorial Orientation		
Project		

Unaccompanied Working Hours

Activity Type	Total Hours
Study	77
Works / Group Works	
Project	
Evaluation	2
Additional	

Total of Working Hours 156

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures			
Theoretical-Practical Lectures	Carla Fidalgo	PhD	Adj Professor
Practical-Laboratoty Lectures			
Tutorial Orientation			
Project			

Responsible(s) Lecturer (s) Carla Fidalgo

Goals

Development of critical spirit, coordination capacity, reflection and research attitudes, seeking the acquisition of indispensable basic knowledge for the group of subjects in the Civil Engineering degree, namely of differential and integral calculus and their applications

Skills

Capacity to use mathematical techniques. Acquirement of basic knowledge of differential and integral calculus and its indispensable applications for the attendance of the other Civil Engineering subjects. Development of the capacity of concepts' perception, abstract reasoning, results' interpretation and its application to the resolution of problems.

Program Contents

Chapter I: Pre-calculus and calculus introduction
Chapter II: Complements of differential calculus
Chapter III: Techniques of integration
Chapter IV: Applications of integration
Chapter V: Introduction to calculus of real functions of two real variables

Signature of Teacher: 

Bibliography

o Pré-Cálculo e Introdução ao Cálculo, DFM, ISEC
o Notas Teóricas de Análise Matemática, Rui Rodrigues, DFM, ISEC
o M. Fonseca Saraiva, M. Carvalho Silva, "Primitivação". Edições ASA
o Ron Larson, Robert Hostetler, Bruce Edwards, "CÁLCULO ", volume 1. McGraw-Hill
o Robert Adams, "CALCULUS, A COMPLETE COURSE ", Addison Wesley Longman
o Howard Anton, "CÁLCULO – UM NOVO HORIZONTE", volume 1. Bookman
o Tom M. Apostol, "CALCULUS", volume 1. John Wiley & Sons
o Hamilton Luiz Guidorizzi, "UM CURSO DE CÁLCULO", volume 1. LTC Editora
o Erwin Kreyszig, "ADVANCED ENGINEERING MATHEMATICS". John Wiley & Sons
o Earl W. Swokowski "CÁLCULO COM GEOMETRIA ANALÍTICA", volume 1. McGraw-Hill

Access Conditions and Attendance Excuse

Not applicable

Conditions for Exam Admission

All students enrolled in accordance with the ISEC's rules may take the exam.

Evaluation Method

Final Exam: 100%
The approval requires the acquisition of at least 9.5 values and the marks above 17 are subject to an oral exam.

Conditions for Results Improvement

According to the rules defined by ISEC

Date	**Signature from the lecturer responsible for the course**
12/09/2018	

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Lecturer's signature:_____

Licenciatura – BsC – Engenharia Civil

Licenciatura – BsC - Civil Engineering

Academic Year: **2018/2019**

Program Contents

Course Unit CONSTRUCTION MATERIALS I

Specialization (s)

Subject type **Research Area**

Year 1.º **Semester** 1.º **ECTS** 5

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures		
Theoretical-Practical Lectures	3.5	49
Practical-Laboratory Lectures		
Tutorial Orientation	0.5	7
Project		

Unaccompanied Working Hours

Activity Type	Total Hours
Study	
Works / Group Works	
Project	
Evaluation	
Additional	

Total of Working Hours 130

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures			
Theoretical-Practical Lectures	Rui Ferreira	MSc	Adjunct Professor
Practical-Laboratory Lectures			
Tutorial Orientation	Rui Ferreira	MSc	Adjunct Professor
Project			

Responsible(s) Lecturer (s) Rui Ferreira

Goals

Get the knowledge necessary for the characterization of building materials.

Skills

Increase knowledge of the various construction materials, revealing the advantages and disadvantages of each and their application conditions.

Program Contents

PART I – CHARACTERIZATION OF CONSTRUCTION MATERIALS

1. Mass and volumetric characteristics.
2. Mechanical properties.
3. Thermal characteristics.
4. Acoustic properties.

PART II - DESCRIPTION OF CONSTRUCTION MATERIALS

1. Stone materials
   1.1 Natural stones
   1.2 Ceramic materials
   1.3 Glass
2. Metallic materials
3. Organic materials
4. Composite materials

Bibliography

- SMITH, Andres, "Materials of construction", McGraw-Hill International Editions.
- DOMONE, Peter and ILLSTON, John, "Construction Materials – their nature and behaviour", Spon Press.
- PATTON, "Materiais de construção", EPU Lda, São Paulo.
- LOURENÇO, Jorge, "Lições de Materiais de Construção I"; ISEC.
- LOURENÇO, Jorge, "Catálogo das rochas ornamentais", ISEC.
- LOURENÇO, Jorge e LEMOS, Carlos, "Caderno das Práticas", ISEC.
- LOURENÇO, Jorge, "Determinações de massas volúmicas de inertes e ligantes e de absorções e humidades de inertes", ISEC / SIKA, 1992.
- D'ARGA E LIMA, "ARMADURAS - Caracterização, Fabrico, Colocação e Pormenorização", LNEC, 1997.
- Manuais do Centro Tecnológico da Cerâmica e do Vidro:
- Telhas cerâmicas;
- Alvenaria de tijolo;
- Revestimentos cerâmicos.
- Manual do vidro Saint-Gobain.
- CACHIM, Paulo B., "Construções em madeira", PUBLINDÚSTRIA, 2007.

Access Conditions and Attendance Excuse

Conditions for Exam Admission

All students have access to exam.

Evaluation Method

The UC can be performed by tests to be carried out during the semester or by final written examination.

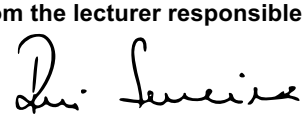
Conditions for Results Improvement

Students can improve their grades or have access to a second chance exam under the conditions defined in the operating regulation of ISEC.

Date

05-09-2018

Signature from the lecturer responsible for the course



Signature of Teacher:

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Licenciatura - BsC Engenharia Civil (3064/1245)
Degree - BsC Civil Engineering

***Academic Year** 2018/2019*

Program Contents

Course Unit COMPUTER-AIDED DESIGN DRAWING

Specialization (s)

Subject type basic sciences **Research Area** civil engineering - constructions

Year 1 **Semester** 1 **ECTS** 4

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures		
Theoretical-Practical Lectures	1,5	21
Practical-Laboratoty Lectures	1,0	14
Tutorial Orientation	0,5	7
Project	0	
Total of Working Hours		42

Unaccompanied Working Hours

Activity Type	Total Hours
Study	21
Works / Group Works	35
Project	
Evaluation	6
Additional	

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures			
Theoretical-Practical Lectures	João Fernandes Silva	Msc. Expert Architect	Associate Professor
Practical-Laboratoty Lectures	João Fernandes Silva	Msc. Expert Architect	Associate Professor
Tutorial Orientation	João Fernandes Silva	Msc. Expert Architect	Associate Professor
Project			

Responsible(s) Lecturer(s) João Fernandes Silva

Goals

E1: visualize and interpret tridimensional drawing pieces.
E2: knowing the concepts and methodologies of project pieces representation, translate graphical details and constructive materials.
E3: using specific technical drawing software, to learn to generate and manipulate bi-dimensional drawing.

Skills

Develop capacities of technical drawing representation, in respect of elementary principals of construction, typologies and dimensions.

Signature of Teacher:

Program Contents

GRAPHICS SYSTEMS OF TWO-DIMENSIONAL AND THREE-DIMENSIONAL REPRESENTATION

Matters seeks to develop the following chapters:

CHAPTER_1 – REPRESENTATION OF VIEWS – NP327
CHAPTER_2 – CUTS AND SECTIONS – NP328
CHAPTER_3 – IMPERSONATION SCALES – NP717
CHAPTER_4 – SUBTITLING – NP204
CHAPTER_5 – DIMENSIONS – NP297
CHAPTER_6 – FORMATS FILE PAPERS – NP12
CHAPTER_8 – ORTHOGONAL PROJECTION
CHAPTER_9 – AXONOMÉTRIC REPRESENTATION

COMPUTER-AIDED DESIGN

Introduction and development of concepts and techniques of computer - aided design – CAD.
CONCEPTS AND TECHNIQUES OF 2D DRAWING
CHAPTER 1 - INTRODUCTION TO COMPUTER AIDED DESIGN SYSTEMS
CHAPTER 2 – ARCHITECTURE OF AUTOCAD PROGRAM
CHAPTER 3 - DEFINITION OF PARAMETERS
CHAPTER 4 - DATA ENTRY- BASIC COMMANDS
CHAPTER 5 - DRAWING – ANCILLARY COMMANDS
CHAPTER 6 - CONTROL DESIGN OF VISUALIZATION OF DRAWINGS
CHAPTER 7 - MODIFY COMMANDS
CHAPTER 8 - LAYOUT AND PRINTING DRAWINGS
CHAPTER 9 - DIMENSIONING DRAWINGS
CHAPTER 10 - GROUPED ENTITIES IN DRAWING BLOCKS

Bibliography

CUNHA , LUIS VEIGA DA (1991), - DESENHO TÉCNICO, - *Fundação Calouste Gulbenkian, Lisboa*
SILVA, ARLINDO; DIAS, JOÃO; SOUSA, LUÍS – DESENHO TÉCNICO MODERNO, - *LIDEL Editora*
MORAIS, SIMÕES (1987) - DESENHO DE CONSTRUÇÕES, *1º Vol. Desenho Básico, 19ª Ed., Porto Editora*
SILVA, JOÃO FERNANDES, (2011) CADERNO 01 - Apontamentos de Desenho e Métodos Gráficos, ISEC
SILVA, JOÃO FERNANDES, (2011) CADERNO 02 - Apontamentos de Desenho de Projeto de Construção, ISEC
GARCIA, JOSÉ, - AutoCAD 2012 & AutoCAD LT 2012 - Curso Completo – Ed. FCA´
PERIS, Vicente Giménez (2014) – DIÉDRICO DIRECTO-Tomo I, Mares de Libros, ISBN: 978-84-612-0413-7
PERIS, Vicente Giménez (2014) – DIÉDRICO DIRECTO-Tomo II, Mares de Libros, ISBN: 978-84-616-8764-0
NEUFERT, ERNEST (1981) - A ARTE DE PROJECTAR EM ARQUITECTURA, *Editora Gustavo Gili, São Paulo*
NETO, PEDRO LEÃO (1999), Autocad 2002, FCA – *Editora Informática, Lisboa*
NORMAS PORTUGUESAS DE DESENHO TÉCNICO, - *NP-62, 1961; NP-89, 1963; NP-49, 1968; NP-327, 196*
NP-671, 1973; NP-297, 1963; NP-328, 1964; NP-167, 1966; NP-716, 1968; NP-204, 1968; NP-718, 1968;
PORTAS, NUNO (1969) – FUNÇÕES E EXIGÊNCIAS DE ÁREAS DA HABITAÇÃO, Lnec, Lisboa
REGULAMENTO GERAL EDIFICAÇÕES URBANAS,- *Imprensa Nacional - Casa da Moeda, Lisboa*
REGULAMENTO GERAL DAS ESTRUTURAS DE BETÃO ARMADO e PRÉ-ESFORÇADO – *Imprensa Nacion*
- Casa da Moeda, Lisboa
TEXTS AND FORMS SUPPORTS, ISEC, (lecturer : João Fernandes Silva)

Learning Methodology

The teaching methodology is based on two learning processes:
AFFIRMATIVE METHOD, in that knowledge is transmitted through the exhibition and demonstration of issues inherent in each chapter.
ACTIVE METHOD, based on the principle of independent learning, where the student refers to the analysis and testing of experimental models, fostering the intellectual and practical skills.

Access Conditions and Attendance Excuse

The class attendance is required.
The student needs to attend at least 2/3 of lessons.
Student workers, associative leaders, athletes with high competition status or other special cases provided for by the law and regulation in force are exempted from the previous requirement.

Signature of Teacher:

Conditions for Exam Admission

Students who opt for the continuous assessment scheme will not be admitted to the exam.
Will be admitted to the exam, student workers, associative leaders, Athletes, or other special cases laid down by law and regulation in force.

Evaluation Method

The evaluation will be ongoing and will focus on evaluation exercises conducted in the theoretical lessons in class laboratory and a practical work produced by students throughout the school term. The exercises are of practical application to apply knowledge acquired in the topics discussed.

The evaluation exercises will be 2 (two) and should be held in theoretical lesson practice, except pre-announced change by the teacher in charge, with minimum antecedence of 5 (five) working days. In addition to the proposed evaluation exercises, a practical work of continuous evaluation will take place in the laboratory lessons.

The evaluation will be translated in a final rating of 0 to 20 quantitative values, shared in part by the following parameters:

First evaluation exercise	20% [4 values]
2nd evaluation exercise	30% [6 values]
Practical work	45% [9 values]
Attendance and participation	5% [1 values]

In addition to these elements, which are decisive in the final average, will still be considered:
Participation and interest; Progression; Execution of tasks in tyme.
The approval requires obtaining at least 10.0 values in the Final note.
The results of more than 17 values will be defended in oral, if the teacher understands this.

Conditions for Results Improvement

The improvement of classification is made by a theoretical/practical exam, upon prior registration in one of the two subsequent seasons, excluding the special season.

Date

2018.09.07

Signature from the lecturer responsible for the course

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher:___ _____

Licenciatura – BsC Engenharia Civil (Português)

Licenciatura – BsC Civil Engineering (Inglês)

Academic Year: **2018/2019**

Program Contents

Course Unit COMPUTER APPLICATION IN CIVIL ENGINEERING

Specialization (s)

Subject type **Research Area** Civil Engineering (Territory and Transportation)

Year 1 **Semester** 1 **ECTS** 5

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures		
Theoretical-Practical Lectures	2	28
Practical-Laboratoty Lectures	1.5	21
Tutorial Orientation	0.5	7
Project		

Unaccompanied Working Hours

Activity Type	Total Hours
Study	71
Works / Group Works	
Project	
Evaluation	3
Additional	

Total of Working Hours 130

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	Alexandra Ribeiro	MSc	Adjunct Prof.
Theoretical-Practical Lectures	Alexandra Ribeiro		
Practical-Laboratory Lectures			
Tutorial Orientation			
Project			

Responsible(s) Lecturer (s) Alexandra Ribeiro

Goals

At the completion of this course, the student be able to understand the functioning of a spreadsheet, and the potential for its application to solving real problems from different fields of knowledge covered during the undergraduate course.

Skills

- To identify key operational features of Microsoft Excel related to storage, organization and data analysis, and presentation of results;
- To build, interpret and solve real problems (simple), including making "what-if" analysis;
- To instruct Microsoft Excel to automatically perform tasks normally performed manually through user defined functions or through macro recording, in a programming environment;
- To develop and program simple analysis.

Signature of Teacher:___ _____

Program Contents

Microsoft Excel 2016:

1. Worksheets Basics
2. Formulas and Functions
3. Organizing Information
4. Charts and Graphics
5. Advanced Data Analysis: pivot tables; scenarios; goal-seeking
6. Importing and Exporting Information
7. Programming Excel:
    - Automating Tasks with Macros
    - Programming Spreadsheets with Visual basic for Applications (VBA).

Bibliography

Liengme, B. (2015). *A Guide to Microsoft Excel 2013 for Scientists and Engineers*. Academic Press.

Loureiro, H. (2014). *Excel 2013 Macros & VBA*. FCA.

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Maria do Rosário, B., Negas, M. C., & Isaías, P. (2013). *Excel Aplicado*. FCA.

Marques, P. C., & Costa, N. (2014). *Fundamental do Excel 2013*. FCA.

Microsoft Excel 2016 Help. Microsoft Corporation.

Walkenbach, J. (2016). *Microsoft® Excel® 2016 bible*. Indianapolis: Wiley.

Other support material in the Moodle platform.

Access Conditions and Attendance Excuse

Conditions for Exam Admission

Evaluation Method

All the exams consist on solving individually practical problems using MS Excel. In order to pass, the student must have at least 10 out of 20 values.

The student must choose from one of two options:

1) A distributed evaluation consisting of two exams, each covering approximately a half of the course unit subjects and graded to 20 values each. The final classification is the average of both classifications, rounded to an integer. The minimum classification on each exam is 6.0 values. The examination dates are: exam 1 – 14/11/2018; exam 2 – on the date of the first exam of the end-term examination calendar (a.k.a., normal examination).
2) An end-term exam graded to 20 values, covering the all subjects of the course unit.

At the time of the normal examination, a student who has carried out the exam 1, still has the opportunity to choose whether to take the exam 2 of the distributed evaluation, or the final exam on all the matter.

Conditions for Results Improvement

Any student may propose to the achievement of improved classification only once, and only in the appeal examination.

Date	**Signature from the lecturer responsible for the course**
September 17th, 2018	

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher:___Alexandra Ribeiro_____

Licenciatura – BsC Engenharia Civil

Licenciatura – BsC Civil Engineering

Academic Year: **2018/2019**

Program Contents

Course Unit GEOGRAPHIC INFORMATION SYSTEMS

Specialization (s)

Subject type **Research Area** Civil Engineering (Territory and Transportation)

Year 3rd **Semester** 2nd **ECTS** 5

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures		
Theoretical-Practical Lectures	1.5	21
Practical-Laboratory Lectures	2	28
Tutorial Orientation	0.5	7
Project		

Unaccompanied Working Hours

Activity Type	Total Hours
Study	70
Works / Group Works	
Project	
Evaluation	4
Additional	

Total of Working Hours 130

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures			
Theoretical-Practical Lectures	Alexandra Maria Galvão Ribeiro	MSc	Adjunct Prof.
Practical-Laboratoty Lectures	Alexandra Maria Galvão Ribeiro		
Tutorial Orientation	Alexandra Maria Galvão Ribeiro		
Project			

Responsible(s) Lecturer (s) Alexandra Maria Galvão Ribeiro

Goals

On completion of the course, the student will:

- understand how geographical information systems work;
- be able to explain the difference between raster and vector format;
- understand how geographical data are gathered and stored;
- describe the basics of how geographical databases work and are built up;
- be able to perform simple overlaying in both raster and vector environment;
- be able to perform simple network analyses;
- be able to evaluate when raster or vector format is to prefer;
- be able to evaluate quality and usability of different data sources for different GIS applications and analyses;
- be able to critically evaluate the use of GIS for different types of applications.

Skills

After completing the course, the student must be able to:

- give further details of basic terms and theory in geographic information science;
- combine external data into own databases;
- perform processing, analysis and presentation in GIS from data collection to report;
- evaluate geographic data and processing methods in GIS;
- use GIS in a project.

Signature of Teacher:___ _____

Program Contents

Part I: Data and maps in GIS

1. Introduction
   - What is a GIS?
   - Brief History of GIS
   - What can a sig do?
   - Main areas of application
2. Spatial data models
   - Representation of real entities/phenomena
   - Modelling with objects and continuous fields
   - Vector-data model: representation of objects and continuous fields; data structures; topology
   - Raster-data model: representation of objects and continuous fields; data structures; compression methods
   - Data models most used in terrain representation
3. Attributes
   - Spatial database management systems
   - Concept of attribute tables
   - Queries; table joins; summarizing tables
   - Attribute tables in ArcGIS; table formats; editing and field calculation
4. Basic edition
5. Spatial referencing systems
   - Geographic coordinate systems
   - Projected coordinate systems;
   - Most common spatial referencing systems in Portugal

6. Analysis in GIS
   - Raster and vector-based analysis
   - Attribute and spatial queries
   - Spatial joins

Bibliography

CHANG, K. Introduction to Geographic Information Systems with Data Files CD-ROM. 5.ª ed. McGraw-Hill Science/Engineering/Math, cop. 2009.

DEMERS, M. N. Fundamentals of Geographical Information Systems. 4.ª ed. Wiley, cop. 2008.

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MATOS, João Luís de - Fundamentos de informação geográfica / João Matos. - Lisboa [etc.] : Lidel, cop. 2001. - 326 p. - (Geomática)

KENNEDY, Michael - Introducing geographic information systems with ArcGIS: featuring GIS software from Environmental Systems Research Institute / Michael Kennedy. - Hoboken, NJ : John Wiley & Sons, cop. 2006. - 588 p. : il.

Paul A. Longley. [et al.] - Geographic information systems and science / Paul A. Longley.[et al.]. - Chichester [etc.] : John Wiley & Sons, Ltd, cop. 2001. - 454 p.

BOLSTAD, Paul - GIS fundamentals: a first text on Geographic Information Systems / Paul Bolstad. - 3rd print. - White Bear Lake: Eider Press, 2003 imp. - 412 p.: il.

GRANCHO, Norberto - Origem e Evolução Recente dos Sistemas de Informação Geográfica em Portugal (1ª ed.). Bond, cop. 2006. - 280 p.

Signature of Teacher:___ _____

Access Conditions and Attendance Excuse

Conditions for Exam Admission

Evaluation Method

1. Continuous assessment:
Comprises two tests with the characteristics described in the item 2). The final grade is the arithmetic average of the two tests. The second test is done during the first call examination.

2. Full examination:
Full examination carried out for 20 points, comprising practical exercises done using ArcGIS software.

The student can choose one of the two forms of evaluation. If the students opt for continuous evaluation and is not successful, they can do the full examination on any of the periods provided for in the school calendar ISEC.

Conditions for Results Improvement

Any student may propose to the achievement of improved classification only once, and only in the appeal examination.

Date	**Signature from the lecturer responsible for the course**
2019/01/14	

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Signature of Teacher:

Licenciatura – BsC engenharia civil

Licenciatura – BsC civil engineering

Academic Year: **2018/2019**

Program Contents

course unit	operations management 2				
subject type	engineering sciences	**research area**	constructions		
year	3rd	**semester**	2nd	**ECTS**	5.0

working Hours

activity Type	working hours per week	total hours
Theoretical Lectures		
Theoretical-Practical Lectures	3.5	49
Practical-Laboratoty Lectures		
Tutorial Orientation	0.5	7
Project		
Total of Working Hours		56

unaccompanied working hours

activity Type	total hours
Study	57
Works / Group Works	15
Project	
Evaluation	2
Additional	
	130

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures			
Theoretical-Practical Lectures	nuno malaquias	MSc	Prof Adjunto
Practical-Laboratoty Lectures			
Tutorial Orientation			
Project			

Responsible(s) Lecturer (s) nuno malaquias

Objectives
Focus on the most important subjects for professionals working for companies dedicated to construction, management and inspection of construction works, including planning, organizing and managing a building site.

Generic skills
understanding and solving the problems, resolution methodology selection and consequent application. Evaluate the results obtained, look for alternative solutions and communicate the results according to specific predefined criteria.

Specific skills
Acquiring knowledge and capacity of organizing a building site, planning the construction works and optimizing the plan, monitoring the works evolution and calculating the monthly situations.

Signature of Teacher:_____

Program contents

INTRODUCTION

BUILDING SITES
Organizing and planning building sites.

OUTSOURCING IN CONSTRUCTION
Selecting and managing outsourced construction works

PLANNING
Identifying the activities and their dependencies
Estimating each activity duration
Elaborating work plan diagrams and identifying the critical path

CONTROLLING
Manage the works in progress
Calculate monthly situations
The building site director preferred profile
Meetings management: useful techniques.

Bibliography

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- "Manual de Estaleiros de Construcão de Edifícios", Farinha, Brasão e Paz Branco, 1996, LNEC.
- "Introdução ao Planeamento na Construção de Edifícios", Branco, José Paz, 1977, LNEC.
- "Organização e Gestão de Obras", A. Correia dos Reis, 2007, Edições Técnicas ETL, Lda, Lisboa.
- legislation
- documents prepared by the teacher, and available at moodle.isec.pt

Evaluation Method

An exam that is worth 50% and a group of practical works that are worth the remanescent 50%.

The evaluation of the subject will have two components, the exam and some practical works, weighting 50% each.

Approval requires at least 9.5 values in the overall assessment, and the student must reach a minimum of 30% (thirty) in the exam. An oral exam may be requested for final scores above 17 points.

Students who do not reach the minimum classification established will be awarded, as final and overall evaluation result, the grade of 7.00 values.

The examination referred to above shall preferably be written, and may take the form of oral tests in situations where this proves to be more appropriate, especially in special seasons.

There will be a maximum of eight Practical Works, developed by groups of a maximum of three students, during classes and throughout the semester.
Practical works elaborated in previous academic years will not be considered.
The practical works should be sent by email to mcphersn@isec.pt, until 23:59 on June 2, 2019 , in pdf format.

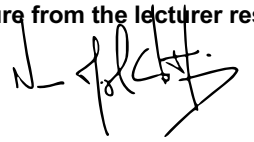
Conditions for Results Improvement

Only the non-continuous part can be subject to improvement.

Date

21Jan2019

Signature from the lecturer responsible for the course



Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher:_____

Licenciatura – BsC _Engenharia Civil (Português)

Licenciatura – BsC *Civil Engineering* (Inglês)

Academic Year: **2018/2019**

Program Contents

Course Unit MUNICIPAL ROADS

Specialization (s)

Subject type Specialty Sciences **Research Area** Civil Engineering

Year 3rd **Semester** 2nd **ECTS** 5

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures		
Theoretical-Practical Lectures	3.0	42
Practical-Laboratoty Lectures	0.5	7
Tutorial Orientation	0.5	7
Project		
Total of Working Hours		56

Unaccompanied Working Hours

Activity Type	Total Hours
Study	56
Works / Group Works	14
Project	
Evaluation	4
Additional	
	74

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures			
Theoretical-Practical Lectures	Silvino Capitão / Mário Martins	PhD	Professor
Practical-Laboratoty Lectures	Susana Meneses	PhD	Professor
Tutorial Orientation	Susana Meneses	PhD	Professor
Project			

Responsible(s) Lecturer (s) Silvino Capitão

Goals

The curricular unit aims to provide students with knowledge in the field of road construction, in what concerns earthworks, paving and drainage. In addition, it aims to provide students with skills in design, construction and maintenance of road pavements as well as with issues regarding urban road planning, traffic, pedestrian system and public transport.

Skills

- Be familiar with the activities related with planning and management of the transport system.
- Design the various components of road transport infrastructures;
- Know the construction techniques and the applicable management methodologies.

Program Contents

1. **EARTHMOVING**
   - **Earthwork cross-section: end area calculations**
   - **Volume calculations**
     - *Cross sectional end areas method*
   - **Mass haul diagram (mass curve)**

- *Haul distance; Swelling of soil; Brückner diagram ou mass haul diagram.*
- *General rules to determine the economical haul*

○ ***Geological and geotechnical studies; prospecting; stability problems; water in the soil; earthwork operations; stabilisation of soils.***

Types of soils

○ **Testing of soils** (upgrade)
- *Granulometry; Atterberg limits; Methylene blue; Sand equivalent.*

○ **Compaction & Consolidation** (upgrade)

○ **Strength of soils**
- *Reaction modulus; CBR (California Bearing Ratio); Soil shear strength.*

○ **Soils classification** (upgrade)

○ **Pavement subgrade**
- *Functions; Capping layer; Use of geosynthetics in earthworks;*
- *Specifications and recommendations.*

2. PAVING

○ **General conception of highways pavements**

○ **Pavement types and constitution** (constructive aspects)

○ **Soils for pavement layers**
- *Natural soils; stabilized soils*

○ **Binders for pavement layers**
- *Natural asphalt, asphaltic rock and tar; bitumen; cut-back; bitumen emulsion; polymer modified bitumen; cement.*

○ **Aggregates for pavement layers**
- *General properties*
- *Natural aggregates for unbound layers*
- *Aggregates for asphalt mixtures: general properties*
- *Needed quantities for the design of asphalt mixtures*

○ **Asphalt mixtures for pavements**
- *General properties; compositions of blends; main types of hot mixtures asphalt; dense asphalt; special asphalt mixtures (with polymer modified binders; porous; gap-graded; with by-products).*
- *Types of mixtures proposed by the IP's manual of pavements*
- *Composition of the aggregate blend*
- *Design of asphalt mixtures: the Marshall method*

○ **Cold asphalt mixtures**

○ **Paving technology**
- *Production and laying of hot mixture asphalt*
- *Production and laying of cold mixture asphalt*
- *Production and laying of cement concrete*
- *Quality control of materials*

○ **Cement concrete for pavements**
- *Concrete with low cement dosing; cement for structural layers (wearing course + base)*
- *Concrete properties and verification methods*

○ **Pavement design**
- *General principles*
- *Calculation of stresses and strains*
- *Action on the pavement*
- *Traffic; temperature; Mechanical properties of layers*
- *Design criteria; expeditious pavement design methods*

3. BEHAVIOUR AND PATHOLOGIES OF FLEXIBLE PAVEMENTS

○ *Constitution and behaviour of flexible pavements*

○ *Degradation types of flexible pavements*

○ *Causes of degradation of flexible pavements*

4. MAINTENANCE AND REHABILITATION TECHNIQUES FOR FLEXIBLE PAVEMENTS

○ **Rehabilitation of surface characteristics** (skid resistance and surface texture)

○ **Rehabilitation of structural features** (general aspects of rehabilitation techniques)

5. DRAINAGE

- **Surface Water Drainage**
  - *Roadways; shoulder; slopes; ditches; culverts.*
- **Subsurface Water Drainage**
  - *Drain constitution; drain ditch; drain pipe; filter material; use of geosynthetics; drain types; longitudinal drains; lower table drain; transverse drains; drain location.*
- **Design of Drainage Systems**
  - *General characterization of flow phenomena in hydrographic basins - Precipitation and flow; return period;*
  - *Determination of the peak design flow: the Soil Conservation Service method – peak design flow; Calculation of useful precipitation; Calculation of total precipitation; Determination of the peak design flow: the rational method.*
- **Calculation of Culvert Flow Cross-Section**
  - *Operating conditions; Abacuses and tables for design; Culvert design methodology; Problem data; Choosing approximate section dimensions (D or H and B); Determination of headwater;*
  - *Considering external loading; Design of ditches; Construction technical aspects.*

6. URBAN ROAD PLANNING

- **Road Hierarchy**
  - *Functional classification of roads. Hierarchy principles. Features of arterial roads, collector roads, local distributor roads and access roads. Examples of roads and intersections hierarchy. Influence on the spatial planning of cities. Rural networks. Types of intersections: types, relationship with road hierarchy and demand characterization.*
- **Parking**
  - *Management policies of parking spaces. Evaluation of supply and location of car parks. Collecting data. Parking along roadways. Parking outside roadways.*
- **Traffic Calming**
  - *Background and description of traffic calming techniques. Typical global solutions.*
  - *Regulations and examples in Portugal.*
- **Network Management by Considering a Support to Collective Transports**
  - *Background and available techniques. Implementation problems.*
- **Pedestrian System**
  - *Characterization of the pedestrian mode. Design of footways and pedestrian zones. Pedestrian crossings. Pedestrians security.*

Bibliography

- Pereira, P. e Picado-Santos, L., *Pavimentos Rodoviários*, Edição dos autores, Braga, 2005.
- Branco, F., Picado, L., Capitão, S., *Vias de Comunicação* – Vol II– DEC, FCTUC, Coimbra, 2005.
- Seco, A., Gonçalves, J., Costa, A, *Estacionamento, Manual de Planeamento das Acessibilidades e da Gestão Viária*, Vol. 9, CCDRN, Porto, 2008.
- Seco, A., Macedo, J., Costa, A, Peões, *Manual de Planeamento das Acessibilidades e da Gestão Viária*, Vol. 8, CCDRN, Porto, 2008.
- Marques, J., *Engenharia de Segurança Rodoviária em Áreas Urbanas: recomendações e boas práticas*, Prevenção Rodoviária Portuguesa, Lisboa, 2005.
- Martins, M., *Apoio aos Transportes Coletivos*, DEC-ISEC, Coimbra, 2002.
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- Capitão, S., Sousa, J., *Dimensionamento Hidráulico Simplificado e Passagens Hidráulicas para Infraestruturas de Transporte,* Instituto Superior de Engenharia de Coimbra, Instituto Politécnico de Coimbra, Coimbra, 2013.
- Seco, A., Pais Antunes, A., et al., *Princípios Básicos de Organização de Redes Viárias*, Manual de Planeamento das Acessibilidades e da Gestão Viária, Vol. 4, CCDRN, Porto, 2008.
- Seco, A., Ribeiro, A., Macedo, J., Silva, A., *Acalmia de Tráfego*, Manual de Planeamento das Acessibilidades e da Gestão Viária, Vol. 10, CCDRN, Porto, 2008.

Access Conditions and Attendance Excuse

- The students achieve attendance if they carry out the practical assignments and deliver them on the dates indicated in this unit form (1st project: 29/3/2019; 2nd project: 24/5/2019).

- If students do not comply with the aforementioned conditions, they obtain a fail grade.

Conditions for Exam Admission

Only students who have delivered the mandatory projects in the established dates can access the exam.

Evaluation Method

• **Practical work** (**Pw**)

Three different projects are mandatory and should be carried out in groups of up to 3 elements. The projects will have a weight of **20%** in the final grade.

The Laboratory sessions will have an evaluation component, with a weight of **10%** on the final grade. This evaluation is based on individual reports written by the students. This evaluation component is not mandatory (since it's optional, instead of writing reports related with laboratory sessions, the students may, alternatively, opt by answering additional questions in the final exam on the same subject).

• **Exam**

Written (or oral) exam (**Ex grade**) at the end of the semester, weighing 70% in the final grade. Minimum grade required to pass: 9/20.

Theoretical part of the exam: 10 points (minimum grade required: 3 points); practical part of the exam: 10 points (minimum grade required: 3 points).

Calculation of the **Final Grade:**

Final Grade = Grade of Pw + **Ex. Grade** × 0.7 (if **Ex. Grade** ≥ 9.0 points, meeting the minimum requirements)
Final Grade = 9 points (if **Ex. Grade** ≥ 9.0 points, minimum requirements not achieved)
Final Grade = **Ex. Grade** (if **Ex. Grade** < 9.0 points)

The use of mobile phones and other equipment allowing communication with the exterior of the examination room is expressly not allowed throughout the exams. The consultation elements to be used in the exam should be in paper support and they are restricted to those allowed in the curricular unit. The students will be informed on the subject at the beginning of the exam to be carried out (official formula and tables sheet, Portuguese pavement manual, abacuses of the Asphalt Institute, LNEC Specification E-242).

Conditions for Results Improvement

The student who enrolls for classification improvement will do the exam to 20 points (minimum 9 points).

The component of the classification obtained for practical work cannot be improved in the academic year in which the work is carried out.

Date	**Signature from the lecturer responsible for the course**
2019/01/17	

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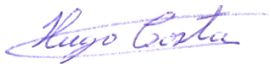
Signature of Teacher: 

Licenciatura – BsC Engenharia Civil (Português)

Licenciatura – BsC Civil Engineering (Inglês)

Academic Year: **2018/2019**

Program Contents

Course Unit STRUCTURAL DESIGN OF CURRENT BUILDINGS

Specialization (s) STRUCTURAL MECHANICS

Subject type **Research Area** Civil Engineering

Year 3rd **Semester** 2nd **ECTS** 5

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures		
Theoretical-Practical Lectures	1.5	21
Practical-Laboratoty Lectures	2.0	28
Tutorial Orientation	0.5	7
Project		

Unaccompanied Working Hours

Activity Type	Total Hours
Study	15
Works / Group Works	56
Project	
Evaluation	3
Additional	

Total of Working Hours 130

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures			
Theoretical-Practical Lectures	Hugo Costa	PhD	Assistant Prof.
Practical-Laboratoty Lectures	Ricardo do Carmo	PhD	Assistant Prof.
Practical-Laboratoty Lectures	Hugo Costa	PhD	Assistant Prof.
Tutorial Orientation	Hugo Costa	PhD	Assistant Prof.
Project			

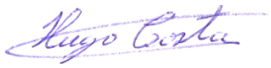
Responsible(s) Lecturer (s) Hugo Sérgio Sousa Costa

Goals

To deepen and improve the knowledge on the analysis of structures.
Analyze and design reinforced concrete structures.
To acquire knowledge on the quantification of actions and on seismic analysis.
Acquire theoretical and practical knowledge about the realization of projects of buildings structures.

Skills

Know the theory and practice regarding the design and production of reinforced concrete structures: current structures.
To know and apply the methodology and regulations/codes regarding the seismic analysis of current structures.
Use software for stability analysis and design of reinforced concrete structures.
Recognize, diagnose and prevent structural pathologies in buildings.

Signature of Teacher: 

Program Contents

Introduction: scope and objectives; the phases of a project; responsibility for drawing up design projects, following procedures.
Design of the structure: general aspects; the constraints (architectural, related to the location of the building, resulting from the purpose of the building, economic and aesthetic, other constraints); structural choices.
General safety verification criteria: serviceability limit state and ultimate limit states; actions; combinations of actions.
Quantification of actions: permanent actions; variable actions (temperature variations, wind action, snow action, overloads, earthquakes).
Seismic analysis: calculation of earthquake action; distribution of the earthquake.
Calculation of internal forces: methodology; loading of frames; combinations of actions; calculation of internal forces.
Design of reinforced concrete elements: general provisions; choice of materials; general constructive specifications; specific constructive specifications.
Presentation of the project: introduction; written pieces (descriptive and justification, geotechnical studies, calculations); drawn pieces (structural plants, slab reinforcement plants, detailing of reinforced concrete elements).

Bibliography

Projecto de Obras Correntes – compilação de textos elaborados pelos docentes e outros autores.
NP EN 1990: 2009 – Eurocódigo – Bases para o Projecto de Estruturas.
NP EN 1991-1-1: 2009 – Eurocódigo 1 – Acções em Estruturas, Parte 1-1: Acções Gerais – Pesos Volúmicos, Pesos Próprios, Sobrecargas em Edifícios
NP EN 1991-1-3: 2009 – Eurocódigo 1 – Acções em Estruturas, Parte 1-3: Acções Gerais – Acções da Neve
NP EN 1991-1-4: 2010 – Eurocódigo 1 – Acções em Estruturas, Parte 1-4: Acções Gerais – Acções do Vento
NP EN 1991-1-5: 2010 – Eurocódigo 1 – Acções em Estruturas, Parte 1-5: Acções Gerais – Acções térmicas
NP EN 1992-1-1: 2010 – Eurocódigo 2 – Projecto de Estruturas de Betão, Parte 1-1: Regras Gerais e Regras para Edifícios
NP EN 1998-1:2010 – Eurocódigo 8 – Projecto de Estruturas para Resistência aos Sismos, Parte 1: Regras Gerais, Acções Sísmicas e Regras para Edifícios
NP EN 206-1 Betão. Especificação, desempenho, produção e conformidade, 2007
NP EN 13670:2011 Execução de estruturas em betão.

Access Conditions and Attendance Excuse

Conditions for Exam Admission

The rules provided in ISEC regulations shall apply.

Evaluation Method

Assessment will be based on a written final exam and on the performance, presentation and discussion of the project work. Only those students who have attended at least 50% of the practical classes / laboratory will be evaluated. Worker students who prove that they do not have an available schedule compatible with the practical / laboratory classes should contact the teachers of the discipline to arrange follow-up meetings to carry out the work.

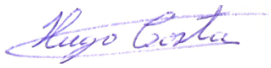
1. Final written examination - 6 values
In the written exam the students can consult the regulations used, if not annotated, and a form in A4 sheet handwritten by himself. The examinations are carried out in the period defined for evaluation: the normal exam period and the second semester recourse period. Students who are in the conditions defined by the ISEC regulations will also be able to access the special period of examination and deliver the work on the day and time of the special exam. Improvement of the classification by repetition of the written exam is not allowed.

2. Group work (maximum of 2 students) - 14 values
Realization of the design project of a reinforced concrete structure for a current building.
The definition of intermediate deadlines for the partial deliveries of the work will be fixed by the teachers of the P / L classes. Those partial deliveries concern: a) Calculations related to the design of RC slabs and drawings with the detailing of the reinforcements in the slabs (structural plant, lower reinforcement, superior reinforcement, 2 cuts of slabs cross section with reinforcement); b) Calculations related to the quantification of actions (permanent, overload, wind and earthquake). Schemes with representation of the actions applied in each frame (permanent, overload and earthquake).

Deadline for submission of the final project:
1st phase: day and time of the examination of the normal period
2nd phase: day and hour of the examination of the recourse period
After delivery of the projects, it will be defined the day and time for presentation and discussion of the work.
The final grade of the work will reflect a bonus for students who carry out the partial deliveries defined above.

3. Final classification
The final mark in the scale of 0 to 20 is equal to the sum of the marks obtained in the defined evaluation methods. The student must obtain at least 10/20 values in the final classification to obtain approval to the discipline, 7/14 values in the work and 3/6 values in the written exam.

Information on the design project of the reinforced concrete structure
The drawings of the structure to be designed will be provided. It should be noted that the architectural drawings of the building will not be given because the structural solution is already presented.
In the practical work the following elements must be presented:

Signature of Teacher: 

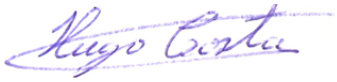
a) Written parts
- Descriptive and justificative memory;
- Calculations, to be presented in manuscript form:
  - Quantification of actions: permanent actions, overloads, wind action and earthquake action;
  - Distribution of actions by the various structural elements;
  - Combination of actions: consider permanent actions, overloads and earthquakes in the action combinations (no need to include wind action);
  - Internal forces: The use of automatic calculation programs is only allowed for the calculation of the internal forces. Two programs, Ftool and Galileo will be available, however, other programs may be used, as long as this is authorized by the teachers;
  - Design of some structural RC elements to be defined by the teacher: (i) all slabs of one floor, including the balcony and slab of stairs; (ii) 1 beam; (iii) 1 column; (iv) 2 foot foundation; (v) 1 equilibrium beam.

b) Designed pieces
- Schemes with the representation of the actions applied in each frame (permanent, overload and earthquake).
- Envelops od the internal forces of the frames to which the column, the beam and the foot foundation elements to be designed and drawn.
- Detailing of reinforced concrete (geometric definition and reinforcement steel bars) of designed elements.

IMPORTANT NOTE:
- Improvement of final written exam scores is not allowed.
- For the realization of the practical work (project), the knowledge taught in the curricular units of Structures and Reinforced Concrete is essential; to students who do not have this basic knowledge it is not advisable to enroll in this curricular unit.

Conditions for Results Improvement

The rules provided in ISEC regulations shall apply.

Date	**Signature from the lecturer responsible for the course**
21/01/2019	

Instituto Superior de Engenharia de Coimbra
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Signature of Teacher: LRibeiro

Licenciatura – BsC Engenharia Civil

Licenciatura – BsC Civil Engineering

Academic Year: **2018/2019**

Program Contents

Course Unit APPLIED HYDRAULICS II

Specialization (s) HYDRAULICS, WATER RESOURCES AND ENVIRONMENT

Subject type Specialty Sciences **Research Area** Civil Engineering

Year 3º **Semester** 2 nd **ECTS**

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures		
Theoretical-Practical Lectures	3.5	49
Practical-Laboratoty Lectures		
Tutorial Orientation	0.5	7
Project		

Unaccompanied Working Hours

Activity Type	Total Hours
Study	36
Works / Group Works	
Project	35
Evaluation	3
Additional	

Total of Working Hours

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures			
Theoretical-Practical Lectures	Luísa Lourenço Ribeiro	PhD	Assist. Professor
Practical-Laboratoty Lectures			
Tutorial Orientation	Luísa Lourenço Ribeiro	PhD	Assist. Professor
Project	Luísa Lourenço Ribeiro	PhD	Assist. Professor
Responsible(s) Lecturer (s)	Luísa Lourenço Ribeiro		

Goals

Acquire the required knowledge for interpretation, conception and design of drainage systems (wastewater and stormwater).

Skills

E22: Conceive and design drainage systems (drainage networks and pumping stations).
E24: Introduce the main chemical, physical and biological processes involved in water and wastewater treatment.
E25: Understand the hydrological processes involved in the determination of hydrological variables used in the design of stormwater networks.

Signature of Teacher:_____

Program Contents

1. Wastewater systems
1.1 Regulatory provisions, regulations and specifications
1.2 Base elements
1.2.1 Reviews about base elements in water supply systems
1.2.2 Return factor
1.2.3.Infiltration flows
1.2.4 Hydrology elements.
1.2.5 Storm water flows.
1.3 Types of drainage systems
1.4 Constituent parts of the system. Main organs, accessories and complementary facilities
1.5 Hydraulic calculation
1.5.1 Drainage network
1.5.2 Pumping station
1.5.3 Other elements.
1.6 Buried pipe stability
2. Non-conventional drainage systems
2.1 Vacuum systems (domestic sewage)
2.2 Infiltration systems (rainwater)
3. Introduction to wastewater treatment systems.

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B. E. Larock, R. W. Jeppson and G. Z. Watters – Hydraulics of pipeline systems, CRC Press.
S. D. Lin – Water and wastewater calculations manual, McGraw-Hill.
E. W. Steel and T. J. McGhee – Water supply and sewerage, McGraw-Hill.
E. E. Baruth – Water treatment plant design, McGraw-Hill.
F. R. Spellman – Handbook of water and wastewater treatment plant operations, Lewis Publ.
R.E. Featherstone and C. Nalluri – Civil engineering hydraulics, Blackwell Science, Ltd.
Metcalf and Eddy – Wastewater engineering: collection, treatment, disposal, McGraw-Hill
Larry W. Mays – Stormwater Collection Systems Design Handbook, McGraw-Hill.
D. Butler and John W. Davies – Urban drainage, Spon Press.
W. H. Hager – Wastewater hydraulics – Theory and practice, Springer.

Access Conditions and Attendance Excuse

Except in cases mentioned in artº 15 of REACTA, to obtain attendance, the student must attend at least 2/3 of theoretical-practical lectures and score at least 40% on the project mark.

Conditions for Exam Admission

The student must fulfill the access conditions during the academic year 2017/2018.

Evaluation Method

The evaluation includes an ongoing assessment (a group of students have to conceive and design a wastewater system) and a final written exam. The ongoing assessment represents 40% of the students' overall mark and the final exam represents 60% of the overall mark. A student is approved if: scores at least 40% on the ongoing assessment component, and the final mark (project and final exam) is equal or exceeds 9.5 points from a total of 20.

Conditions for Results Improvement

Students can improve the final written exam.

Date	Signature from the lecturer responsible for the course
21/01/2019	Luisa Lourenço Ribeiro Luisa M. P. N. Lourenço Ribeiro

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher:_____

Licenciatura – BsC Engenharia Civil

Licenciatura – BsC BsC Civil Engineering

Academic Year: **2018/2019**

Program Contents

Course Unit FOUNDATIONS II

Specialization (s) GEOTECHNICS

Subject type **Research Area** Civil engineering

Year 3rd **Semester** 2nd **ECTS** 5.0

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures		
Theoretical-Practical Lectures	3	42
Practical-Laboratoty Lectures	0,5	7
Tutorial Orientation	0,5	7
Project		

Unaccompanied Working Hours

Activity Type	Total Hours
Study	50
Works / Group Works	20
Project	
Evaluation	4
Additional	

Total of Working Hours 130

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures			
Theoretical-Practical Lectures	Carlos Moreira	Doutor	Prof. Coord.
Practical-Laboratoty Lectures	Carlos Moreira	Doutor	Prof. Coord.
Tutorial Orientation	Carlos Moreira	Doutor	Prof. Coord.
Project			

Responsible(s) Lecturer (s) Carlos Moreira

Goals

Technology and design of geotechnical structures involving earth works, including two-dimensional seepage, slope stability, compaction, soil reinforced and geosynthetics.

Skills

Analyze and design natural and excavation slopes and embankments, compaction situations, soil reinforcement and geosynthetic usage. Recognize, diagnose and prevent pathologies in earth works. Use software programs to evaluate stability and safety of geotechnical structures.

Program Contents

1. Two-dimensional seepage in soils

Basic principles and theories (Revisions). Permeability and Darcy's law (Revision). Hydraulic head. Bernoulli theorem. One-dimensional ascending and descending seepage. Influence of seepage in water pressures and soil effective stresses. Equivalent permeability coefficient in stratified soil massifs. Two-dimensional seepage. Flow nets in soil with permeability isotropy. Flow mathematical equation. Flow evaluation. Soil stress state evaluation. Flow nets in soil with permeability anisotropy. Hydraulic instability and collapse. Critical gradient. Piping and hydraulic heaving.

2. Slope stability

Types of slopes. Natural, excavation and constructed. Geomorphological evolution of slopes. Erosion. Land movements. Geological influence on slope stability. Lithology. Fractures and joints. Hydro-geological conditions. Causes of slope

unstabilization. External and internal causes. Stabilization works. Stability analysis methods. Infinite slopes: dry frictional soil with seepage parallel to ground surface; cohesive soil. Safety evaluation according to Eurocode 7. Circular slipping surfaces. Failure mechanism. Total stress analysis. Partially submerged slopes. Taylor's stability number. Slices methods. Fellenius. Bishop. Bishop and Morgenstern stability numbers. Stability of embankment and unsupported excavation in clays. Embankments in soft soils.

3. Compaction

Compaction energy. Compaction curves. Compaction of non cohesive soils. Compaction of cohesive soils. Compaction test. Proctor. Procedures and results. Types of compaction. Pressure, impact and vibration. Compaction works and equipments. Precautions. Selection of the adequate equipment. Compaction control in the field. Tests. Frequency.

4. Soil reinforcement

Reinforced earth. General characteristics. Basic principles and assumed behaviour. Design. Materials. Constructive procedures. Geosynthetics. Main types. Functions and characteristics of the materials. Design properties. Walls and slopes reinforced with geosynthetics. Design and constructive details.

5. Trenches

Legal framing. Accidents, risks and preventing measures. Supporting systems. Constructive Procedures. Design.

Bibliography

ABMS/ABEF editado por Waldemar Hachich et. al. - Fundações,Teoria e Prática
Coelho, Silvério, Tecnologia de Fundações, edições E.P.G.E.
Day, R. W., Geotechnical and Foundation Engineering, McGraw Hill
Jewell, R. A., Soil reinforcement with geotextiles
Koerner, Robert M., Designing with geosynthetics
Matos Fernandes, M., Mecânica dos Solos II
Moreira, C., Percolação Bidimensional da Água nos Solos
Moreira, C., Compactação
Moreira, C., Estabilidade de Taludes – Método Global
Ordem dos Engenheiros, Recomendações na Área da Geotecnia

Access Conditions and Attendance Excuse

The attendance of this subject is recommended only for the students who have already obtained approval in the curricular units: Introduction to Geotechnical Engineering, Soil Mechanics and Foundations I;

The attendance of students in classes will be recorded; It is required to be present in 75% of the laboratory classes and performing all the tests; Attendance is recommended and will be valued in the evaluation process.

Conditions for Exam Admission

Can access the final exam all the students who have performed the practical work in the current academic year.

Evaluation Method

Laboratory work; Required; Written report; Individual assessment during testing; Maximum grading: 1 value.

OPTION 1: Continuous assessment consists of two written tests; The normal exam in not allowed to the students that choose this option. The material appearing in the first test will not be evaluated in the second test;

First test: performed in a class during the semester;

Second test: held on the day and time of the normal exam;

OPTION 1: Final exams;

Written tests or exams:

Theoretical part: without consultation; maximum grading: 10 in exams and 5 in tests; minimum: 2 in exams and 1 in tests;

Theoretical-practical part: consultation of the written elements presented on the subject; maximum grading: 10 in exams and 5 in tests;

The final grade is equal to the exam grade or the sum of the test grades if less than 10, or is 9 if that value is higher than 10 but the minimum required was not achieved;

The final grade is the sum of 95% of the exam grade or the sum of the test grades plus the laboratory work grade;

Final grade exceeding 16 will have to be defended in oral exam.

Exams scheduled off the usual times shall preferably be oral;

The prior registration for exams must be performed according to the current regulations; Irregularities in the prior registration for exams can harm or condition the realization of tests and exams and will be recorded, so that they can be valued in the evaluation process.

Signature of Teacher:_____

Conditions for Results Improvement

None.

Date	Signature from the lecturer responsible for the course
15.01.2019	

Signature of Teacher: 

Licenciatura – BsC engenharia civil

Licenciatura – BsC civil engineering

Academic Year: **2018/2019**

Program Contents

course unit	Operations Management 1				
subject type	engineering sciences	**research area**	constructions		
year	3rd	**semester**	1st	**ECTS**	5.0

working Hours

activity Type	working hours per week	total hours
Theoretical Lectures		
Theoretical-Practical Lectures	3.5	52.5
Practical-Laboratoty Lectures		
Tutorial Orientation	0.5	7.5
Project		
Total of Working Hours		60

unaccompanied working hours

activity Type	total hours
Study	
Works / Group Works	
Project	
Evaluation	
Additional	

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures			
Theoretical-Practical Lectures	nuno malaquias	MSc	Prof Adjunto
Practical-Laboratoty Lectures			
Tutorial Orientation			
Project			

Responsible(s) Lecturer (s) nuno malaquias

Goals

quantify all the works, materials and other resources needed to the construction execution of the project and estimate its cost, respecting the existing legislation.
learning how to prepare a bid for a public contract contest.

Skills

know how to measure and budget a construction project.
know what rules should a prime contractor respect when answering a building solicitation, according to specific national legislation.
reviewing a project's plans and specifications to produce a takeoff (a list of item and material quantities needed for the construction execution of the project)

Program contents

INTRODUCTION

MEASUREMENTS IN CONSTRUCTION

Calculate all the work quantities necessary to build a construction project.

COST ESTIMATING
Estimate the cost of all materials, human resources and equipments needed to build a construction project. Starting by calculating the unitary costs and end elaborating the final budget to deliver to the client.

THE PUBLIC CONTRACTS LAW
Requisites to observe when presenting a bid for a public construction contest.

BUILDING PERMIT
Understanding the requisites to integrate the construction activity and keep working there.

PRICES REVIEW
Calculate the price reviews obligatory by law.

Bibliography

- "Curso sobre Regras da Medição na Construção", M. Santos Fonseca, 2010, LNEC.
- Informação sobre Custos, Fichas de Rendimento, LNEC.
- "Organização e Gestão de Obras", A. Correia dos Reis, 2007, Edições Técnicas ETL, Lda, Lisboa.
- "Gestão de Empreendimentos – A Componente de Gestão da Engenharia", João Coutinho-Rodrigues, Ediliber, Coimbra
- legislation
- documents prepared by the teacher, and available at moodle.isec.pt

Access Conditions and Attendance Excuse

Conditions for Exam Admission

Evaluation Method

An exam that is worth 50% and a group of practical works that are worth the remanescent 50%.

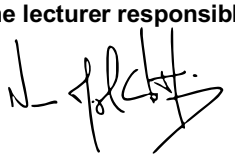
Conditions for Results Improvement

Only the non-continuous part can be subject to improvement.

Date

10set2018

Signature from the lecturer responsible for the course



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www.isec.pt

Signature of Teacher: _____

Licenciatura – BsC Civil Engineering

Academic Year: **2018/19**

Program Contents

Course Unit LAND USE PLANNING AND MANAGEMENT

Specialization (s)

Subject type Territory and Transports **Research Area** Engineering Science

Year 3rd **Semester** 1st **ECTS** 5

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures		
Theoretical-Practical Lectures	3,5	49
Practical-Laboratoty Lectures		
Tutorial Orientation	0,5	7
Project		
Total of Working Hours		81

Unaccompanied Working Hours

Activity Type	Total Hours
Study	14
Works / Group Works	14
Project	
Evaluation	3
Additional	

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures			
Theoretical-Practical Lectures	João Armando Gonçalves	PhD	Assist. Professor
Practical-Laboratoty Lectures			
Tutorial Orientation	João Armando Gonçalves	PhD	Assist. Professor
Project			

Responsible(s) Lecturer (s) João Armando Gonçalves

Goals

- Knowledge of the conceptual framework related to Planning
- Knowledge of the competences, duties and activities of municipal authorities regarding spatial planning and management and related legal framework
- Knowledge and use of analysis techniques applied to spatial planning and management

Skills

- To understand the structures and instruments which entail the spatial planning and management activity
- To know and apply methodologies, methods and techniques used in spatial planning and management
- To develop critical thinking related to problems of land use

Signature of Teacher:_____

Program Contents

- Theories and concepts of Land Use Planning and Management
- Land Use Planning and Management in Portugal
  - Legal framework
  - Local governments: definition, types, duties and competences in the field of urbanism
- Municipal Land Use Planning:
  - Conceptual and legal framework;
  - Instruments and basic operational techniques in terms of analysis of demography, economy, urbanismo and landscape
- Municipal Land Use Management
  - Practice and procedures of Land Use Management
- Geographical Information systems in the context of urbanistic activity
  - GIS solutions for the urbanism activity at municipal level

Bibliography

- Antunes, António José, *Lições de Planeamento Territorial*. DEC_UC, 2004
- Costa Lobo, M., Correia, Paulo e Pardal, Sidónio, *Normas Urbanísticas*, Vol I, II, III, IV, DGOTDU/UTL, 1991-2000
- Costa Lobo, M., *Administração Urbanística - evolução legal e sua prática*, IST press, 2001
- Hall, Peter, *Urban and Regional Planning*, John Wiley & Sons, 1992
- DL 380/99 – Regime Jurídico dos Instrumentos de Gestão Territorial (e alterações posteriores)
- DL 177/2001 – Regime Jurídico da Urbanização e Edificação (e alterações posteriores)
- Lei 31/2014 – Lei de bases gerais da política de solos, de ordenamento do território e de urbanismo
- Articles and documents made available on the Moodle platform
- Slides from the presentations done during the lectures

Access Conditions and Attendance Excuse

n/a

Conditions for Exam Admission

Realization of 2 assignments as explained below

Evaluation Method

Working papers – students must do (individually or in groups of 2 persons) 1 or 2 working papers related to practical aspects of spatial planning and management at municipal level (value: up to 40% of the final mark)

Exam – written test at the end of the semester (value: 60% of the final mark). The marks of the working papers will be added to the mark of the test providing that this one is above 9,0 (in 20)

Conditions for Results Improvement

n/a

Date	**Signature from the lecturer responsible for the course**
18Set18	

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Signature of Teacher:_____

Licenciatura – BsC Engenharia Civil (Português)

Licenciatura – BsC Civil Engineering (Inglês)

Academic Year: 2018 / 2019

Program Contents

Course Unit HIGHWAY DESIGN AND SAFETY *(ESTRADAS E SEGURANÇA RODOVIÁRIA)*

Specialization (s)

Subject type **Research Area** CIVIL ENGINEERING

Year 3rd **Semester** 1st **ECTS** 5,0

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures	1,5	21
Theoretical-Practical Lectures	2	28
Practical-Laboratoty Lectures		
Tutorial Orientation	0,5	7
Project		

Unaccompanied Working Hours

Activity Type	Total Hours
Study	54
Works / Group Works	14
Project	
Evaluation	6
Additional	

Total of Working Hours 130

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures Theoretical-Practical Lectures Practical-Laboratoty Lectures Tutorial Orientation Project	Mário Martins	PhD	Associate Prof.

Responsible(s) Lecturer (s) Mário Martins

Goals
It is intended that students grasp the main features and constraints of land transport infrastructure as works of Civil engineering, focusing especially its geometrical layout.

Skills
To frame the activities relating to the design of land transport infrastructures, roads and railways, in its various components, with a particular focus on the geometry and safety of roads.

Program Contents

- Geometrical design – Definition of the geometric layout according to a wide set of criteria, addressing issues currently encountered in the determination of the geometrical characteristics in the design phase, highlighting points of contact between the highways and the railroads. The discussed topics include: planning and main elements of a land transportation infrastructure, fundamental constraints of its layout, general geometric definition, traffic analysis and prediction and evaluation of the performance of traffic flow of isolated facilities.
- Introduction to road safety and road signs - The combination of driver-vehicle-highway factors in the context of accidents, the importance of quality principles, spatial and temporal consistency in a safe road environment and the detection of risk locations. General principles of vertical and horizontal signage and framework of the Road Signs and Signals Regulations in use.
- Evaluation of the volumes of land to be moved concerning the definition of the earthworks to be carried out, as regards the construction of a road or railway infrastructure.

Signature of Teacher:_____

Bibliography

MAIN :

- "Vias de Comunicação – Vol I", F. Branco, L. Picado, S. Capitão – DEC, FCTUC, Ed. 2001
- "Norma de Traçado", Junta Autónoma de Estradas, Almada – JAE, 1994 [**7-4-186** (ISEC) **- 12378**]
- Compilation of PowerPoint slides used in class

ADDITIONAL :

- "Highway Capacity Manual" – Washington, D. C. : TRB, 2000 [**7-4-177** (ISEC) **- 11934**]
- "Highway Engineering", Paul H. Wright, Karen Dixon – 7th ed., International ed – Hoboken, NJ : John Wiley & Sons, cop. 2004 [**7-4-204** (ISEC) **- 13060**]
- "Principles of highway engineering and traffic analysis", F. L. Mannering, W. P. Kilareski – New York [etc.] : John Wiley & Sons, Inc., cop. 1998 [**7-4-159** (ISEC) **- 10884**]
- "Highway design and traffic safety engineering handbook", Ruediger Lamm, *et al*. – New York [etc.] : McGraw-Hill, cop. 1999 [**7-4-161** (ISEC) **- 10885**]
- "Road safety manual : recommendations from the World Road Association", PIARC Technical Commmittee on Road Safety (C13) – Kent, UK : Route 2 Market, 2003 [**7-4-215** (ISEC) **- 13490**]
- "Nociones básicas ferroviarias / RENFE", RENFE 2ª ed ISBN:978-84-267-1513-5 – Barcelona : Marcombo**, cop. 2008** [7-4-254 **(ISEC)** - 15274**]**

Access Conditions and Attendance Excuse

Any student, who, fulfilling the legal requirements, has carried out the practical group work, as well as the respective oral discussion, in the present or the previous two academic years, will be admitted to the examination.

During the semester (the 20th November), an **interim test** will be carried out, addressing the topics of practical application taught until then. Taking this test will allow exemption of evaluation regarding the part of the exam corresponding to those subjects. Students should make this request in Moodle, until the date that will be established for the purpose

Evaluation Method

- **Group practical work**

A mandatory practical work will be carried out in groups of (up to) 3 elements, which will be discussed orally with the teacher(s). Its grade [**PW**] valued 8/20 weights **40%** of the **Final mark**. Students with a verified impossibility to carry out this work in a group should do an individual work, and respective oral discussion, to be **admitted to the examination**.

(Grades, regarding this component, obtained in the two academic years prior to the present can be considered. Failure to present the work, the lack of discussion, or its completion more than two years ago, implies the Non Admission to Exam)

- **Examination**

Written test at the end of the period, with the weight of **60%** of the **Final mark**, valued 20/20 [**EX**] with 10/20 for the theoretical part (minimum of 3) and 10/20 for the practical part (minimum of 3).

In this last part the grade obtained in the **interim test** will be included, if the student wishes and declares it. The elements that students may look up is: the Geometrical Standard (NT JAE) and the Formulas & Tables (available from Moodle)

- **Final mark**

will be calculated as follows:

$$\textbf{Final mark} = \begin{cases} \textbf{PW} + \textbf{EX} \times 0{,}6 & (\text{if } \textbf{EX} \geq 9{,}0/20, \text{ having achieved Minimums on both parts}) \\ 9 / 20 & (\text{if } \textbf{EX} \geq 9{,}0/20, \text{ without Minimum on one, or both parts}) \\ \textbf{EX} & (\text{if } \textbf{EX} < 9{,}0/20) \end{cases}$$

Approval requires obtaining of a Final Mark of at least 9,5 /20. Marks higher than 16 points must be defended in an oral test (optional - nonattendance will result in a Final Mark of 16 points)

Conditions for Results Improvement

Students intending to improve classification shall take the examination corresponding to the period where it takes place, with the same characteristics as described above. The final score will be calculated by the generic rules, being the PW the same with which approval for the curricular unit was obtained.

Date	**Signature from the lecturer responsible for the course**
10 - 09 - 2018	Mário M. A. Martins

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher: 

Licenciatura – BsC Engenharia Civil

Licenciatura – BsC Civil Engineering

Academic Year: **2018/2019**

Program Contents

Course Unit Applied Hydraulics I

Specialization (s) Hydraulics, water resources and environment

Subject type Specialty Sciences **Research Area** Civil Engineering

Year 3rd **Semester** 1st **ECTS** 5

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures		
Theoretical-Practical Lectures	3.5	49
Practical-Laboratoty Lectures		
Tutorial Orientation	0.5	7
Project		

Unaccompanied Working Hours

Activity Type	Total Hours
Study	36
Works / Group Works	
Project	35
Evaluation	3
Additional	

Total of Working Hours 130

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures			
Theoretical-Practical Lectures	Joaquim José de Oliveira Sousa	PhD	Assist. Professor
Practical-Laboratoty Lectures			
Tutorial Orientation	Joaquim José de Oliveira Sousa	PhD	Assist. Professor
Project	Joaquim José de Oliveira Sousa	PhD	Assist. Professor

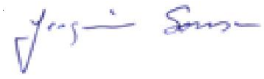
Responsible(s) Lecturer (s) Joaquim José de Oliveira Sousa

Goals
Acquire the required knowledge for interpretation, conception and design of water supply systems.

Skills
Conceive and design water supply systems (treatment, conveyance, storage and distribution).
Understand the hydrological processes and recognize the potential of water use as an economic factor of production and social progress.
Introduce the main chemical, physical and biological processes involved in water and wastewater treatment.

Program Contents

Applied Hydraulics Domains. Urban Hydraulics. Laws and Regulations
Water Supply Systems – Population estimation, Water use, Variations in water use, Fire demand, Design discharges; System conception and design (water treatment, conveyance, pipelines, pumping stations, water hammer analysis, storage and distribution networks).

Signature of Teacher: 

Bibliography

L. W. Mays - Hydraulic design handbook, McGraw-Hill.
P. K. Swamee and A. K. Sharma – Design of water supply pipe networks, Wiley.
B. E. Larock, R. W. Jeppson and G. Z. Watters – Hydraulics of pipeline systems, CRC Press.
S. D. Lin – Water and wastewater calculations manual, McGraw-Hill.
E. W. Steel and T. J. McGhee – Water supply and sewerage, McGraw-Hill.
E. E. Baruth – Water treatment plant design, McGraw-Hill.
F. R. Spellman – Handbook of water and wastewater treatment plant operations, Lewis Publ.

Access Conditions and Attendance Excuse

Students must attend at least 2/3 of theoretical and practical classes (working students and with other special status are excused from this requirement) and must score at least 50% on the ongoing assessment component.

Conditions for Exam Admission

Fulfilment of the access conditions.

Evaluation Method

The final mark has two components: a) The ongoing assessment mark (50% of students' overall mark); b) The final oral examination mark (50% of the overall mark).
For the ongoing assessment students have to conceive and design a water supply system.
The final oral examination is about the project and the course subjects.
A student succeeds if: scores at least 50% on the ongoing assessment component, and the final mark (project and final oral examination) is equal or exceeds 9.5 points from a total of 20.

Conditions for Results Improvement

Students can only improve the final oral examination mark.

Date	**Signature from the lecturer responsible for the course**
10/09/2018	

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher:

Licenciatura – BsC Engenharia civil (Português)

Licenciatura – BsC Civil engineering (Inglês)

Academic Year: **2018/2019**

Program Contents

Course Unit REINFORCED CONCRETE STRUCTURES II

Specialization (s)

Subject type Structural Mechanics **Research Area** Civil engineering

Year 3º **Semester** 1º **ECTS** 5

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures		
Theoretical-Practical Lectures	3.5	49
Practical-Laboratoty Lectures		
Tutorial Orientation	0.5	7
Project		

Total of Working Hours 130

Unaccompanied Working Hours

Activity Type	Total Hours
Study	71
Works / Group Works	
Project	
Evaluation	3
Additional	

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures			
Theoretical-Practical Lectures	Ricardo Nuno Francisco do Carmo	PhD	Assistant professor
Practical-Laboratoty Lectures			
Tutorial Orientation	Ricardo Nuno Francisco do Carmo	PhD	Assistant professor
Project			

Responsible(s) Lecturer (s) Ricardo Nuno Francisco do Carmo

Goals

know the theory and the practice related with design and production of reinforced concrete structures (current structures). Recognize, diagnose and prevent structural pathologies in constructions.

Skills

Generic skills:
- Application of knowledge;
- Make judgments / decisions;
- Self-learning.

Specific skills:
- Acquire knowledge and understanding capacity in the field of reinforced concrete structures, particularly at the level of design and production;
- Review the fundamental principles on the behavior of reinforced concrete structures in order to strengthen the knowledge already acquired;
- Increase the capacity to understand the reinforced concrete structures used in current buildings;

- Provide the students with new knowledge to deal with the contemporary situations in the area of reinforced concrete structures (making judgments and developing solutions).

Program Contents

Torsion in reinforced concrete beams
- General: review of knowledge about torsion, compatibility and balance torsion;
- Model of strength in cracked phase;
- Torsion moment strength (torsion associated with bending and shear);
- Detailing of reinforcement;

Slabs (introduction)
- Definition of slab;
  Types and classifications: description of various types of slabs and presentation of several examples.

Punching
- Basic control perimeter;
- Punching shear resistance of slabs and column bases without shear reinforcement;
- Punching shear resistance of slabs and column bases with shear reinforcement;
- Detailing of reinforcement;

Slabs with ceramic elements and pretensioned members
- Overview;
- Checking the safety to the Ultimate limit states (ULS) and to the Serviceability limit states (SLS);
- Production of this type of slabs.

Concrete slabs
- General presentation;
- Determination of the internal forces and moments. Hypotheses of Kirchoff. Lagrange equation.
- Calculation of maximum moments applied in the slabs using tables;
- Theory of plasticity in slabs: static method - application examples; cinematic method - lines of fracture;
- Design slabs: slabs of one-way spanning and slabs of two-way spanning;
- Detailing of reinforcement acording to EC2;
- Checking the safety to the Ultimate limit states and to the Serviceability limit states;
- Slabs for stairs.

Direct Foundations
- Column footings (isolated, center and eccentric);
  Column footing with beams of balance.

Bibliography

- REBAP - Regulamento de Estruturas de Betão Armado e Pré-Esforçado (1983), Decreto-Lei n.º 349-C/83, de 30 de Julho;
- EC2 - EN 1992-1-1 - “Eurocódigo 2: Projecto de estruturas de betão armado – Parte 1-1: Regras gerais e regras para edifícios”;
- CEB-FIP MODEL CODE 1990, Comité Euro-International du Béton, Lausanne, Suisse, 1990;
- Júlio Appleton, João Almeida, José Câmara, Augusto Gomes - “Betão Armado e Pré-Esforçado II – Volume I, Volume II e Volume III”, Instituto Superior Técnico, 1989;
- Leonhardt, F. - “Construções de Concreto” (do Volume 1 ao volume 4), Editora Interciência, Lda., Rio de Janeiro, Brasil;
- Elementos de apoio às aulas elaborados pelos docentes da disciplina – Betão Armado II. Diapositivos apresentados nas aulas.

Other elements of study available at: http://www.civil.ist.utl.pt/~cristina/bape1/
http://www.civil.ist.utl.pt/~cristina/bape2/
http://www.qsp.pt/

- Elementos de estudo da disciplina Estruturas de Betão I (IST) – Módulo 3 Verificação do comportamento em serviço (Estados Limites de Utilização) – Carla Marchão e Júlio Appleton;
- Elementos de estudo da disciplina Estruturas de Betão II (IST) – Módulo 2 Lajes – Carla Marchão e Júlio Appleton;
- Elementos de estudo da disciplina Estruturas de Betão II (IST) – Módulo 3 Fundações de Edifícios – Carla Marchão e Júlio Appleton;
- Elementos de estudo da disciplina Estruturas de Betão II (IST) – Execução de Estruturas de Betão – Júlio Appleton;

- Cálculo prático de estruturas de betão armado – aços SD

Scientific papers available at: http://www.civil.ist.utl.pt/~cristina/GDBAPE/Artigos.htm

- Júlio Appleton – "Eurocódigo 2 – EN1992-1-1"
- Júlio Appleton, Paulo França – "Implementação do Eurocódigo 2 – (EN1992-1) em Portugal. Comparação com o REBAP"
- Júlio Appleton, António Costa, Paulo França – "Efeitos Estruturais da Deterioração em Estruturas de Betão Armado"
- João Saraiva, Júlio Appleton – "Avaliação da Capacidade Sísmica de Edifícios de Betão Armado de Acordo com o Eurocódigo 8 – Parte 3"
- Miguel Lourenço, João Almeida - "Campos de Tensões em Zonas de Descontinuidade"
- João Almeida, Miguel Lourenço – "Stress Field Models for Structural Concrete

Access Conditions and Attendance Excuse

Not applicable.

Conditions for Exam Admission

All students enrolled in the course are admitted to the exam.

Evaluation Method

- One final exam to be carried out during the period of the exams.
- The approval requires the achievement of at least 9.5 in the final result (on a scale of 0 to 20).
- Students with a mark higher than 16 can be submitted to an additional oral test.

Conditions for Results Improvement

The improvement of the classification can only be done by exame.

Date	**Signature from the lecturer responsible for the course**
08/09/2018	Ricardo Nuno F do Carmo

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher:_____

Licenciatura – BsC Engenharia Civil

Licenciatura – BsC Civil Engineering

Academic Year: **2018/2019**

Program Contents

Course Unit FOUNDATIONS I

Specialization (s) GEOTECHNICS

Subject type Research Area Civil engineering

Year 3rd **Semester** 1st **ECTS** 5.0

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures		
Theoretical-Practical Lectures	3	42
Practical-Laboratoty Lectures	0,5	7
Tutorial Orientation	0,5	7
Project		

Unaccompanied Working Hours

Activity Type	Total Hours
Study	55
Works / Group Works	25
Project	
Evaluation	4
Additional	

Total of Working Hours 140

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures			
Theoretical-Practical Lectures	Carlos Moreira	Doutor	Prof. Coord.
Practical-Laboratoty Lectures	Carlos Moreira	Doutor	Prof. Coord.
Tutorial Orientation	Carlos Moreira	Doutor	Prof. Coord.
Project			

Responsible(s) Lecturer (s) **Carlos** Moreira

Goals
Technology and design of earth support structures and foundations.

Skills
Specific Competence: E18 - Analyse and design structures and geotechnical construction works, namely: foundations, retaining structures, natural and constructed slopes, geosynthetic usage.
Specific Competence: E30 - Recognize, diagnose and prevent structural pathologies in constructions.

Program Contents

1. Earth forces

Introduction. State of stress at rest. Pressure coefficient at rest. Active and passive limit equilibrium states. Rankine's Method. Hypothesis and general formulation. Surcharges. Stratified formations. Water level. Rankine's Theory extended to cohesive soils. Rankine's Theory extended to soils with inclined surface. Consideration of soil-structure friction. Boussinesq's Theory. Caquot-Kérisel tables. Coulomb's method. Coulomb's active force. Culmann's resolution scheme. Coulomb's passive force.

2. Earth retaining structures

Types of earth retaining structures. Rigid and flexible. Gravity walls. Massive and reinforced construction. Concrete, masonry, gabion and crib walls. Cantilever, buttresses, pre-fabricated and pre-stressed walls. Reinforced soil walls. Nailed soils. Reinforcement with geosynthetic materials. Flexible walls. Steel sheets. Soldier pile walls. Berlin type walls. Diaphragm walls. Pile walls. Hybrid walls. External stability of retaining walls. Safety. Classical methodology. Eurocode 7.

Overturning. Base sliding. Foundation collapse. Global slipping. Drainage. Wall holes, perforated pipes, geosynthetic drains, sand filters, pumping. First approach to dimensions.

3. Foundations

Definition and classification of foundations. Usual types of shallow foundations. Blocs, isolated and continuous footings, mats. Selection of the adequate foundation. Foundation soil failure. Generalized, localized and punching. Prandtl's failure mechanism. Plastic failure theories. Terzaghi and Meyerhof. Bearing capacity. Short and long term. Water level influence. Plasticized zone in sands. Generalization of the formulation. Corrections due to shape, deep and inclined forces. Eccentric loads. Safety. Ultimate and service load resistance. Classic methodology. Global safety coefficients. Eurocode 7. Partial safety coefficients. Settlements. Famous examples. Signs that indicate settlements. Methods for settlement prediction. Rational and empirical. Types of settlements. Classification: movement, time and profile. Structural and footing stiffness influence. Settlement evaluation. Immediate and consolidation settlements. Skempton-Bjerrum correction. Creep. Allowable settlements. Laboratorial parameters for settlement prediction.

4. Field tests for bearing capacity evaluation and settlement prediction of foundations

Penetration tests. Dynamic, SPT, CPT, CPTU, SCPTU. Load plate tests. Pressumeters of Ménard and Cambridge self-boring. Marchetti dilatometer. Seismic analysis. Corrections. Correlations with mechanical soil parameters. Drillings. Sampling.

5. Deep foundations

Objectives. Classification. Usage. Main types. Driven piles. Timber, steel and concrete. Bored and cast in situ piles. Franki, Strauss, continuous auger and injected piles. Bearing capacity of isolated piles. Formulation based on soil parameters. Shaft and end bearing capacities. Terzaghi, Meyerhof, Berezantzev and Vesic. Methods based on SPT and CPT results. Dynamic formulas. Negative skin friction. Design according to Eurocode 7. Horizontal loading.

Bibliography

Bowles, J. E., Foundation Analysis and Design, 5th Ed., McGraw Hill
Brown, R. W., Practical Foundation Engineering Handbook, McGraw Hill
Coduto, D., Foundation Design, Principles and Practices, Prentice Hall
Coelho, Silvério, Tecnologia de Fundações, edições E.P.G.E.
Day, R. W., Geotechnical and Foundation Engineering, McGraw Hill
Matos Fernandes, M., Mecânica dos Solos II
Moreira, C., Dimensionamento de Muros de Suporte
Moreira, C., Estruturas Flexíveis de Contenção Periférica
Ordem dos Engenheiros, Recomendações na Área da Geotecnia
Velloso, D. et al., Fundações, volumes 1 e 2, COPPE-UFRJ

Access Conditions and Attendance Excuse

-

Conditions for Exam Admission

-

Evaluation Method

Written evaluation;
Laboratorial and bibliographical research assignments; oral presentation.

Conditions for Results Improvement

-

Date	**Signature from the lecturer responsible for the course**
6.09.2018	

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher: _____

Licenciatura – BsC: Engenharia Civil (Português)

Licenciatura – BsC: Civil Engineering (Inglês)

Academic Year: 2018/2019

Program Contents

Course Unit ECONOMICS AND MANAGEMENT

Specialization (s) N.A

Subject type **Research Area** Industrial Engineering and Management

Year 2º **Semester** 2º **ECTS** 5.0

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures	2	28
Theoretical-Practical Lectures	2	28
Practical-Laboratoty Lectures		
Tutorial Orientation		
Project		
Total of Working Hours		56

Unaccompanied Working Hours

Activity Type	Total Hours
Study	46,5
Works / Group Works	24
Project	
Evaluation	3.5
Additional	
	74

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	Ricardo Ferraz	Post-doc	Invited Adjunct Professor
Theoretical-Practical Lectures	Hugo Raposo	PhD	Invited Adjunct Professor. Equip.
Practical-Laboratoty Lectures			
Tutorial Orientation			
Project			

Responsible(s) Lecturer (s) Ricardo Ferraz

Signature of Teacher:_____

Goals

• To transmit core information in the fields of Economics and Management. More specifically, students will be taught how to:

• Develop knowledge and skills for understanding Economics and Management.

• Apply theoretical concepts from the field of Economics and Management to the real world.

• As engineers, operating within the context of the labour market, to acquire and apply the essential concepts needed for communicating with economists and managers;

• Refer to subjects taught in the field of Economics and Management and to use these to solve practical and specific problems in their professional life;

• Develop creative and entrepreneurial skills.

Skills

• Students will learn how to:

• Understand what an organisation is and to comprehend the reality of the Portuguese business structure.

• Perceive the connections between the organisation and its surrounding environment.

• Understand the importance of the human factor in organisations.

• Recognise the strategic importance of marketing.

• Understand the importance of leadership for organisations.

• Develop a simple business plan.

• Understand economic science and its postulates.

• Understand the economic problem and its solutions.

• Interpret State activities.

• Describe the reality of the Portuguese economy.

• Analyse a set of relevant economic indicators.

• Interpret economic texts.

Signature of Teacher:_____

Program Contents

- Theory:

o Economic Science and its Postulates;
o The Economic Problem and its Solutions;
o The Economic Role of the State;
o The Marshallian Cross;
o The Main Market Forms;
o Economic Activity;
o Principles of Economic Policy;
o Currency and Banking;
o Management, Organisation, Company, and the Portuguese business structure;
o Organisational Theories;
o Organisations and the Environment;
o Business Strategy;
o Marketing;
o Leadership.

- Practice:

o The Business Plan (Formulation, Elaboration and Fundamental Points);
o Strategic Analysis;
o Strategic Formulation;
o Organisation and Implementation of the Strategy;
o Accounting Exercices;
o Economics Exercises;
o The Discussion of Economic Texts;
o Presentations of Group Work.

Bibliography

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- "Gestão Estratégica – Conceitos, modelos e instrumentos". A. J. Robalo Santos. Escolar Editora, 2008.
- "Fundamentos de Marketing". B. Ferreira; H. Marques; J. Caetano; L. Rasquilha; M. Rodrigues. Edições Sílabo, 3ª Ed. 2015.
- "Direito das Sociedades Comerciais – Sumários desenvolvidos das aulas de Direito para Economia e Gestão". M. Carvalho e S. Moreira. Universidade do Minho, 2013.
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- "Como Elaborar um Plano de Negócios – Guia Explicativo". IAPMEI, 2016.
- "Manual do Empreendedor 2016". IAPMEI, 2016.
- "Empreendedorismo e Inovação". S. Sarkar. Escolar Editora, 3.ª Edição, 2014.
- "Introdução à Economia". J. C. das Neves. Verbo, 11ª edição, 2016.
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- "Guia de Apoio à Introdução à Economia". I. Ucha. Verbo, 7ª edição, 2015.
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- "Princípios de Economia Política". J. C. das Neves, Verbo, 2011.

- "Introdução à Política Económica". J. Généreux, 1995.
- "Política Económica (Notas Metodológicas). A, Mateus, 1994. Instituto Superior de Economia e Gestão (ISEG).
- "Dicionário de Economia". J. C. Soares. Plátano Editora, 2008.
- "Economia Portuguesa: Evolução no contexto internacional (1910-2013). A. Mateus. Principia, 2013.
- "*Monitoring the World Economy*". A. Maddison. OECD, 1995.
- *The World Economy – A millennial Perspective"*. A. Maddison. OECD, 2001.
- *"The World Economy – Historical Statistics"*. A. Maddison. OECD, 2003.
- "Portal do Instituto Nacional de Estatística (INE)": https://www.ine.pt/
- "Gabinete de Estatísticas da União Europeia (Eurostat)": http://ec.europa.eu/eurostat
- "*Economic and Financial Affairs – Indicators (AMECO)*": http://ec.europa.eu/economy_finance/ameco/user/serie/SelectSerie.cfm
- "*Organisation for Economic Co-Operation and Development (OECD) stat*": http://stats.oecd.org/
- "Banco de Portugal" Estatísticas: https://www.bportugal.pt/page/estatisticas.
- "Pordata (Base de dados – Fundação Francisco Manuel dos Santos)": https://www.pordata.pt/

Access Conditions and Attendance Excuse

To enrol for the course, students must meet the requirements set out in the applicable legislation. Students are required to systematically attend all classes as a prerequisite for academic success and for developing a correct understanding of the subjects taught.

Conditions for Exam Admission

Evaluation Method

Option 1- General scheme of assessment:

Final Mark = Classification obtained in Final Examination

or

Option 2 – Continuous assessment*:

Final Mark = [0.3 x Mark obtained for Group Work + 0.1 x Mark for Individual Work + 0.6 x Classification obtained in Final Examination]

* The Continuous Assessment scheme requires:

- Attendance of at least 70% of practical classes.
- A minimum classification of 8.0 in the Final Examination
- Group work will be presented and defended in the practical classes. All members of the group must participate in the presentation. Those who are not present at the group presentation will be awarded a mark of 0.0.
- Individual work will be presented, analysed and commented on in the practical classes. Those who are not present at the individual work presentation will be awarded a mark of 0.0.

Conditions for Results Improvement

Students wishing to improve their final mark must meet the requirements set out in the applicable legislation.

Date
21.01.2019

Signature from the lecturer responsible for the course

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher:

Licenciatura – BsC Engenharia Civil

Licenciatura – BsC Civil Engineering

Academic Year: **2018/2019**

Program Contents

Course Unit HYDRAULICS 2

Specialization (s) N/A

Subject type Engineering sciences - Hydraulics **Research Area** Hydraulics

Year 2 **Semester** 2 **ECTS** 5

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures		
Theoretical-Practical Lectures	3	42
Practical-Laboratoty Lectures	0.5	7
Tutorial Orientation	0.5	7
Project		

Unaccompanied Working Hours

Activity Type	Total Hours
Study	61
Works / Group Works	10
Project	
Evaluation	3
Additional	

Total of Working Hours 130

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	-		
Theoretical-Practical Lectures	Pedro Nuno Madeira Afonso	PhD	Prof. Coordenador
Practical-Laboratoty Lectures	Luísa Lourenço Ribeiro	PhD	Prof. Adjunto
Tutorial Orientation	Pedro Nuno Madeira Afonso	PhD	Prof. Coordenador
Project	-		

Responsible(s) Lecturer (s) Pedro Nuno Madeira Afonso

Goals
On successful completion of this module, students will have the ability to analyze and solve problems related to: pipe systems; flow in open channels; pumping stations; flow through orifice and weirs.

Skills
On successful completion of this module, students will have developed a range of generic skills spanning: hydraulic analysis; team work; numerical analysis; data analysis.

Program Contents

1. PRESSURE FLOW
   1.1. Minor Losses
   1.2. Pipe Systems
      1.2.1. Pipes in series and parallel

1.2.2. Multiple pipes and multiple reservoirs
1.2.3. Pipe networks

2. OPEN CHANNEL FLOW
   2.1. Classification of open channel flows
   2.2. Uniform flow
      2.2.1. Simple sections
      2.2.2. Velocity distribution
      2.2.3. Closed sections
      2.2.4. Nonuniform perimeters
   2.3. Gradually varied flow
      2.3.1. Specific energy
      2.3.2. Flow control
      2.3.3. Classification of surface profiles
      2.3.4. Examples of gradually varied flow
   2.4. Rapidly varied flow - hydraulic jump

3. FLOW TROUGH ORIFICES AND WEIRS

4. TURBOMACHINERY
   4.1. Pumps
      4.1.1. Classification of pumps
      4.1.2. Centrifugal pump installations
      4.1.3. Axial pump installations
      4.1.4. Specific speed
      4.1.5. Pump performance curves
      4.1.6. Matching a pump to a piping system
      4.1.7. Pumps in parallel or series connection
      4.1.8. Pump start-up and priming
      4.1.9. Suction limitations of pumps

   4.2. Turbines
      4.2.1. Classification of turbines
      4.2.2. Reaction turbines installations
      4.2.3. Impulse turbines installations

Bibliography

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- CIVIL ENGINEERING HYDRAULICS – 5th Edition. Nalluri & Featherstone's. Wiley-Blackwell, 2009
- HIDRÁULICA GERAL. Armando Lencastre. Edição do Autor
- MECÂNICA DOS FLUIDOS. B. S. Massey. Fundação Calouste Gulbenkian.
- MECÂNICA DOS FLUIDOS E HIDRÁULICA GERAL. J. Novais Barbosa. Porto editora HIDRÁULICA GERAL. A. Manzanares. Editora AEIST
- ENGINEERING FLUID MECHANICS. John A. Roberson, Clayton T. Crowe. John Wiley & Sons
- FUNDAMENTALS OF FLUID MECHANICS. Bruce R. Munson, Donald F. Young, Theo-dore H. Okiishi. John Wiley & Sons
- EXERCICES DE MÉCANIQUE DES FLUIDES. Michel A. Morel, Jean-Pierre Laborde. Eyrolles

Signature of Teacher:

Access Conditions and Attendance Excuse
N/A

Conditions for Exam Admission
N/A

Evaluation Method
Exam: 90%; Number of exams: 2; Exam duration: 3h; Exam parts: theoretical part (60 min), Practical part: 120 min; in the theoretical part no consultation is allowed; in the practical part a form with the equations needed to solve the problems is given to the students.
Other assessment: laboratorial work; Other assessment: 10%

Conditions for Results Improvement
The student wishing to improve the classification will take an exam that has been quoted for 18 values. The classification of the exam will be added to the note of the laboratory part.

Date

15/1/2019

Signature from the lecturer responsible for the course

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher: 

Licenciatura – BsC em Engenharia Civil (Português)

Licenciatura – BsC Civil Engineering (Inglês)

Academic Year: 2018 / 2019

Program Contents

Course Unit BETÃO ARMADO I (REINFORCED CONCRETE STRUCTURES I)

Specialization (s) STRUCTURAL MECHANICS

Subject type Applied Sciences **Research Area** Civil Engineering

Year 2nd **Semester** 2nd **ECTS** 5

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures		
Theoretical-Practical Lectures	3,5	49
Practical-Laboratoty Lectures		
Tutorial Orientation	0,5	7
Project		

Unaccompanied Working Hours

Activity Type	Total Hours
Study	60
Works / Group Works	11
Project	
Evaluation	3
Additional	

Total of Working Hours

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures			
Theoretical-Practical Lectures	Paulo Maranha Nunes Tiago	Specialist	Adjunct Professor
Practical-Laboratoty Lectures			
Tutorial Orientation	Paulo Maranha Nunes Tiago	Specialist	Adjunct Professor
Project			

Responsible(s) Lecturer (s) Paulo Maranha Nunes Tiago

Goals

To learn to apply calculation methods to the analysis, design and detail of linear reinforced concrete members (beams, columns and frames) and its foundations in the context of a modern approach like the Eurocode 2 one. To develop the appropriate skills in order to gather, select, and understand up-to-date technical information in the scope of the discipline contents.

Skills

To have the knowledge from the theoretical and practical perspective for the design and detail of linear reinforced concrete elements for building regular structural systems.

Program Contents

Chapter 0 Introducing Reinforce Concrete I: general considerations; methodology; contents; final examination.

Chapter I Introduction. The concept of RC. The history of concrete construction; Portland cement; Special types of concrete.

Chapter II Principles of Structural Safety.
Structural Safety. Evolution; philosophy; concepts and uncertainties.
Standards, regulatory texts and their evolution. Eurocodes: general concept; actions, action combinations: material properties. The frame of concrete industry standards and regulations.
Materials properties: concrete and reinforcing steels. Time effects: concrete creep and shrinkage; basics and approximated determination methods.

Reinforcing steel bars (rebars) and concrete: rebar surface and resistant characteristics. Bond: rebar bond anchorage and overlapping. Rebar bending inside concrete. Durability of steel and concrete.

Chapter III The Ultimate Limit State (ULS) approach for the design of concrete sections.
Axial, bending and shear failure of concrete sections: basic assumptions; conventional failures; stress-strain relationships for concrete and steel. The strength of sections: characteristic and design values. Simple bending ULS; flexural-compression ULS; shear ULS.
Beam design and detailing to the bending ULS. Charts, tables and approximate formulae as design aids.
Particular and best practice rules for the detailing of beams. Reinforced concrete geometry and detail drawings.
Cracking and deflection of beams: most important aspects. Dealing with cracking and deflection by Eurocode simplified rules: the implicit check of Service Limit State (SLS) of deflection and cracking.
Beam shear design by ULS. Shear design in the scope of Eurocode 2. The Ritter-Mörsch truss analogy. Shear-bending interaction, the shift rule for bending design.
Important and best practice detailing rules.

Chapter IV The design of columns to the flexural-compression ULS. Uniaxial/biaxial bending and compression of concrete sections. Design aids in the form of charts and tables.
Geometrical imperfections of concrete members. Non-linear geometrical and material aspects of concrete columns behavior.
Second order effects in concrete isolated columns and in concrete structures. Eurocode approach to the ULS of buckling: nominal curvature method; moment magnification method with simplified nominal stiffness.
Important and best practice detailing rules for concrete columns and beam-column joints.

Bibliography

[1] EC0. NP EN 1990:2009. Eurocódigo - Bases para o projecto de estruturas, European Committee for Standardization (CEN).
[2] EC1. NP EN 1991-1-1:2009. Eurocódigo 1: Acções em estruturas – Parte 1-1: Acções gerais. Pesos volúmicos, pesos próprios, sobrecargas em edifícios, European Committee for Standardization (CEN).
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[8] REBAP - Regulamento de Estruturas de Betão Armado e Pré-Esforçado (1983), Decreto-Lei n.º 349-C/83 de 30/6.
[9] F. Leonhardt e E.Mönnig. Construções de Concreto, Volume 1 – Princípios Básicos do Dimensionamento de Estruturas de Concreto, Editora Interciência, Lda., Rio de Janeiro, Brasil, 1977.
[10] F. Leonhardt e E.Mönnig. Construções de Concreto, Volume 3 - Princípios Básicos sobre a Armação de Estruturas de Concreto, Editora Interciência, Lda., Rio de Janeiro, Brasil, 1978.
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[12] J. Appleton, J. Almeida, J. Câmara, A. Gomes. Betão Armado e Pré-Esforçado II – Volume I, Volume II e Volume III, Instituto Superior Técnico, 1989.
[13] Henry Thonier. Conception et calcul des structures de bâtiment - Tome 7 - L'Eurocode 2 pratique, 2ème Ed. Presses de L'École Nationale des Ponts et Chaussées, 2009.
[14] B. Mosly, J. Bungey & R. Hulse. Reinforced Concrete Design to Eurocode 2. 6th Edition. Palgrave-Macmillan, 2007.
[15] A. J. Bond, O. Brooker, A. J. Harris, T. Harrison, R. M. Moss, R. S. Narayanan & R. Webster. How to Design Concrete Structures using Eurocode 2. The Concrete Centre. Camberley, 2006.
[16] R. S. Narayanan & A. Beeby. Designer's Guide to EN1992-1-1 and EN1992-1-2. Thomas Telford. Londres, 2005.
[17] P. Maranha Tiago. Elementos de apoio às aulas teórico-práticas de Betão Armado I. Diapositivos apresentados nas aulas, 2015-2017.
[18] J. Gouveia e J. Valença. Elementos de apoio às aulas elaborados pelos docentes da disciplina – Betão Armado I. Diapositivos apresentados nas aulas, 2012.
[19] E. Júlio e D. Dias da Costa, Apontamentos de Betão I, FCTUC, 2008.
[20] Helena Barros e Joaquim Figueiras. Tabelas e Ábacos de Dimensionamento de Secções de Betão Solicitadas à Flexão e a Esforços Axiais Segundo o Eurocódigo 2, FEUP Edições, Porto, 2012.
[21] J. D'Arga e Lima. Betão Armado – Armaduras. Aspectos Gerais (MN 6), LNEC, 2004
[22] B. Cresswell Riol, editor. Standard Method of Detailing Structural Concrete – A Manual for Best Practice, 3th Edition. The Institution of Structural Engineers / Concrete Society. Londres, 2006.

Access Conditions and Attendance Excuse

Students attending theoretical-practical lectures should be aware of basic topics in statics (support reactions, internal forces diagrams), strength of materials (stresses, deformations and constitutive laws) and structural analysis (frame analysis, displacements calculation, influence lines).

Signature of Teacher: 

Conditions for Exam Admission

All students enrolled in the course having attended at least two theoretical-practical lectures will be admitted to examination.

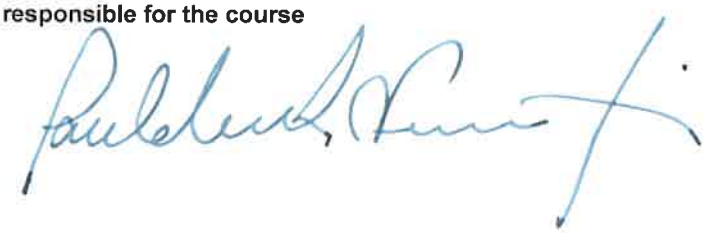
Evaluation Method

Final exam: Individual written examination about any topics lectured during course period, with particular emphasis in practical design and detailing problems. Approval requires achievement of a 9.5/20.0 mark, at least. Marks higher than 16/20 must be orally defended. During examination students will be allowed to use texts or abridged form of texts of EN 1992, EN 1991 and EN 1990 standards, without any commentaries, graphics or tables design aids and a written set of self collected adequate formulae.

Conditions for Results Improvement

Accordingly to official regulation.

Signature from the lecturer responsible for the course

21/1/2019 

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher: _____

Licenciatura – BsC Engenharia Civil

Licenciatura – BsC Civil Engineering

Academic Year: **2018/2019**

Program Contents

Course Unit ANALYSIS OF STRUCTURES

Specialization (s) STRUCTURAL MECHANIC AND STRUCTURES

Subject type **Research Area** Civil Engineering

Year 2º **Semester** 2º **ECTS** 5,0

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures	-	-
Theoretical-Practical Lectures	3,5	52,5
Practical-Laboratoty Lectures	-	-
Tutorial Orientation	0,5	7,5
Project	-	-

Total of Working Hours 130

Unaccompanied Working Hours

Activity Type	Total Hours
Study	45
Works / Group Works	20
Project	-
Evaluation	5
Additional	-

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures			
Theoretical-Practical Lectures	João Paulo Martins Gouveia	Master	Prof. Adj.
Practical-Laboratoty Lectures			
Tutorial Orientation	João Paulo Martins Gouveia	Master	Prof. Adj.
Project			

Responsible(s) Lecturer (s) João Paulo Martins Gouveia

Goals

The organisation of teaching and the evaluation methodology of each student is composed by different forms, considered important for your training: 1. Ability to learn, to work to obtain capacity of individual organization; 2. Ability to group study, and present ideas and resolution of problems; 3. Development spirit of research in bibliography in addition of study and practice exercises; 4. Attendance and commitment throughout the semester; 5. Knowledge and interpretation of potential objectives and resolution of essential problems addressed in final test.

Skills

Study of the behavior's principles of reticulate structures for to design structures. Understand the behavior of elements and prevision of structural deformation.
Study different methods to calculate hiperstatics structures. Evaluate deformed vs diagrams of efforts and calculation of reactions. Solve hiperestatics structures. Research about systems and software of automatic design of structures and perform applications with problems of unit.
Pesquisar sobre ferramentas e sistemas de cálculo automático de estruturas e realizar aplicações.
Understand the process of combination of actions by the concepts of influence lines deformed and efforts by the duality relationship static-kinematics.

Signature of Teacher: _____

Program Contents

The classes will be taught in Portuguese, being referred to the following contents:

PART 1: Introduction and basis

Chapter 1– Introduction to the analysis of structures; Objectives of structural analysis, reviews about basis of static, diagrams, and superposition-of-effects principle; hypothesis of the structure analysis; Deformation in the structures by relation of tensions-deformations and forces-displacements; Condition of equilibrium.

Chapter 2– Energy methods; Fundamental considerations on the energy theorems and methods by virtual work applied elastic behaviour of structures. Calculation of displacements using the theorem of virtual work with Bonfim Barreiros Method. Practices exercices.

PART 2: Cause and effect relationships: action-reaction, load-displacement, stress-strain:

Chapter 3 – Displacements in isostatic structures. Calculation of tension diagrams and the displacement in isostatic structures. Conventions of signal to efforts. Determination analysis of deformed by imposition of deformations in sections. Determination of discontinuities and of displacement results. Relation between displacement section and tension section. Relationship between kinematic and static methods Application examples and resolution of problems

Chapter 4 – Influence lines. Physical interpretation and notion of influence line. Example of application this concepts for definition of combination of actions. Determination of efforts in structures by influence lines. Examples and Exercises.

PART 3: Structural analysis: Force method and displacement method

Chapter 5 – Force method of analysis structures. Introduction and interpretation about the method of forces. Structural hiperestaticity degree. Internal and external degree. Matrix of flexibility of structures. Behavior of structures with displacements in the supports and elastic elements. Effect of temperature variations in structures. Final efforts in hyperstatic structures. Examples and application.

Chapter 6 – Displacement method of analysis structures. Introduction and interpretation about the method of displacements. Fundamental concepts. Relationship of method of displacements with method of forces. Methods for determination the kinematics degree. Stiffness matrix and vector of forces caused by external actions. Analysis of structures with displacements in the supports and elastic elements and cables. Examples and application

Bibliography

1. AZEVEDO, A. (1987) – Análise estática e dinâmica de estruturas de edifícios. Laboratório Nacional de Engenharia Civil. Lisboa, 1987.
2. FLEMING, Jonh F. (1997) - Analysis of Structural Systems. Ed. Prentice Hall.
3. FREITAS, J. A. Teixeira (1980) – Simetria e anti-simetria, Teoria de Estruturas, Instituto Superior Técnico; Lisboa.
4. FREITAS, J. A. Teixeira (1986) – Introdução ao Métodos dos deslocamentos, Teoria de Estruturas, Instituto Superior Técnico. Lisboa.
5. FREY, F. (1990) – Analyse des structures et milieux continus: Statique Appliqué. Traité de Génie Civil de l´École polytechnique fédérale de Lausanne, Lausanne, 1990.
6. GHALI, A; NEVILLE A. (1979) – Structural analysis: a unified classical and matrix approach. Second Edition. Chapman and Hall. London. England. 1979.
7. GOUVEIA, J.P. (2007) – Mecânica Estrutural: apontamentos de apoio às aulas teóricas e práticas de Estruturas I, 06/07. DEC do Instituto Superior de Engenharia de Coimbra, Coimbra, 2007.
8. GUEDES, J.M. (2002) – Método dos deslocamentos, Departamento de Engenharia Civil, Faculdade de Engenharia, Universidade do Porto, Porto.
9. IST (1997) – Tabelas de Análise de Estruturas. Secção de Folhas da Associação de Estudantes do Instituto Superior Técnico, Lisboa, 1997.
10. LAURSEN, H.I. – Structural Analysis. McGraw-Hill.
11. NEGRÃO, J.H (1992) – Teoria de Estruturas I – Apontamentos práticos. Departamento de Engenharia Civil da Faculdade de Ciências e Tecnologia da Universidade de Coimbra, Coimbra, 1992.
12. PEREIRA, E.M. (1994) – Análise de Estruturas I – Linhas de Influência. Secção de Folhas da Associação de Estudantes do Instituto Superior Técnico, Lisboa, 1994.
13. SILVA, V. Dias (1999) – Mecânica e resistência dos materiais. Departamento de Engenharia Civil da Universidade de Coimbra, Coimbra, 1999.
14. TADEU, A.; NEVES, L. e COELHO, P. (1992) – Teoria de Estruturas II. Departamento de Engenharia Civil, FCTUC, Coimbra.
15. TIMOSHENKO, S. e GERE, J. (1983) – Mecânica dos Sólidos. Volumes I e II. Livros Técnicos e Científicos.
16. Documents submitted by students in previous academic years, available in digital format and in the library.
17. Frey F. Analyse des strucutres et millieux continus – Statique appliqué. Traité de Génie Civil de l'École polytechnique fédérale de Lausanne, Vol. 1, Presses polytechniques et universitaires romandes, 1994.
18. Riley WF, Sturges LD. Engineering mechanics: statics. John Wiley & Sons, 1996.
19. Bibliography in the library and appointments with problems prepared by teachers and others, available on the internet and in Moodle.

Access Conditions and Attendance Excuse

Not applicable

Conditions for Exam Admission

Students may perform tests of discipline, if they are properly registered on academic services, and with the name registered on the sheet of classifications

Signature of Teacher: _____

Evaluation Method

The evaluation of students will be made by the written exam to perform on the defined institutional dates. The student can obtain evaluation by frequency of study with presentation of individual work of personal study and research about program contents. It is also considered the frequency of attendance at lessons.

- Information concerning the written exam:

All students will be assessed by the written exam (with A4 sheet query written by the student and to deliver along with the evidence, which shall be signed by the professor for supervision of the examination).

The exams forms will be divided into two parts: fundamental problems (5.0values) and applied problems (15.0values). The student must obtain a minimum rating of 3.0 on the values of fundamental problems. In cases where students do not obtain the minimum rating at the fundamental problems, the part of applied problems will not be corrected and will be assigned a final grade of 5.0 values.

The written tests will be presented by specific form for resolution of the questions and exercises. During the written test, are not allowed to use mobile phones or image and communication equipment or any other portable equipment not authorized by the professor for supervision of the examination.

The test can be written and presented in english form for students who request it in advance.

- Information concerning by working frequency:

It is considered the possibility of evaluating for frequency works (works written, test of evaluation on subject taught or documents with problems and their resolution), to be held during the academic period and class schedule.

The student can be resolve exercises and problems, presented in handwritten form (in document given by a teacher). The originals of these works manuscripts shall be returned to the teacher in role in each week. Later, the student must make available the pdf of the work performed for all students.

The classification will have the maximum of 5 values.

For consideration of this value in the definition of the final grade of the course, the student should have positive note on the written exam. The final classification will be obtained by conversion of the final value of the written exam and the work realized for 15 values being added the classification obtained by frequency works.

- Information concerning by regular attendance at lessons:

This classification will have the maximum of 1 value, being defined and weighted according to the number of lesson.

- Information about final classification:

For the definition of the final classification shall be achieved by the sum of the evaluation of the written exam and all parts of work realized, and the value of the written test will be converted to be added the values obtained in the other components for evaluation.

Conditions for Results Improvement

It is expected to carry out special character evaluations of students with request additional test or special tests. This exams can be defined by indication of the academic services. The teacher may suggest that these tests are in the form of written exam, oral exam or for presentation and defense of works that can be done.

Date	Signature from the lecturer responsible for the course
15-01-2019	João Paulo Gouveia

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Licenciatura em Engenharia Civil

BSc in Civil Engineering

Academic Year: **2018/2019**

Program Contents

Course Unit SOIL MECHANICS

Specialization (s) GEOTECHNICS AND FOUNDATIONS

Subject type **Research Area** Civil Engineering

Year 2nd **Semester** 2nd **ECTS** 5.0

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures		
Theoretical-Practical Lectures	3.0	42
Practical-Laboratory Lectures	0.5	7
Tutorial Orientation	0.5	7
Project		

Unaccompanied Working Hours

Activity Type	Total Hours
Study	54
Works / Group Works	14
Project	
Evaluation	5
Additional	

Total of Working Hours

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures			
Theoretical-Practical Lectures	Luis Araújo Santos	PhD	Prof. Adjunto
Practical-Laboratory Lectures	Luis Araújo Santos	PhD	Prof. Adjunto
Tutorial Orientation	Luis Araújo Santos	PhD	Prof. Adjunto
Project			

Responsible(s) Lecturer (s) Luis Araújo Santos

Goals

At the end of this course it is expected that the student will be able to:

- know the concepts related to the soil's characteristics, its strength and its compressibility;

- calculate soil stresses before and after construction and to calculate settlements due to consolidation;

- use suitable design shear strength parameters;

- contact with common soil tests: permeability, compressibility and shear strength.

Skills

Generic:

- Ability for both acquisition and application of knowledge and solving problems.

- Ability for individual work and for working in groups.

- To know basic and mechanical characteristics of soils and appropriate tests to characterize them.

- To develop critical thinking related to the appropriate soils in civil engineering works

Specific:

To know theoretical and practical concepts of Engineering Geology, Soil Mechanics and Rocks Mechanics and to apply them in solving problems of structures and geotechnical works.

Program Contents

1. Soil water

   Pore water pressure. Bernoulli's theorem applied to pore water pressure. Permeability. Darcy's law. Coefficient of permeability (k). Determination of k.

2. In situ stresses due to the self-weight of soil

   Principle of effective stress. Total normal stress (□), effective normal stress (□') and pore water pressure (u). Coefficient of earth at rest (k_0). In situ stresses due to surface loads. Boussinesq´s theory. Bulb of pressure.

3. Compressibility and consolidation.

   The oedometer test. Consolitation settlement. Terzaghi´s theory of one-dimensional consolidation. Vertical drains.

4. Shear strength.

   The Mohr-Coulomb failure criterion and the Tresca failure criterion. Shear strength tests: the direct shear test, the triaxial test and the Vane shear test. Shear strength of sands and saturated clays. Pore pressure coefficients

Laboratory topics

1. Execution of permeability tests.
2. Execution of an oedometer test and calculation of all the consolidation parameters.
3. Execution of a direct shear box test and calculation of the shear strength parameters. Explanation of how to run triaxial tests.

Bibliography

- Cruz, Filomena. (2012). Apontamentos de Mecânica dos Solos. ISEC. Coimbra.

- Fernandes, M. M (2006). Mecânica dos Solos - vol 1. Ed. FEUP. Porto.

- Das, B. M. (2006). Principles of Geotechnical Engineering. 6ª edição, Ed Cengage Learning. USA.

- Craig, R. F. (1977). Soil Mechanics. 6ª edição, Ed. VNR International. London.

Access Conditions and Attendance Excuse

All the students are admitted to final examination. No intermediate tests in English are planned.

All the students must attend laboratory classes.

Conditions for Exam Admission

Only students who have attended Laboratory classes will be admitted to the examination.

Students admitted to the first call exam will have to make their previous registration in Moodle, until two working days before the date of the final exam.

At the beginning of the examination, they should present a identification document.

No mobile phones are allowed during evaluations.

Evaluation Method

Laboratory classes (20% of the final mark):

On individual test reports on permeability test.

Two reports in groups of two or three students on oedometer test and direct shear box test.

Exam (80% of the final mark):

Written exam in English at the end of the term (two examination periods) with theoretical questions (8 points with a minimum of 3) and practical exercises (12 points with a minimum of 5).
Students are approved if Laboratory mark ≥ 9.5 and Exam mark ≥ 9.5.

Conditions for Results Improvement

Regarding the improvement of the classification of the theoretical-practical part of the exam, it obeys the legal existing legislation and rules.

Date	Signature from the lecturer responsible for the course
2019/01/11	

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Lecturer's signature:_____

Licenciatura – BsC – Engenharia Civil

Licenciatura – BsC - Civil Engineering

Academic Year: **2018/2019**

Program Contents

Course Unit HOUSING II

Specialization (s)

Subject type **Research Area**

Year 2.º **Semester** 2.º **ECTS** 5

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures		
Theoretical-Practical Lectures	3.5	49
Practical-Laboratory Lectures		
Tutorial Orientation	0.5	7
Project		

Unaccompanied Working Hours

Activity Type	Total Hours
Study	43
Works / Group Works	28
Project	
Evaluation	3
Additional	

Total of Working Hours 130

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures			
Theoretical-Practical Lectures	Rui Ferreira	MSc	Adjunct Professor
Practical-Laboratory Lectures			
Tutorial Orientation	Rui Ferreira	MSc	Adjunct Professor
Project			

Responsible(s) Lecturer (s) Rui Ferreira

Goals
Transmit the knowledge on the main components of the buildings and its construction processes.

Skills
Selecting abilities and constructive solutions that assure efficient buildings energy, presenting good conditions acoustics, of illumination, natural ventilation and waterproofing. Regulations and the national norms.
Executing buildings nets projects.

Program Contents

1. Water distribution nets of buildings
2. Domestic residual water draining nets of buildings
3. Formworks
4. Lintels
5. Construction technology

Lecturer's signature:_____

Bibliography

Ferreira, Rui, "Sebenta da disciplina", ISEC.
- Pedroso, Vítor M. R., "Manual dos sistemas prediais de distribuição e drenagem de águas", LNEC
- Regulamento geral dos sistemas públicos e prediais de distribuição de águas e de drenagem de águas residuais (RGSPPDADAR)
- Manual de alvenaria do tijolo, CTCV
- Alves, Sérgio; Sousa, Hipólito, "Paredes exteriores de edifícios em pano simples", Lidel
- Manual de aplicação de telhas cerâmicas, CTCV
- Paredes de edifícios, LNEC

Access Conditions and Attendance Excuse

Conditions for Exam Admission

All students have access to exam.

Evaluation Method

Housing II UC can be performed by tests to be carried out during the semester or by final written examination.

Conditions for Results Improvement

Date	**Signature from the lecturer responsible for the course**
11/01/2019	

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher:_____

Licenciatura – BsC Engenharia Civil

Licenciatura – BsC civil Engineering

Academic Year: **2017/2018**

Program Contents

Course Unit QUALITY, HYGIENE AND SAFETY

Specialization (s)

Subject type Specialty Sciences **Research Area** Civil Engineering

Year 2º **Semester** 1º **ECTS** 5

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures		
Theoretical-Practical Lectures	3.5	52.5
Practical-Laboratoty Lectures		
Tutorial Orientation	0.5	7.5
Project		

Unaccompanied Working Hours

Activity Type	Total Hours
Study	10
Works / Group Works	20
Project	
Evaluation	2
Additional	

Total of Working Hours

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures			
Theoretical-Practical Lectures	Eduardo Natividade	PhD	Professor
Practical-Laboratoty Lectures			
Tutorial Orientation	Eduardo Natividade	PhD	Professor
Project			

Responsible(s) Lecturer (s)

Eduardo Natividade

Goals

The main aim of the course is sensitize students to the aspects related to quality in construction and implementation of a Quality Management System in Construction. Acquiring skills in relation to the Construction Safety, including knowledge of applicable law, the proper identification and use of protective equipment, the preparation of Safety and Health Plans.

Skills

Program Contents

QUALITY CONSTRUCTION

a. Introduction to quality in construction
b. ISO 9000
c. Implementation of quality management systems
d. Costs of non-quality
e. Quality Tools

2. HEALTH AND SAFETY AT WORK

a. Introduction to health and safety in construction
b. Personal and collective protective equipment

Signature of Teacher:_____

Bibliography

Bibliography in English selected by the teacher

Access Conditions and Attendance Excuse

Any student who is enrolled in the course will be admitted to the examination and have performed the group work.

Students admitted to the exam must register in D.E.C. up to two days before the date thereof.
At the beginning of the exams, students must present a photo ID.
It is forbidden to manipulate and use mobile phones during the test.

Conditions for Exam Admission

Any student who is enrolled in the course will be admitted to the examination and have performed the group work.

Students admitted to the exam must register in D.E.C. up to two days before the date thereof.
At the beginning of the exams, students must present a photo ID.
It is forbidden to manipulate and use mobile phones during the test.

Evaluation Method

Continuous assessment (compulsory to obtain attendance to the discipline)
Group Work - Rated for 15 values
Final Exam or Test: Quoted for 5 values

Conditions for Results Improvement

Only the classifications relating to the tests or examinations may be improved.

Date

14/Set/2018

Signature from the lecturer responsible for the course