Instituto Superior de Engenharia
Politécnico de Coimbra

Polytechnic Institute of Coimbra (P COIMBRA 02)
Coimbra Institute of Engineering - ISEC
Chemical and Biological Engineering Department

ECTS CATALOGUE

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

The Course Engineering and Industrial Management mainly in Portuguese Language.

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
Chemical and Biological Engineering Department

ECTS CATALOGUE

BACHELOR Industrial Engineering and Management

Old Code	New Code	Title - Portuguese	Title - English	ECTS	Duration
	1.º ano / 1st Year				
910432	60021400	Tecnologias de Informação e programação	Programming and Information Technologies	6	Fall
910402	60021085	Química	Chemistry	6	Fall
910401	60021079	Matemática I	Mathematic I	6	Fall
910431	60021399	Física I	Physics I	6	Fall
910405	60021114	Economia para Engenharia	Engineering Economy	6	Fall
910410	60021169	Introdução à Gestão	Introduction to Management	6	Spring
910406	60021120	Matemática II	Mathematics II	6	Spring
910407	60021131	Mecânica Aplicada	Applied Mechanics	6	Spring
910412	60021197	Termodinâmica	Thermodynamics	6	Spring
910414	60021224	Desenho Assistido por Computador	Computer Aided Design	6	Spring
	2.º ano / 2nd Year				
910411	60021186	Introdução aos Processos	Introduction to Chemical Processes	6	Fall
910420	60021287	Investigação Operacional	Operations Research	6	Fall
910435	60021433	Sistemas de Informação	Information System	6	Fall
910433	60021411	Métodos Estatísticos	Statistic Methods	6	Fall
910434	61000983	Electrotecnia e Eletrónica	Electronics and Electronics	6	Fall
910439	61000994	Sistemas Elétricos Industriais	Industrial Electrical Systems	6	Spring
910417	60021259	Gestão de Operações I	Operation Management I	6	Spring
910437	60021456	Métodos Númericos	Numerical Methods	6	Spring
910438	60021467	Mecânica de Fluidos e Transferência de Calor	Fluid Mechanics and Heat Transfer	6	Spring
910440	60021489	Introdução às tecnologias de Fabrico	Introduction to Manufacture Technologies	6	Spring
	3.º ano / 3rd Year				
910424	60021323	Gestão da Qualidade	Quality Management	6	Fall
910425	60021334	Automação e Instrumentação	Automation and Instrumentation	6	Fall
910423	60021312	Gestão de Operações II	Operation Management II	6	Fall
910428	60021366	Manutenção Industrial	Industrial Maintenance	6	Fall
910441	60021495	Contabilidade de Gestão	Management Accounting	6	Fall
910422	60021301	Instalações e Serviços Industriais	Industrial Utilities and Equipment	6	Spring
910436	60021444	Gestão de Recursos Humanos	Human Resources Management	6	Spring
910429	60021377	Estratégia e Marketing	Strategy and Marketing	6	Spring
910442	60021508	Projecto/Estágio*	Project/Internship*	12	Spring

*This subject needs previous acceptance during application deadlines. A ISEC teacher supervisor must be indicated.

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Signature of Teacher: _____

Licenciatura – BsC *Engenharia e Gestão Industrial* (Português)

Licenciatura – BsC *Management and Industrial Engineering* (Inglês)

Academic Year: **2018/2019**

Program Contents

Course Unit FLUIDS MECHANICS AND HEAT TRANSFER

Specialization (s) MANAGEMENT AND INDUSTRIAL ENGINEERING

Subject type Compulsory **Research Area** Chemical Engineering

Year 2 **Semester** 2 **ECTS** 6.0

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		156

Unaccompanied Working Hours

Activity Type	Total Hours
Study	97
Works / Group Works	
Project	
Evaluation	3
Additional	

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	Belmiro Duarte	PhD.	Adjunct Prof.
Theoretical-Practical Lectures	Belmiro Duarte	PhD.	Adjunct Prof.
Practical-Laboratoty Lectures			
Tutorial Orientation			
Project			

Responsible(s) Lecturer (s) Belmiro Duarte

Goals

The objectives of the course unit are:

- understanding basic principles and concepts of fluid mechanics, such as viscosity, pressure, the principle of mass conservation, principle of energy conservation and viscous dissipation;
- application of the basic principles to the derivation of the equations that model the behavior of moving fluids, namely the Bernoulli equation;
- understanding fluid flow through pipes and distinguishing between laminar and turbulent regimes;
- calculation of load losses in a pipeline and associated accidents;
- physical and mathematical understanding of heat transfer mechanisms;
- prediction of heat transfer coefficients for forced and natural convection regimes.

Skills

This curricular unit intends to develop some generic and specific competences, among which are:

- developing personal skills that enable lifelong learning;
- to develop knowledge and understanding in the fields of engineering sciences;
- provide students with the ability to apply the knowledge acquired in solving specific problems, supported by their own arguments.

Signature of Teacher:_____

Program Contents

1. INTRODUCTION TO FLUID MECHANICS

What is a fluid? Properties of a fluid. The viscosity. Non-Newtonian fluids: the apparent viscosity.

2. FLUID STATIC

Variation of pressure within a fluid: - how does the pressure change at a point of the fluid?; - How does the pressure of the fluid vary from point to point? Transmission of pressure exerted on a fluid. Pressure measurement: piezometric tube, U-tube manometer and inclined tube manometer. The barometer. The push force.

3. BASIC PRINCIPLES OF THE FLUID MOVEMENT

Description of the drainage pattern. Steady state equation of mass conservation (or "continuity"). Acceleration of a fluid particle. The Bernoulli equation (application of the principle of conservation of linear momentum to a system with steady flow). Simple applications of the Bernoulli equation: Pitot tube, Venturi meter, orifice meter, tank discharge.

4. FLUID FLOW CHARACTERIZATION

Laminar and turbulent flow. Laminar flow in tubes. Turbulent flow in tubes. Calculation of pressure drops in pipes and other accidents. The Moody Diagram. Piping systems with pumps and turbines.

5. INTRODUCTION TO HEAT TRANSFER

Thermodynamics and heat transfer. The mechanisms of heat transfer. Conduction: The first of Fourier's law. Convection: The law of convection (Newton's law). Radiation. Heat transfer regimes. Permanent or stationary regime. Transitional or non-stationary regime.

6. UNIDIMENSIONAL CONDUCTION IN PERMANENT REGIME

Thermal conductivity. Conduction through flat plates. Notion of thermal resistance. Insulation materials: The R-value of insulation. Association of thermal resistances: Composite structures. Thermal resistance of contact between two surfaces. Generalization of the concept of association of thermal resistances. Radial conduction on a hollow cylinder. Radial conduction in hollow sphere. Juxtaposed cylindrical shells.

7. CORRELATIONS TO DETERMINE THE HEAT TRANSFER COEFFICIENT

Forced Convection: Correlations for external flows (around objects); Correlations for internal flows. Natural convection: Correlations for natural convection on surfaces; Correlations for natural convection inside closed surfaces.

Bibliography

1. Bruce R. Munson, Donald F. Young E Theodore H. Okiishi, Fundamentals of Fluid Mechanics, John Wiley & Sons, 5ª edição, 2006.
2. Yunus A. Çengel E John M. Cimbala, Fluid Mechanics: Fundamentals and Applications, McGraw-Hill Companies, Inc., 2006 (existe tradução em brasileiro na biblioteca)
3. B. S. Massey, Mecânica dos Fluidos, Fundação Calouste Gulbenkian, 2002 (tradução de J. R. Guedes de Carvalho do original inglês intitulado Mechanics of Fluids, 6ª edição)
4. Clayton T. Crowe, Donald F. Elger E John A. Roberson, Engineering Fluid Mechanics, John Wiley & Sons, 8ª edição, 2005
5. Yunus A. Çengel, Heat Transfer – A Practical Approach, 2ª edição, McGraw-Hill, 2003
6. Franck P. Incropera, David P. DeWitt, Theodore L. Bergman e Adrienne S. Lavine, Fundamentals of Heat and Mass Transfer, John Wiley & Sons, 6ª edição, 2007
7. James R. Welty, Charles E. Wicks, Robert E. Wilson e Gregory L. Rorrer, Fundamentals of Momentum, Heat and Mass Transfer, John Wiley & Sons, 5ª edição, 2008
8. J. P. Holman, Heat Transfer, McGraw-Hill, 9ª edição, 2002

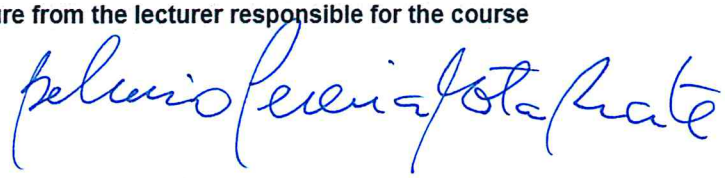
Signature of Teacher: 

Access Conditions and Attendance Excuse
Not applicable.

Conditions for Exam Admission
Those set by the Regulation of Assessment of Knowledge and Transition of Year.

Evaluation Method
Assessment by final exam. In all the calls of regular assessment (normal, resource, special), or other officially decreteed by the ISEC presidency, the final exam will consist of a written test. In all other cases (for example, examinations for special regime students that have special status), the individual assessment test may be an oral test, in which students are required to answer questions posed by a jury composed of three teachers.

Conditions for Results Improvement
Set by the Regulation ofAssessment of Knowledge and Transition of Year.

Date	**Signature from the lecturer responsible for the course**
17.01.2019	

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Signature of Teacher:

Licenciatura – BsC *Engenharia e Gestão Industrial* (Português)

Licenciatura – BsC *Engineering and Industrial Management* (Inglês)

Academic Year: **2018/2019**

Program Contents

Course Unit NUMERICAL METHODS

Specialization (s)

Subject type **Research Area** Mathematics

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

Working Hours

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

Unaccompanied Working Hours

Activity Type	Total Hours
Study	90
Works / Group Works	7
Project	
Evaluation	3
Additional	

Total of Working Hours 156

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	Pascoal Martins da silva	Ph-D	Adj. Prof.
Theoretical-Practical Lectures			
Practical-Laboratoty Lectures	Pascoal Martins da Silva	Ph-D	Adj. Prof.
Tutorial Orientation			
Project			

Responsible(s) Lecturer (s) Pascoal Martins da Silva

Goals

Provide the student with tools enabling him to gather one or more approximate solutions of problems whose resolution cannot be obtain using exact analytical form.
Generic skills: application of knowledge and understanding; Realization of judgment and decision making; Communication; Self-learning Mode.

Skills

Ability to use mathematical techniques.
Develop the capacity of concept's perception, abstract reasoning, interpretation of results and their application to problem solving.
Understanding the details of the algorithms studied for the resolution of specific problems in the field of Engineering.
Use the MATLAB software in the numerical treatment of the subjects and compare, with criticism, the results obtained by computational means with the ones obtained analytically.

Program Contents

1. Brief introduction to the theory of errors.
2. Nonlinear Equations: Introduction and motivation. 2.1 Roots of Nonlinear Equations Location of roots: Bisection and

Signature of Teacher:

Newton methods, Stopping criteria, Computational aspects. 2.2 Minimization Fucntions: Gradient Method.
3. Polynomial interpolation: Introduction and motivation. Interpolador polynomial Lagrangian. The polynomial Newton interpolador (divided differences and finite). Polynomial interpolation inverse. Study of interpolation error.
4. Numerical integration: Introduction and motivation. Newton's rules: rules of trapezes and Cotes of Simpson (simple and compound). Study of the integration error. Computational aspects.
5. Numerical integration of Initial value problems of first order: Introduction and motivation. Euler's method and Runge–Kutta methods of second and fourth order. Study of error. Computational aspects.
6. Methods of solving linear systems: iterative Methods of Jacobi and Gauss-Seidel.

Programming of algorithms studied using Matlab.

Bibliography

- Atkinson, K. E., An Introduction to Numerical Analysis, John Wiley.
- Chapra, S. C. e Canale, R.P., Numerical Methods for Engineers, McGraw-Hill.
- Conte, S. D. e De Boor, C., Elementary Numerical Analysis, McGraw-Hill.
- Faires, J. D. e Burden, R., Numerical Methods (2nd Ed.),Brooks / Cole Publishing Company.
- Valença, M. R., Métodos Numéricos, Instituto Nacional de Investigação Científica.
- Batel Anjo, A. J., Fernandes, R. e Carvalho, A. S., Curso de MatLab, Principia
- J. A. Rodrigues, Métodos Numéricos, Introdução, Aplicação e Programação, Edições Sílado, 1ª edição, 2003.

Access Conditions and Attendance Excuse

Not applicable

Conditions for Exam Admission

All students duly enrolled in the course.

Evaluation Method

Students at the beginning of the semester have to opt for a final written exam, quoted for 20 values, or by the following distributed assessment methodology:
A. Test 1 with 8 values (April, 17 at 16h30);
B. Test 2 with 12 values, with a group of 4 values about computational implementation of the algorithms studied throughout the semester using Matlab.
The final grade will be the A + B grade. Only students with a minimum of 80% attendance in classes can choose to be distributed evaluation.
The student is approved in the discipline if he has a minimum final classification of 10 values in any of the modalities.
Students who score above 17 in any of the evaluation periods may be required to take a grade defense. At the time of appeal, the student may choose to dispense with the distributed assessment component, in which case he will take a 20-point exam.
The special time exam is a written exam for 20 marks.

Conditions for Results Improvement

The conditions for improvement of classification are defined in the REACTA (regulation of frequency, evaluation of knowledge and transition of year).

Date	**Signature from the lecturer responsible for the course**
27/03/2019	

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Signature of Teacher:

Licenciatura – BsC Engenharia e Gestão Industrial (Português)

Licenciatura–BsC Engineering and Industrial Management (Inglês)

Academic Year:2018/2019

Program Contents

Course Unit OPERATION MANAGEMENT I

Specialization (s)

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

Year 2nd **Semester** 2nd **ECTS** 6

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		156

Unaccompanied Working Hours

Activity Type	Total Hours
Study	93
Works / Group Works	
Project	
Evaluation	7
Additional	

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	David José Rocha Domingues	MSc	Adj. Professor
Theoretical-Practical Lectures	David José Rocha Domingues	MSc	Adj. Professor
Practical-Laboratoty Lectures			
Tutorial Orientation			
Project			

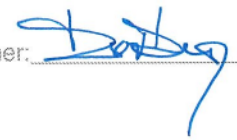
Responsible(s) Lecturer (s) David José Rocha Domingues

Goals

This curricular unit aims to provide students with concepts of production/ operations management and tools methodologies for forecasting and decision theories.

Skills

As an outcome of this unit, the students must identify the functions and strategies of production management, as well as the different typologies of production lines, their balancing and their restrictions. They should formulate and solve decision problems by applying appropriate methodologies. They should formulate and solve resource allocation problems, looking for optimization. They should choose and apply appropriate methodologies for forecasting.
Generally, the aim is to develop problem-solving skills by applying the knowledge acquired.

Signature of Teacher: 

Program Contents

1. Operations Management: Conceptual Areas, Functions and Production Strategies.
2.Tipologies of production systems (Layouts): Concepts; Flowcharts; Line balancing; Theory of constraints.
3. Decision-making: Decision environments (Certainty, Uncertainty, Risk); Decision criteria in Uncertainty environment); Decision in Risk environment; Decision Trees; Multicriteria decision and "Analytic Hierarchy Process" method.
4. Allocation of resources: Formulation and modeling of management problems of operations with Linear, Integer and Binary Programming; Formulation of non-linear operations management problems; Resolution by MsExcel-Solver and analysis of results.
5. Forecasting: Stages, Horizon and Forecasting Methods; Causal models; Time Series (Simple Moving Average, Simple Exponential Smoothing, Series with Trend - Holt Method and Holt-Winters).

Bibliography

ROLDÃO, V.S. , RIBEIRO, J.S.; Gestão das Operações-Uma abordagem Integrada; Ed. Monitor, 2007
LISBOA,J. V., GOMES,C.F. Gestão de Operações; Vida Económica; 2ªEd, 2008
GOLDRATT, Eliyahu M., The Goal : A Process of Ongoing Improvement, Gower Publishing
CAIADO, J.; Métodos de Previsão em Gestão com Aplicações em Excel; Ed Sílabo,2011
KRAJEWSKI, L.J., RITZMAN, L.P., Operations Management ,Addison-Wesley Publishing Company Inc, 1996 RENDER, B., STAIR, R.M., Quantitative Analysis for Management ,Allyn an Bacon Inc, 1998
PINTO, J.P., Gestão de Operações na Indústria e nos Serviços, 3ªed, Lidel, 2010
CHASE, R.B., AQUILANO, N., Production and Operations Management, Irwin, 1989
STEVENSON, W.J., Production / Operations Management, Irwin-McGraw-Hill
HILLIER,F.,S.,LIEBERMAN, G.J., Introduction to Operations Research, McGraw-Hill

Access Conditions and Attendance Excuse
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Conditions for Exam Admission
All students regularly enrolled in the course.

Evaluation Method

There are two modes of evaluation: discrete and by exam.
Discrete Assessment: two equally weighted tests (predictably at 12/4/2019 and 31/05/2019)
Exam evaluation: Final exam
The tests and exams are constituted by two parts: one without consultation and another with consultation.

Conditions for Results Improvement
By exam, acc rules.

Date

Jan 15th, 2019

Signature from the lecturer responsible for the course

Instituto Superior de Engenharia de Coimbra
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Signature of Teacher: _____

Licenciatura – BsC Engenharia e Gestão Industrial (Português)

Licenciatura – BsC Industrial Engineering (Inglês)

Academic Year: 2017 / 2018

Program Contents

Course Unit INFORMATION SYSTEMS

Sistemas de Informação

Specialization (s)

Subject type **Research Area** computer science

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

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures	2	28
Theoretical-Practical Lectures		
Practical-Laboratoty Lectures		
Tutorial Orientation	2	28
Project		
Total of Working Hours		156

Unaccompanied Working Hours

Activity Type	Total Hours
Study	60
Works / Group Works	47,5
Project	
Evaluation	
Additional	2,5

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	Paulo Mariano	Master	Assistent
Theoretical-Practical Lectures			
Practical-Laboratoty Lectures			
Tutorial Orientation	Jorge Alexandre Almeida	Master	Assistant teacher
Project			

Responsible(s) Lecturer (s) Paulo Mariano

Goals

Develop the ability to analyze, plan and monitor the development of information systems in organizations.
At the end of the training cycle, students should acquire knowledge related to the basic concepts of information systems, their constitution and types, in order to understand and support issues related to decision making, empowerment, reengineering and innovation.
It is also intended that they obtain the skills to plan and follow the different alternatives for the construction of an information system.
It also aims to develop the capacity to proceed with the initial specification of an information system, to design its entity-relationship model, the corresponding physical model and the support database.

Skills

Knowledge and Understanding
A 1. Identify the fundamental concepts and definitions of information systems;
A.2. Identify and measure the impacts of introducing information systems in organizations;
A.3. Identify the means and methodologies inherent in the development of information systems;
A.4. Identify the underlying concepts of relational databases;
A.5. Know how to interrogate a relational database using SQL;
A.6. Construct a normalized model of relational databases;
A.7. Build a basic server client application.

Application of Knowledge
B.1. To study the different applications of information systems;
B.2. To prepare a notebook of initial requirements of an information system;
B.3. Design relational databases;
B.4. Define the conceptual and physical model of a normalized relational database.
B.5. Use elementary SQL commands to construct queries;
B.6. Develop basic client server applications.

Grounded Decisions
C.1. Justify proposed solutions at the level of design of a database;
C.2. Justify the proposed solutions at the level of the database design;
C3. Justify decisions on different solutions of technological and computer applications for a scenario.

Related searches
D.1. Evaluate application portfolios and database models, demonstrating a critical attitude.

Communication
E.1. Prepare appropriate documentation for the specification and analysis of relational databases;
E.2. Presenting possible technological solutions for a given business context;
E.3. Explain the projects developed in a clear way.

Self-Learning Skills
F.1. To develop complex projects in an autonomous way and apply concepts beyond those learned in class.

Program Contents

Theoretical component

1. Introduction to Information Systems
1.1. History
1.2. Concepts
1.3. ICTs as key elements in an organization
1.4. What we have to consider in an SI
1.5. The parts of an SI
2. ICT in organizations
2.1. Decision and information
2.2. ICTs in the current business models

2.3. ICTs as socio-technical systems
2.4. Reengineering
2.5. Production management
3. How to implement an information system
3.1. Business Processes
3.2. Alternatives for developing information systems
3.3. Collaboration and teamwork systems
4. Information systems, organizations and strategy
4.1. Information systems and their relationship with organizational strategy;
4.2. The model of Porter's 5 competitive forces;
4.3. The role of information systems in obtaining competitive advantages.
5. Corporate information systems
5.1. ERP -Enterprise Resource Planning
5.2. SCM - Supply chain Management.
5.3. CRM - Costumer Realtionship Management

Tutorial Component Tutorial

1. Introduction to Modeling Relational Databases
1.1. Relational Model
1.2. Entity-Relationship Model
1.3. Candidate keys
1.4. Primary keys
1.5. Foreign Keys
1.6. Standardization rules
2. The SQL Language
2.1. SQL Basics
2.2. Junction
2.3. SQL Functions
2.4. Sorting and Grouping
2.5. Subqueries
2.6. Table Management
2.7. Integrity Restrictions
2.8. Data Manipulation

Bibliography

[1] Kenneth C. Laudon and Jane P. Laudon, "Management Information Systems: Managing the Digital Firm (13th Edition)", Prentice Hall, 2013, ISBN: 978-0132574792

[2] Luís Amaral e João Varajão, "Planeamento De Sistemas De Informação", FCA-Editora, 2007, ISBN: 978-972-722-579-8

[3] Chris Date, "An Introduction to Database Systems", Pearson/Addison-Wesley, 2004, ISBN: 0-321-18956-6 (1A-5-120 (ISEC) – 12657)

[4] Ramez Elmasri and Shamkant B. Navathe, "Fundamentals of database systems", Pearson/Addison Wesley, 2004, ISBN: 0-321-20448-4, (1A-5-119 (ISEC) – 12656)

[5] Luís Manuel Dias Damas, "SQL - Structured Query Language - 6ª Edição Actualizada e Aumentada", ISBN: 972-722-443-1

[6] http://moodle.isec.pt/ - Informação e material da disciplina

Signature of Teacher:_____

Access Conditions and Attendance Excuse

Don't Apply

Conditions for Exam Admission

In order to obtain attendance at the course (and can go to the exam), the students can not have a number of absences superior to 1/3 of the classes . Students must achieve the minimum required for the practical work and theoretical research component of the curricular unit

Evaluation Method

The evaluation of the curricular unit is divided as follows:
1) Theoretical: 10 Values
a) Research work - 2 values (group work); minimum of 30%.
b) Final exam - 8 points.
2) Practice: 10 Values
a) Initial specification and the entity-relationship model (ER) of the chosen organization - 3 values;
b) Mini-test (no query) of SQL. - 3 values;
c) Final practical work - 4 values;
d) The component of item a) and item c) together have a minimum of 50%;
e) The work must be carried out in continuous evaluation.

Conditions for Results Improvement

Only the classifications obtained in the components of examination and theoretical-practical test can be improved at the time of appeal or in another regulated period for the purpose.
The improvement of the marks obtained in the exams and in the theoretical-practical test can be obtained only by accomplishment of new written test in the time of appeal or in another time regulated for the effect.

Date

25/09/2017

Signature from the lecturer responsible for the course

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher: _____

Licenciatura – BsC Engenharia e Gestão Industrial

Licenciatura – BsC Engineering and Industrial Management

Academic Year: **2018/2019**

Program Contents

Course Unit CIRCUIT ANALYSIS AND ELECTRICAL MACHINES

Specialization (s)

Subject type **Research Area** Electrical Engineering

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

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		156

Unaccompanied Working Hours

Activity Type	Total Hours
Study	96
Works / Group Works	
Project	
Evaluation	4
Additional	

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	Carlos Jorge Coelho Teixeira	MSc	Assistant
Theoretical-Practical Lectures	Carlos Jorge Coelho Teixeira	MSc	Assistant
Practical-Laboratoty Lectures			
Tutorial Orientation			
Project			

Responsible(s) Lecturer (s) Carlos Jorge Coelho Teixeira

Goals

Basics on circuit analysis and electrical machines, both in DC and mono/three-phase AC, including resonance effects.
Main electrical machines characteristics: equivalent circuits and applications.

Skills

Voltage/current interpretation.
Direct current with constant or variable magnitude;
Mono and three-phase AC current/voltage systems.
Electric circuits components and the respective voltage/current relations.
Ability to properly use measuring devices
Solving electrical circuits of medium complexity using mathematical tools.
Electrical machines characteristics.
Importance of power transformers in electrical networks.
Voltage drop evaluation and reactive power compensation for voltage regulation purposes.
Induction machines in industry.
Starting currents.

Signature of Teacher:_____

Program Contents

1. DC circuit analysis
1.1 Fundamentals
1.2 Sources
1.3 Fundamental laws: Ohm's law, Kirchhoff's law
1.4 Theorems
1.5 Methodologies for circuit analysis
2. Alternating Circuits
2.1 Sinusoidal signals
2.2 Steinmetz transformation´
2.3 Solving AC circuits using steady-state analysis
2.4 Extending DC analysis techniques to AC
2.5 Active and reactive power
2.6 Extending mono to three-phase circuit analysis
3. Power transformers
3.1 Parts
3.2 Principles
3.3 Nominal quantities
3.4 Equivalent circuits
3,5 Losses and power efficiency.
3.6Testing.
3.7 Voltage regulation.
4. Rotating machines
4.1 Main machine types
4.2 Operating principles of DC and AC machines
4.3 Induction generators
4.3.1 Working principles
4.3.2 Equivalent circuits
4.3.3 Torque, power, losses and efficiency
4.3.4 Starting currents
4.3.5 Protections
4.4 Selecting motors.

Bibliography

BESSONOV, L. "Electricidade Aplicada para Engenheiros"
BRANDÃO, DIOGO PAIVA L. "Electrotecnia Geral "
COELHO, Carlos "Eletrotecnia e Máquinas Elétricas" - texto de apoio, v1.0, Março 2011.
DESOER, CHARLES A. "Teoria Básica de Circuitos"
EDMINISTER, J. A. "Teoria e problemas de Circuitos Eléctricos"
FISH, S. & POTTER, J. "Theory of Electric Circuits"
GURU, B. A. & HIZIROGLU "Electric Machinery and Transformers"
KOSOW, I. I. "Máquinas Eléctricas e Transformadores"
MATIAS, J. "Tecnologias de Electricidade"
MEIRELES, VITOR CANCELA. "Circuitos Eléctricos"
SANTOS, JAIME B. "Análise de Circuitos Eléctricos "
SEN, P. C." Principles of Electric Machines and Power Electronics"
VILLATE, JAIME E. "Electromagnetismo "

Access Conditions and Attendance Excuse
No particular rules apply. Students attending to 2/3 of the contact hours can use partial evaluation components in the final grade.

Conditions for Exam Admission

Only general rules apply.

Evaluation Method

Final exam, graded to 100%; optionally, students can use intermediate evaluation components (up to 50% of the final grade), performing the final exam only for the remaining 50% of the subjects under evaluation.

Conditions for Results Improvement
General rules apply.

Date
12/9/2018

Signature from the lecturer responsible for the course

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher: _____

Licenciatura – BsC Engenharia e Gestão Industrial

Licenciatura – BsC in Industrial Management and Engineering

Academic Year: **2018/2019**

Program Contents

Course Unit STATISTICAL METHODS

Specialization (s)

Subject type General and Scientific **Research Area** Mathematics

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

Working Hours

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

Unaccompanied Working Hours

Activity Type	Total Hours
Study	92
Works / Group Works	4
Project	
Evaluation	4
Additional	

Total of Working Hours 156

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	Nuno Filipe Jorge Lavado	PhD	Prof. Adjunto
Theoretical-Practical Lectures			
Practical-Laboratoty Lectures	Nuno Filipe Jorge Lavado	PhD	Prof. Adjunto
Tutorial Orientation			
Project			

Responsible(s) Lecturer (s) Nuno Filipe Jorge Lavado

Goals
Understanding the basic concepts in Statistics and Probability and the reasoning and calculus techniques that enable its application to practical problems. Explore and self-learn data analysis tools for computational statistics.

Skills
Understanding the language of Statistics and Probability and the rules inherent to them. Know how to code using the programming language R and report results of data analysis.

Program Contents

0. Descriptive Statistics review.

1. Probability
Random experiments. Probability of an event. Probability Rules. Conditional Probability and independent events. Total probability theorem. Bayes' theorem.

2. Discrete Random Variables
Random variable definition. Discrete vs continuous variables. Probability and distribution functions. Expected Values and Standard Deviations. Some special probability distributions: binomial and Poisson. Pairs of discrete random variables: joint probability and distribution functions, marginal and conditional probabilities. Covariance and correlation.

3. Continuous Random Variables
Continuous random variables. Probability and distribution functions. Expected Values and Standard Deviations. Some special probability distributions: uniform, exponential and Normal. Central Limit Theorem.

Signature of Teacher: _____

4. Sampling. Sampling distribution. Estimation
Introduction to statistical inference. Random sampling. Point estimation and confidence intervals. Application to estimation of proportion, mean and variance. Confidence interval about the difference of two population means.

5. Testing Parametric hypotheses
Introduction to testing hypotheses framework and its methodology. Test hypotheses about: proportions, mean, variance and difference of means.

6. Data Analysis software
Brief introduction to the statistical computing language R.

Bibliography

- Notes from the theoretical lectures.
- R Core Team (2018)- An Introduction to R – Notes on R: A Programming Environment for Data Analysis and Graphics, https://cran.r-project.org/doc/manuals/r-release/R-intro.pdf, Version 3.5.1, 02/07/2018
- Pedrosa, A.C., Gama, S. M. A. – Introdução Computacional à Probabilidade e Estatística, Porto Editora
- Reis, E., Melo, P., Andrade, R. e Calapez, T. – Estatística Aplicada – Vols. 1 e 2, Edições Sílabo
- Reis, E., Melo, P., Andrade, R. e Calapez, T. – Exercícios de Estatística Aplicada – Vols. 1 e 2, Edições Sílabo
- Bowker and Lieberman - Engineering Statistics, Prentice Hall
- Murteira, Bento et all – Introdução à Estatística, Mc Graw-Hill
- Ross, Sheldon – Introduction to Probability and Statistics for Engineers and Scientists, Elsevier

Access Conditions and Attendance Excuse
Not applicable.

Conditions for Exam Admission
Exam admission is granted for all students register in this unit.

Evaluation Method
Distributed evaluation or assessment by Final Exam. In every evaluation moment the student may use the list of formulas provided by the department, one sheet with its own notes and a calculator.
Distributed evaluation consists in two tests, a practical work and in the active participation in classes. The first test will be made during the class on the November 14th and the second test in the same day as the first exam. Each test will last 1h30 and each will be quoted to 8 values. The practical work will be about data analysis using the language/software R, will last 1h30, being schedule for December 20th. The work will be quoted for 4 values. The active participation in classes will be evaluated with oral discussions during classes and written exercises to be delivered at the end of the class. The student may be called to participate in the oral discussion at any moment, being directly asked at least three times and four times to deliver exercises. This participation will have a maximum grade of 2 values. The student can obtain approval if the assessment in each of the tests is at least 4 values and the sum of the grades of the tests, the practical work and the active participation is equal to or greater than 9.5 values.
The assessment by Final exam consists in conducting an exam quoted for 20 values, obtaining approval if the sum of the final exam and the active participation (as defined in the previous paragraph) is equal to or greater than 9.5 values. The final exam will cover all program contents' chapters, in particular the skills with the language/software R.
In any of the methods of assessment, students with score greater than 17 values will have to be submitted to an additional evaluation. Otherwise, the grade will be 17.

Conditions for Results Improvement
See the "Regulamento de Avaliação de Conhecimentos e Transição de Ano dos Estudantes das Licenciaturas do ISEC".

Date 16/10/2018

Signature from the lecturer responsible for the course

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher: 

Licenciatura – BsC Engenharia e Gestão Industrial
Alunos de Programas Mobilidade (Português)

Licenciatura – BsC Engineering and Industrial Management
Mobility Program Students (Inglês)

Academic Year: **2018 / 2019**

Program Contents

Course Unit OPERATIONS RESEARCH

Specialization (s)

Subject type mandatory **Research Area** Informatics Engineering

Year 2nd **Semester** 1st **ECTS** 6

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures	2	28
Theoretical-Practical Lectures	2	28
Practical-Laboratory Lectures		
Tutorial Orientation		
Project		
Total of Working Hours		156

Unaccompanied Working Hours

Activity Type	Total Hours
Study	97,5
Works / Group Works	
Project	
Evaluation	2,5
Additional	

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	Ana Rosa Pereira Borges (arborges@isec.pt)	PhD	Coordinator Prof.
Theoretical-Practical Lectures	Ana Rosa Pereira Borges (arborges@isec.pt)	PhD	Coordinator Prof.
Theoretical-Practical Lectures	Teresa Raquel Corga Teixeira Rocha (teresa@isec.pt)	PhD	Assistant Prof.
Practical-Laboratory Lectures			
Tutorial Orientation			
Project			

Responsible(s) Lecturer (s) Ana Rosa Pereira Borges (arborges@isec.pt, office G01 - DEIS)

Goals

After attending this curricular unit, students must: know and understand the fundamental characteristics of the most representative optimization and decision problems; be able to translate simple optimization and decision problems into mathematical models of linear programming (LP); understand the LP algorithms and know to apply the appropriate ones to solve this kind of problems; be able to interpret the solutions obtained by the application of these algorithms to the mathematical models; and to analyse the sensitivity of this (these) solution(s) to variations in model's parameters.
The knowledge acquired in this course can be applied in solving similar algorithms/problems in a real context.

Skills

After attending this course, students must:
1 - Be able to translate simple optimization and decision problems into mathematical models of linear programming (LP);
2 - Understand the LP algorithms and know to apply the appropriate ones to solve this kind of problems;
3 - Be able to interpret the solutions obtained by the application of these algorithms to the mathematical models;
4 - Be able to analysis the sensitivity of the optimal solution(s) obtained due to variations in model's parameters.

Signature of Teacher:

Program Contents

Theoretical content:
1 – Introduction to Operations Research
2 – Linear Programming
3 – Introduction to Post-Optimization and Sensitivity Analysis
4 – Goal Programming
5 – Multi-Objective Linear Programming

Theoretical-Practical content:
- Resolution of theoretical-practical exercises involving the various chapters of the theoretical program *(exercises sheets available on Moodle)*.

Bibliography

Hillier, F.S. , Liberman, G.J.
"Introduction to Operations Research" – 9th Edition
McGraw-Hill, 2009
(Pdf version available online)

Hamdy A.Taha
"Operations Research: an introduction" – 8th Edition
Pearson Prentice Hall, 2007

Bazaraa M.S., Jarvis J.J. and Sherali H.D.
"Linear Programming and Network Flows" – 4th Edition
Wiley, 2010

Steuer, R., "Multiple Criteria Optimization: theory, computation and application", John Wiley & Sons, 1986.

Access Conditions and Attendance Excuse
Not applicable

Conditions for Exam Admission
Not applicable

Evaluation Method

Students can choose two different assessment methods:
a) Final Evaluation (20 points), covering all subjects
Or
b) Continuous Assessment, which consists of two (2) Evaluation Tests to be carried out during the semester (10 points + 10 points),for students with assistance in more than two thirds (2/3) of the classes that are taught.
Mandatory minimum of 30% in each Evaluation Test.
The Continuous Assessment Final Grade is the sum of the marks obtained in both evaluation tests.

Comments:
- The final exam and the tests are "closed book" and the use of any equipment during the tests is not authorized.
- The 1st evaluation test will be held in the theoretical class on 05/11/2018.
- The date of the 2nd evaluation test (the last one) coincides with the date of the 1st Call final examination exam.
- One of the tests failure, implies that the student will move to the final assessment methods.
- Students meeting the minimum required grade of 9,5 (or higher) in the average of the two tests will be automatically dismissed from assessment by final evaluation.

Conditions for Results Improvement
No restriction is placed, and the improvement of the grade to the course unit is possible according to the evaluation rules of the school.

Date

12th September 2018

Signature from the lecturer responsible for the course

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher: _____

Licenciatura – BsC Engenharia e Gestão Industrial

Licenciatura –BsC Industrial Engineering and Management

Academic Year: **2018/2019**

Program Contents

Course Unit INTRODUCTION TO PROCESSES

Specialization (s)

Subject type Compulsory **Research Area** Chemical Engineering

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

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures	1	14
Theoretical-Practical Lectures	3	42
Practical-Laboratory Lectures		
Tutorial Orientation		
Project		
Total of Working Hours		156

Unaccompanied Working Hours

Activity Type	Total Hours
Study	100
Works / Group Works	
Project	
Evaluation	
Additional	

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	Maria João da Anunciação Moreira	Ph.D.	Professor Adjunto
Theoretical-Practical Lectures	Maria João da Anunciação Moreira	Ph.D.	Professor Adjunto
	Belmiro Mota Duarte	Ph.D.	Professor Adjunto
Practical-Laboratory Lectures			
Tutorial Orientation			
Project			

Responsible(s) Lecturer (s) Maria João da Anunciação Moreira

Signature of Teacher:_____

Goals

The course Introduction to Processes begins with the identification and definition of a problem, followed by the establishment of relations between known and unknown variables, based on the analysis of the available data, the determination of the unknown parameters and, finally, the solution of the problem. This methodology needs to be implemented intensively, so that the student can acquire the necessary training that allows him to solve similar problems to those exposed, but more complex, and still be able to solve new problems. The discipline thus arises as a transition from the basic subjects to the more practical fields, where the activity of a professional with the course of Industrial Engineering and Management may be developed.

Skills

At the end of this curricular unit students should be able to:
a) calculating average molecular weights, molar and weight compositions; volumetric flow rates, volumetric masses and specific volumes (NTP or any others);
b) perform mass balances in processes without and with chemical reaction and assimilation of notions of variation of inventory, by-pass, recycling and purge;
c) use the psychrometric chart using the concepts of dry and wet temperatures, dew point, absolute, relative and molar humidity;
d) carry out energy balances.

Program Contents

1. UNITS, DIMENSIONS, MIXTURE COMPOSITIONS AND ESTEQUIOMETRY
Ways of expressing compositions of mixtures and solutions.
Chemical reactions: stoichiometry, limiting reagent, degree of advancement and conversion of a reaction.
A stoichiometric excess of a reagent.

2. IDEAL GASES
Law of ideal gases. Gas analysis. Standard conditions of pressure and temperature. Density and gas density.

3. MATERIAL BALANCES
The concept of material balance.
Selection of a calculation basis in problems of mass balances.
Connecting element.
Mass balances in processes with and without chemical reaction.
System of process independent equations.
Variation of inventory in a chemical process.
Mass balances in processes with bypass, with recycling of products and / or inert to the feed and with purge.

4. GAS-LIQUID SYSTEMS
The air-water system.
Partial saturation and humidity.
Psychrometric chart.
Dry and wet temperature, dew point, relative humidity, absolute humidity and molar humidity.
Material balance involving partial saturation.

5. INTRODUCTION TO ENERGY BALANCES
Energy and enthalpy.
Determination of sensitive heats, specific heats and specific average heats.
Amount of heat involved in heating / cooling with and without phase change.
Energy balances without chemical reaction.

Bibliography

1. Himmelblau, David M.; Riggs, J. B. *Basic Principles and Calculations in Chemical Engineering,* 8th edition (2012) Prentice Hall International, New Jersey, USA.

2. Felder, R. M.; Rousseau, R. W. Elementary Principles, 3rd edition (2000) John Wiley & Sons, Inc., New York, USA.

3. Schlesinger, M. E. *Mass and Energy Balances in Materials Engineering* (1995) Prentice-Hall, Inc., New Jersey, USA.

4. Schmidt, A. X.; List, H. L. *Material and Energy Balances* (1962) Prentice-Hall, Inc., New Jersey, USA.

5. Henley, E. J. H.; Rosen, E. M. *Material and Energy Balances Computations* (1969) John Wiley & Sons, Inc., New York, USA.

6. Hougen, O. A.; Watson, K. M.; Ragatz, R. A. *Chemical Process Principles. - Part I. Material and Energy Balances* (1954) John Wiley & Sons, Inc., New York, USA.

Signature of Teacher:_____

Access Conditions and Attendance Excuse

There are no limits of absence for theoretical and theoretical-practical classes.

Conditions for Exam Admission

All students enrolled in the course have access to the exam

Evaluation Method

Evaluation by final exam.

Conditions for Results Improvement

Adopted rules by ISEC.

Date	**Signature from the lecturer responsible for the course**
23/09/2018	

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Licenciatura – BsC em *Engenharia e Gestão Industrial*

BsC in *Industrial Engineering and Management*

Academic Year: 2018/2019

Program Contents

Course Unit COMPUTER AIDED DESIGN

Specialization (s)

Subject type Engineering sciences **Research Area** Mechanical Engineering

Year 1st **Semester** 2nd **ECTS** 6

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures		
Theoretical-Practical Lectures		
Practical-Laboratory Lectures		
Tutorial Orientation	4	56
Project		

Unaccompanied Working Hours

Activity Type	Total Hours
Study	96
Works / Group Works	
Project	
Evaluation	4
Additional	

Total of Working Hours 156

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures		Master's Degree	Adjunct Professor
Theoretical-Practical Lectures			
Practical-Laboratoty Lectures			
Tutorial Orientation	Carlos Miguel de Campos Pinto Borges	Master's Degree	Assistant Prof.
Project			

Responsible(s) Lecturer (s) José Armando Cantador Marques

Goals

Provide fundamental concepts that allow students to reading, understanding, interpretation and implementation of technical drawings and diagrams, in orthogonal projections and axonometric perspectives. It is also intended that, the students learn the main international standards of tecnical drawing, as well as the latest tools of computer aided design.

Skills

Learn elaborate sketches, technical and assembly drawings, either using traditional means or by making use of latest tools of computer aided design.

Program Contents

1. Noções básicas: Normas de desenho técnico; Tipos de linhas; Folhas de desenho; Legendas; esquadria Listas de peças; Escalas.
2. Projecções ortogonais: Método europeu e americano; Selecção das vistas; Vistas parciais, particulares, loca e auxiliares; Desenho à mão livre.
3. Cortes e secções: Interpretação convencional; Planos de corte; Vistas e cortes parciais; Elementos que nã se cortam; Secções.

4. Cotagem: Elementos da cotagem; Inscrição de cotas; Critérios de cotagem.
5. Perspectivas: Tipos; Desenho de perspectivas isométricas; Perspectiva da circunferência.
6. Modelação paramétrica: Esboços; Restrições; Criação de modelos tridimensionais; Conjuntos; Projecçõe
Recursos de Desenho; Cotagem; Desenhos de conjunto; Animação; Apresentações.

Bibliography

- Arlindo Silva, Carlos Ribeiro, João Dias, Luís Sousa, Desenho Técnico Moderno, Editora FCA, 4ª Edição;
- José Simões Morais, Desenho Básico, I Volume, Porto Editora;
- José Simões Morais, Desenho Básico, IIIVolume, Porto Editora, 2007;
- Luís Veiga da Cunha, Desenho Técnico, Fundação Calouste Gulbenkian, 2000;
- Américo Costa, Autodesk Inventor – Curso Completo, Editora FCA, 2013.

Access Conditions and Attendance Excuse

No conditions are laid down

Conditions for Exam Admission

No conditions are laid down

Evaluation Method

There is a system of continuous evaluation that consists of two tests. There is the obligation to obtain a minimum score of 7,5 points on each test. The final mark is the average of 2 tests.
it is expected that the test on the technical design module will be carried out on April 5th during the classes and the test on the computer aided design module will be carried out on 31 May during the classes.
If approval is not obtained in the tests, can perform the final exams.

Conditions for Results Improvement

The note improvement (in alternative exam) requires a global exam.

Date

21/01/2019

Signature from the lecturer responsible for the course

Signature of Teacher:__ Luísa Pais Vaz _

Instituto Superior de Engenharia de Coimbra
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Licenciatura – BsC Engenharia e Gestão Industrial (Português)

Licenciatura – BsC Engineering and Industrial Management (Inglês)

Academic Year: **2018/2019**

Program Contents

Course Unit THERMODYNAMICS

Specialization (s) -

Subject type Basic Sciences **Research Area** Mechanical Engineering

Year 1º **Semester** 2º **ECTS** 6

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		

Unaccompanied Working Hours

Activity Type	Total Hours
Study	97
Works / Group Works	
Project	
Evaluation	3
Additional	

Total of Working Hours

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	Maria Luísa Ingrês Pais Vaz	MSc	Prof. Adjunto Conv.
Theoretical-Practical Lectures	João Manuel Nogueira Malça de Matos Ferreira	PhD	Prof. Adjunto
Practical-Laboratoty Lectures			
Tutorial Orientation			
Project			

Responsible(s) Lecturer (s) Maria Luísa Ingrês Pais Vaz

Goals

The main objective of this subject is to give students the basic scientific training in the area of Thermal Engineering, preparing them not only to solve problems related to thermal systems, but also to help integrate them into the study of subsequent and related subjects.

Skills

The knowledge acquired in this course should help students acquire the following specific competences:
- Knowing, understanding and applying the laws of thermodynamics and heat transfer, including the ability to perform thermal balances;
- Ability to size, install, operate and maintain air conditioning and refrigeration systems;
- Understand the operation and be able to install, operate and maintain thermal machines in general.

Signature of Teacher: Luisa Vaz

Program Contents

1. **Introduction**

   General Concepts. Thermodynamic coordinates. Types of systems. Transformations and irreversibilities. Representation of transformations.

2. **Energy**

   Forms of energy. Transfer of energy. Work and Heat. The First Law of Thermodynamics.

3. **Properties of Pure Substances**

   Phases of a pure substance. Phase changes. Diagrams p-T, T-h, T-v and p-v. Surface p-v-T. Use of property tables. Perfect Gases. Equations of perfect gases. Compressibility Factor. Other State Equations.

4. **Energetic Analysis of Closed Systems**

   Balance of energy. Internal Energy, Enthalpy and Specific Heat of gases, liquids and solids.

5. **Open Systems Energy Analysis**

   Energy of a flowing fluid. Energy balance in stationary flow systems, in uniform flow systems and in other types of open systems. Examples of the various types of open systems.

6. **The Second Law of Thermodynamics**

   The Second Law of Thermodynamics. Principle of operation of the Thermal Machines. Yields and efficiencies. The Carnot cycle. The Carnot Principles.

Bibliography

ÇENGEL, Yunus A.; BOLES, Michael A., Termodinâmica, 5ªEdição, McGraw-Hill, 2007. ISBN:85-86804-66-5

MORAN, M. J.; SHAPIRO, H. N., Fundamentals of Engineering Thermodynamics, 5ªEdição, John Wiley & Sons, 2006. ISBN:0-470-03037-2

Access Conditions and Attendance Excuse

Not applicable.

Conditions for Exam Admission

Those defined in legislation and regulations in effect.

Evaluation Method

The evaluation of this curricular unit is carried out through a written exam at the end of the semester, which includes a theoretical component and a theoretical-practical component. The weight of each component is 50%. In neither part (theoretical and practical), the classification obtained is less than 30% of the grade awarded to that part.

In the theoretical-practical component only the use of scientific calculating machine is allowed. In this component students will be able to consult the theoretical-practical form, as well as the tables of thermodynamic properties.

Conditions for Results Improvement

Those defined in legislation and regulations in effect.

Date	Signature from the lecturer responsible for the course
2019/02/06	Maria Luísa Rodrigues Paiva Vaz

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher: _____

Licenciatura – BsC Engenharia e Gestão Industrial (Português)

Licenciatura – BsC Industrial Engineering and Management (Inglês)

Academic Year: 2018/2019

Program Contents

Course Unit INTRODUCTION TO MANAGEMENT

Specialization (s) --- **Research Area** Engineering and Industrial Management

Subject type

Year 1st **Semester** 2nd **ECTS** 6

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures	2	28
Theoretical-Practical Lectures	2	26
Practical-Laboratoty Lectures		
Tutorial Orientation		
Project		2

Unaccompanied Working Hours

Activity Type	Total Hours
Study	48
Works / Group Works	14
Project	
Evaluation	2
Additional	

Total of Working Hours 120

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	Alexandre Miguel d'Orey de Gouveia e Melo	MSc	Adj.Professor
Theoretical-Pratical Lectures	Alexandre Miguel d'Orey de Gouveia e Melo	MSC	Adj. Professor

Responsible(s) Lecturer (s) Alexandre Miguel d'Orey de Gouveia e Melo

Goals

The objectives are to understand the basic principles of organization and management of companies and organizations, from the strategic level to the operational level in the multiple aspects, creating a common domain of knowledge between engineers and managers.

Skills

At the end of this course students should be able to:
Understand the influence of economic, social, technological and political environments on organizations and their managers.
Understand the importance of competitiveness and business ethics and use tools and know-how that allow management to be carried out in the context of the company culture and in a business perspective that is open to innovation and change.
Identify the different planning horizons of the operations and the procedures to be applied in each case.
Anticipate needs, plan and scale resources, ensuring compliance with goals and optimizing operations.
Apply project planning and control techniques.
Know the different philosophies of production management.
Generally, the aim is to develop problem-solving skills by applying the knowledge acquired

Program Contents

Organization and Management
Organizations and companies - The Management function;
Organizations and the environment, planning and product lifecycle.
The financial statements in the scope of business management.
Fundamentals for analysis and management of companies, economic and financial indicators and fundamental management ratios.
Financial analysis and economic viability of investments and projects.

Bibliography

LISBOA, J. [et al.] , (2004), "Introdução à Gestão das Organizações", editora Vida Económica,
ROBBINS, Stephen P.; COULTER, Mary, "Management", Prentice-Hall, 6th ed. [658 ROB]
SEBASTIÃO TEIXEIRA, (1998),"Gestão das Organizações", Alfragide ,McGraw-Hill
MARQUES PINTO, C.A. [et.al.] (2009)."Fundamentos de Gestão", 2ª Ed.Lisboa, Editorial Presença

Access Conditions and Attendance Excuse

According to the regulatory terms.

Conditions for Exam Admission

All students regularly enrolled in this UC.

Evaluation Method

Assessment by Written Exam.

Conditions for Results Improvement

By exam, according to the regulatory terms.

Date

21st January 2019

Signature from the lecturer responsible for the course

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Lecturer's signature:_____

Licenciatura BsC- Engenharia e Gestão Industrial

Licenciatura BsC - Management and Industrial Engineering

Academic Year: 2018 / 2019

Program Contents

Course Unit APPLIED MECHANICS

Specialization (s)

Subject type **Research Area** Mechanical Engineering

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

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures	2	28
Theoretical-Practical Lectures	1	14
Practical-Laboratoty Lectures	1	14
Tutorial Orientation		
Project		

Unaccompanied Working Hours

Activity Type	Total Hours
Study	57
Works / Group Works	40
Project	
Evaluation	3
Additional	

Total of Working Hours 156

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	Luis Manuel Ferreira Roseiro	PhD	Coordinator Prof.
Theoretical-Practical Lectures	Pedro Miguel Martins Miguens Amaro	MSc	Assistant Prof.
Practical-Laboratory Lectures	Pedro Miguel Martins Miguens Amaro	MSc	Assistant Prof
Tutorial Orientation			
Project			

Responsible(s) Lecturer (s) Luis Manuel Ferreira Roseiro

Goals

This curricular unit aims to develop in the student the abilities to analyze a given problem in a simple way, and to apply fundamental principles of statics and strength of materials. This approach makes possible to understand the behavior of numerous mechanical structures used by man in their everyday life, transposing this behavior into simplified models, using analytical methods, considering their conditions of use and the requests to which they are subject.

The curricular unit incorporates a laboratory component, interconnected with theoretical and theoretical-practical activities, where basic concepts are developed, in order to perform tests in simple mechanical structures. This analysis includes the experimental application of the concepts of experimental stress analysis.

Skills

The student should be able to define the material to be used, evaluate the shape and dimensions more adequate to withstand the different types of external applications applied to isostatic structures, at the lowest possible cost and in safety. The analysis of practical cases in increasing order of difficulty allows to know the dimensioning to the mechanical strength and the rigidity in structures, as for example, bars, beams, truss and transmission shafts.

Lecturer's signature:_____

Program Contents

1 - Introduction

What is Mechanics? Fundamentals concepts. Newton's Law. International Systems of Units (SI)

2 – Static

2.1 Mechanical actions and mechanical structure: types of loads (concentrated and distributed loads) and moment (moment of a force about a point and moment of a couple). Type of structure support.

2.2 - Degrees of freedom of a body. Study of the equilibrium of the bodies. Free body diagram. Determination of the support reactions in isostatic structures. Internal actions developed in a mechanical structure: axial loads, shear forces, bending moments and torque moments. Internal actions diagrams.

2.3 - Geometric properties of plane areas. Centre of gravity of a Body. Centroids and moments of inertia of plane areas. Steiner's theorem. Polar Moments of Inertia. Properties of structural steel shapes.

3 - Basic Concepts of Strength of Materials

Normal and Shear Stress. Concept of displacement and strain. Hooke's Law. Stress-strain diagrams for ductile and fragile materials. Concept of elasticity and plasticity. Mechanical properties of materials. Principle of superposition of the effects of forces. Potential Energy of Deformation. Concept of Resilience and Tenacity of a material. General design process for a mechanical structure. Concept of safety factor.

4. - Experimental Stress Analysis

Basic concepts and principles. Types of strain gages. Strain Rosette. Specifications and selection of strain gages. Techniques for gluing and assembling extensometers. Load cells. Application examples.

5 - Structural elements subjected to axial loads

Stress and strain state in bars loaded axially. Saint-Venant's principle. Changes in length of axially loaded members. Thermal Effects. Statically indeterminate structures. Internal actions determination in reticular systems. Ritter's Method.

7 - Structural Elements Subjected to Torsion

Stresses and strains in Pure Shear. Torsion of members with circular and non-circular cross-section. Torsion of closed thin-walled sections of profiles. Torsion of statically indeterminate members. Transmission of Power by circular shafts.

8 - Structural elements subject to bending

Beam of straight geometric axle: pure and simple bending. Normal stress – tensile and compressive. Neutral axis. Shear stresses in beams. First moment of the cross-section area circular, rectangular, T-shaped, I-shaped cross section. Deflection of beams and shafts using practical tables.

9 – Dimensioning structural elements subjected to bending and torsion.

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- BEER, FERDINAND P.;JOHNSTON, E. RUSSELL, Jr; DEWOLF, JONH T. – *Resistência dos Materiais* – 4ª edição, McGraw Hill, 2006.
- FARINHA, J.S. BRAZÃO; REIS, A. CORREIA DOS – Tabelas Técnicas, Edição P.O.B., 1992.
- HIBBELER,R.C. – ESTÁTICA- Mecânica para Engenharia – 10ª edição, Pearson Prentice Hall, 2005.
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Lecturer's signature:_____

Access Conditions and Attendance Excuse

Nothing to add.

Conditions for Exam Admission

All regularly enrolled students. Only the calculation machine, form and tables available in the Moodle platform are allowed.

Evaluation Method

The curricular unit works in two regimes: a) Continuous assessment, with a component corresponding to the execution of practical work and another one related to written test; b) Evaluation only by written test.

The assessment regime of type a) is the normal one, and is advised to the students. The type b) scheme is the option for students who do not feel able to attend most classes, as students with worker-student status or equivalent status. Until the second week of classes, the student opts for the evaluation regime he intends to follow in the course unit.

In the evaluation system of type a), the curricular unit incorporates the accomplishment of several practical works that involve research and experimentation to be carried out individually and in group, during the practical classes, with written reports. Presence in 75% of practical classes is mandatory. The practical work has 40% of value. The work done in a group is presented in front of the teachers, with a final discussion. The reports should be delivered in digital format in the penultimate practical class. The final exam (written test) will be quoted for 60% of value.

In the evaluation regime of type b), the final exam (written test) will have 100% of value.

The final exam is written as a written test for all students, structured in a theoretical and a theoretical-practical part (case solving), and students in the type a) program must obtain a minimum of 40% of this test to pass the course. The work done in the practical classes is only valid for one year.

Conditions for Results Improvement

Not applicable

Date	**Signature from the lecturer responsible for the course**
2019.01.21	

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Signature of Teacher:

Licenciatura – BsC Engenharia e Gestão Industrial
Licenciatura – BsC Engineering and industrial management

Academic Year: **2018/2019**

Program Contents

Course Unit MATHEMATICS II

Specialization (s)

Subject type Sciences of speciality **Research Area** Mathematics

Year 1st **Semester** 2nd **ECTS** 6

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures	2	28
Theoretical-Practical Lectures	2	28
Practical-Laboratory Lectures		
Tutorial Orientation		
Project		
Total of Working Hours		156

Unaccompanied Working Hours

Activity Type	Total Hours
Study	97
Works / Group Works	
Project	
Evaluation	3
Additional	

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	Rui Manuel Carreira Rodrigues	PhD	Professor Coordenador
Theoretical-Practical Lectures	Rui Manuel Carreira Rodrigues		
Practical-Laboratory Lectures			
Tutorial Orientation			
Project			

Responsible(s) Lecturer (s) Rui Manuel Carreira Rodrigues

Goals
Present an introduction to ordinary differential equations, numerical series and power series, and present the differential and integral calculus of real functions of several real variables. Learning takes place simultaneously in the theoretical classes and in the theoretical-practical classes, where the topics, included in the syllabus contents of the curricular unit, are presented and discussed, through the resolution of exercises and the use of the following software: GeoGebra and WolframAlpha. Classes presented in Portuguese language.

Skills
Autonomous learning and rigor in the interpretation, use and description of the mathematical concepts.

Signature of Teacher:_____

Program Contents

1. **Introduction to the study of ordinary differential equations**

   Introduction and motivation. First order differential equations - Existence and uniqueness of solution, Ilinear equation. Bernoulli equation, separable equation and homogeneous equation. Slope field and Euler's method.

2. **Differential and integral calculus in Rn**

   Curves in Rn. Conics and quadrics surfaces. Real functions of several real variables – Notions of Topology in IRn. Domain, level set and graph of a two-variable function. Limit and continuity. Partial derivatives and gradient vector. Partial derivatives of higher order. Differentiable function. Directional derivative, tangent plane and normal straight line. Linear approximation. Maxima, minima and saddle points, extrema with constraints, Lagrange's multipliers.

   Double integral - Definition, properties, geometric interpretation and calculation. Applications of the double integral. Double integral in polar coordinates. Triple integral - Calculation of the triple integral. Triple integral in cylindrical and spherical coordinates.

3. **Infinite series**

   Numerical sequences. Properties. Numerical series. Nature and properties. Geometric series and telescoping series. Necessary condition for convergence. Series of nonnegative terms. Tests for convergence. Integral test. Root and ratio test. Conditional and absolute convergence. Alternating series. Leibniz's rule.

4. **Real power series**

   Definition. Radius and interval of convergence. Properties of functions represented by power series. Taylor series. Power series expansions.

Bibliography

- Hamilton Luiz Guidorizzi, "Um curso de cálculo", volume 1, volume 2 e volume 4. Livros técnicos e científicos editora.
- Ron Larson, Robert P. Hostetler e Bruce H. Edwards, "Cálculo", volume 1 e volume 2. McGraw-Hill.
- James Stewart, "Cálculo". Thomson Learning.
- João Cardoso, "Apontamentos de apoio às aulas de Cálculo II".
- Rui Rodrigues - notas teóricas de análise matemática e exercícios de análise matemática.

Access Conditions and Attendance Excuse
Not applicable.

Conditions for Exam Admission
Access to the exam allowed to all students duly enrolled in the course unit. In particular, access to the appeal period requires enrollment in the academic services.

Evaluation Method
Evaluation by final exam (in the first and the second seasons). Students have access to two tests: one exam in the first season and one exam in the second season quoted for 20 values. The student is approved if he or she obtains a classification of 10 values or higher in any of the tests. A supplementary test is mandatory for students with a score of 17 values or higher.

Conditions for Results Improvement
Conditions for the improvement of classification defined in the REACTA (regulation of frequency, assessment of knowledge and transition of year).

Date	Signature from the lecturer responsible for the course
18.01.2019	Rui Manuel Carreira Rodrigues

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Signature of Teacher: _____

Licenciatura – BsC Engenharia e Gestão Industrial (Português)

Licenciatura – BsC Industrial Management and Engineering
(Inglês)

Academic Year: **2018/2019**

Program Contents

Course Unit INFORMATION TECHNOLOGIES AND PROGRAMMING

Specialization (s)

Subject type Base sciences **Research Area** Informatics Engineering

Year 1st **Semester** 1st **ECTS** 6

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures	2	28
Theoretical-Practical Lectures		
Practical-Laboratoty Lectures	2	28
Tutorial Orientation		
Project		
Total of Working Hours		156

Unaccompanied Working Hours

Activity Type	Total Hours
Study	59
Works / Group Works	36
Project	
Evaluation	5
Additional	

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	Ana Cristina da Costa Oliveira Alves	Ph.D.	Professor Adjunto
Theoretical-Practical Lectures			
Practical-Laboratoty Lectures	Jorge Alexandre Caldeira Gonçalves de Almeida	MSc	Professor Adjunto
Tutorial Orientation			
Project			

Responsible(s) Lecturer (s) Ana Cristina da Costa Oliveira Alves

Goals

- Develop a general skill to solve problems stimulating solutions based on the principles of "knowing to think" and the corresponding "know-how";
- Introduce and apply programming concepts in order to create functions and procedures in Visual Basic for Applications (VBA), and their interconnection to Microsoft Excel. Allow to develop and create forms for task automation.

Skills

- To become an efficient user of one of the main tools daily used in the work of an Industrial Engineer. In this specific case, dominate the use of a spreadsheet processing tool, such as Microsoft Excel, specially in an advanced way in order to solve engineering problems;
- Develop functions and procedures in VBA to be invoked through Microsoft Excel for task automation;
- Develop graphical interfaces to solve calculation problems.

Signature of Teacher: 

Program Contents

Theoretical Component

1. Introduction to Programming:

Algorithms. Steps in solving a computation problem. Construction of algorithms. Elementary concepts. Constants, variables, operators and arithmetic expressions. Arrays. Modularization. Types of Procedures. Passing arguments by reference and by value. Decision and Repetition Flow Control.

2. Programming in Visual Basic:

Types of data. Variables, operators and arithmetic expressions. Arrays. Modularization. Types of Procedures. Arguments. Passing arguments by Reference and by Value. Decision and Repetition Flow Control. Library functions (Text, Conversions, Date / Time, Validation, Formatting). Error Handling. Message Boxes.

3. Visual Basic for Applications:

Interface objects. Excel Objects: Hierarchy and Object Collection. Properties, Methods, and Events. Selection of Objects. Flow Control walking through a collection of objects. Forms and Controls. Access to online services.

Practical Component

Advanced MS Excel:

- MS Excel Environment.
- Worksheets, workbooks and cells.
- Creating charts.
- Printing.
- Functions and formulas.
- Sorting and filtering of data.
- Protection of documents and cells.
- Importing data.
- Spatial data visualization.

Programming in VBA:

- Command macro programming.
- Absolute and relative references.
- Function macro programming.
- Decision and repetition flow control.
- Programming procedures.
- Excel objects and interface.
- Use of library functions.
- Creation of forms.

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Winston, Wayne L. Microsoft Excel Data Analysis and Business Modeling. Redmond: Microsoft Press, ISBN 0-7356-1901-8

Larsen, Ronald W. Engineering with Excel. Upper Saddle River, NJ: Pearson/Prentice Hall, ISBN 0-13-147511-8.

Kiong, L. Excel VBA Made Easy. ISBN: 1449959628 http://www.excelvbatutor.com/vba_book/vbabook_ed2.pdf

Deitel, P. and Deitel, J. Introduction to Problem Solving and Control Statements in Visual Basic 2010. Available at: http://www.informit.com/articles/article.aspx?p=1701416

Online and Official Documentation from MSDN (Microsoft Developer Network https://msdn.microsoft.com)

Access Conditions and Attendance Excuse

All students must attend at least 2/3 of the practical classes to have access to the normal and resource exams. For worker students or with any special statute provided by law, which is confirmed from the information provided by the Academic Services, there is no minimum assistance.

The students are advised to systematically follow the theoretical classes, as an indispensable condition for the academic achievement and the correct understanding of the subjects. In the practical classes, it is not supposed to repeat what was taught in the theoretical class, that is, the introduction of the concepts demonstrated.

Signature of Teacher: 

Conditions for Exam Admission

Access to the final exam of the normal and supplementary period is only allowed to the students that have the minimum of attendance in the practical classes.

Evaluation Method

Evaluation Methodology by:

-An individual practical test in the lab about Advanced MS Excel (4 (four) values) on November 14, 2018.

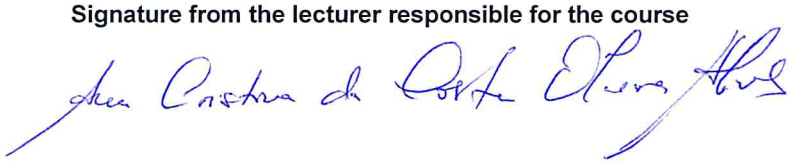
-Implementation of a practical work in groups of up to 2 students with a proposed theme in VBA Programming (4 (four) values). The delivery of the work is done in 2 stages. The 1st stage will be on December 10, 2018, and the 2nd stage (final) will be on January 2, 2019. There will be a mandatory defense from students after the final delivery of the work on January 3, 2019. All students must deliver the practical work on the same date, regardless of their status, which will be valid for the normal and supplementary period of evaluation.

-Realization of a written exam without consultation valued in 12 (twelve) values, consisting of a theoretical part and practical part. This last evaluation component has a mandatory minimum of 25%.

Students who are justified in not being able to attend on the day of the practical test in the normal date and who have access to another period of evaluation (resource or special) should contact the responsible teacher to define the new date of the practical test, that can be carried out on the same day of the written exam.

Conditions for Results Improvement

Those provided for in the law, and it cannot be carried out in the normal period.

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

Física I

Signature of Teacher:

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Licenciatura – BsC Engenharia e Gestão Industrial (Português)

Licenciatura – BsC Engineering and Industrial Management (Inglês)

Academic Year: 2018 / 2019

Program Contents

Course Unit PHYSICS

Specialization (s) COMMON TRAINING

Subject type Mandatory **Research Area** Physics

Year 1 **Semester** 1 **ECTS** 6,0

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures	2	28
Theoretical-Practical Lectures	1	14
Practical-Laboratoty Lectures	1	14
Tutorial Orientation		
Project		

Unaccompanied Working Hours

Activity Type	Total Hours
Study	85
Works / Group Works	12
Project	
Evaluation	3
Additional	

Total of Working Hours 156

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	Jorge Miguel Tavares Couceiro de Sousa	PhD	Adjunct Professor
Theoretical-Practical Lectures	Jorge Miguel Tavares Couceiro de Sousa	PhD	Adjunct Professor
Practical-Laboratoty Lectures	Hugo Sérgio Sousa Costa	PhD	Adjunct Professor
Tutorial Orientation			
Project			

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

Goals

- Understanding the fundamental laws of Nature in the field of Classical Mechanics.
- Assimilation of the contents described in the program.
- Application of the knowledge acquired in solving problems and interpreting results.

Skills

- Ability to understand the theoretical concepts of physical laws and to relate them to practical situations and problem solving, along with a critical analysis of the results obtained.
- Autonomous acquisition of knowledge.
- Interpretation of physical phenomena.
- In the execution of laboratory work, technical skills are acquired by operating measurement instruments and interpersonal skills are acquired from the exchange of ideas and decisions taken in group.

Program Contents

1. Systems of Units
   1.1. Base units and derived units of the International System of Units;
   1.2. Equations of dimensions and principle of dimensional homogeneity;
   1.3. Units of the International System used in engineering;

Signature of Teacher:

1.4. Change of system of units.

2. Propagation of Uncertainty
   2.1. Precision and accuracy;
   2.2. Uncertainty propagation formula for uncorrelated variables

3. Vector Calculus
   3.1. Scalars and vectors;
   3.2. Graphical representation of vectors;
   3.3. Bound, sliding and free vectors;
   3.4. Graphical operations with free vectors: multiplication by a scalar, addition and subtraction;
   3.5. Unit vectors;
   3.6. Projection of a vector along an arbitrary direction;
   3.7. Cartesian representation of vectors: components of a vector, position vector, module of a vector, directing cosines;
   3.8. 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.

4. Kinematics of Particles
   4.1. Coordinate reference systems;
   4.2. The notion of rest and movement;
   4.3. Position, velocity and acceleration vectors;
   4.4. Tangential and normal components of the acceleration vector;
   4.5. One-dimensional movement laws';
   4.6. Circular motion: angular position, velocity and acceleration;
   4.7. Relation between angular and linear parameters;
   4.8. Bi-dimensional movement: projectiles;
   4.9. Movement in three dimensions.

5. Particle Linear Dynamics
   5.1. Newton's Laws;
   5.2. Principle of independence of simultaneous forces;
   5.3. Directly applied, connecting and friction forces;
   5.4. Linear momentum: conservation principle of linear momentum;
   5.5. Impulse of a Force.

6. Rotational Dynamics
   6.1. Angular momentum of a particle
   6.2. Torque of a force about a point;
   6.3. Torque of a force about a line;
   6.4. Couple (force couple);
   6.5. Conservation of the angular momentum;
   6.6. Angular momentum of a rigid body: moment of inertia
   6.7. Equation of the dynamics of rotation of a rigid body

7. Statics
   7.1. Condition for equilibrium of a particle;
   7.2. Conditions for equilibrium of a rigid body;
   7.3. Free body diagrams.

8. Work and Energy
   8.1. Definition of work: general case and particular cases;
   8.2. Definition of power;
   8.3. Kinetic energy;
   8.4. Kinetic energy theorem;
   8.5. Conservative forces fields: gravitational and electric;
   8.6. Potential energy;
   8.7. Non-conservative forces.

Signature of Teacher:

Bibliography

- Paul A. Tipler, Gene Mosca, Physics for Scientists and Engineers, 6th Edition, Vol. 1, W. H. Freeman, 2007. ISBN: 978-1-4292-0132-0.
- D. Halliday, R. Resnick, J. Walker, *Fundamentals of Physics*, 10th Edition (Extended Edition), John Wiley & Sons, Inc., 2014. ISBN: 978-1-1182-3072-5.
- Hugh D. Young, Roger A. Freedman, *Sears & Zemansky's University Physics*, 13th Edition, Vol. 1, Addison-Wesley, 2011. ISBN: 978-0-3217-3338-2.
- Marcelo Alonso, Edward Finn, Physics, Revised Edition, Addison Wesley, 1992. ISBN: 978-0-2015-6518-8.

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 agree with the teacher of the practical laboratory classes, an appropriate time table 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

Those that are in force in ISEC, with no improvement in the practical component.

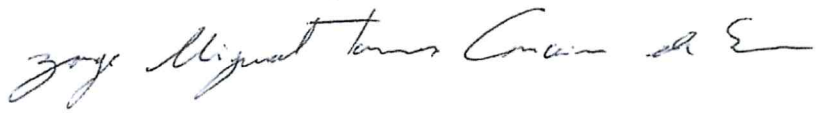
Date	Signature from the lecturer responsible for the course
07/09/2018	

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 acceleration of an object in a frictionless inclined plane;
   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 gravity's acceleration using a gravitational pendulum;
   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



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Signature of Teacher:_____

Licenciatura – BsC Engenharia e Gestão Industrial

Licenciatura – BsC Industrial Engineering and Management

Academic Year: **2018/2019**

Program Contents

Course Unit ECONOMICS FOR ENGINEERING

Specialization (s)

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

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

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 156

Unaccompanied Working Hours

Activity Type	Total Hours
Study	77
Works / Group Works	20
Project	
Evaluation	3
Additional	

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	José Luís Ferreira Martinho	PhD	Prof. Adjunto
Theoretical-Practical Lectures	José Luís Ferreira Martinho	PhD	Prof. Adjunto
Practical-Laboratoty Lectures			
Tutorial Orientation			
Project			

Responsible(s) Lecturer (s) José Luís Ferreira Martinho

Goals

This course aims to provide students with a basic understanding of the economic system, developing shared domain knowledge between engineers and economists.

Skills

At the end of this course students should be able to:

- Understand the object and the main principles of the Economic science.
- Understand the functioning of markets and the behavior of the main economic decision makers: consumers, producers and government.
- Interpreting the main macroeconomic data and relevant information in the field.

Signature of Teacher:_____

Program Contents

1. Introduction to the study of economics
   Concepts, issues and basic principles of economics. Axioms, assumptions and models in economics. Microeconomics and macroeconomics.
2. Supply and demand
   Demand and supply curves. Market equilibrium. Elasticity.
3. Consumer choice theory
   Consumer behavior. Utility function and budget constraint. Indifference curves and marginal rate of substitution.
4. Production theory and the organization of industry
   Production function, technology and production factors. Total, average and marginal product. Marginal rate of technical substitution. Production costs. The producer decision and market equilibrium: perfect and imperfect competition.
5. Overview of Macroeconomics
   The measurement of economic activity. Consumption, savings and investment. Inflation. International trade. State intervention in the economy. Portuguese and world economy.

Bibliography

- Mankiw, N. Gregory. Introdução à Economia. Thomson Learning, 2005
- Samuelson & Nordhaus. Economia. 16ª Edição, McGraw-Hill, Lisboa, 1999
- Diapositivos de apoio às aulas.

Access Conditions and Attendance Excuse

See Evaluation method.

Conditions for Exam Admission

See Evaluation method.

Evaluation Method

Two options to choose till 5 of October:
Option A:
- 2 tests during the semester (40%+40%)
- Attendance and participation in classroom (10%)
- Practical assignment, with report and presentation (10%)
- Minimum grade of 40% in all the evaluation parts.
- Minimum of 75% of attendance

Option B:
- Final exam

Those who choose the evaluation method A and fail, have one single opportunity to do the final exam (2nd call).

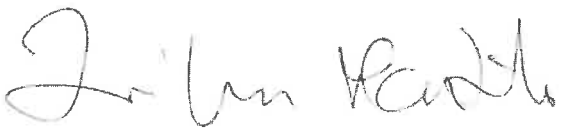
Conditions for Results Improvement

See Evaluation method.

Date

11/09/2018

Signature from the lecturer responsible for the course



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Signature of Teacher: José Sousa

Licenciatura – BsC Engenharia e Gestão Industrial (Português)

Licenciatura – BsC Engineering and industrial management (Inglês)

Academic Year: **2018 / 2019**

Program Contents

Course Unit CHEMISTRY

Specialization (s)

Subject type Base Sciences **Research Area** Chemical

Year 1º **Semester** 1º **ECTS** 6

Working Hours 156

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	96
Works / Group Works	
Project	
Evaluation	4
Additional	
	100

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	José Manuel Matias Vieira de Sousa	PhD.	Professor Adjunto
Theoretical-Practical Lectures	José Manuel Matias Vieira de Sousa	PhD.	Professor Adjunto
Practical-Laboratoty Lectures			
Tutorial Orientation			
Project			

Responsible(s) Lecturer (s) José Manuel Matias Vieira de Sousa

Goals

The objectives set for the subject of chemistry relate to its key role, general and pedagogical support. The approach and development is based on the specific level of knowledge of the students, in view of their applicability to the study of the biological engineering. It is intended to provide the students an understanding of the fundamentals of chemistry that underlie the transformation and characterization of matter and the structures it forms.

Skills

- Solve simple physic-chemical problems using the appropriate form,
- Identify, interpret and communicate the relationship between the microstructure and the properties of the materials.
- View, interpret and equate physical-chemical problems involving homogeneous or heterogeneous systems.
- Predicting the direction of the evolution of chemical systems based on thermodynamic data.
- to interpret and communicate the mechanisms involved in the deterioration of metals by electrochemical processes.
- Complementary and consolidate the knowledge of the subjects covered in the discipline, being able to access a new knowledge through the use of library materials, databases.

Program Contents

1. Electronic Structure of the Atoms and Periodic Table

Electromagnetic radiation and interaction with matter. Planck's quantum theory.
Photoelectric effect. Bohr theory of the hydrogen atom. Electron nature duality - De Broglie principle. Heisenberg's Principle of Uncertainty. Quantum Mechanics. Quantum numbers. Atomic orbital.
Electronic configuration - Aufbau principle, Pauli's exclusion principle and Hund's rule.
Development of the Periodic Table. Periodic classification of the elements.
Periodic variation of physical properties - nuclear charge, atomic radius, ionic radius.
Ionization energy, Electron affinity. Variation of the chemical properties of the elements.

2. Chemical Bonding and Molecular Structure

Ionic, metallic and covalent bonds.
Lewis structure. Concept of resonance. Exceptions to the octet rule.
Molecular geometry.
Dipole moments. Valence bond theory.

3. Intermolecular Forces

Molecular Kinetic Theory of Liquids and Solids.
Intermolecular forces - dipole-dipole, ion-dipole, London dispersion, and hydrogen bond forces.
Properties of liquids - surface tension, viscosity.
Phase changes - liquid-vapour equilibria; Liquid-solid and solid-vapour.

4. Chemical Reactions

Chemical equations: writing and balancing.
Stoichiometric calculations. Limiting Reactants and Reaction Yield.
Properties of aqueous solutions - electrolytes versus non-electrolytes.
Three main types of reactions - precipitation, acid-base and oxidation-reduction.
Physical properties of solutions. Effect of temperature on solubility.
Effect of pressure on gas solubility. Colligative properties.

5. Properties of the Gases

Pressure of the gas.
The Gases Law - Boyle's Law, Charles and Gay-Lussac's Law, Avogadro's Law.
Ideal gas equation.
Dalton's Law of Partial Pressures.
Kinetic theory of the gases.
Deviation from the ideal gas behaviour.

6. Chemical Equilibrium

Equilibrium constant.
Expressions for the equilibrium constants - homogeneous and heterogeneous equilibrium.
Factors that affect the chemical equilibrium - Le Châtelier principle, variations in concentration, volume and pressure.
Equilibrium involving little soluble salts - constant of the solubility, prediction of precipitate formation.
Effect of the common ion in the solubility of salts.

7. Thermochemistry

Endothermic and exothermic reactions.
Enthalpy of chemical reactions - enthalpy of reactions and thermochemical equations.
Standard formation enthalpy and standard reaction enthalpy
Law of Hess.
Specific heat and heat capacity.
Gibbs energy of reaction and chemical equilibrium.

8. Electrochemistry

Extension of the oxidation-reduction reactions.
Galvanic Cells. Reference electrode and standard potential reduction.
Spontaneity of oxidation-reduction reactions.
Effect of the concentration on the electromotive force of the cell - Nernst equation.
Batteries. Corrosion. Electrolysis.

9. Organic Chemistry

Classes of the Organic Compounds.
Aliphatic hydrocarbons - alkanes, cycloalkanes, alkenes and alkynes.
Aromatic hydrocarbons.
Functional Group Chemistry - alcohols, ethers, aldehydes, ketones, carboxylic acids, esters and amines.

Bibliography

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. KOTZ, J.C. ; TREICHEL, P. Jr. – *Chemistry and Chemical Reactivity ;* Saunders College Publishing, 1999. ISBN 0-03-023762-9

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. KOTZ, J.C. ; PURCEL, P. Jr. – *Chemistry and Chemical Reactivity ;* Saunders College Publishing, 1991 ISBN 0-03-047562-7

. ATKINS, P.; - *The Elements of Physical Chemistry, Oxford University Press, 3ª edição UK 2001. ISBN: 019 879290 5*

Access Conditions and Attendance Excuse

The conditions defined in the REACTA

Conditions for Exam Admission

. There are no restrictions to the access of the normal and recourse exam seasons.

Evaluation Method

Students, ordinary and student-workers, should choose one of the evaluation methodologies:
A) Distributed evaluation
This evaluation methodology will consist of two tests in the first semester, quoted for 20 values. The 1st and the 2nd test will be in 21 of November and in 19 of December 2018, respectively. Students who opt for this method of evaluation must have to obtain a minimum of 75% of lessons attendance until reach each test. The completion of the 2nd test by students, is subject to a minimum of 7 points in the 1st test.
The Final Classification of the Curricular Unit will result from the following equation: C = 0,5 × T1 + 0,5 × T2, where T1 is the classification obtained in the 1st test, T2 the classification obtained in the 2nd test.

B) Final Evaluation
This evaluation methodology will consist of a Global Exam in the Normal Season and will have a 100% quotation. The student who does not obtain approval in the Final Evaluation can obtain it by taking the Resource Exam. To obtain approval for the Chemistry Unit, students will have to obtain a final grade equal to or greater than 10 value (from 0 to 20).
Conditions for Results Improvement

Conditions for Results Improvement

According with the REACTA.

Date

14/09/2018

Signature from the lecturer responsible for the course

José Manuel Matias Vieira de Sousa

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher:

Licenciatura – BsC *Engenharia e Gestão Industrial* (Português)

Licenciatura – BsC *Engineering and Industrial Management* (Inglês)

Academic Year: **2018/19**

Program Contents

Course Unit MATHEMATICS I

Specialization (s)

Subject type **Research Area** MATHEMATICS I

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

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		156

Unaccompanied Working Hours

Activity Type	Total Hours
Study	97.5
Works / Group Works	
Project	
Evaluation	2.5
Additional	

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	Pascoal Martins da Silva	Ph-D	Adj. Prof.
Theoretical-Practical Lectures	Pascoal Martins da Silva	Ph-D	Adj. Prof.
Practical-Laboratoty Lectures			
Tutorial Orientation			
Project			

Responsible(s) Lecturer (s) Pascoal Martins da Silva

Goals

Understanding and applying the concept of integral of a real function of a real variable. Acquisition of knowledge about Linear Algebra tools.

Skills

The aim is to develop personal skills that enable autonomous lifelong learning, drawing on secondary level knowledge and specialty texts. Instill concern for quality and develop knowledge and understanding in the fields of engineering sciences.

Program Contents

1. Real Functions on IR - Hyperbolic functions; Inverse trigonometric functions.
2. Antiderivatives - Techniques of calculus by decomposition, parts and substitution, and of trigonometric and rational functions.
3. Integral Calculus on IR - Definite integral (Riemann's integral); Fundamental theorem of calculus; Applications of integrals to the calculus of areas, volumes and length; Indefinite and improper integrals.
4. Linear Algebra - Matrices, Linear Equations Systems and Determinants.

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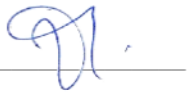
Signature of Teacher: 

Licenciatura – BsC Engenharia e Gestão Industrial

Licenciatura – BsC Engineering and Industrial Management

Academic Year: **2018/2019**

Program Contents

Course Unit PROJECT/INTERNSHIP

Specialization (s) N. A.

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

Year 3 **Semester** 2 **ECTS** 12.0

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures		
Theoretical-Practical Lectures		
Practical-Laboratory Lectures		
Tutorial Orientation		11
Project		

Unaccompanied Working Hours

Activity Type	Total Hours
Study	
Works / Group Works	
Project	300
Evaluation	1
Additional	

Total of Working Hours 312

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures			
Theoretical-Practical Lectures			
Practical-Laboratory Lectures			
Tutorial Orientation			
Project			

Responsible(s) Lecturer (s) Supervisor Professor of each Project/Internship

Goals

In general terms, students are expected to undertake a job that will enable them to apply the skills developed during the study cycle. The job can be done as an internship in a company or a project developed mainly at ISEC. The specific objectives depend on each project / internship.

Skills

- Apply knowledge in solving specific problems in a business environment;
- Analyse real problems and propose the appropriate solutions, justified with the knowledge acquired and applying the theoretical state of the art based on scientific references;
- Simulate industrial engineering problems from the business environment;
- Communicate adequately, in written and oral form, the specific contents of the project.

Program Contents

Depend on each project/Internship

Signature of Teacher:_____

Bibliography

Depend on each project/Internship

Access Conditions and Attendance Excuse

NA

Conditions for Exam Admission

NA

Evaluation Method

- Students should prepare a monography based on the job done, which will be distributed to the jury for assessment in a public presentation and discussion;
- The jury is composed of three faculty members, including the supervisor and two other faculty members with no participation in the project / internship; one of the juries may be replaced by the supervisor in the company;
- The evaluation will be based on the monography, the opinion of the supervisors and the presentation and discussion;
- The final grade will be given in a range of 0 to 20 values and should take into account the following elements:
    - Monography, graded by the jury;
    - Work developed, according to the opinion of the company's supervisor;
    - Work developed, according to the opinion of the ISEC's supervisor;
    - Final presentation and discussion, evaluated by the jury.

Conditions for Results Improvement

- Students can only submit the monography for evaluation once with the same work plan.
- If the student wishes to improve the grade, new tasks should be added to the initial work plan that could justify any change in the grade, based on the supervisor's opinion.

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

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Lecturer's signature: _____

Licenciatura – BSc Engenharia e Gestão Industrial (Português)

Licenciatura – BSc Industrial Engineering and Management (Inglês)

Academic Year: *2018/2019*

Program Contents

Course Unit HUMAN RESOURCES MANAGEMENT

Specialization (s)

Subject type **Research Area**

Year 3RD **Semester** 2ND **ECTS 6,0**

Working Hours

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

Unaccompanied Working Hours

Activity Type	Total Hours
Study	72
Works / Group Works	24
Project	
Evaluation	4
Additional	

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	Jorge Alexandre Caldeira Gonçalves de Almeida	M.Sc.	Adjunct Prof.
Theoretical-Practical Lectures			
Practical-Laboratoty Lectures	Jorge Alexandre Caldeira Gonçalves de Almeida	M.Sc.	Adjunct Prof.
Tutorial Orientation			
Project			

Responsible(s) Lecturer (s) Jorge Alexandre Caldeira Gonçalves de Almeida

Goals

- Develop knowledge and understanding skills in the area of Human Resources, relying on classroom exposure and research in specialty texts.
- Develop the ability to apply the knowledge acquired in solving specific problems of the business life, supported by own argument;
- To create the capacity to collect, select and interpret relevant information in the area of Human Resources, combined with the capacity for analysis, synthesis and formulation of opinions;
- To instill a professional attitude in the development of their tasks by the knowledge acquired and the ability to understand their scope, applicability and opportunity in relation to specific situations.

Skills

Generic Competencies:
1-Create and develop the ability to interpret and master basic concepts of Human Resource Management, communicate topics of the relational and organizational area exposing ideas, problems, information and interconnection with the external environment.
2-Develop personal skills that allow students to learn independently.
3-Give students the ability to work in groups, developing interpersonal relationships as a way to improve their insertion in the job market and in life.
4-Incutir the concern for the quality and rigor in the acquisition of the basic concepts of these areas of knowledge, concepts that will allow to develop capacities of decision-making in the management of the available organizational resources.

Specific Skills:
1-Develop knowledge and understanding in the areas of Organizational Behavior, based on the knowledge acquired in class, in texts of the specialty and in research conducted by the students.
2-Provide the students with the ability to apply the knowledge acquired to solve specific problems and concrete cases of their daily life, thus understanding the world around them.
3-Create the capacity to collect, select and interpret relevant information in the Social Area, together with the capacity for analysis, synthesis and formulation of own opinions that will allow a more insightful participation in these areas of knowledge.

Program Contents

1 - ORGANIZATIONAL RESOURCES, MANAGERS AND MANAGEMENT
1.1 - The Organizational Resources
1.2 - Managers and Management

2 - INTEGRATED MANAGEMENT OF HUMAN RESOURCES
2.1 - The Three Fundamental Dimensions of Social Area - Individual, Work and Development
2.2 - The Five Basic Functions of the Social Subsystem. The Main Functions of the 5 Base Functions
2.3 - Study of Functions
2.4 - Recruitment and Selection of Personnel
2.5 - Performance Evaluation
2.6 - Vocational Training
2.7 - Legal framework of industrial relations

3 - ORGANIZATIONAL BEHAVIOR
3.1 - Introduction
3.2 - What do we talk about when we talk about Organizational Behavior?
3.3 - Levels of Analysis and Intervention in Organizational Behavior:
Individual; Group; Organizational, Interorganizational and Social.

4 - MOTIVATION
4.1 - Concept of Motivation and constituent elements
4.2 Theories about Human Nature
4.3 - Theories about Motivation:
4.3.1 - Content Theories: General and Organizational
4.3.2 - Process Theories: General and Organizational
4.4 - Motivation in Practice
4.5 - Some Recent Trends

5 - LEADERSHIP
5.1 - Concept of Leadership. Leadership vs. Management
5.2 - Leadership Styles. The Blake and Mouton Grid
5.3 - The Different Approaches:
5.4 - The Hersey and Blanchard Situational Leadership Model (HB)
5.5 - Choosing the Leadership Style in Companies
5.6 - The Future of Leadership Theories.
5.7 - Myths about Leadership.

6 - COMMUNICATION
6.1 - Concept of Communication, process and essential elements, effects of new technologies on the effectiveness of communications.
6.2 - Halo Effect and Rejection Effect.
6.3 - The formal and informal communication channels.
6.4 - Types of communication networks, advantages and disadvantages.
6.5 - Barriers to Communication. Communication Capacity Development.

Lecturer's signature:_____

7 - ORGANIZATIONAL CULTURE
7.1 - Concept of Organization Culture
7.2 - Culture of the organization and macroculture. Origins of organizational culture
7.3 - The cultural web of an organization. Types of cultures

8 - TRADING
8.1 - Concept of Negotiation and basic terms. The Current Importance of Negotiation.
8.2 - Preparation and Planning of a Negotiation. Business language.
8.3 - The four phases of the Negotiation.
8.4 - Techniques and tactics for negotiating. Negotiator's Weapons.
8.5 - Distributive Negotiation and Integration Negotiation.
8.6 - Multilateral team negotiation.

9 - CONFLICT MANAGEMENT
9.1 - Concept of Conflict. Interpersonal Relations and Conflict Management.
9.2 - Levels, types and categories of Conflicts.
9.3 - Prepare to Manage Conflicts. Negotiate the Conflict.
9.4 - Three Strategies and Ten Business Tactics.
9.5 - "The difficult art of managing conflicts" - analysis and discussion of E A Berg's article.

10 - OCCUPATIONAL STRESS
10.1 - Concept of Occupational Stress. Stress and Strain
10.2 - Stress as: Response; Stimulus; Interaction; Transaction
10.3 - Theoretical Models of Occupational Stress
10.4 - Background and Causes of Occupational Stress.
10.5 - Responses to Stress
10.6 - Negative Consequences of Stress: Individual and Organizational
10.7 - Organizational Stress Management Programs

Bibliography

BILHIM, João A. F. – Gestão Estratégica de Recursos Humanos – 3ª Ed. Lisboa, UTL ISCSP: 2007 ISBN: 972-8726-71-6
CÂMARA, Pedro; [et al.] – Humanator: Recursos Humanos e Sucesso Empresarial. Lisboa: Dom Quixote, 2000. ISBN: 972-20-1406-4
CUNHA, Miguel Pina; [et al.] – Manual de Comportamento Organizacional e Gestão – 3ª Ed. Editora RH, Lda. 2004 ISBN:972-98823-8-X
CUNHA, Miguel Pina; [et al.] – Manual de Gestão de Pessoas e do Capital Humano – 2ª Ed. Edições Sílabo, Lda. 2010 ISBN:978-972-618-568-0; Cota na Biblioteca do ISEC: 2A – 1 – 218

Notes and articles provided by the lecturer.

Access Conditions and Attendance Excuse

Those provided by the legislation. It is advisable to follow the subjects taught in class.

Conditions for Exam Admission

Those provided by the legislation.

Evaluation Method
Continuous assessment: constituted by realization and presentation of practical work valued in 5 (five) points/20 and by attending classes (minimum of 75% attendance). The frequency / final exam has a percentage weight of 75% (15 points/20). Students who cannot or do not wish to fall under the previous regime will be evaluated by a final exam, quoted for 20 values.
Final evaluation: final exam (quoted for 20 values). Written test – week 12. Project presentations – week 14.

Conditions for Results Improvement
Those provided for in the legislation in force, and cannot be carried out in the Normal Season.

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

17.1.2019

Lecturer's signature:_____

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher:_____

Licenciatura – BsC Engenharia e Gestão Industrial

Licenciatura – BsC Engineering and Industrial Management

Academic Year: **2018/2019**

Program Contents

Course Unit STRATEGY AND MARKETING

Specialization (s) N.A.

Subject type Specialty Sciences **Research Area**

Year 3rd **Semester** 2nd **ECTS** **6.0**

Working Hours

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

Unaccompanied Working Hours

Activity Type	Total Hours
Study	60
Works / Group Works	36
Project	
Evaluation	4
Additional	
	100

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	Silvino Dias Capitão	PhD	Coordinator Professor
Theoretical-Practical Lectures	Silvino Dias Capitão	PhD	Coordinator Professor
Practical-Laboratoty Lectures			
Tutorial Orientation			
Project			

Responsible(s) Lecturer (s) Silvino Dias Capitão

Goals

- Develop knowledge and comprehension skills in Strategy and Marketing;
- Develop the ability to apply the knowledge acquired in solving specific problems of business life, supported by their own arguments;
- Create the ability to collect, select and interpret relevant information in Strategy and Marketing, combined with the ability to analyse, synthesize and formulate opinions;
- Introduce a professional attitude in the development of their tasks by the knowledge acquired and the ability to understand their scope, applicability and opportunity in the face of specific day-to-day situations;
- Introduce strategic / marketing thinking into professional decisions made on a day-to-day basis.

Signature of Teacher:_____

Skills

General skills:

- To create and develop the ability to interpret and master basic concepts of Strategy and Marketing, to communicate themes of the relational and organizational area exposing ideas, problems, information and interconnection with the external environment;
- Develop personal skills that allow students to learn autonomously;
- Provide students with the ability to work in groups, developing interpersonal relationships to improve their insertion in the job market;
- Introduce the concern for quality and accuracy in the acquisition of basic concepts of these areas of knowledge to develop decision-making capacities in the management of the available organizational resources.

Specific skills:

- Provide students with the ability to apply their knowledge to solve specific problems and concrete cases of their daily life, thus understanding the world where they live.
- Create the capacity to collect, select and interpret relevant information in the Social Area, together with the capacity for analysis, synthesis and formulation of own opinions that will allow a more insightful participation in these areas of knowledge.

Program Contents

Strategy

1. STRATEGIC ANALYSIS

1.1. Fundamentals of business strategy
1.2. Mission, vision and strategy
1.3. Analysis of the environment
1.4. Internal analysis
1.5. SWOT analysis

2. COMPETITIVE STRATEGIES

2.1. Business strategy
2.2. Corporate strategies
2.3. Internationalization strategy
2.4. Restructuring strategy
2.5. Diversification strategy

3. IMPLEMENTATION OF THE STRATEGY

3.1. Organizational structure
3.2. Management Policy

Marketing

1. MARKETING CONCEPTS

1.1. Importance of marketing
1.2. Basic concepts
1.3. Business orientation to the market

2. UNDERSTANDING THE MARKETPLACE AND CONSUMER VALUE

2.1. Analizing the marketing environment
2.2. Market studies and information
2.3. Buyer behaviour

3. DESIGNING MARKETING STRATEGIES

3.1. Creating value for target customers
3.2. Segmentation and positioning
3.3. Product policy

3.4. Marketing channels
3.5. Pricing strategies
3.6. Communication strategy
3.7. Brand: building customer value

Bibliography

- Almeida, F. (2016). Introdução à Gestão de Organizações, 4ª Edição, Escolar Editora, Lisboa.
- Navas, J. (2015). *La Dirección Estratégica de la Empresa, Teoria y aplicaciones*. 5ª Edição, Civitas, Thomson Reuters.
- Santos, A. (2008). *Gestão Estratégica – Conceitos, modelos e instrumentos*. Escolar Editora, Lisboa.
- Teixeira, S. (2011). *Gestão estratégica*. Escolar Editora, Lisboa.
- Ferreira, B., Marques, H., Caetano, J., Rasquilha, L., Rodrigues, M. (2015). *Fundamentos de Marketing*, 3ª edição, Edições Sílabo, Lisboa.
- Kotler, P., Armstrong, G. (2018). *Principles of Marketing*. 17th edition, Pearson Global Edition.
- Kotler, P., Keller, K. (2012). *Marketing Management*, 14th edition, Pearson International Edition

Access Conditions and Attendance Excuse

Students are advised to systematically follow classes as a prerequisite to school achievement and to the correct understanding of the subjects.

Only students who have delivered the mandatory practical assignments in the established dates can access the exam (1st practical assignment: 2019/3/29; 2nd practical assignment: 2019/5/24).

Conditions of attendance excuse are generally not applicable, except in the specific cases defined by law.

Conditions for Exam Admission

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

Evaluation Method

• **Practical assignments** (**Pa**)

Two different practical assignments are mandatory and should be carried out in groups of up to 3 elements. These practical assignments will have a weight of **40%** in the final grade.

• **Exam**

Written (or oral) exam (**Ex grade**) at the end of the semester, weighing 60% in the final grade. Minimum grade required to pass: 7/20.

Calculation of the **Final Grade:**

Final Grade = 0.2 **Grade of Pa1** + 0.2 **Grade of Pa2** + 0.6 **Ex. Grade** (if **Ex. Grade** ≥ 7.0 points)
Final Grade = **Ex. Grade** (if **Ex. Grade** < 7.0 points)

Conditions for Results Improvement

The student who enrolls for classification improvement will do the exam to 20 points (minimum 7 points). The calculation of the final grade will be done by the rules indicated in "Evaluation methodology".

The component of the classification obtained for practical assignments cannot be improved in the current academic year.

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

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher: _____

Licenciatura – BsC Engenharia e Gestão Industrial (Português)

Licenciatura–BsC Engineering and Industrial Management (Inglês)

Academic Year: 2018/2019

Program Contents

Course Unit INDUSTRIAL SERVICES AND FACILITIES

Specialization (s)

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

Year 3rd **Semester** 2nd **ECTS** 6

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures	2	28
Theoretical-Practical Lectures	1	14
Practical-Laboratoty Lectures	1	14
Tutorial Orientation		
Project		
Total of Working Hours		156

Unaccompanied Working Hours

Activity Type	Total Hours
Study	70
Works / Group Works	24
Project	
Evaluation	6
Additional	

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	**António Luís** Pereira do **Amaral**	PhD	Adj.Professor
	David José Rocha Domingues	MSc	Adj. Professor
Theoretical-Practical Lectures	**António Luís** Pereira do **Amaral**	PhD	Adj.Professor
	David José Rocha Domingues	MSc	Adj. Professor
Practical-Laboratoty Lectures	**António Luís** Pereira do **Amaral**	PhD	Adj.Professor
	David José Rocha Domingues	MSc	Adj. Professor
Tutorial Orientation			
Project			

Responsible(s) Lecturer (s) **António Luís** Pereira do **Amaral**
David José Rocha Domingues

Goals

At the end of this course it is intended that students identify the main types of industrial facilities and master the basic characterization and selection of the most common equipment and systems in the process industry. It is intended that they acquire concepts and techniques of management of occupational health and safety services and environmental management.

Skills

Generally, the aim is to develop autonomous learning skills, to apply the knowledge acquired in solving real problems and in the collection and processing of information. Socio-relational and communication skills are also pursued in the presentation and discussion of the developed projects.

Signature of Teacher: _____

Program Contents

1.Typology of facilities: types; layouts; industrial licensing.
2. Boilers and Thermal Fluids: Characterization of boilers; Thermal Fluids; Steam Networks; Fuels.
3. Refrigeration and Cooling: Refrigerating equipment; Water cooling towers.
4. Compressed Air: Compressors and Distribution Networks.

5. Environmental Services and Management
5.1 - Air and gaseous effluents: Main gaseous pollutants; Environmental legislation on air and effluents; Treatment of industrial gaseous effluents;
5.2 - Water and liquid effluents: Main pollutants of the water environment; Environmental legislation on water and liquid effluents; Treatment of liquid effluents.
5.3 - Environmental Management Systems: The standard NP EN ISO 14001: 2015.
6. Safety Management and Services: Fundamentals of Occupational Health and Safety; Chemicals and REACH and CLP Regulations; The OHSAS 18001: 2007 / NP 4397: 2008 standard

Bibliography

- Juanico, F.M., Instalações Industriais, Principia, 1998
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- Norma NP EN ISO 14001:2015
- Guimarães Sá, J., Santos, João; de Sousa, Teresa Carvalho e de Sousa, Rita Ribeiro. Guia do Utilizador ISO 14001:2015. APCER 2016.
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- Nunes, F. M. D. Oliveira; Segurança e Higiene do trabalho - Manual Técnico, Edições Cooptécnica, 2ª edição, 2010 ISBN 9728326459
- Norma NP 4397:2008. Sistemas de gestão da segurança e saúde do trabalho.
- Segurado, Maria Tyssen e Oliveira, Rui. Guia Interpretativo OHSAS 18001:2007 / NP 4397:2008. APCER 2010

Signature of Teacher: _____

Access Conditions and Attendance Excuse
na

Conditions for Exam Admission

All students regularly enrolled in the course.

Evaluation Method

There are two types of evaluation: "distributed" and "exam".
"Distributed" evaluation:
1st part (chapters 1 to 4): test (predictably on 28/3/2019).
This test consists of one part without consultation and another part (problems) with consultation of the elements used in the classes of problem solving.
2nd Part (ch 5-6): test (predictably on 30/05/2019) and work, (to be carried out during the theoretical-practical and practical classes)

The two parts contribute equally to the final result.
Students who choose the "distributed" evaluation do not have access to the normal period exam.
In the "distributed" evaluation there is a minimum of 7.5 (in 20) in each of the assessment, testing and work items.

"Exam" evaluation:
-Final exam

Conditions for Results Improvement

By exam, acc rules.
In case of opting for the distributed evaluation, the students will only be able to make improvement of classification at the second exam call (or appeal period).

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

16-Jan-2019

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher:

Licenciatura – BsC Engenharia e Gestão Industrial

Licenciatura – BsC Industrial Engineering and Management

Academic Year: **2018/2019**

Contabilidade e Custos

Program Contents

Course Unit MANAGEMENT ACCOUNTING

Specialization (s)

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

Year 3 **Semester** 1 **ECTS**

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		156

Unaccompanied Working Hours

Activity Type	Total Hours
Study	52
Works / Group Works	
Project	42
Evaluation	6
Additional	

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	José Luís Ferreira Martinho	PhD	Professor Adjunto
Theoretical-Practical Lectures	José Luís Ferreira Martinho	PhD	Professor Adjunto
Practical-Laboratoty Lectures			
Tutorial Orientation			
Project			

Responsible(s) Lecturer (s) José Luís Ferreira Martinho

Goals

Management accounting is essential to control and measure organizational performance and assist the decision making process. The aim of the course is the preparation and interpretation by student of relevant information on the management accounting field.

Skills

At the end of this course students should be able to:
- Interpret the main financial statements.
- Understand the usefulness of management accounting.
- Understand different types of costs and their behavior.
- Understand the differences between the various costing systems
- Apply properly the main methods of determining the product cost in different industries.
- Work with standard cost.
- Understand the budgeting process and the variance analysis.
- Evaluate various alternatives and justify the proposed solutions.
- Prepare a written report and an oral presentation in a clear way, working in a group.

Program Contents

1. Financial Statements
   Economic and financial flows. Balance Sheet, Income Statement and Cash-flow statement. The limitations of financial information.
2. Financial and Management accounting.
   Cost classification and cost behavior. The cost of products and its components. Production overheads allocation. Costing systems: job and process costing. Cost centers method. Activity-based costing. Joint production costing. Spoilage, Rework and Scrap.
3. Budgeting and control.
   Standard costing and variance analysis.
4. From tableau de bord to Balanced Scorecard.

Bibliography

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- Atrill, P. e McLaney, E. - Accounting and finance for non-specialists, Prentice Hall, 5th ed , 2006.
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- Drury, C. - Management and cost accounting, Thomson Learning, cop., 5th ed, 2000.
- Fernandes, R. F. - Contabilidade para não contabilistas, Almedina, 2ª ed, 2008.
- Franco, Vitor - Contabilidade de Gestão I - O Apuramento dos Custos e a Informação de Apoio à Decisão, Publisher Team.
- Franco, Vitor - Temas de Contabilidade de Gestão - Os custos, os resultados e a informação para a Gestão, Livros Horizonte.
- Jordan, H.; Neves, J. C. e Rodrigues, J. A., O Controlo de Gestão ao Serviço da Estratégia e dos Gestores Controlo de Gestão - ao Serviço da Estratégia e dos Gestores, ÁreasEditora, 7ª ed., 2007.
- Nabais, C. e Nabais, F. - Prática Financeira I – Análise Económica e Financeira, Lidel, 5ª ed., 2009.

Access Conditions and Attendance Excuse

Those in the current rules.

Conditions for Exam Admission

Those in the current rules.

Evaluation Method

Options A:
- 2 tests during the semester (20%+20%)
- Attendance and participation in classroom (20%)
- Practical assignment, with report and presentation (40%)
- Average of 50% and minimum grade of 40% in all the evaluation parts.
- Minimum of 75% of attendance

Option B:
- Final exam (60%)
- Practical assignment, with report and presentation (40%)
- Average of 50% and minimum grade of 40% in all the evaluation parts.

Those who opt for the option A and fail have one single opportunity to do the final exam (2nd call).

Conditions for Results Improvement

Those in the current rules.

Date

11/09/2018

Signature from the lecturer responsible for the course

Degree in Mechanical Engineering

Academic Year 2018/2019

Course Unit Description

Course Unit INDUSTRIAL MAINTENANCE

Sientific Area Industrial Engineering and Management

Year 3 **Semester** 2 **ECTS** 4

Contact Hours

Type of Activity	Hour per Week	Total of Hours
Theoretical	2	28
Theoretical-Practical	2	28
Practical / Laboratory		
Tutorial guidance		
Project		

Self Working Hours

Type of Activity	Total of Hours
Self-study	70
Homework / Group Work	24
Project	
Evaluation	6
Other	

Total Working Hours 156

Teachers

Type of Activity	Name	Qualifications	Category
Theoretical	José Manuel Torres Farinha	PhD	Prof. Coordinator Principal
Theoretical-Practical	Hugo Nogueira Raposo	PhD	Equip. Prof. Adjunct
Practical / Laboratory			
Tutorial guidance			
Project			

Responsible Teacher José Manuel Torres Farinha

Learning Objectives

At the end of the Course Unit, the student must have acquired knowledge on:

- The concept of Maintenance and its evolutions, as well as the concepts associated with it;
- The organization and management of a maintenance department of a company industrial, of services, hospital, hospitality, or another one, where the component of equipment and facilities is relevant;
- The programming, accompaniment and control of the maintenance interventions;
- The use of techniques and methods of maintenance planning;
- The identification and application of some techniques of on-condition maintenance;
- The functioning of the information systems for maintenance management;
- The technical and management indicators and the elaboration of cockpit charts for aid the maintenance;
- The new management methodologies of the maintenance activity.

Outcomes and Competences

The abilities that the student will have to acquire in this course unit are the following ones:

- To know how to act in a Maintenance department, namely in the preparation and control of the Working Orders, planned and non planned;
- To know dialoguing with the several departments of the company that interact with the maintenance department;
- To know implementing a cockpit chart to aid the maintenance management and the company;
- To know looking for, by self initiative, the real solutions for the real problems of the maintenance;
- To know applying the new management techniques to the real problems of the maintenance activity.

Study Plan

1. **Framework and Maintenance Organization**
   The Maintenance Concept and associated concepts. The interdisciplinarity of the maintenance. The maintenance organization.
2. **Assets Organization**
   Definition of the structure of the Facilities and Equipment. Codification of the Facilities and Equipment.
3. **Types of Maintenance Works**
   Works of Planned Maintenance. Works of Non-Planned Maintenance. Works for maintenance improvement of facilities and equipment. Other types of Works.
4. **Maintenance Planning**
   Types of planned maintenance. Methods Function. The Five Levels of Planning. Algorithms for planning.
5. **Maintenance Resources**
   Human resources. Spare parts. Tools.
6. **Reliability**
   Basic concepts on reliability. Serial and parallel Systems. FMECA analysis.
7. **Vibration Analysis**
   Fourier series. Average and effective value. Spectral analysis. Applications.
8. **Information Systems for Maintenance**
   Importance of the information systems in the maintenance. Structure and functioning of an information system.
9. **Maintenance Costs**
   Direct and indirect Costs. Costs Optimization. Cost of Ownership of an Equipment. Cost of the Lyfe Cycle of an Equipment.
10. **Maintenance Standards**
    NP 4492/2010 and related norms: NP 4483:2009; NP EN 13269:2007; NP EN 13306:2007; NP EN 13460:2009; NP EN 15341:2009; CEN/TR 15628:2007.
11. **Maintenance Indicators**
    Elaboration of indicators. The Portuguese Norms indicators.
12. **Maintenance management methodologies**
    Toyota Production System (TPS); Just In Time; Jidoka (Poka Yoke, Andon). 5S. TPM (Total Productive Maintenance). Lean Maintenance; the seven Mudas. PDCA cycle. 6 Sigma. A3 Method. GUT Matrix. Ishikawa Diagram. Brainstorming. SWOT Analysis.

Method of Teaching and Learning
- Lectures by the teacher
- Exercises and case studies by students

Bibliography

- FARINHA, J. M. T. (2018): "Asset Maintenance Engineering Methodologies". CRC Press; 1 edition (May 29, 2018). English. Printed in USA. ISBN-10: 1138035890. ISBN-13: 978-1138035898
- FARINHA, J. M. T. (2011) - *Manutenção – A Terologia e as Novas Ferramentas de Gestão*. MONITOR, Lisboa, Portugal. ISBN 978-972-9413-82-7.
- FARINHA, J. M. T. (1997) - *Manutenção das Instalações e Equipamentos Hospitalares - Uma Abordagem Terológica*, Livraria Minerva, Coimbra, 1997. ISBN: 972-8318-16-2.
- FERREIRA, Luís Andrade (1998) - *Uma Introdução à Manutenção*, Publindústria, Porto. ISBN: 972-95794-4-X
- François Monchy (1989): La fonction Maintenance. Formation à la gestion de la maintenance industrielle. Paris: MASSON. ISBN: 2-225-85518-8. EAN: 9782225855184.

Conditions to attend the Course Unit

- According to the evaluation methodology and the general rules of ISEC.

Conditions to Acess Examination

- According to the evaluation methodology and the general rules of ISEC.

Assessment Methodology

- The evaluation of the course unit will be done by Final exam in the form of written test with a maximum duration of three hours.
- An evaluation component, with a maximum weighting of 25%, resulting from the intervention of the student at the class and or a homework; the evaluation criterions of this component will be defined at the beginning of the Semester.

Conditions to Improve Classification

- According to the evaluation methodology and the general rules of ISEC.

Date

September, 13th 2018

Teacher responsible for the Unit Course

José Manuel Torres Farinha

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher:_____

Licenciatura – BsC em Engenharia e Gestão Industrial (Português)

Licenciatura – BsC Engineering and Industrial Management
(Inglês)

Academic Year: **2018/2019**

Program Contents

Course Unit AUTOMATION AND INSTRUMENTATION

Specialization (s)

Subject type **Research Area** Electrotechnical Eng

Year 3 **Semester** 1 **ECTS** 6

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures	2	28
Theoretical-Practical Lectures		
Practical-Laboratoty Lectures	2	28
Tutorial Orientation		
Project		
Total of Working Hours		156

Unaccompanied Working Hours

Activity Type	Total Hours
Study	48
Works / Group Works	50
Project	
Evaluation	2
Additional	

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	João Paulo Morais Ferreira	PhD	Prof. Adj.
Theoretical-Practical Lectures			
Practical-Laboratoty Lectures	João Paulo Morais Ferreira	PhD	Prof. Adj.
Tutorial Orientation			
Project			

Responsible(s) Lecturer (s)
João Paulo Morais Ferreira

Goals

Familiarize students with the field of automation and instrumentation, particularly with measurement instruments, automatic systems and industrial sensors. Develop knowledge and understanding capacity to solve problems in the fields of industrial instrumentation and automation.

Skills

To develop knowledge and an understanding capacity in the fields of instrumentation and industrial automation;
Provide the student with the ability to apply the knowledge acquired in solving specific problems, supported by discussion and actions, please obtain your best continuous demand;
Endow the student's ability to work in groups, developed as interpersonal relationships.

Program Contents

1. Introduction to Instrumentation
1.1. Methods of measurement and errors associated
1.2. Measure instruments and their specifications
1.3. Calibration of instruments
1.4. Chain actuation and measurement

Signature of Teacher:_____

2. Introduction to systems acquisition
   2.1. Conditioning Signal
   2.2. Operational Amplifiers
   2.3. Signal conversion
      2.3.1. Digital - Analog
      2.3.2. Analog - Digital
   2.4. Interference in the acquisition systems
3. Sensors
   3.1. General characteristics and specifications
   3.2. Operation of the main transducers
4. Introduction to automation
   4.1. Industrial sensors and actuators
   4.2. logical systems
   4.3. Introduction to Automatic devices
      4.3.1. Grafcet level I and II
      4.3.2. Coding Grafcet in ladder
   4.4. PLCs high level
   4.5. Industrial Networks
   4.6. SCADA and HMI systems
5. Introduction to Robotics

Bibliography

[1] J.P. Ferreira, Apontamentos das aulas teóricas e práticas.
[2] Pires, J.N., "Automação Industrial", Lidel, Lisboa, Portugal, 2002, 2004 e 2007
[3] PROGRAMMING MANUAL - Programmable Controllers – SYSMAC CQM1/CPM1/CPM1A/SRM1
[4] Gustavo da Silva, Instrumentação. Industrial - 2ª edição

Access Conditions and Attendance Excuse
For students of special schemes, namely those under the Worker-Student Statute (Law no. 99/2003 and Law no. 35/2004), and for components with compulsory attendance and distributed assessment, it must be agreed between the person responsible for the curricular unit and the student, on the initiative of the student and at the beginning of the academic semester, a form of alternative operation of these components, when the student cannot attend them at the scheduled times.

Conditions for Exam Admission
Obtain a rating equal to or greater than 7 values from 0 to 20 values and have at most two faults in the practical component.

Evaluation Method
The practical works performed represent 40% of the final grade. The other 60% result from a written exam. In any of these evaluations it is necessary to obtain a classification equal to or greater than 7 values in 20 values. There are two opportunities to take the written examination exam, first call and appeal time, within the deadlines set by the Pedagogical Council. Each written exam will include theoretical and practical questions and will last 2 hours.

Conditions for Results Improvement
The improvement of classification will be carried out through an overall evaluation process, in order to allow improvement of all evaluation components. Through a research work to improve the practical component and final exam in one of the allowed times.

Date

14/9/2018

Signature from the lecturer responsible for the course

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher: _____

Licenciatura – BsC *Engenharia e Gestão Industrial* (Português)

Licenciatura – BsC *Industrial and Management Engineering* (Inglês)

Academic Year: **2018/2019**

Program Contents

Course Unit QUALITY MANAGEMENT

Specialization (s)

Subject type Compulsory **Research Area** Industrial Management

Year 3 **Semester** 1 **ECTS** 6.0

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		156

Unaccompanied Working Hours

Activity Type	Total Hours
Study	46
Works / Group Works	54
Project	
Evaluation	
Additional	

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	Belmiro Pereira Mota Duarte	PhD	Asso. Professor
Theoretical-Practical Lectures	Belmiro Pereira Mota Duarte	PhD	Asso. Professor
Practical-Laboratoty Lectures			
Tutorial Orientation			
Project			

Responsible(s) Lecturer (s) Belmiro Pereira Mota Duarte

Goals

Provide the students with the knowledge of a set of tools necessary to the implementation of a Quality Management System within a strategic policy of continuous improvement and innovation. The focus is in Quality Management and its related techniques, both in the area of procedural control and in the domain of process optimization. The learning outcomes are the:

1. Notion of the importance of the concept of Quality, its historical evolution and value in enterprise development policies;
2. Familiarity with the Quality Manual;
3. Ability to develop procedures to integrate in Quality Manuals;
4. Notion of integration between Quality, Strategy and Marketing;
5. Ability to interpret Quality tools, particularly statistical tools.
6. Ability to design quality control tools, particularly control charts and acceptance sampling plans.
7. Ability to use the 7M group of quality control tools.

Skills

- Ability to understand Quality Management Systems, design and use the main Quality tools in industrial environments.
- Ability to understand the models used in Quality Management Systems.
- Ability to design and use quality control tools.

Signature of Teacher:_____

Program Contents

1. Introduction Module to Quality Assurance
    - 1.1. Quality definitions
    - 1.2. Origin of Quality problems
    - 1.3. Myths of Quality
    - 1.4. Quality Models
    - 1.5. Historical perspective of Quality development
    - 1.6. Quality management system
    - 1.7. Consequences of bad Quality - economically, safety, image
    - 1.8. Quality Assurance Standards
    - 1.9. Total quality
2. Quality System Formalization Module
    - 2.1. Structure of the Quality Manual
    - 2.2. Management responsibility
    - 2.3. Quality System resources
    - 2.4. Documentation
    - 2.5. Quality planning
    - 2.6. Preparation of the Quality and Procedures Plan of the QMS
    - 2.7. Product Design control
    - 2.8. Documentation control
    - 2.9. Provisioning
    - 2.10. Process control
    - 2.11. Inspection and testing
    - 2.12. Nonconformity control
    - 2.13. Corrective and preventive actions
    - 2.14. Internal Quality Audits
    - 2.15. Formation
    - 2.16. Statistical techniques
    - 2.17. Acceptance by sampling
    - 2.18. Statistical control of the process
    - 2.19. Costs of Quality - Dynamic Perspective
3. Integration Module of the Quality Function in Management
    - 3.1. Notion of the life cycle of the QMS
    - 3.2. Quality Assurance and Management
    - 3.3. Quality and competitiveness
    - 3.4. Quality and strategy
    - 3.5. Innovation vs. Continuous improvement
4. Product Acceptance Module based on sampling plans
    - 4.1. Sampling Plans for Attributes
    - 4.2. Sampling plans based on operating curves
    - 4.3. Standard sampling plans
    - 4.4. Sampling plans for variables
    - 4.5. Sampling plans based on operating curves
    - 4.6. Standard sampling plans
5. Quality Tools Module
    - 5.1. Check Sheets
    - 5.2. Histograms
    - 5.3. Pareto diagrams
    - 5.4. Diagrams of "fishbone"
    - 5.5. Trend graphs
    - 5.6. Flowcharts
    - 5.7. Control charts
        - 5.7.1. Charts for attributes
        - 5.7.2. Charts for variables
        - 5.7.3. Nonconformity detection rules
        - 5.7.4. Charts of known and unknown pattern
        - 5.7.5. Related searches
        - 5.7.6. Operating curve and performance parameters
    - 5.8 Reliability studies
        - 5.8.1. R&R studies

Signature of Teacher:

Bibliography

1. Bank, J., "Qualidade Total - Manual de Gestão", 2a. ed., Edições CETOP, Portugal (1998)
2. Duarte, B., "Apontamentos de Optimização e Estratégias de Qualidade", Instituto Superior de Engenharia de Coimbra, Coimbra (2000)
3. Ganhão, F.N., Pereira, A., "A Gestão da Qualidade – Como Implementá-la na Empresa", Editorial Presença, Lisboa (1992)
4. Juran, J.M., Gryna, F.M., "Quality Planning and Analysis", 3rd. ed., MacGraw-Hill, Inc., New York (1993)
5. Mitra, A., "Fundamentals of Quality Control and Improvement", 2nd. ed., Prentice Hall, Inc., New Jersey (1998)
6. Montgomery, D.C., Runger, G.C., "Applied Statistics and Probability for Engineers", John Willey & Sons, Inc., New York (1994)
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9. Wadsworth, H.M., Stephens, K.S., Blanton Godfrey, A., "Modern Methods for Quality Control and Improvement", John Willey & Sons, Inc., Singapore (1986)

Access Conditions and Attendance Excuse
Not applicable.

Conditions for Exam Admission
There are no limitations on access to the normal period exam. Regarding the examinations of the remaining calls, the rules stipulated by the ISEC are followed.

Evaluation Method
Exam quoted for 20 points. Exceptionally, and by the will of the students, they will be able to carry out small homeworks such as the structuring of procedures to be included in the quality management system and the design of acceptance plans. These works will be worth 3.75 values each.

Conditions for Results Improvement
Not applicable.

Date

30.09.2018

Signature from the lecturer responsible for the course

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher:

Licenciatura – BSc Engenharia e Gestão Industrial(Português)

Licenciatura – BSc Engineering and Industrial Management(Inglês)

Academic Year:2018/2019

Program Contents

Course Unit OPERATION MANAGEMENT II

Specialization (s)

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

Year 3rd **Semester** 1st **ECTS** 6

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		156

Unaccompanied Working Hours

Activity Type	Total Hours
Study	94
Works / Group Works	
Project	
Evaluation	6
Additional	

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	David José Rocha Domingues	MSc	Ad. Prof
Theoretical-Practical Lectures	David José Rocha Domingues	Msc	Ad.Prof
Practical-Laboratoty Lectures			
Tutorial Orientation			
Project			

Responsible(s) Lecturer (s) David José Rocha Domingues

Goals

This curricular unit aims to provide students with concepts of production, operations and project planning, as well as new approaches to production management.

Skills

At the end, the student should identify the different planning horizons and the procedures to be applied in each case. It must anticipate needs, plan and scale resources, ensuring compliance with targets and optimizing operations. They should apply project planning and control techniques. They must know the different philosophies of production management. Generally, the aim is to develop problem analysis and skills by applying the knowledge acquired.

Signature of Teacher:

Program Contents

1. AGGREGATE PLANNING
   1.1 Planning horizons: strategic, aggregate and operational
   1.2 Aggregate Planning and Master Production Scheduling
   1.3 Strategies of Aggregate Planning
   1.4 Costs and Aggregate Planning
   1.5 Mathematical models with linear programming

2. PROGRAMMING IN INTERMITTENT AND CONTINUOUS SYSTEMS
   2.1 Scheduling with Heuristics
   2.2 Performance Evaluation
   2.3 Balancing of assembling lines
   2.4. Heuristics in Continuous Programming
   4.5 Theory of waiting queues

3. PROGRAMMING AND MANAGEMENT OF MATERIALS-Dependent demand
   4.1 Dependent demand and product structure
   4.2 MRP Material Requirements Planning
   4.3 CRP Capabilities Planning
   4.4 Evolution and Integration of Information Systems

4. PROGRAMMING AND MANAGEMENT OF MATERIALS-Independent Demand
   4.1 Stock management, characteristics and ABC classification
   4.2 Costs in stock management
   4.3 Deterministic models of supply with continuous demand: model of economic order quantity with instantaneous and continuous supply and with quantity discounts.
   4.4 Models for Discrete Demand
   4.5 Stochastic Models and Safety Stock
   4.6 Continuous Revision Models and Reorder Point
   4.7 Cyclical review models

5. PROJECT PLANNING AND CONTROL
   5.1 Characteristics and constraints of a project
   5.2 Planning and control techniques: network and critical path determination
   5.2 The CPM
   5.3 PERT and resource management

6. NEW PRODUCTION MANAGEMENT METHODS
   6.1 The synchronized production JIT (Just-In-Time)
   6.2 Lean Tools: 5S, SMED, TPM
   6.3 Synchronizing production with demand
   6.4 Characterization of Lean systems
   6.5 Value Stream Mapping

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LISBOA,J. V., GOMES,C.F.; Gestão de Operações; Vida Económica; 2ªEd, 2008

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HILLIER,F.,S.,LIEBERMAN, G.J.,Introduction to Operations Research, McGraw-Hill

STEVENSON, W.J., Production / Operations Management, Irwin-McGraw-Hill

Signature of Teacher:_____

Access Conditions and Attendance Excuse

Not applicable

Conditions for Exam Admission
All students regularly enrolled in this UC

Evaluation Method

There are two ways of assessment: discrete and by exam.

Discrete Assessment:
• Two tests weighted at 50% each, predictably at 14/11/2018 and 19/12/2018

Assessment by exam:
• Final exam

Conditions for Results Improvement

By final exam acc regulatory terms

Date

10-Sept-2018

Signature from the lecturer responsible for the course

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher:_____

Licenciatura – BsC Engenharia e Gestão Industrial

Licenciatura – BsC Industrial Engineering and Management

Academic Year: **2018/2019**

Program Contents

Course Unit INTRODUCTION TO MANUFACTURING TECHNOLOGIES

Specialization (s)

Subject type Eng. Sciences **Research Area** Mechanical Engineering

Year 2st **Semester** 2st **ECTS** 6

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures	2	28
Theoretical-Practical Lectures	1	14
Practical-Laboratory Lectures	1	14
Tutorial Orientation		
Project		

Unaccompanied Working Hours

Activity Type	Total Hours
Study	97
Works / Group Works	
Project	
Evaluation	3
Additional	

Total of Working Hours 156

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	João Miguel Maia Carrapichano	PhD	Coord. Prof.
Theoretical-Practical Lectures	João Miguel Maia Carrapichano	PhD	Coord. Prof.
Practical-Laboratory Lectures	João Miguel Maia Carrapichano	PhD	Coord. Prof.
Tutorial Orientation			
Project			

Responsible(s) Lecturer (s) João Miguel Maia Carrapichano

Goals

To know in general the different classes of the engineering materials, as well as their most relevant properties or parameters, and fields of application.
Know the different manufacturing processes and equipment used in the production of components, especially for mechanical equipment, with special focus on manufacturing technologies used in metallic and polymeric materials.
Determine dimensions with the main measuring instruments used in mechanical components.

Skills

Know the properties and application fields of a wide variety of engineering materials.
Know and be able to use technological processes of manufacture.
Know different conventional and computerized machining processes involving equipment, tools, cutting parameters and programming.
Know and be able to use the main measuring instruments used in mechanical components.
Interpret technical drawings containing manufacturing specifications.
Know the main welding processes and equipment's.

Signature of Teacher:_____

Program Contents

Materials and processing. Classes of materials - metals, ceramics, polymers and composites. General material properties and parameters.
Metallic materials: properties and mechanisms of plastic deformation. Technological processes of forming and manufacturing (general designations and characteristics) - casting, chemical processes, deformation and powders metallurgy.
Metallic materials processing - conformation by plastic deformation processes: rolling mill, extrusion, drawing and deep drawing processes. Casting systems.
Polymeric materials processing. Processing techniques: extrusion; injection; blow molding; tubular film casting; rotational molding; compression; thermoforming.
Dimensional metrology. Accuracy, resolution and repeatability. Principle of operation of measuring devices used in projects of mechanical components. Standard blocks and calibers. Dimensional and geometric tolerance. Adjustments. Enrolment of tolerated dimensions. Surface status inscription. Execution of measurement operations with different instruments. Interpretation of technical drawings containing manufacturing specifications.
Machine-cut cutting operations. Conventional machine tools and controlled by computer. Nomenclature of system axis. Sawing, drilling, tapping, turning, milling, grinding and boring operations. Cutting tools and parameters. Execution of machining operations with different equipment.
Welding. Classification of welding processes. Visualization of weld beads executed in different types of materials and by different processes of welding. Welding defects and inspection tests. Preparation of joints: Terminology, types of joints.

Bibliography

William F. Smith, Javad Hashemi, Fundamentos de Engenharia e Ciência dos Materiais, McGraw Hill Brasil, 2013, ISBN 8580551153, 9788580551150
Jorge Rodrigues, Tecnologia Mecânica: Tecnologia da Deformação Plástica, Vol. I (Fundamentos Teóricos) e Vol. II (Aplicações Industriais), 2ª Edição, Escolar Editora, 2010
Vicente Chiaverini – Tecnologia Mecânica, Vol II, Makron Books, 1986, ISBN 9780074500903
A. Completo e outros - Tecnologias de Fabrico, Publindústria, 2009. ISBN: 9789728953317
J.M. Simões Morais – Desenho Técnico Básico, III Volume, Porto Editora, 2007
L. Veiga da Cunha – Desenho Técnico, Fundação Calouste Gulbenkian, 2000
J. Paulo Davim - Princípios da Maquinagem, Almedina, Coimbra, 1995. ISBN: 972-40-0878-9
J. Santos, F. Oliveira, L. Quintino, Processos de Soldadura, Vol I e II, Instituto de Soldadura e Qualidade, 1993
Supporting texts provided by the teacher (s).

Access Conditions and Attendance Excuse

According to general rules used in the school.

Conditions for Exam Admission

According to general rules used in the school.

Evaluation Method

Final written exam grade (0-20) according to official school regulations and marked days. *To Erasmus student's progress assessment can be established by lectures as complementary meetings in English language, to develop parallel written project work in a predefined subject, with individual final presentation and discussion, complemented the final written exam*.

Conditions for Results Improvement

Improving grades or retaking exams is allowed, according to general rules of the course and used in the school.

Date	**Signature from the lecturer responsible for the course**
18.01.2019	

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher:

Licenciatura – BsC Engenharia e Gestão Industrial

Licenciatura – BsC – Engineering and Industrial Management

Academic Year: **2018/2019**

Program Contents

Course Unit APPLIED ELECTRONICS

Specialization (s) Common Formation

Subject type Mandatory **Research Area** Electrical Engineering

Year 2nd **Semester** 2nd **ECTS** 6

Working Hours

Activity Type	Working Hours Per Week	Total Hours
Theoretical Lectures	2	28
Theoretical-Practical Lectures		
Practical-Laboratory Lectures	2	28
Tutorial Orientation		
Project		
Total of Working Hours		156

Unaccompanied Working Hours

Activity Type	Total Hours
Study	69
Works / Group Works	28
Project	
Evaluation	3
Additional	

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	António Luis Ferreira Marques	MsC	Prof. Adjunto
Theoretical-Practical Lectures			
Practical-Laboratory Lectures	António Luis Ferreira Marques	MsC	Prof. Adjunto
Tutorial Orientation			
Project			

Responsible(s) Lecturer (s) António Luis Ferreira Marques

Goals

Know and understand the functioning of the various semiconductor devices and its application in simple electronic systems.
To know and understand various types of electronic power converters.
Analysis and design of electronic circuits of basic to medium complexity is also a goal to achieve.

Skills

Know and understand the operation of semiconductor devices (Diode, BJY and FET).
Analyze and understand the features and technical specifications of the components used in electronic circuits.
Analyze, Design and Implement analog electronic circuits of basic to medium complexity .
Know and understand electronic devices functioning as power switches.
Know working principles of power converters, namely DC-DC type.
Use simulation tools (Spice).
Know and use correctly test and measurement equipment.
Develop the ability to do group work and to write technical reports.

Program Contents

1. Semiconductor Diodes and Applications
2. Bipolar Junction Transistors and DC Biasing. Application circuits.

3. Field Effect Transistors and DC biasing. Application circuits.
4. Operational amplifiers and circuits.
5. Electronic devices used in power electronics.
6. Circuits for power conversion (DC-DC, AC-DC and DC-AC).

Bibliography

Robert Boylestad e Louis Nashelsky, *Dispositivos Electrónicos e Teoria dos Circuitos*, 11ª Edição, Prentice-Hall do Brasil, 2013

Stanley G. Burns e Paul. R. Bond, *Principles of Electronics Circuits*, Second Edition, PWS Publishing Company

Albert Malvino, *Princípios de Electrónica*, Vol. 1 e 2, Sétima Edição, McGraw-Hill, 2007

Albert Malvino and David Bates, *Electronic Principles* (8th Edition), McGraw-Hill Education, 2015

Ned Mohan, Tore M. Undeland, William P. Robbins, *Power electronics: converters, applications, and design (3rd Edition)*, John Wiley & Sons, 2002.

Muhammad H. Rashid, *Power electronics: devices, circuits and applications (4th Edition)*, Prentice Hall, 2018.

Slides covering topics used in theoretical classes.

Tutorial on using Spice simulator.

Exercise sheets.

Access Conditions and Attendance Excuse

Those provided by ISEC evaluation regulation.

Conditions for Exam Admission

Obtain a minimum of 2.5 points in laboratory evaluation.

Maximum of two absences in laboratory lectures.

The conditions of access are valid for all examination periods.

Evaluation Method

Final Exam (15 points)
Laboratory Works – pré-lab plus report (5 points)

Conditions for Results Improvement

It is only possible to improve the component evaluated by exam, in accordance with the regulations of ISEC.

Date

21.Januray.2019

Signature from the lecturer responsible for the course