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 ECTS catalogue includes subject contents in English. The 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 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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Code 6069010- MASTER Informatics and Systems Course

Code	Title - Portuguese	Title – English	ECTS	Period
1.º ano / 1st Year				
60014591	Metodologias de Desenvolvimento de Software	Software Development Methodologies	7.5	1º Semester
60014605	Design e Arquitecturas de Software	Software Architecture and Design	7.5	1º Semester
60014616	Plataformas de Desenvolvimento	Development Platforms	7.5	1º Semester
60014627	Análise de Requisitos	Requirements Engineering	7.5	1º Semester
690105	Engenharia e Gestão de Sistemas de Informação	Information Systems Management and Engineering	7.5	2º Semester
690106	Testes e Qualidade de Software	Test and Software Quality	7.5	2º Semester
690108	SSD+CU+LE1	Decision Support Systems	7.5	2º Semester
690107	Projecto de Software	Software Project	7.5	2º Semester
2.º ano / 2nd Year				
60014684	Seminários Industriais	Industrial Seminars	7.5	1º Semester
690115	Bioinformática	Bioinformatics	7.5	1º Semester
60014745	Data Warehousing	Data Warehousing	7.5	1º Semester

Signature of Teacher: Ana Rosa Borges

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Mestrado em Informática e Sistemas
Ramo de Desenvolvimento de Software
Ramo de Tecnologias da Informação e do Conhecimento

Informatics and Systems Master
Software Development Branch
Information and Knowledge Technologies Branch

Academic Year: 2018/2019

Program Contents

Course Unit DECISION SUPPORT SYSTEMS

Subject type Elective **Research Area** Computer Science

Year 1 **Semester** 2 **ECTS** 7,5

Working Hours

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

Unaccompanied Working Hours

Activity Type	Total Hours
Study	91,5
Works / Group Works	45
Project	
Evaluation	2,5
Additional	

Total of Working Hours 195

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	Ana Rosa Pereira Borges (arborges@isec.pt)	PhD	Profª. Coordenadora
Theoretical-Practical Lectures			
Practical-Laboratoty Lectures	Ana Rosa Pereira Borges (arborges@isec.pt)	PhD	Profª. Coordenadora
Tutorial Orientation			

Responsible(s) Lecturer (s) Ana Rosa Pereira Borges (arborges@isec.pt)

Goals / Skills

It is intended to foster in students the minimum competencies that enable them to understand the key concepts in the area of decision support systems and methodologies of optimization.
The main aim of this curricular unit is to provide students with the minimum necessary concepts to a specialist who can serve as an interface between a System Decision Support and the "staff" of a company. On the other hand, the student must be able to implement a SAD itself.
The knowledge acquired can be applied in solving similar algorithms/problems in a real context.

Learning outcomes of this curricular unit:
1- Understand the importance of decision support systems and the main concepts related with decision support systems.
2- Identify different types of decision problems and distinct types of optimization methodologies.
3- Identify the suitable algorithm that can be used to solve a simple decision problem.
4- Solve simple practical problems using the appropriate optimization algorithms and interpret the obtained solution(s).
5- Encourage the autonomous study and research work.

Signature of Teacher: Ana Rute Boyn

Program Contents

- Linear programming with a single objective (revisions)
- Decision linear programming problems with multiple objectives
- Decision linear goal programming problems
- Uncertainty in linear programming problems
- Dynamic programming

Work Done

Individual **Research** *written* **work or Computational implementation to be done:**

Carry out a research work that allows students to deepen some of the topics in the area of Decision Support Systems, and the development of their scientific, research and investigation competences (individual work).

In order to carry out this work, the student will have to search for an appropriate bibliography and do an autonomous study.

Depending on the type of research work chosen, case studies or applications developed within the scope of study may also be presented.

The work, which will consist of a written report, and for works with a classification of more than 16 values of an oral presentation followed by some questions (discussion), will enable to test the ability to communicate (written and/or oral) and critical argumentation of each student.

The presentation (and discussion) of the work is required to works with a rating higher than 16 points. The no-show presentation/discussion of work, corresponding to the assignment of the classification of 16 points in this work component. The presentation/discussion referred to above will focus not only on the content of the respective work, but also in others taught in the course unit. It is scheduled for the afternoon of the day of the 1st Call final examination exam (or on a date to be agreed between the teacher and students, but never after 48 hours following the day of the 1st Call final examination exam).

The themes of student research work should be defined as early as possible.
In addition to the topics to be proposed by the teacher, others may be proposed by the students, which will be later validated by the teacher.

Some Proposed Topics

1 - Group Decision Support Systems
2 - Qualitative aspects of the decision-making process
3 - Decision aide versus decision support
4 - Some examples of decision support systems (different specific areas can be studied by different students)

As an alternative to the **Research Work**, the student can choose to perform the computational implementation of one of the approaches taught during the classes of the Curricular Unit (chosen between the student and the teacher, as soon as possible). This **computational implementation work** can be individual or group work, with a maximum of 2 elements.

Students must **submit the work in moodle** - (**untir** 11h30 p.m. on **9/6/2019**)
(a report with +/- 7500 words)

- The **delivery date** of the work (**06/09/2019**) **is unique** and valid for all final examination exam Calls (NORMAL, RECURSO ou ESPECIAL) that students be subject to assessment by final exam.

Teaching Methododoly

The lectures are expository (using chalkboard and Power-Point projections) but tend to promote the active participation of students, either by asking questions, either through the resolution of exercises involving the application of the topics being exposed.
In theoretical-practical classes the knowledge acquired in lectures is applied by resolution of exercises.
It is necessary an individual study of students out of class (for better monitoring of lessons).

Bibliography

Notes, slides and various content, used in class *(available in moodle)*

"Programação Linear multiobjectivo: do modelo de programação linear clássico à consideração explícita de várias funções objectivo"
Clímaco J. N.., Antunes C.H. e Alves M. J.
Coimbra – Imprensa da Universidade, 2003

"Introduction to Operations Reasearch" – 9th Edition
Hillier, F.S. , Liberman, G.J.
McGraw-Hill, 2009

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

"Programação Linear" (Volumes I e II)
Ramalhete M., Guerreiro J., Magalhães A.
McGraw-Hill, 1985

"Investigação Operacional" (Volumes 1 e 2)
Manuela Hill, Mariana Santos
Edições Silabo, 1999

"Investigação Operacional"
Tavares, L.V., Oliveira, R. C., Themido, I. H., Correia, F.N.
McGraw-Hill,1996

"Decision Support Systems & Intelligent Systems"
Turban, Efraim, Aronson, Jay E.
Prentice Hall, 6th edition, 2000

"Investigação Operacional"
Tavares, L.V., Oliveira, R. C., Themido, I. H., Correia, F.N.
McGraw-Hill,1996

"Abordagens interactivas para tratamento da incerteza em modelos de optimização multiobjectivo para apoio à decisão"
Borges, A. R., Dissertação de Doutoramento. Faculdade de Ciências e Tecnologia da Universidade de Coimbra, 2005.

"Programação Linear Difusa" Borges, A. R., Lição proferida no âmbito das Provas Públicas para Professor Coordenador, Instituto Superior de Engenharia de Coimbra, 2016.

Evaluation Method

Students can choose **four** *different* ***assessment methods***:

1) Final evaluation
   a) Writen Final Evaluation (14 points), covering all subjects
      +
      - Individual research work OR computational implementation work (6 points).

      Mandatory minimum of 30% in the writen Final Evaluation.
   b) Writen Final Evaluation (20 points), covering all subjects

      ✓ The best grade is guaranteed between:
      - Writen Final evaluation
      - Writen Final evaluation + work

2) Continuous Assessment,
   a) two (2) Written Evaluation Tests to be carried out during the semester (7 points + 7 points), covering all the subjects taught until the day of the test
      +
      - Individual research work OR computational implementation work (6 points).
   b) two (2) Written Evaluation Tests to be carried out during the semester (10 points + 10 points), covering all subjects covering all the subjects taught until the day of the test
      Mandatory minimum of 30% in each evaluation Test.

      ✓ The best grade is guaranteed between:
      - Written Evaluation Tests
      - Written Evaluation Tests + work

The **approval requires** a grade greater than or equal to 9,5 ([0, 20]).

- The 1st evaluation test will be held in the class on 02/05/2019
- The date of the 2nd evaluation test (the last one) coincides with the date of the 1st Call final examination exam.
- Mandatory minimum of 30% in each evaluation Test.
- 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 Continuous assessment method will be automatically dismissed from assessment by final evaluation.
- Continuous Assessment grades of approved students will be posted in the 1st call evaluation grade list.

Conditions for Exam Admission

All students can access the exam.

Signature of Teacher: Ana Rosa Borja

Access Conditions and Attendance Excuse

N:A:

Conditions for Results Improvement

No restriction is placed, and the improvement of the grade to the discipline is possible according to the evaluation rules of the school.

Ana Rosa Borja

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

January 22th, 2019

Instituto Superior de Engenharia de Coimbra
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Signature of Teacher:

Mestrado em Informática e Sistemas
Ramo de Desenvolvimento de Software

Informatics and Systems Master
Software Development Branch

Academic Year: 2018/2019

Program Contents

Course Unit SOFTWARE PROJECT

Subject type Mandatory **Research Area** Computer Science

Year 1 **Semester** 2 **ECTS** 7,5

Working Hours

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

Unaccompanied Working Hours

Activity Type	Total Hours
Study	35
Works / Group Works	104
Project	
Evaluation	
Additional	

Total of Working Hours 195

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	João Cunha	PhD	Coordinator Professor
Theoretical-Practical Lectures			
Practical-Laboratoty Lectures	João Cunha	PhD	Coordinator Professor
Tutorial Orientation			

Responsible(s) Lecturer (s) João Cunha

Goals / Skills

The main objective of this course is to provide knowledge, understanding and practice on software processes and project management and development as an engineering activity.
This course is concerned with software processes and the knowledge about the planning, organization, and monitoring of all software life-cycle phases.
In this course, students participate in the definition of software processes and the development of a software project, being involved in all activities such as project management, requirements analysis, architecture, implementation, and quality assurance. Questions related to communication, group dynamics, or professional practice are also handled.
Software processes are defined, assessed and improved.

Program Contents

Definition, evaluation and improvement of software processes; project planning; project monitoring and control; quality assurance; requirements definition and specification; prototypes; formal specification; reliability and safety; verification and validation; maintenance; reuse; group dynamics; risk management.

Signature of Teacher:_____

Work Done

There will be three practical works:

1. Processes definition. This assignment consists of the definition and design of the necessary processes to carry out the software project. The work will be performed by teams with about 6-8 members. Expected delivery and due date: 3/25/2019
2. Execution of a software project, following the previously defined processes, as well as good software engineering practices, related in particular to management (design, quality, risk), analysis, design, implementation and testing. This assignment will be performed by the same teams. Expected delivery and presentation date: exam day.
3. Process assessment and improvement. Each student should focus on an aspect of the processes in use, in order to measure, assess and improve. Expected delivery and presentation date: exam day.

Teaching Methododoly

The theoretical classes will be to present the topics, and for milestones reviews or sprint reviews.
The practical classes will be used for progress meetings, monitoring the progress of the project teams.
The projects will be developed mainly outside of the classes, although, at certain times, they may be partially realized during the lessons.
Students who, due to professional or other valid reasons, are unable to attend classes, can follow progress meetings through video conference.

Bibliography

- Pankaj Jalote, Software Project Management in Practice, Addison-Wesley, 2002
- Andrew Stellman, Jennifer Greene, Applied Software Project Management, O'Reilly, 2006
- Henrik Kniberg, Scrum and XP from the Trenches - 2nd edition, InfoQ, 2015
- Several papers

Evaluation Method

Grades are based on:

1. Process definition: 4 points
2. Project execution: 12 points
3. Processes analysis and improvement: 4 values

Assignments 1 and 2 are performed in teams, however the grades are individual, based on student performance during the assignment, including all contributions in the production of artifacts, writing progress reports and active participation during classes and discussions in forums.
Assignment 3 is individual.
There will be no written exam.

Conditions for Exam Admission

There will be no exam.

Access Conditions and Attendance Excuse

There will be no attendance excuse.

Conditions for Results Improvement

None. The project will end by the established deadlines.

Date	Signature from the lecturer responsible for the course
23/1/2019	

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Signature of Teacher:

Mestrado em Informática e Sistemas
Ramo de Desenvolvimento de Software

Informatics and Systems Master
Software Development Branch

Academic Year: 2018/2019

Program Contents

Course Unit TEST AND SOFTWARE QUALITY

Subject type Mandatory **Research Area** Computer Science

Year 1 **Semester** 2 **ECTS** 7.5

Working Hours

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

Unaccompanied Working Hours

Activity Type	Total Hours
Study	47
Works / Group Works	90
Project	
Evaluation	2
Additional	

Total of Working Hours 195

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	Jorge Miguel Sousa Barreiros	PhD	Professor Adjunto
Theoretical-Practical Lectures			
Practical-Laboratoty Lectures	Jorge Miguel Sousa Barreiros	PhD	Professor Adjunto
Tutorial Orientation			

Responsible(s) Lecturer (s) Jorge Miguel Sousa Barreiros

Goals / Skills

Understanding the role of testing in the software development process.
Understanding the concepts of error, failure, fault and other relevant concepts.
Knowing and using test tools
Analyzing and extracting models based on graphs, logic models, input partitioning and syntax models for testing purposes.
Knowing and understanting model.based testing
Defining test requirements
Creating tests, based on test requirements

Signature of Teacher:

Program Contents

1- Introduction
2-Structural models and critera
3 Logic models and criteria
4 – Input space partitioning models and criteria
5- Syntax based models and criteria
6 – Practical considerations

Work Done

3 Mini projects, to be done in and out of classes, and also a presentation on a selected topic, with identical classification weight. Projects take place in last letive weeks of april, may and june.

Teaching Methododoly

Concept description and analysis in theoretical classes and complemented by application exampes in lab classes. Mini projects are also partially done in lab classes..

Bibliography

Theoretical slides:

Ammani & Offutt, "Introduction to Software Testing", Cambridge University Press

Evaluation Method

Exam (12 points)
Mini-projects (8 points)

Conditions for Exam Admission

N/A

Access Conditions and Attendance Excuse

N/A

Conditions for Results Improvement

The exam can be improved according to the general rules in effect l.

Date	Signature from the lecturer responsible for the course
24-01-19	

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Signature of Teacher:_____

Mestrado em Informática e Sistemas
Ramo de Desenvolvimento de Software
Ramo de Tecnologias da Informação e do Conhecimento

Informatics and Systems Master
Software Development Branch
Information and Knowledge Technologies Branch

Academic Year: 2018/2019

Program Contents

Course Unit ENGINEERING AND MANAGEMENT OF INFORMATION SYSTEMS

Subject type mandatory **Research Area** Computer Science

Year 1 **Semester** 2 **ECTS** 7.5

Working Hours

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

Unaccompanied Working Hours

Activity Type	Total Hours
Study	55
Works / Group Works	80
Project	
Evaluation	4
Additional	

Total of Working Hours 195

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	Fernanda Brito Correia	Master (8 years-previous Bologne)	Prof. Adjunta
Theoretical-Practical Lectures			
Practical-Laboratoty Lectures	Paulo Miguel Mariano	Master (7 years-previous Bologne)	Assistente
Tutorial Orientation			

Responsible(s) Lecturer (s) Fernanda Brito Correia

Goals / Skills

Teach knowledge so that students acquire the ability to prepare a study of Information Systems planning in an organization comprising all the components that should be taken into account in this planning.

Competences

Objectives/ learning goals

Knowledge and Understanding

A.1. Understanding the importance of information management in organizations.
A.2. Understand key concepts related to an organization's business model, its processes and information architecture.

Signature of Teacher:

A.3. Understanding the dynamic and evolutionary nature of Information Systems (IS) in organizations.
A.4. Identify and describe the main types of IS / IT in organizations.
A.5. Identify and describe the main approaches and methods of Information Systems planning (ISP).
A.6. Describe the main methodologies for managing and evaluating the impacts of IS / IT in Organizations.
A.7. Understand the significance of business process reengineering.

Application of Knowledge and Understanding

B.1. Analyze and describe the business processes of an Organization and the corresponding Information needs.
B.2. Analyze and describe the IS / IT of an organization.
B.3. Describe the information architecture of an organization.
B.4. Analyze the main shortcomings of an organization's IS / IT.
B.5. Propose guidelines for the evolution of an existing IS.

Knowledge Integration and Judgment

C.1. Justify the main options taken in carrying out the work of ISP in an organization.
C.2. Propose and justify changes to an organization's business processes.
C.3. To recommend, in a justified manner, the priority SI / IT investment projects for the organization.
C.4. To propose a methodology of management of the impacts of IS / IT for the organization studied.
C.5. Evaluate and select priority areas to be developed in an IS based on an analysis.

Comunication

D.1. To prepare documentation related to the study of ISP in an Organization.
D.2. Ability to communicate and evolve ideas in a teamwork context.
D.3. Ability to obtain information relevant to the ISP based on the interview of people of the organization for which the system is intended.
D.4. Ability to synthesize the collected information that must be transmitted, clearly distinguishing the fundamental of the accessory..
D.5. Simplicity and clarity in the presentation of the results obtained, both written and oral.
D.6. Communicate and present the work done, justifying the options taken.

Self-Learning Skills

E.1. Promote the autonomous development of new strategies for analysis and structuring of information.
E.2. Enhancing the ability to interpret norms or working methods and their application to a real and concrete case.
E.3. Enhance the ability to organize and manage teamwork.

Program Contents

1. Introduction to Information Systems.
2. Information Systems management.
3. Information Systems planning.
4. Quality in Information Sisitems of organizations.

Work Done

A group work (with several stages of individual defenses) is carried out, which consists of applying the method taught of ISP to a company or organization.

Teaching Methododoly

Exposition of the subjects, combined with practical application to real cases. Presentations of the students during the various stages of the content taught. Follow-up of the work carried out. In all classes there may be assessment moments for the practical work components.

Bibliography

- Varajão, João - " A Arquitectura da Gestão de Sistemas de Informação, 3ª Edição, FCA-Editora de Informática 2005.
- Silva, Miguel M. – "Integração de Sistemas de Informação", FCA-Editora de Informática, 2003.
- "ISO 9000", Instituto Português da Qualidade, 2015.
- Ward, J.; Griffiths, P. e Whitmore, P - "Strategic Planning for Information Systems", John Wiley & Sons, 2002.
- O'BRIEN, James," Management Information Systems", McGraw-Hill, Maidenhead, Berkshire, Reino Unido, , 7ª edição 2005.
- Dess, G., Miller - "Strategic Management", McGraw- Hill, 2010.
- Rothaermel F. – "Strategic Management: Concepts and Cases", 2012
- Correia, Fernanda Brito – " Textos de Apoio", 2019
- B-On – http://b-on.pt

Signature of Teacher:

Evaluation Method

It contains a practical work that is mandatory and consists of the preparation of a study of ISP of a company or organization. The work is carried out in a group and is carried out during the semester, with individual oral presentations in classes, mandatory individual defenses and the presentation of a final report. In all classes there are assessment moments for the practical work component.
Theoretical exam (30% weight - minimum of 30%) and practical work (Report 35%, Individual Work done in class, Presentation and Defense 35%).

Conditions for Exam Admission

All students have access to the exam, only obtaining approval if they fulfill the requirements defined in the previous point (Evaluation Method).

Access Conditions and Attendance Excuse

Não existe dispensa de frequência

Conditions for Results Improvement

There is only one edition of the practical work and it cannot be improved.

Date	Signature from the lecturer responsible for the course
25/02/19	Fernanda Maria Brito Correia

Signature of Teacher:

Instituto Superior de Engenharia de Coimbra
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Mestrado em Informática e Sistemas
Ramo de Tecnologias da Informação e do Conhecimento

Informatics and Systems Master
Information and Knowledge Technologies Branch

Academic Year: 2018/2019

Program Contents

Course Unit INFORMATION SYSTEMS PROJECT

Subject type Mandatory **Research Area** Computer Science

Year 1 **Semester** 2 **ECTS** 7.5

Working Hours

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

Unaccompanied Working Hours

Activity Type	Total Hours
Study	28
Works / Group Works	54
Project	54
Evaluation	3
Additional	

Total of Working Hours 195

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	Jorge Bernardino	PhD	Coordinator
Theoretical-Practical Lectures			
Practical-Laboratory Lectures	Jorge Bernardino	PhD	Coordinator
Tutorial Orientation			

Responsible(s) Lecturer (s) Jorge Bernardino

Goals / Skills

Develop knowledge and understanding skills in the area of Information Systems Design.
Identify the concepts underlying the design of information systems.
Identify the underlying concepts of project management.
Develop the ability to apply the knowledge acquired in solving specific problems of business life.
Provide students with the ability to work in groups, developing interpersonal relationships as a way to improve their insertion in the job market.

Program Contents

Theoretical: Project Management:
1. Introduction
2. Project life cycle and organization
3. Project management processes
4. Integration management
5. Management of scope
6. Time Management

7. Cost management
8. Quality management
9. Human resources management
10. Communications management
11. Risk management
12. Procurement management
13. Stakeholders management

Practice: Current Approaches to the Information Systems Project
1 - Open source project management tools
2 - Implementation based on Packages versus implementation by measure
3 - Outsourcing Information System
4 - Management of a real project

Work Done

Evaluation of open source project management tools
Management of a project of an information system

Teaching Methodology

Presentation of the theoretical foundations of information systems projects
Research of project management tools
Bibliographic collection and follow-up research

Bibliography

- Slides presented in class
- "A Guide to the Project Management Body of Knowledge", (PMBOK® Guide) -Sixth Edition, Published by: Project Management Institute, Inc., 2017
- " Gestão de Projetos de Software ", António Miguel, 5th Edition, FCA, 2015

Evaluation Method

Continuous evaluation
• Presentations throughout the semester: 40%
• Individual research work: 50%
• Defence 10%

Final classification = 0.4 * Presentations + 0.5 * Research works + 0.1 Defence

Exam evaluation
• Exam: 40%
• Individual research work: 50%
• Defence 10%

Final classification = 0.4 * Presentations + 0.5 * Research works + 0.1 Defence

Conditions for Exam Admission

Students can only access the exam by submitting and defending the research works.

Access Conditions and Attendance Excuse

Those provided by law.

Conditions for Results Improvement

The classification obtained in the research works will be used in all exams of the academic year (normal, resource and special).

Date	Signature from the lecturer responsible for the course
20th January 2019	Jorge Bernardino

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher:_____

Mestrado em Informática e Sistemas
Ramo de Tecnologias da Informação e do Conhecimento

Informatics and Systems Master
Information and Knowledge Technologies Branch

Academic Year: 2018/2019

Program Contents

Course Unit BUSINESS INTELLIGENCE

Subject type Mandatory **Research Area** Computer Science

Year 1st **Semester** 2nd **ECTS** 7.5

Working Hours

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

Unaccompanied Working Hours

Activity Type	Total Hours
Study	50
Works / Group Works	50
Project	35
Evaluation	4
Additional	

Total of Working Hours 195

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	Viriato Marques	PhD	Coordinator Professor
Theoretical-Practical Lectures			
Practical-Laboratoty Lectures	Viriato Marques	PhD	Coordinator Professor
Tutorial Orientation			

Responsible(s) Lecturer (s) Viriato Marques

Goals / Skills

To know, understand and use data warehouses, OLAP systems, data mining algoritms and development tools. To implemente data warehouses, OLAp systems, KPI's. To implemente pivot tables, dashboards and reports. To apply, evaluate and get conclusions from data mining techniques. To supervise and implement projects in the BI field. To have a perspective of the use and importance of BI in models such as Balanced Scorecards.

Program Contents

- SQL Server BIDS – Introduction:
  - Installation
  - Services
  - Configuration and Management Studio

- Introduction to ETL in BIDS: basic ETL project (read and write, queries, aggregations, lookup, error recovery); SQL Server Agent.
- The OLAP concept
- Basic Analysis Services project in BIDS:
  - Architecture and data propagation
  - The front-ends role
  - OLAP project: implementation and deployment
  - DM project: implementation, deployment, conclusions
- Advanced project with Analysis Services of BIDS
  - MDX (Management Studio examples)
  - Introduction to MDX scriopts
  - Calculations, Actions, Aggregations, Perspectives, Translations
  - Partitions: ROLAP / MOLAP configuration
  - KPI concept and definition in BIDS
- Front-End Tools and dashboards
  - Excel, Power-pivot and DAX
  - Power BI (desktop)
- Reporting and dashboards in BIDS:
  - Simple Reporting projects
  - Shared connections and datasets
  - Reporting toolbox and advanced reporting projects
  - Report Server configuration and deployment for Internet
- Connecting applications to OLAP servers
- ADODM
- Application template in VB or C# with OLAP and ADODM
- Creating and managing knowledge in organizations
- Vision of Skandia and Balanced Scorecards models. The role of KPIs

- Data Mining:
  - Association Rules: A-priori e FPGrowth
  - Clustering: K-Means, AHC and DBScan
  - Linear Regression
  - Outlier detection algorithms and techniques

- Business Intelligence

Work Done

Implenetation of data warehouses, ETL, OLAP systems e KPIs. Implementation of Reports, PowerBI desktop and Excel. Smqll application with ADODM. Data mining techniques with BI Studiom RapidMiner and Weka. Practical exercicies with MDX in SQL Server.

Teaching Methododoly

Theoretical classes using slides and some application examples
Application exercices
Development of practical works using Microsoft BI Development Studio, Excel, PowerBI desktop, Rapidminer and Weka.

Bibliography

Business intelligence
Santos & ramos, FCA, 2010

Introduction to Data-mining
Tan, Steinbach, Kumar (Pearson), 2008

Delivering BI with Microsoft SQL Server
Larson, 2012

Foundations of SQL Server Business Intelligence
Langit, 2009

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Data Mining: Concepts and Techniques
Han, Kamber, Morgan Kaufman, 2006

MDX with Microsoft SQl Server 2008R2 Analysis Services Cookbook
Piasevoli, Tomislav, PACKT enterprise, 2011

Microsoft SQL Server 2008 Analysis Services Unleashed
Gorbach, Irina et al., SAMS 2008

Powerpoint slides about all the subjects
Solved exercices
Solved past exams questions
Practical wotks with some possible solutions

Evaluation Method

Exam – 10 points
Final Practical Work – 10 points to be finished until 1 week before 1st call exam or 2nd call exam

Conditions for Exam Admission

No restrictions

Access Conditions and Attendance Excuse

Accordign to the law

Conditions for Results Improvement

Access to 2nd exam call for improvement of classification of the 1st exam call

The final practical work is unique, i.e., we can accept a single version of the work without possibility of improvement. For special epoch exams there is the possibility of a new practical work, but with a theme different from that used in the normal epoch(s).

Date	Signature from the lecturer responsible for the course
2019/2/7	

Instituto Superior de Engenharia de Coimbra
www.isec.pt

Signature of Teacher:_____

Mestrado em Informática e Sistemas
Ramo de Desenvolvimento de Software
Ramo de Tecnologias da Informação e do Conhecimento

Informatics and Systems Master
Software Development Branch
Information and Knowledge Technologies Branch

Academic Year: 2018/2019

Program Contents

Course Unit UBIQUITOUS COMPUTING

Subject type Elective **Research Area** Computer Science

Year 1 **Semester** 2nd **ECTS** 7.5

Working Hours

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

Unaccompanied Working Hours

Activity Type	Total Hours
Study	60
Works / Group Works	69
Project	
Evaluation	5
Additional	5

Total of Working Hours 195

Lecturer

Activity Type	Name	Qualifications	Category
Theoretical Lectures	Ana Cristina da Costa Oliveira Alves	PhD	Assistant Professor
Theoretical-Practical Lectures			
Practical-Laboratory Lectures	Ana Cristina da Costa Oliveira Alves	PhD	Assistant Professor
Tutorial Orientation			

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

Goals / Skills

Signature of Teacher:_____

After attending this course, students should:

- Have a broad view on the technologies that support ubiquitous computing
- Know the big picture on: wireless sensor networks, the different kinds of RFIDs systems, the different systems for indoor location
- Have a first understanding on the Global Navigation Satellite Systems (GNSS)
- Understand the main principles of the design of ubiquitous systems
- Understand process of development of a field study: types of field studies; study design; participants; data analysis; technology; security and privacy
- Understanding the relation between spatial databases and GIS
- Know some spatial data models
- Know what is a geographic data model and possible representations for geographic data
- Know some rudiments of computational geometry
- Know the main data analysis methods regarding context-awareness data processing

Program Contents

• Introduction
Mark Weiser vision; introduction to the concepts of: context awareness; pro-activity; computers as human proxies.

• Pos-PC computing
Surrounded by computational power and data, opportunities, and implications; from GUI to UUI; sensor networks, internet of things, opportunistic sensors, and private sensors; security and privacy.

• Field studies
Types of field studies. Design. Participants.

• Behavior and context modelling
4-w Model: who, when, where, what. Understanding individual needs, activities, land-use and mobility.

• Data processing
Knowing your data and pre-processing; Data Fusion; classification, clustering and analysis of time series.

• Privacy
Understanding privacy. Technical solutions. Addressing privacy

• Location
Location representation; location systems; approaches to determining location; error reporting; indoor location systems; outdoor location systems.

• The future
Intelligent Transport Systems, Smart cites; Participatory Government; Energy and Sustainability; Precision Agriculture.

Work Done

A practical work will be carried out (or a set of, necessarily, 3 smaller works) that will consist in the development and implementation of a field study where the concept (s) of: context awareness, privacy, pro-activity and processing of collected data.

Teaching Methodology

Theoretical classes (2 hours/week)
Practical classes (2 hour/week)
In this course unit, the teaching methodologies aim to foster student involvement encouraging his active participation since the beginning. With the knowledge and understanding of the subjects taught in lectures and with the understanding of solutions and algorithms from the state-of-the-art in Ubiquitous Computing, conditions are created for students to develop skills to conceptualize and implement a new application concerning: context awareness, privacy, pro-activity, and data processing

Bibliography

- Ubiquitous Computing Fundamentals. Edited by John Krumm, CRC Press, 2010

- Mark Weiser, 1991. The Computer for the Twenty-First Century. Scientific American, pp. 94-10, September 1991

Signature of Teacher:_____

- Location-Aware Applications. Richard Ferraro, Murat Aktihanoglu. Manning Publications, 2011

- Data Mining: Practical Machine Learning Tools and Techniques. Ian Witten, Elbie Frank, Mark Hall. Morgan Kaufmann, 3a Edição, 2011

- Other several papers (generally available online)

Evaluation Method

The evaluation consists of a theoretical exam (given in the respective periods or in phases during the semester - continuous evaluation) and of a self-proposed practical work (or 3 works proposed by the teacher), specifically:
- The theoretical component worth 8 values of the final grade (40%), with a minimum required of 3 values;
- The practical work worth 12 values of the final grade (60%). There are 3 student profiles for this practical work: Development, Data Analysis, or Full Continuous Evaluation. On the first 2 profiles the evaluation is distributed over:
• Proposal presentation (5%) - Submission date: April 25th, 2019, Presentation day: theoretical class the next day
• First version of a paper describing the application or field study to develop (without results yet) (20%) Scheduled date: May 31st, 2019
• Final presentation + demo + complete version of the previous paper (35%) – Day of the respective exam: June 28th, 2019 or July 15th, 2019

The Full Continuous Evaluation is only to those students who are present in 75% of practical classes, and consists of 3 practical works proposed by the teacher - Scheduled date for the delivery of each work: April 18th, 2019; May 23rd, 2019; Day of the respective exam: June 28th, 2019 or July 15th, 2019.

These works cover almost all topics lectured. The submission of these works are distributed along the semester and are supplemented by a technical report describing the decisions taken during the development of each work.

In the special season, the full continuous evaluation is individual as the other two evaluation profiles, and in all evaluation profiles, the evaluation elements will all be delivered together as follows:
• Article to describing the application including its architecture, the data collection, visualization and analysis phases (25%)
• Final presentation with demonstration of the application (35%)
For those who choose profiles 1 and 2, the teacher must validate the theme of the work previously.

Conditions for Exam Admission

All students are eligible to take final exams

Access Conditions and Attendance Excuse

Continuous assessment is only allowed for students who attend 75% of the practical classes.

Conditions for Results Improvement

Students who have not passed the subject have access to the alternative period of exams provided.
Students who have passed the subject can sign up for improving exam grade in the period of exams. The score obtained in the previous exam will be assured.

Date	Signature from the lecturer responsible for the course
31/01/19	Ana Cristina Oliveira Silva