INFORMATION SYSTEMS DESIGN & ANALYSIS

BACHELOR IN MANAGEMENT INFORMATION SYSTEMS
Professor: JESUS FREIRE COSTAS
E-mail: jfreirec@faculty.ie.edu

Academic year: 17-18
Degree course: SECOND
Semester: 1º
Category: COMPULSORY
Number of credits: 6.0
Language: English

PREREQUISITES
No prerequisites

SUBJECT DESCRIPTION
Technology is transforming the society and all the industries, changing very deeply their business models and structures. The information system is the key element to support the new operating models required by the disruptive changes driven by technology.

“Information System Analysis and Design” (ISA&D) describes the techniques and methods to identify and design the systems that support the enterprise business capabilities and operating models, not only based on technology but also on people, processes and culture in a context of new delivery models and advanced technologies, like Cloud and Artificial Intelligence.

This subject merges traditional and new methodologies and techniques like Systems Thinking and Design Thinking at scale, with a clear connection with the enterprise business strategy and direction.

OBJECTIVES AND SKILLS
The objective of this course is to introduce the main principles, methods and techniques used in software engineering to analysis and design information systems. This is a fundamental knowledge and skill set for system developers and architects but also for future IT managers, executives and entrepreneurs that should have a deep understanding on how transform the customers needs into efficient, manageable and operable information system.

The course covers traditional techniques, like object oriented and structured methods, as they are the essential foundation for the system analysis and design techniques, but also new approaches and styles like Agile, Devops or how to design the new Cognitive and AI systems.

At the end of this course, the student should be able to:
- Understand the whole system development lifecycle
- Know the main methods for Systems Analysis and Design
- Work on requirements identification a gathering and develop analysis' models for simple problems
- Design simple solutions using traditional and modern techniques
- Understand new architectural styles and delivery models, like cognitive or cloud

**METHODOLOGY**

This class will be taught through a continuous combination of theory, open discussion and exercises. The teacher will start the session with a summary of the previous one and then will present the class topic to foster discussions based on real use cases. Exercises will be performed individually or in teams during the classes or between sessions. The classes will end up with a recap of the presented subject and the teacher will inform about the topics and material that the students should prepare for the next session and potential exercises to be performed. In summary it is expected that the students get familiar with the topics before the session in order to take advantage of the class environment for discussion and team working.

Although in the course we will review several traditional and new analysis and design methods, we will be mainly focused on the Object Oriented paradigm due to it is a mature method, broadly adopted and frequently used with a number of programming languages.

<table>
<thead>
<tr>
<th>Teaching methodology</th>
<th>Weighting</th>
<th>Estimated time a student should dedicate to prepare for and participate in</th>
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<tbody>
<tr>
<td>Lectures</td>
<td>20.0 %</td>
<td>30 hours</td>
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<tr>
<td>Discussions</td>
<td>10.0 %</td>
<td>15 hours</td>
</tr>
<tr>
<td>Exercises</td>
<td>10.0 %</td>
<td>15 hours</td>
</tr>
<tr>
<td>Group work</td>
<td>26.67 %</td>
<td>40 hours</td>
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<tr>
<td>Other individual studying</td>
<td>33.34 %</td>
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<tr>
<td>TOTAL</td>
<td>100.0 %</td>
<td>150 hours</td>
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</table>
PROGRAM

Course presentation and Introduction to the Topic

SESSION 1 (FACE TO FACE)
TOPIC INTRODUCTION
Teacher and students introduction. Norms, rules and expectations.
Subject objectives and structure.
Student performance measurement

Block 1: Analysis Foundations
Establish the foundations for the Analysis methods and techniques

SESSION 2 (FACE TO FACE)
SYSTEMS & COMPLEXITY
"Information Systems Analysis & Design" subject Overview
Systems fundamentals and Complexity theory.
Information Systems Architecture. What is architecure and why is extremelly important for designing Information Systems.

SESSION 3 (FACE TO FACE)
Systems Analysis and Design Overview
SDLC (System Development Life Cycle)
Introduction to the Structured and Object Oriented Methods
Waterfall vs Agile

SESSION 4 (FACE TO FACE)
Structured Analysis 1: Introduction & Requeriments Management
Structured Methods Introduction. Main methods and models.
Requeriments Management: What is a requirement. Types of requirements. Requeriments gathering. Requirements lifecycle.
System Context.

SESSION 5 (FACE TO FACE)
Structured Analysis 2: Methods & Techniques
Process & Functional Modeling. Data flows
Data Modeling. E/R Models

SESSION 6 (FACE TO FACE)
Object Oriented Analysis 1: Introduction & Requirements in OO
OO Methods & Language Introduction
OO Principles
UML Fundamentals
Requirements Management in OO. Systems Context, Use Case Modeling

SESSION 7 (FACE TO FACE)
Object Oriented Analysis 2: Static Modeling in OO
The static view of a system in OO: Component, Class and Object Models

SESSION 8 (FACE TO FACE)
Object Oriented Analysis 3: Dynamic Modeling in OO
The behavioral view on OO: Sequence diagrams, Communication diagrams, state machines

Block 2: Design Foundations
Establish the foundations for the Design methods and techniques

SESSION 9 (FACE TO FACE)
From Analysis to Design
Moving on to Design
Evolving Requirements and Models
Design Strategy: Build vs Buy

SESSION 10 (FACE TO FACE)
Architecture Design
What is Architecture
Types of Architectures: Enterprise Architecture, Solutions Architecture, etc
Standard Models. TOGAF
Domains: Infrastructure, Application Technical Architecture, Application, Development etc.

SESSION 11 (FACE TO FACE)
Structured Design 1: Data Model Design
Relational Models Design: E/R
Big Data and Data Lakes Design

SESSION 12 (FACE TO FACE)
Structured Design 2: Process Model Design
Business Process Modelling and Management
Industry Standards
SESSION 13 (FACE TO FACE)
Object Oriented Design 1: Static Models
OO Static Models (Classes, Objects, etc) in Design
Service Design

SESSION 14 (FACE TO FACE)
Object Oriented Design 2: Dynamic Models
OO Dynamic Models (Sequence, Collaboration, etc) in Design

SESSION 15 (FACE TO FACE)
UI Design
User Interface design techniques
Principles, Interaction and Navigation Models
Mobile and Social Networks

SESSION 16 (FACE TO FACE)
Testing Foundations
What is Testing
Types of Testing
Testing Strategy

SESSION 17 (FACE TO FACE)
Designing for the Cloud 1: Cloud Architecture
Types of Cloud
Cloud standards
Cloud deployment model
Cloud restriction for Systems Design: The 12-Factors

SESSION 18 (FACE TO FACE)
Designing for the Cloud 2: Cloud Applications
Microservices Architecture
Self-Contained Systems Style

BLOCK 3: SA&D New Techniques
Review of new methods and techniques for anaLysis and design

SESSION 19 (FACE TO FACE)
Design Thinking 1: User centric Design for Creativity
Design Tinking Principles
The Method and Tools 1

SESSION 20 (FACE TO FACE)
Design Thinking 2: User centric Design for Creativity
The Method and Tools 2

SESSION 21 (FACE TO FACE)
Agile Software Development 1: Introduction
The Agile Manifesto
Why Agile?
Agile Methods
Agile at Scale (how to face big transformational projects using the Agile style)

SESSION 22 (FACE TO FACE)
Agile Software Development 2: Scrum
Scrum in detail.
Roles, workflow, artifacts in Scrum

SESSION 23 (FACE TO FACE)
DevOps
What is Devops: Integrating Development and Operation. Objectives
Relationship with Agile
The enterprise cultural change

SESSION 24 (FACE TO FACE)
Platform as a Services
What is a design and development platform
PaaS and Agile and DevOps
Developing in PaaS

SESSION 25 (FACE TO FACE)
AI & Cognitive Systems 1: Introduction
What is AI and Cognitive Systems
AI/Cognitive areas
Differences with the traditional information systems
AI & Cognitive in the enterprise: Relevant use cases

SESSION 26 (FACE TO FACE)
AI & Cognitive Systems 2: System development
Design vs Training vs Learning. How to develop cognitive systems

Block 4: Other Factors in SA&D
Other elements that are relevant for System Analysis and Design

SESSION 27 (FACE TO FACE)

Human Factors
Organizations, people and culture: The impact on ISA&D
ISA&D in an open world. Open innovation

SESSION 28 (FACE TO FACE)

ISA&D and Project Management
Short introduction to Project Management
The integration between PM and ISA&D
Project Manager, Architect, Analyst, Designer Roles: How they collaborate for a successful project delivery

SESSIONS 29 - 30 (FACE TO FACE)

Final Exam
**BIBLIOGRAPHY**

*Buy your books here.*

IE Library permalink: [https://ie.on.worldcat.org/courseReserves/course/id/12025676](https://ie.on.worldcat.org/courseReserves/course/id/12025676)

**Basic Bibliography**

*Systems Analysis and Design: An Object Oriented Approach with UML, 5th Edition*

Alan Dennis, Barbara Haley Wixom, David Tegarden

Wiley, April 2015

ISDN: 978-1-118-80467-4

This book is also available in electronic version (using a free reader). See publisher web site.

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**EVALUATION CRITERIA**

The evaluation will be based on assignements grades (workgroups and individuals), the level of involvement of the student in class and a final exam.

<table>
<thead>
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<th>Criteria</th>
<th>Percentage</th>
<th>Comments</th>
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<tbody>
<tr>
<td>Final Exam</td>
<td>40 %</td>
<td></td>
</tr>
<tr>
<td>Class Participation</td>
<td>20 %</td>
<td></td>
</tr>
<tr>
<td>Individual Work</td>
<td>20 %</td>
<td></td>
</tr>
<tr>
<td>Workgroups</td>
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**PROFESSOR BIO**

Professor: **JESUS FREIRE COSTAS**

E-mail: jfreirec@faculty.ie.edu

**Jesus Freire Costas**

Jesús Freire is an IBM Distinguished Engineer and Senior Architect with more than twenty years experience in information system architecture, analysis and design, mainly in the financial services sector.

Since 2012 he is the IBM Industry Technical Leader (CTO) for Banking and Financial Markets in Europe, leading the technical community, IBM solutions and transformational customers engagements, with a main background in banking architectures and digital-oriented core system transformation in very complex and large information system design. Jesús currently leads the IBM team designings the new IBM Digital Framework and Architecture Model for Banking, a global IBM asset.

Prior to his current position he was the IBM WW Technical Advisor for Santander Group (2010-2012), working with this customer in all their IT areas, including infrastructure, architecture, applications and innovation, and supporting them in their global expansion.

Jesús joined IBM Global Business Service in 1998, working as chief IT Architect for most of the banking and insurance companies in Spain.

Between 2011 and 2014 he was the Spain, Portugal, Greece & Israel IBM Technical Expert Council Chairman, being appointed as an IBM Academy of Technology member in 2016

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**OTHER INFORMATION**

**CODE OF CONDUCT IN CLASS**
1. **Be on time:** Students arriving more than 5 minutes late will be marked as “Absent”. Only students that notify in advance in writing that they will be late for a specific session may be granted an exception (at the discretion of the professor).

2. **If applicable, bring your name card and strictly follow the seating chart.** It helps faculty members and fellow students learn your names.

3. **Do not leave the room during the lecture:** Students are not allowed to leave the room during lectures. If a student leaves the room during lectures, he/she will not be allowed to re-enter and, therefore, will be marked as “Absent”.

4. **Do not engage in side conversation.** As a sign of respect toward the person presenting the lecture (the teacher as well as fellow students), side conversations are not allowed. If you have a question, raise your hand and ask it. If you do not want to ask it during the lecture, feel free to approach your teacher after class.

5. **Use your laptop for course-related purposes only.** The use of laptops during lectures must be authorized by the professor. The use of Social Media or accessing any type of content not related to the lecture is penalized. The student will be asked to leave the room and, consequently, will be marked as “Absent”.

6. **No cellular phones:** IE University implements a “Phone-free Classroom” policy and, therefore, the use of phones, tablets, etc. is forbidden inside the classroom. Failing to abide by this rule entails expulsion from the room and will be counted as one absence.

7. **Escalation policy: 1/3/5.** Items 4, 5, and 6 above entail expulsion from the classroom and the consequent marking of the student as “Absent.” IE University implements an “escalation policy”: The first time a student is asked to leave the room for disciplinary reasons (as per items 4, 5, and 6 above), the student will incur one absence, the second time it will count as three absences, and from the third time onward, any expulsion from the classroom due to disciplinary issues will entail 5 absences.