

Academic Year: ( 2023 / 2024 )

Review date: 19-05-2023

Department assigned to the subject: Computer Science and Engineering Department

Coordinating teacher: ALVAREZ RODRIGUEZ, JOSE MARIA

Type: Compulsory ECTS Credits : 6.0

Year : 2 Semester : 1

**REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)**

Writing and Communication Skills (1st course, 1st semester)

**SKILLS AND LEARNING OUTCOMES**

- ¿ Know how to obtain, describe and manage requirements for the functional and non-functional description of a software application.
- ¿ Design and develop conceptual and architectural models of a software application.

**DESCRIPTION OF CONTENTS: PROGRAMME**

Block I. Requirements engineering  
 Unit 1. Introduction to requirements engineering  
 Unit 2. Elicitation, description and management of requirements  
 Unit 3. Properties, attributes and organization of requirements  
 Unit 4. Types of requirements

Block II. Conceptual modeling with UML  
 Unit 5. Introduction to conceptual modeling  
 Unit 6. Conceptual modeling: classes and objects  
 Unit 7. Conceptual modeling: associations  
 Unit 8. Conceptual modeling: hierarchies

Block III. Architectural modeling with UML  
 Unit 9. Introduction to architectural modeling  
 Unit 10. Architectural modeling: components  
 Unit 11. Architectural modeling: interfaces  
 Unit 12. Architectural modeling: design by contracts

**LEARNING ACTIVITIES AND METHODOLOGY**

Theoretical-Practical Lectures: 1 ECTS

- Review of contents before class

Practical Lectures: 1 ECTS

- Exercise resolution
- General tutoring
- Partial oral expositions of the project

Team Work: 3 ECTS

- Proposal of project statement
- Project development
- Project peer review
- Proposal of questions for the theoretical exam

Individual Work: 1 ECTS

- Contribution to team project
- Individual practical exercises
- Study and preparation of final exam

## ASSESSMENT SYSTEM

### CONTINUOUS EVALUATION (70%)

- Week 5, Individual theoretical mid-term exam block I: Requirements Engineering: 10%
- Week 6, 1st final project (team) delivery (and presentation): 10%
- Week 10, Individual theoretical mid-term exam block II: Conceptual Modelling: 10%
- Week 13, 2nd final project (team) delivery (and presentation) : 10%
- Week 13, Individual theoretical mid-term exam block III: Architectural Modelling: 10%
- Week 14, Delivery of two individual practical exercises: 10%
- Week 3, 4, 6, 7, 8, 9, 11, 12, 13, 1-minute quizzes: 10%

### FINAL EVALUATION (30%)

- Final project, complete technical report: 20%
- Group proposal of exam-type questions: 10%

A minimum grade of 5 is required in each partial exam to pass the theoretical part. In the case of not passing one of the blocks, the student shall make a FINAL THEORETICAL EXAM ONLY including all the failed blocks.

A minimum grade of 5.0 in the final project report is required to pass the course.

<b>% end-of-term-examination:</b>	30
<b>% of continuous assessment (assignments, laboratory, practicals...):</b>	70

## BASIC BIBLIOGRAPHY

- Alexander, I. and Stevens, R. Writing Better Requirements, Addison-Wesley, 2002
- Arlow, J. and Neustadt, I. UML and the Unified Process. Practical Object-Oriented Analysis & Design, Addison-Wesley, 2002
- Braude, E. Software Engineering. An Object-Oriented Perspective., John Wiley & Sons, 2001..
- ESA Board for Software Standardisation and Control (BSSC). ESA Software Engineering Standards., European Space Agency, February 1991..
- Fowler, M. and Scott, K. UML Distilled. A Brief Guide to the Standard Object Modeling Language, Addison-Wesley, 2004
- Larman, C. Applying UML and Patterns. An Introduction to Object-Oriented Analysis and Design and the Unified Process, Prentice Hall, 1998
- Mark Richards, Neal Ford Fundamentals of Software Architecture, O'Reilly Media, Inc, 2020
- Martin Fowler Patterns of Enterprise Application Architecture, Addison-Wesley , 2002
- Martin Fowler Refactoring, Addison-Wesley , 2018
- Pressman, Roger S. Ingeniería del software: un enfoque práctico, 6ª ed., McGraw-Hill, 2006..
- Robert Martin Clean Code: A Handbook of Agile Software Craftsmanship, Prentice Hall, 2008
- Robert Martin Clean Architecture, Prentice-Hall, 2017
- Sommerville, I. Ingeniería del Software., Pearson-Addison Wesley, 2005..
- Sommerville, I. and Sawyer, P. Requirements Engineering: A Good Practice Guide, John Wiley & Sons, 1997
- Stevens, P. and Pooley, R. Using UML, Software Engineering with Objects and Components, Addison-Wesley, 2000
- Wiegers, K. and Beaty, J. Software Requirements, Microsoft Press, 2013

## ADDITIONAL BIBLIOGRAPHY

- N. Ford, M. Richards, P. J. Sadalage, and Z. Dehghani Software Architecture: The Hard Parts: Modern Trade-Off Analyses for Distributed Architectures , O'Reilly, 2021

## BASIC ELECTRONIC RESOURCES

- IEEE Software Special Issue . 50 Years of Software Engineering: <https://ieeexplore.ieee.org/document/8474511>
- Ian Sommerville . Software Engineering, Tenth Edition: <https://iansommerville.com/software-engineering-book/>
- Jose María Álvarez Rodríguez . Lista de lectura de DevOps: <https://learning.oreilly.com/playlists/bc1031bc-6189-42b8-85b7-789a7e59b0bd>
- Jose María Álvarez Rodríguez . Lista de lectura de Arquitectura de Software: <https://learning.oreilly.com/playlists/80425411-f3fe-4b47-8415-35cfffce0f>
- UC3M . The Software Architect Code: Building the Digital World: <https://www.edx.org/course/software-architect-code-building-digital-uc3mx-inf-1x>

- edX Platform . List of courses on Software Engineering:  
[https://www.edx.org/course?search\\_query=SOFTWARE+ENGINEERING](https://www.edx.org/course?search_query=SOFTWARE+ENGINEERING)