

**1. General information****Course:** SOFTWARE ENGINEERING I**Type:** CORE COURSE**Degree:** 346 - DEGREE IN COMPUTER SCIENCE AND ENGINEERING**Center:** 604 - SCHOOL OF COMPUTER SCIENCE AND ENGINEERING (AB)**Year:** 2**Main language:** Spanish**Use of additional languages:** English in Group I (Bilingual)**Web site:** <http://campusvirtual.uclm.es>**Code:** 42314**ECTS credits:** 6**Academic year:** 2019-20**Group(s):** 10 11 12**Duration:** First semester**Second language:** English**English Friendly:** N**Bilingual:** Y**Lecturer:** JOAQUIN FERNANDEZ MARTINEZ - Group(s): 10 11

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**2. Pre-Requisites**

Students are expected to have passed the subject "Information Systems" in the first year and acquired knowledge of the Object Oriented Paradigm. To this end, it is advisable to have passed the subject of Fundamentals of Programming I and II, in the first year.

**3. Justification in the curriculum, relation to other subjects and to the profession**

This subject provides a general view of the discipline called Software Engineering and the role it plays within the context of computer science and engineering. To this end, the course includes the basic concepts and the main features and techniques to be applied during the stages of software development, that is to say, requirements, analysis, design and implementation, taking into account the Object-Oriented Paradigm.

As a result, students will acquire the basic skills and knowledge needed to work as a software engineer. With the foundations acquired in this course, students will be able to deepen in more specific software engineering-related subjects offered throughout the degree.

**4. Degree competences achieved in this course****Course competences**

Code	Description
BA4	Basic knowledge about the uses and programming of computers, operating systems, data bases, and digital programmes with applications in engineering.
CO1	Ability to design, develop, select, and assess, applications and digital systems, guaranteeing their reliability, security, and quality, according to ethical principles and the current and common laws.
CO16	Knowledge and application of principles, methodologies, and life spans of software engineering.
CO2	Ability to conceive, plan, develop and manage projects, services, and digital systems in any context, leading their start and applying continuous improvements, assessing their economic and social impact.
CO3	Ability to understand the importance of negotiation, work efficiency, leadership, and communication abilities in every context of software development.
CO8	Ability to analyse, design, build and maintain applications in a strong, safe, and efficient manner by selecting the most appropriate paradigms and programming languages.
INS3	Ability to manage information and data.
PER1	Team work abilities.

**5. Objectives or Learning Outcomes****Course learning outcomes****Description**

Knowledge about tools that support the construction of software systems and the storage and processing of data.

Knowledge of the principles of software engineering and the main methodologies for the construction of quality software.

Building design models, both high leveled and detailed, for the construction of software systems that implement them.

Identification, modelling, and specifications of software and business requirements for the construction of software systems that implement them.

## 6. Units / Contents

### Unit 1: Introduction to Software Engineering

Unit 1.1 Background and definitions

Unit 1.2 Fundamental concepts

### Unit 2: Requirements Engineering

Unit 2.1 Introduction

Unit 2.2 Requirement: Definition, types and features

Unit 2.3 Requirements Engineering Process Models

Unit 2.4 Requirements Elicitation Stage

Unit 2.5 Requirements Analysis Stage

Unit 2.6 Requirements Validation and Verification Stage

### Unit 3: Requirements modelling with UML 2.0: Use Case Diagrams

Unit 3.1 Introduction

Unit 3.2 Use Cases Specification

Unit 3.3 Graphical Notation

Unit 3.4 Relationships within a Use Case Diagram

Unit 3.5 Examples and practical cases

### Unit 4: Object Oriented Analysis with UML 2.0

Unit 4.1 Introduction to Software Modelling with UML 2.0

Unit 4.2 Domain Class Diagrams

Unit 4.3 Analysis Class Diagrams

Unit 4.4 Activity Diagrams

### Unit 5: Object Oriented Design with UML 2.0

Unit 5.1 State Diagrams

Unit 5.2 Sequence Diagrams

Unit 5.3 Communication Diagrams

Unit 5.4 Timing Diagrams

Unit 5.5 Component Diagrams

Unit 5.6 Deployment Diagrams

### Unit 6: Object Oriented Software Development: Unified Process (RUP)

Unit 6.1 Introduction

Unit 6.2 Basic Principles of RUP

Unit 6.3 RUP Stages

## 7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	R	Description
Class Attendance (theory) [ON-SITE]	Lectures	CO1 CO16 CO2 CO3	0.88	22	N	-	-	MAG: Lectures dedicated to present the theoretical concepts of the subject, in which different methods will be used, combining master lessons with puzzles, etc.
Problem solving and/or case studies [ON-SITE]	Group Work	CO3 INS3 PER1	0.4	10	Y	N	N	PRO, RES: Working groups (WG) will be established, composed of 3 students, who will consider various problems or specific cases that the WGs will have to solve by applying the techniques and methods seen in face-to-face theory sessions.
Group tutoring sessions [ON-SITE]	Guided or supervised work	PER1	0.2	5	N	-	-	RES: Advice and resolution of doubts on the exercises proposed to the WGs
Class Attendance (practical) [ON-SITE]	Workshops and Seminars	BA4 INS3	0.08	2	N	-	-	PLAB: Introductory session to the practices of the subject as a seminar to present the software tools to be used at the laboratory.
Computer room practice [ON-SITE]	Project/Problem Based Learning (PBL)	CO1 CO16 CO2 CO3 CO8 INS3 PER1	0.4	10	Y	Y	N	LAB: Practical sessions in the laboratory where students in groups of two develop a project throughout the course.
Group tutoring sessions [ON-SITE]	Guided or supervised work	CO1 CO16 CO2 CO3 INS3 PER1	0.16	4	N	-	-	TUT: Tutoring sessions to the practice groups to resolve doubts.
Project or Topic Presentations [ON-SITE]	Assessment tests	CO8 INS3	0.16	4	Y	Y	Y	EVA: A total of 4 hours will be devoted throughout the course for the students to present the work performed during the practice sessions to make a progressive evaluation of the practice part of the subject
Study and Exam Preparation [OFF-SITE]	Self-study	CO1 CO16 CO2 CO3 INS3	1.6	40	N	-	-	EST: Hours dedicated to study the theory of the subject
Study and Exam Preparation [OFF-SITE]								Preparation of the exercises and

[SITE]	Problem solving and exercises	INS3 PER1	0.8	20	N	-	-	problems proposed to be solved by the working groups
Study and Exam Preparation [OFF-SITE]	Practical or hands-on activities	BA4 CO1 CO16 CO2 CO3 CO8 INS3 PER1	0.6	15	N	-	-	PLAB: Preparation of practical laboratory sessions
Practicum and practical activities report writing or preparation [OFF-SITE]	Group Work	BA4 CO8 INS3 PER1	0.6	15	Y	Y	Y	PLAB: Preparation of the practice reports and generation of the different documents that students must deliver about their practice work.
Final test [ON-SITE]	Assessment tests	CO1 CO16 CO2 CO3 INS3	0.12	3	Y	Y	Y	EVA: Individual final exam
Total:			6	150				
Total credits of in-class work: 2.4			Total class time hours: 60					
Total credits of out of class work: 3.6			Total hours of out of class work: 90					

Class Attendance (theory) [PRESENCIAL][Lectures]	2
Study and Exam Preparation [AUTÓNOMA][Self-study]	3
<b>Teaching period:</b> Week 1	
<b>Unit 2 (de 6): Requirements Engineering</b>	
<b>Activities</b>	<b>Hours</b>
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Study and Exam Preparation [AUTÓNOMA][Self-study]	7
Study and Exam Preparation [AUTÓNOMA][Practical or hands-on activities]	3
Practicum and practical activities report writing or preparation [AUTÓNOMA][Group Work]	2
<b>Unit 3 (de 6): Requirements modelling with UML 2.0: Use Case Diagrams</b>	
<b>Activities</b>	<b>Hours</b>
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Problem solving and/or case studies [PRESENCIAL][Group Work]	2
Group tutoring sessions [PRESENCIAL][Guided or supervised work]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	7
Study and Exam Preparation [AUTÓNOMA][Problem solving and exercises]	6
Study and Exam Preparation [AUTÓNOMA][Practical or hands-on activities]	3
Practicum and practical activities report writing or preparation [AUTÓNOMA][Group Work]	2.5
<b>Teaching period:</b> Weeks 3 and 4	
<b>Unit 4 (de 6): Object Oriented Analysis with UML 2.0</b>	
<b>Activities</b>	<b>Hours</b>
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Problem solving and/or case studies [PRESENCIAL][Group Work]	4
Group tutoring sessions [PRESENCIAL][Guided or supervised work]	2
Class Attendance (practical) [PRESENCIAL][Workshops and Seminars]	2
Computer room practice [PRESENCIAL][Project/Problem Based Learning (PBL)]	3
Group tutoring sessions [PRESENCIAL][Guided or supervised work]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	8
Study and Exam Preparation [AUTÓNOMA][Problem solving and exercises]	7
Study and Exam Preparation [AUTÓNOMA][Practical or hands-on activities]	4
Practicum and practical activities report writing or preparation [AUTÓNOMA][Group Work]	3.5
<b>Teaching period:</b> Weeks 5 to 8	
<b>Unit 5 (de 6): Object Oriented Design with UML 2.0</b>	
<b>Activities</b>	<b>Hours</b>
Class Attendance (theory) [PRESENCIAL][Lectures]	6
Problem solving and/or case studies [PRESENCIAL][Group Work]	4
Group tutoring sessions [PRESENCIAL][Guided or supervised work]	2
Computer room practice [PRESENCIAL][Project/Problem Based Learning (PBL)]	7
Group tutoring sessions [PRESENCIAL][Guided or supervised work]	3
Project or Topic Presentations [PRESENCIAL][Assessment tests]	2
Study and Exam Preparation [AUTÓNOMA][Self-study]	12
Study and Exam Preparation [AUTÓNOMA][Problem solving and exercises]	7
Study and Exam Preparation [AUTÓNOMA][Practical or hands-on activities]	4
Practicum and practical activities report writing or preparation [AUTÓNOMA][Group Work]	3.5
<b>Teaching period:</b> Weeks 9 to 14	
<b>Unit 6 (de 6): Object Oriented Software Development: Unified Process (RUP)</b>	
<b>Activities</b>	<b>Hours</b>
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Project or Topic Presentations [PRESENCIAL][Assessment tests]	2
Study and Exam Preparation [AUTÓNOMA][Self-study]	3
Study and Exam Preparation [AUTÓNOMA][Practical or hands-on activities]	1
Practicum and practical activities report writing or preparation [AUTÓNOMA][Group Work]	3.5
<b>Teaching period:</b> Week 15	
<b>Global activity</b>	
<b>Activities</b>	<b>hours</b>
Project or Topic Presentations [PRESENCIAL][Assessment tests]	4
Study and Exam Preparation [AUTÓNOMA][Self-study]	40
Study and Exam Preparation [AUTÓNOMA][Problem solving and exercises]	20
Study and Exam Preparation [AUTÓNOMA][Practical or hands-on activities]	15
Practicum and practical activities report writing or preparation [AUTÓNOMA][Group Work]	15
Final test [PRESENCIAL][Assessment tests]	3
Problem solving and/or case studies [PRESENCIAL][Group Work]	10
Group tutoring sessions [PRESENCIAL][Guided or supervised work]	5
Class Attendance (practical) [PRESENCIAL][Workshops and Seminars]	2
Computer room practice [PRESENCIAL][Project/Problem Based Learning (PBL)]	10
Group tutoring sessions [PRESENCIAL][Guided or supervised work]	4
Class Attendance (theory) [PRESENCIAL][Lectures]	22
<b>Total horas: 150</b>	

Author(s)	Title/Link	Publishing house	City	ISBN	Year	Description
Ambler, Scott W.	The elements of UML 2.0 style	Cambridge University Press		978-0-521-61678-2	2007	
DEBRAUWER, L.	UML 2.0. Iniciación, Ejemplos y Ejercicios corregidos	Ediciones-ENI	Barcelona	978-2-7460-4741-9	2009	
JACOBSON, I.	El Proceso Unificado de Desarrollo de Software.	Addison-Wesley			2005	
LESZEK A. MACISZEK.	Requirements analysis and system design: developing information systems with UML.	Addison Wesley			2001	
MILES, R.	Learning UML 2.0.	O'Reilly.		0-596-00982-8	2006	
PRESSMAN, R.	Ingeniería del software. Un enfoque práctico. 6ª Edición	McGraw-Hill			2006	
Pilone, Dan	UML 2.0 in a nutshell	O'Reilly		978-0-596-00795-9	2005	
SOMMERVILLE, I.	Software Engineering, 8ª Edición.	Addison Wesley			2007	