Universidad Europea

1. OVERVIEW

Subject area	Software Engineering
Degree	Bachelor's Degree in Computer Engineering
School/Faculty	Architecture, Engineering and Design
Year	Fourth
ECTS	6 ECTS
Type	Compulsory
Language(s)	Spanish
Delivery mode	On campus / Online
Semester	First semester
Year	2022/2023
Coordinating professor	Carlos Moreno
Teacher	Software Engineering

2. INTRODUCTION

Software Engineering is a compulsory subject in the Bachelor's Degree in Computer Engineering, taught in the 1st semester of 4th year. It is worth 6 ECTS credits, like all other compulsory subject areas within the degree programme.

This subject area prepares students to become qualified professionals in Computer Science who, regardless of their field of professional development, will need to apply concepts, methods, techniques and principles of Software Engineering to improve their skills in innovation, application development, analysis, extraction of computer elements, implementation, etc. in the different environments in which they carry out their work. The subject area is highly practical, based on several case studies, that pose real-life Software Engineering problems.

3. SKILLS AND LEARNING OUTCOMES

Basic skills (CB, by the acronym in Spanish):

- **CB1:** Students have demonstrated knowledge and understanding of a study area originating from general secondary school education, and are usually at the level where, with the support of more advanced textbooks, they may also demonstrate awareness of the latest developments in their field of study.
- **CB2:** Students can apply their knowledge to their work or vocation in a professional manner and possess the skills which are usually evident through the forming and defending of opinions and resolving problems within their study area.
- **CB3:** Students have the ability to gather and interpret relevant data (usually within their study area) to form opinions which include reflecting on relevant social, scientific or ethical matters.
- **CB4:** Students can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences.

Transversal skills (CT, by the acronym in Spanish):

- **CT2**: Self-confidence: Ability to evaluate one's own results, performance and skills with the self-determination necessary to complete tasks and meet any objectives.
- **CT10**: Initiative and entrepreneurial spirit: Ability to undertake difficult or risky actions with resolve. Ability to anticipate problems, propose improvements and persevere to ensure they are implemented. Willingness to take on and carry out tasks.
- **CT12**: Critical thinking: Ability to analyse an idea, occurrence or situation from different perspectives and adopt a personal viewpoint based on scientific rigour and objective reasoning, rather than intuition.
- **CT13**: Problem solving: Ability to resolve an unclear or complex issue or situation which has no established solution and requires skill to reach a conclusion.
- **CT14**: Innovation/Creativity: Ability to propose and invent new, original solutions that contribute towards improving problem situations, including ideas from other contexts.

Specific skills (CE, by the acronym in Spanish):
- **CE10.** Ability to draw up the technical specifications of a computer installation, complying with the standards and regulations in force.
- **CE14**. Ability to analyse, design, construct and maintain robust, secure and efficient applications, choosing the most appropriate paradigm and programming languages.
- **CE22**. Knowledge and application of software engineering principles, methodologies and life cycles.

General skills of the profession (CG, by the acronym in Spanish):
- **CG5**. Ability to design, develop and maintain systems, services and computer applications using software engineering methods as a tool for quality assurance, in accordance with the knowledge acquired as established in section 5 of Annex II of the Spanish Official Gazette (BOE) 12977/2009.

Learning outcomes (RA, by the acronym in Spanish):
- **RA1**. Describe the most important models and standards in software development processes, including strategy, phases, deliverables, quality indicators, procedures, results, roles and responsibilities.
- **RA2**. Analyse proposed case studies, the advantages and benefits of the different models, both from the point of view of concepts and processes.
- **RA3**. Design detailed deliverables for all phases of the software life cycle, according to the software engineering principles, using industry standards and formats.
- **RA4**. Assess the completeness and consistency of software engineering tools (logic models, diagrams, deliverables, documents, quality indicators, plans, etc.) for the proposed case studies.

The following table shows how the skills developed in the subject area match up with the intended learning outcomes:

Skills	Learning outcomes
CB1, CB4, CG5, CE10, CE14	**RA1.** Describe the most important models and standards in software development processes, including strategy, phases, deliverables, quality indicators, procedures, results, roles and responsibilities.
CT2, CT12, CE14	**RA2.** Analyse proposed case studies, the advantages and benefits of the different models, both from the point of view of concepts and processes.
CB3, CG5, CT12, CT13, CE10, CE14, CE22	**RA3.** Design detailed deliverables for all phases of the software life cycle, according to the software engineering principles, using industry standards and formats.

CB2, CB4, CT10, CT14, CE22	**RA4.** Assess the completeness and consistency of software engineering tools (logic models, diagrams, deliverables, documents, quality indicators, plans, etc.) for the proposed case studies.

4. CONTENTS

The subject is organised into six learning units (UA, by the acronym in Spanish), which in turn are each divided into topics.

Unit 1. Introduction. Software process
- ☐ Topic 1. Software engineering. Basic concepts
- ☐ Topic 2. The development of quality software projects
- ☐ Topic 3. Software process models in software engineering
- ☐ Topic 4. Traditional and agile models in the software process

Unit 2. Acquisition (Elicitation) and viability in software projects
- ☐ Topic 1. Basic concepts of elicitation. Elicitation techniques
- ☐ Topic 2. Requirements in software projects
- ☐ Topic 3. Viability in software projects and requirements
- ☐ Topic 4. Use cases and requirements

Unit 3. Basis of Analysis and Design Strategies
- ☐ Topic 1. Analysis phase in software projects
- ☐ Topic 2. Design phase in software projects
- ☐ Topic 3. Standardised process of software production

Unit 4. Architectural design in software projects
- ☐ Topic 1. Use case model and domain model
- ☐ Topic 2. Domain model Class diagrams
- ☐ Topic 3. Object diagrams
- ☐ Topic 4. Specification of interfaces and interactions

Unit 5. Software project analysis and design
- ☐ Topic 1. Activity Diagram
- ☐ Topic 2. Sequence Diagrams
- ☐ Topic 3. Collaboration Diagrams
- ☐ Topic 4. State Diagrams

Unit 6. Implementation design and testing
- ☐ Topic 1. Packet diagrams
- ☐ Topic 2. Implementation support diagrams
- ☐ Topic 3. Test plan and traceability

5. TEACHING/LEARNING METHODS

The types of teaching/learning methods are as follows:

- Lectures
- Case studies
- Collaborative learning
- Problem-based learning
- Project-based learning
- Professional Workshop simulation

6. LEARNING ACTIVITIES

The types of learning activities, plus the amount of time spent on each activity, are as follows:

On campus:

Learning activity (AF, by the acronym in Spanish)	Number of hours
Lectures, reading on main topics and complementary materials, implementation of activities carried out independently and collectively (including participation in collaborative learning forums).	50
Integrative group work, consisting of participation in debates and seminars, and group implementation of integrative activities, mainly in the classroom.	25
Independent working	50
Tutorials, academic monitoring and assessment, both in the classroom and on the Campus Virtual.	25
TOTAL	**150**

Online:

Learning activity (AF, by the acronym in Spanish)	Number of hours
Independent working	50
Independent reading on complementary topics and materials and implementation of activities carried out independently. Subsequently, asynchronous group discussion on the Campus Virtual forum, and online seminars with the synchronous e-learning tools on the Campus Virtual.	50
Integrative group work, consisting of participation in debates and seminars, and group implementation of integrative activities. Carried out with the support of the Campus Virtual (the debates are held via forums, the seminars are online). In addition, each group will have asynchronous communication tools to prepare the group work (mainly forums), as well as	25

synchronous communication tools (mainly virtual meeting tools).	
Tutorials, academic monitoring and assessment through the Campus Virtual. Some assessment tests (e.g. exams) will be carried out on-campus when necessary.	25
TOTAL	**150**

7. ASSESSMENT

The assessment systems, plus their weighting in the final grade for the subject area, are as follows:

On campus:

Assessment system	Weighting
Knowledge tests, exams, test.	30%
Development of articles, reports or design briefs.	30%
Alternative assessment methods with mind maps, diaries, debates, portfolios, peer assessment, etc.	25%
Exercises, problems, case studies, designs, simulations and research will be used to assess the basic and general skills of the subject.	15%

Online:

Assessment system	Weighting
Knowledge tests, exams, test.	60%
Development of articles, reports or design briefs.	20%
Alternative assessment methods with mind maps, diaries, debates, portfolios, peer assessment, etc.	10%
Exercises, problems, case studies, designs, simulations and research will be used to assess the basic and general skills of the subject.	10%

On the Campus Virtual, when you open the subject area, you will find all the details of your assessable tasks and the deadlines and assessment procedures for each task.

7.1. Ordinary exam period

To pass the subject area in the ordinary exam period, you will need a final grade of at least 5.0 out of 10.0 (weighted average) for the subject area.

In any case, you will need a grade of at least 5.0 in the final test for it to be included in the weighting with the other activities.

7.2. Extraordinary exam period (resits)

To pass the subject area in the ordinary exam period, you will need a final grade of at least 5.0 out of 10.0 (weighted average) for the subject area.

In any case, you will need a grade of at least 5.0 in the final test for it to be included in the weighting with the other activities.

Activities not passed in the ordinary exam period, or those not submitted, must be submitted after receiving the relevant corrections and feedback from the lecturer.

8. TIMELINE

The timeline with submission dates for the assessable tasks in this subject area will be indicated in this section:

Assessable tasks	Date
Activity 1. Demand analysis	Weeks 4–5
Activity 2. Gathering requirements with elicitation techniques	Weeks 6–7
Activity 3. Analysis through use cases and user stories	Weeks 9–10
Activity 4. Use cases, domain and actors in design	Weeks 12–13
Activity 5. Design of dynamic aspects of the Software solution	Weeks 14–15
Activity 6. Transition to production	Weeks 16–17
Activity 7. Knowledge test	Weeks 18–19

The timeline may be subject to change for logistical reasons related to the activities. Students will be informed of any changes in due time and course.

9. BIBLIOGRAPHY

The reference material for the subject area is as follows:

The recommended bibliography is indicated below:
Learning   Unit   1:

Learning Unit 2: Learning Unit 3:
Learning Unit 4:
Learning Unit 5: Complementary bibliography for units 1, 2, 3:
Complementary bibliography for units 3, 4, 5 and 6:

10. DIVERSITY AWARENESS UNIT

Students with special educational needs:

To ensure equal opportunities, curricular adaptations or adjustments for students with special educational needs will be outlined by the Diversity Awareness Unit (UAD, Spanish acronym).

As an essential requirement, students with special educational needs must obtain a report about the curricular adaptations/adjustments from the Diversity Awareness Unit by contacting unidad.diversidad@universidadeuropea.es at the beginning of each semester.

11. SATISFACTION SURVEYS

Your opinion matters!

Universidad Europea encourages you to complete our satisfaction surveys to identify strengths and areas for improvement for staff, degrees and the learning process.

These surveys will be available in the survey area of your campus virtual or by email.

Your opinion is essential to improve the quality of the degree.

Many thanks for taking part.