COMILLAS
UNIVERSIDAD PONTIFICIA
ICAI ICADE CIHS

Syllabus
2023 - 2024

GENERAL INFORMATION

Data of the subject	
Subject name	Software Engineering
Subject code	DTC-GITT-315
Mainprogram	Bachelor's Degree in Engineering in Telecommunication Technologies
Involved programs	Grado en Ingeniería en Tecnologías de Telecomunicación [Third year]
Credits	6,0 ECTS
Type	Optativa (Grado)
Department	Department of Telematics and Computer Sciencies

Teacher Information	
Teacher	
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DESCRIPTION OF THE SUBJECT

Contextualization of the subject

Prerequisites

Knowledge of Structured Programming and Object-Oriented Programming

Course contents

Contents

CHAPTER I - OVERVIEW OF THE BASIC SOFTWARE ENGINEERING CONCEPTS.

Introduction.
What is Software Engineering and why is it important.
Development processes, techniques and tools.
Ethical Principles of Software Engineering (ACM/IEEE Code of Ethics and Professional Practice of Software Engineering)

CHAPTER II – SOFTWARE PROCESS MODELS FOR APPLICATION DEVELOPMENT. CLASSICAL PROCESSES AND AGILE METHODS. DESCRIPTION OF THE ACTIVITIES OF ANY DEVELOPMENT PROCESS.

Introduction. Software Processes: Directed by a plan and Agile.
Process Activities. Aim.

- Software Specification.

- Software Development.
- Software Validation.
- Software Evolution.

Software processes directed by a plan: waterfall, incremental, reuse, spiral, RUP.
Agile software processes: XP, Scrum, ...

Agile history and manifesto.
Roles.
Product Backlog.
Minimum Viable Product.
Release.
Sprint.
Planning Poker.
Kanban method.

CHAPTER III – SOFTWARE MANAGEMENT: PROJECT MANAGEMENT, QUALITY MANAGEMENT AND CONFIGURATION MANAGEMENT. RELIABILITY AND SECURITY.

Project management. Management Functions:

Estimation and Planning.
Follow-up.
Control.
Risk management.

Quality Management. Guarantee and control, Quality Assurance Plan (PAC).

ISO 9001, ISO 90003.

Configuration management: version and change control.
Reliability and Security.

CHAPTER IV – REQUIREMENTS ENGINEERING: FEASIBILITY STUDY, REQUIREMENTS DISCOVERY AND TECHNIQUES TO SPECIFY REQUIREMENTS. REQUIREMENTS MANAGEMENT.

Viability study:

Identification of necessities.
Economic analysis of Cost – Benefit.
Conclusion.
Information Collection Techniques.

The INTERVIEW technique.
Introduction to requirements.
User Requirements – System Requirements.
Traditional requirements approach – agile approach.
Functional and Non-functional Requirements. Domain requirements.
Requirements Document.

Obtaining, Analysis and Specification of Requirements. Requirements Discovery Techniques.
Requirements Validation (V&V&T Activity)
Requirements Management (V&V&T Activity).
Traceability of requirements.

CHAPTER V – VALIDATION, VERIFICATION AND TEST. THEORY AND EXAMPLES OF TECHNIQUES TO USE. TEST DESIGN.

Continuous task throughout the Development Process. Test Methods.
Types of test.
JUnit: Unit Testing in Java

CHAPTER VI – SYSTEM MODELING. BASIC CONCEPTS, STRUCTURAL AND BEHAVIORAL MODELS. UML AND OTHER MODELING TECHNIQUES.

Introduction to modeling.
UML diagrams.
System modeling with UML:
Context Models.
Interaction Models.
Structural Models.
Behavior Models

CHAPTER VII – DESIGN AND IMPLEMENTATION. ARCHITECTURAL DESIGN, DESIGN PATTERNS, INTERFACE DESIGNS, COMPONENT DESIGN. LANGUAGE STANDARDS AND PROCEDURES FOR THE IMPLEMENTATION OF THE SOFTWARE.

Architectural design.

What does architectural design consist of?
Decisions in architectural design.
Architectural patterns.
Preparation of Architectural Design.
Interface Design. Navigation. Interface prototyping.
Component Design: Object Oriented Design with UML. Design patterns.
Database design.

CHAPTER VIII – IMPLEMENTATION AND EVOLUTION OF THE SOFTWARE. CHANGE MANAGEMENT.

Evolution and Maintenance.

Adaptive.
Corrective.
Deletion of the Application.
DevOps

CHAPTER IX – CURRENT TRENDS IN SOFTWARE ENGINEERING. SOFTWARE QUALITY REFERENCE MODELS.

Standards and reference models for software management and quality. Process Improvements.

ISO 9001, ISO 90003.

CMM, CMMI

ISO/IEC 15504: SPICE

ITIL

ISO/IEC 20000

Agile vs Waterfall Processes

MDE – MDA.

EVALUATION AND CRITERIA

BIBLIOGRAPHY AND RESOURCES

Basic References

"Object-Oriented Analysis and Design with UML and the Unified Process", Stephen R. Schach, McGrawHill, 2005.

"Software Engineering 9", Ian Sommerville, Pearson, 2010

"Software Engineering Tenth Edition", Ian Sommerville, Financial Times/Prentice Hall, 2015