Faculty: Information Technology	
Department: Software Engineering	**Program: Master**
Academic Year:	**Semester:**

Course Plan

First: Course Information

Course No.: 1503755	***Course Title: Software Maintenance and Evolution***	***Credit Hours: 3***	***Theoretical: 3***	***Practical: 0***
Prerequisite No. and Title: ----------	***Section No.:***	***Lecture Time:***		
Level in JNQF	***7***			
Type Of Course:	☐ ***Obligatory University Requirement*** ☐ ***Elective University Requirement*** ☐ ***Obligatory Faculty Requirement*** ☐ ***Elective Faculty Requirement*** ■ ***Obligatory Specialization Requirement*** ☐ ***Elective Specialization Requirement*** ☐ ***Ancillary course***			
Type of Learning:	■ ***Face-to-Face Learning*** ☐ ***Blended Learning (2 Face-to-Face + 1 Asynchronous)*** ☐ ***Online Learning (2 Synchronous+ 1 Asynchronous)***			

Second: Instructor's Information

Course Coordinator					
Name:			***Academic Rank:***		
Office Number:	***Extension Number:***		***Email:***		
Course Instructor:					
Name:			***Academic Rank:***		
Office Number:	***Extension Number:***		***Email:***		
Office Hours:	***Sunday***	***Monday***	***Tuesday***	***Wednesday***	***Thursday***

Third: Course Description

This course discuss the issues and techniques necessary to enhance, perfect and modify software products over their life time. It also explains software re-engineering is sometimes a cost effective option for system evolution, where the different actions of the software re-engineering process take place, such as reverse engineering and program restructuring. How legacy systems can be assessed to decide if they should be scrapped, maintained, re-engineered or replaced to improve maintainability, extensibility, and software adaptability to different environments. The distinction between Software Re-engineering and Data Re-engineering will also be demonstrated. Finally, we will come across some issues of software reuse and how they affect software maintainability.

Fourth: Course Objectives

1. A wide variety of architectures and technologies available to design and implement software
2. Advance principles of maintenance and re-engineering know the most common root causes of software errors and software development scheduling problems;
3. Introduce the student to the a scientific research paper direction
4. Expanding the student's skills of research.

Fifth: Learning Outcomes

Level descriptor according to (JNQF)	*CILOs Code*	*CILOs* If any CLO will not be assessed in the course, mark NA.	*Associated PILOs Code* *Choose one PILO for each CILO**	*Assessment method* *Choose at least two methods*
Knowledge	**K1**	Outline the advance topics of software maintenance and research.	**PK1**	• Mid-term Exam • Final Exam
	K2	Identify Software maintenance on aspect-oriented design and meta-programming	**PK1**	• Mid-term Exam • Final Exam • Assignment
	K3	Describe the most common approached used in software maintenance such as reverse engineering, program understanding, re-engineering	**PK1**	• Mid-term Exam • Final Exam
Skills	**S1**	Describe the maintenance process and its role in software maintenance	**PS3**	• Mid-term Exam • Final Exam
	S2	Analyze and compare some of the COTS products and how they support software maintainability issues	**PS4**	• Mid-term Exam • Final Exam • Assignment
	S3	To assess strengths and weaknesses of Software maintenance approaches and methods	**PS4**	• Mid-term Exam • Final Exam • Assignment
Competencies	**C1**	Analyze and compare strategies used in evolving legacy systems.	**PC2**	• Practice

*CILOs: Course Intended Learning Outcomes; PILOs: Program Intended Learning Outcomes; For each CILO, the PILO could be the same or different.

Sixth: Learning Resources

Main Reference:	***Software Evolution and Maintenance A Practitioner's Approach, Roger Pressman, 7th edition, 2010***		
Author: Roger Pressman	***Issue No.: 8th***	***Print:***	***Publication Year: 2018***
Additional Sources and Websites:	***Software Maintenance: Concepts and Practice, 2nd edition (revised)*** ***Authors: Penny Grubb (Author), Armstrong A Takang*** ***Publication year: 2021***		
Teaching Type:	■ ***Classroom*** □ ***Laboratory*** □ ***Workshop*** ■ ***MS Teams*** ■ ***Moodle***		

Seventh: Course Structure

Week Number	Course Intended Teaching Outcomes (CILOs)	Topics	Teaching Procedures*	Teaching Methods**	References***
1	K1,S1, C1	Syllabus Concepts and Preliminaries	Face-to-Face	- Lecture, In-class Questions	- Chapter 1
2	K3, S1, S2, C1	Categories of Software Maintenance	Face-to-Face	Lecture, In-class Questions	Chapter 3
3	K1, K2, S1, S2, S3, C1	Evolution and Maintenance Models- Reuse Oriented Model	Face-to-Face	Lecture, In-class Questions	Chapter 3
4	K2, S1, C2	Evolution and Maintenance Models- IEEE/EIA 1219 Maintenance Process	Face-to-Face	Lecture, In-class Questions	Chapter 3
5	K2, S1, S2, C1	Reengineering- A General Model for Software Engineering	Face-to-Face	Lecture, In-class Questions	Chapter 4

6	K1, S1, S3,C1	Reengineering Process and approach	Face-to-Face	Lecture, In-class Questions	Chapter 4
7	K1, S2, S1, C1, S2	Legacy – Software Wrapping	Face-to-Face	Lecture, In-class Questions	Chapter 5
Midterm Exam					
8	K2, S1, S2, S3, C1	Legacy - Software Migration	Face-to-Face	Lecture, In-class Questions	Chapter 5
9	K1, S1, S2, S3, C1	Impact Analysis Process	Face-to-Face	Lecture, In-class Questions	Chapter 6
10	K1, K3, S3, C1, C2	Dependency-based Impact Analysis	Face-to-Face	Lecture, In-class Questions	Chapter 6
11	K1, K2, K3, S2, S3, C1	Refactoring-Activities in a Refactoring Process	Face-to-Face	Lecture, In-class Questions	Chapter 7
12	K1, K3, S2, S3, C1	More Examples of Refactoring	Face-to-Face	Lecture, In-class Questions	Chapter 7
13	K2, K3, S3, C1	Program Comprehension	Face-to-Face	Lecture, In-class Questions	Chapter 8
14	K4, S1, S3, C1	Reuse	Face-to-Face	Lecture, In-class Questions	Chapter 9
Final Exam					

*Teaching procedures: (Face-to-Face, synchronous, asynchronous).
** Teaching methods: (Lecture, video….).
*** Reference: (Pages of the book, recorded lecture, video….)

Eighth: Assessment Methods

Methods	Online Learning	Blended Learning	Face-To-Face Learning	Specific Course Output to be assessed **If any CILO will not be assessed in the course, mark NA.						
				K1	K2	K3	S1	S2	S3	C1
First Exam										
Second Exam										
Mid-term Exam			30	✓	✓	✓	✓	✓	✓	✓
Participation										
Asynchronous Activities										
Quizzes			10	✓		✓		✓		✓
Assignments			20		✓	✓			✓	✓
Group presentation										
Final Exam			50	✓	✓	✓	✓	✓	✓	✓
Total out of 100			100							

Ninth: Course Policies

- All course policies are applied to all teaching patterns (online, blended, and face-to-face Learning) as follows:
  a. Punctuality.
  b. Participation and interaction.
  c. Attendance and exams.
- Academic integrity: (cheating and plagiarism are prohibited).