



Faculty: Information Technology	
Department: Software Engineering	Program: Bachelor
Academic Year:	Semester:

Course Plan

First: Course Information

Course No.: 1503475	Course Title: software maintenance and evolution	Credit Hours: 3	Theoretical: 3	Practical: 0
Prerequisite No. and Title: 1503370		Section No.:	Lecture Time:	
Level in JNQF	7			
Type Of Course:	<input type="checkbox"/> <i>Obligatory University Requirement</i> <input type="checkbox"/> <i>Elective University Requirement</i> <input type="checkbox"/> <i>Obligatory Faculty Requirement</i> <input type="checkbox"/> <i>Elective Faculty Requirement</i> <input checked="" type="checkbox"/> <i>Obligatory Specialization Requirement</i> <input type="checkbox"/> <i>Elective Specialization Requirement</i> <input type="checkbox"/> <i>Ancillary course</i>			
Type of Learning:	<input checked="" type="checkbox"/> <i>Face-to-Face Learning</i> <input type="checkbox"/> <i>Blended Learning (2 Face-to-Face + 1 Asynchronous)</i> <input type="checkbox"/> <i>Online Learning (2 Synchronous+ 1 Asynchronous)</i>			

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:	<i>Sunday</i>	<i>Monday</i>	<i>Tuesday</i>	<i>Wednesday</i>	<i>Thursday</i>
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Third: Course Description

This course mainly looks at issues and techniques necessary to enhance, perfect and modify software products over their life time. It also explains why 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. Introducing the student to the fundamental concepts of maintenance and evolution.
2. Developing the student's ability to benefit from the laws of evaluation.
3. Guiding the student to understand the relation between the following concepts and maintenance: reengineering, legacy system, impact analysis, refactoring, reuse, and program comprehension.
4. Providing the student by skills of the best maintenance practices witch result in a quality changed software.

Fifth: Learning Outcomes

<i>Level descriptor according to (JNQF)</i>	<i>CILOs Code</i>	<i>CILOs</i> If any CLO will not be assessed in the course, mark NA.	<i>Associated PILOs Code</i> Choose one PILO for each CILO*	<i>Assessment method</i> Choose at least two methods
Knowledge	K1	List the basic of software maintenance terminologies.	PK1	<ul style="list-style-type: none"> • Mid-term Exam • Final Exam
	K2	List the concept of software maintenance process and define each type maintenance processes.	PK2	<ul style="list-style-type: none"> • Mid-term Exam • Final Exam
	K3	List the concept of legacy systems and the concept of software reuse in supporting software maintainability.	PK2	<ul style="list-style-type: none"> • Quizzes • Mid-term Exam • Final Exam
	K4	List the concept of architectural evolution concept and reengineering process and its techniques.	PK2	<ul style="list-style-type: none"> • Mid-term Exam • Final Exam

	K5	Learn Reusability techniques and software metrics that have been used in different software development processes	PK2	<ul style="list-style-type: none"> • Mid-term Exam • Final Exam
Skills	S1	Implement solutions of COTS integration problems. Describe some notation that can be used to analyze problem requirement.	PS5	<ul style="list-style-type: none"> • Mid-term Exam • Final Exam
	S2	Learn specific software maintenance processes and solve several issues affecting their performance efficiency.	PS5	<ul style="list-style-type: none"> • Mid-term Exam • Final Exam
Competencies	C1	Distinguish between maintenance types	PC2	<ul style="list-style-type: none"> • Participation
	C2	Evaluate some factors affecting software maintainability.	PC2	<ul style="list-style-type: none"> •
	C3	Analyze and compare strategies used in evolving legacy systems.	PC2	<ul style="list-style-type: none"> •
	C4	Analyze and compare some of the COTS products and how they support software maintainability issues.	PC2	<ul style="list-style-type: none"> •
	C5	Discuss and work in a group in order to study several cases, each of which has issues affecting the software maintainability in such a way.	PC1	<ul style="list-style-type: none"> •

*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:	<i>Software evolution and maintenance: a practitioner's approach</i>		
Author: Tripathy, P., & Naik, K	Issue No.: 3^d	Print:	Publication Year: 2015
Additional Sources and Websites:	<ul style="list-style-type: none"> • <i>Software Engineering, Ian Sommerville, 10 th Edition, Addison Wesley, 2016.</i> 		
Teaching Type:	<input checked="" type="checkbox"/> Classroom <input type="checkbox"/> Laboratory <input type="checkbox"/> Workshop <input checked="" type="checkbox"/> MS Teams <input checked="" type="checkbox"/> Moodle		

Seventh: Course Structure

Week	Course Intended Teaching Outcomes (CILOs)	Topics	Teaching Procedures*	Teaching Methods**	References***
1	K1,K2,K3,S2	-Course Syllabus discussion -Evolution vs maintenance -Laws of Lehman	Face-to-face	- Lecturing and assignments	Chapter 1
2	K2,K3,S2	-Laws of Lehman -Evolution vs maintenance	Face-to-face	Lecturing and assignments	Chapter 1
3	K1,K2,K3,K2 ,S1,C4	-FOSS system(free and open source software system) -Software maintenance -Software maintenance	Face-to-face	Lecturing and assignments	Chapter 1
4	K1, K3,S1,C4 K1, K3,S1,C4 K1, K3,S1,C4	-Software maintenance COTS -Software evolution models and processes	Face-to-face	Lecturing and assignments	Chapter 1
5	K1,K2, K4	-Software configuration management -Reengineering	Face-to-face	Lecturing and assignments	Chapter 1
6	K1,K2,K3,K4, C3	-Reengineering -Legacy systems	Face-to-face	Lecturing and assignments	Chapter 1
7	K1,K2,K3,K5,C3	-Impact analysis -Refactoring -Program comprehension	Face-to-face	Lecturing and assignments	Chapter 1

Midterm Exam					
8	K1,K2,K3,K5,C3	-Program comprehension -Intension-based classification of software maintenance	Face-to-face	Lecturing and assignments	Chapter 2
9	K1,K2,K4,C1	-Activity-based classification - Evidence-based classification -Categories of maintenance Concepts	Face-to-face	Lecturing and assignments Lecturing and assignments Lecturing and assignments	Chapter 2
10	K1,K2,K4	-Categories of maintenance Concepts -Maintained product	Face-to-face	Lecturing and assignments	Chapter 2
11	K1,K2,K4, C5	-maintenance types -Maintenance organization processes	Face-to-face	Lecturing and assignments	Chapter 2
12	K1,K2,K4, C5	-Maintenance organization processes -People ware	Face-to-face	Lecturing and assignments	Chapter 2
13	K1,K2,K4,C1, C2	- Evolution of software systems -SPE taxonomy	Face-to-face	Lecturing and assignments	Chapter 2 Chapter 3
14	K1,K2,K4,C1, C2	-SPE taxonomy -Evolution and maintenance models	Face-to-face	Lecturing and assignments	Chapter 3
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	K4	K5	S1	S2	C1	C2	C3	C4	C5	
First Exam																
Second Exam																
Mid-term Exam			35	✓	✓	✓		✓	✓	✓			✓			
Participation			5	✓											✓	
Asynchronous Activities																
Quizzes																
Assignments																
Group presentation			10	✓					✓						✓	
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).