



## Course Specification of Software Engineering

Course No ( ..... )

2020/2021

Head of Department	Vise Dean for Quality Assurance	Dean of the Faculty	Dean of Academic Development center and Quality
Dr. Ahmed Al-shalabi	Dr. Anwar Al-Shamiri	Dr. Nagi Al-Shibani	Assoc. Prof. Dr.Huda Al.Emad
Rector of Sana'a University			
Prof. Dr. Qassim Mohammed Abbas			



I. Course Identification and General Information:					
1	Course Title:	Software Engineering			
2	Course Code & Number:				
3	Credit hours:	C.H			
		Th.	Seminar	Pr	Tr.
		2	-	2	-
4	Study level/ semester at which this course is offered:	3 <sup>rd</sup> Level -1 <sup>st</sup> Semester			
5	Pre –requisite (if any):	Mathematics (1).			
6	Co –requisite (if any):	None			
7	Program (s) in which the course is offered:	CS			
8	Language of teaching the course:	English/Arabic			
9	Study System	Term based system			
10	Mode of delivery:	Full Time			
11	Location of teaching the course:	Faculty of Computer and Information Technology			
12	Prepared By:	Dr-Abdualmajed Ahmed Al-Khulaidi – Associate Professor at Sana'a University			
13	Date of Approval				

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## II. Course Description:

This course introduces the student to the basics and techniques required in software engineering that help him understand how to develop software systems, where the course takes an introduction to software engineering and its principles, software, methodologies and models of software engineering, requirements engineering, the nature of programming and its cost, software engineering based on the elements, Software architecture, software project management, UML, software testing, software maintenance, software quality. Software Engineering is the branch of computer science that creates practical, cost-effective solutions to computing and information processing problems, preferentially by applying scientific knowledge, developing software systems in the service of mankind. This course covers the fundamentals of software engineering, including understanding system requirements, finding appropriate engineering compromises, effective methods of design, coding, and testing, team software development, and the application of engineering tools. The course will combine a strong technical focus with a capstone project providing the opportunity to practice engineering knowledge, skills, and practices in a realistic development setting with a real client.

III. Course Intended learning outcomes (CILOs) of the course (maximum 8CILOs)		Referenced PILOs (Only write code number of referenced Program Intended learning outcomes)
a.1	Explain the basic concepts in software engineering.	A1
a.2	Describes how to choose the appropriate methodology in software engineering.	A1,A2

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b.1	Explore the information needed in the analysis and design process in software projects.	B2
b.2	Analyze the complex software to meet customer needs.	B3,B4
c.1	Apply software engineering techniques in software project management.	C1,C2
c.2	Building software that works on different operating systems.	C2,C3
d.1	Communicates effectively with others and works in one team spirit while designing software projects.	D1,D2
d.2	Writing technical reports and creating solutions to problems facing the system in the operating system environment.	D1,D2

**(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:**

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1-Explain the basic concepts in software engineering.	- lecture	-Written tests.
a2- Describes how to choose the appropriate methodology in software engineering.	-Dialogue and discussion. -Cooperative learning and working groups.	-Oral tests. - Evaluating individual and group homework reports. - Quizzes.

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	-Self-education. -Brainstorming.	
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**(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:**

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1-Explore the information needed in the analysis and design process in software projects.	-lecture. - Dialogue and discussion.	-Written tests. - Short tests. -Evaluation of reports.
b2- Analyze the complex software to meet customer needs.	-Brainstorming. -Problem Solving. -Tasks and working groups.	

**( C ) Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:**

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
C1-Apply software engineering techniques in software project management.	-Practical presentations and simulations. - Practical applications.	-Performance Note. -Written tests.
C2- Building software that works on different operating systems.	-Problem Solving. -Cooperative learning and working groups. -Dialogue and discussion.	- Evaluating the reports of applied duties. -Oral tests.

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	- Exchanging experiences between colleagues.	
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<b>(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:</b>		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1- Communicates effectively with others and works in one team spirit while designing software projects.	- Dialogue and discussion. - Self-education.	- Note the performance. - Evaluating assignments reports, projects and activities.
d2- Writing technical reports and creating solutions to problems facing the system in the operating system environment.	- Cooperative education. - Tasks and homework .	- Evaluation of presentations

<b>IV. Course Content:</b>					
<b>A – Theoretical Aspect:</b>					
Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	contact hours
1	General introduction to software engineering  And its principles	a1,b1,c1	The concept of software engineering - the importance of software engineering - the difference between software	3	9

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			<p>engineering and computer science - the difference between software engineering and systems engineering - the difference between software engineering and systems analyst.</p>		
			<p>Software engineering costs - Good software properties - Computer aided software engineering - Software engineering methods and methodologies - Software error.</p>		
			<p>The goals of software engineering - adaptability - effectiveness - reliability - understandability - abstraction and information hiding - local and</p>		

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			unitary - homogeneity, complementarity, and suitability.		
2	Software and its classifications	a1,b1,c1,d1	Software concept - software properties - classification of software applications - systems and real time software - business and scientific and engineering software - hardware and personal computer software.	1	3
3	Software procedures and methodologies and principles of analysis and design	a1 , a2,b1,b2,c2,d1	Software Procedures - Software Process Models - Linear Sequential Model and Software Build and Repair Model - Prototype Modeling - Rapid Development Model.  Developmental models of the programming process - the	2	

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			incremental and spiral model - the synchronous development model - the component assembly model - the mock methods model - analysis - requirements analysis - communication techniques - model-segmentation - specific characteristics of system requirements - the relationship between software design and software engineering - design principles.		6
4	The nature, cost, and development of the software	a2,b1,c1	The nature of software - sections of software cost - the software pyramid and its causes - software properties - software engineering project - types of software projects	1	

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			- software development project control.		3
5	Software Project Management	a1, c1 ,d1	Program project management - team organization - how to manage people - types of team organization - set of principles related to program team organization - quality and composition management.	1	3
6	Requirements Engineering	a1,b1,c1, d1	Requirements engineering - Feasibility study - Requirements collection and analysis - Requirements discovery - Software framework - Structural plans.	1	3
7	UML modeling language	a2,c1,c2, d1	The concept of modeling language - the regression model - iterative model - the spiral model - the initiation	1	

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			phase - the construction phase - the detail phase - the transition phase - the time constraint.		3
8	Software testing	a1,b1,c1 ,d1	The concept of software testing - causes of software defects - types of software testing - white box testing - black box test - integration test - performance test - integration test - reliability test - system test - smoke test - alpha test - beta test.	1	3
9	Software maintenance	a2,b1,c1 ,d1	Software errors - Software error ratings - Software error detection methods - Software previews - Software preview benefits - Software preview procedure - Automated static analysis.	1	3

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10	Software quality	a1,b1,c1 ,d1	The concept of software quality - the techniques adopted to ensure software quality - the process of software standardization - measuring the quality of internal software.	2	6
			Measuring the quality of external software - Measuring software quality in terms of extent - International standards for software quality - Quality checking Quality control of software.		
Number of Weeks /and Units Per Semester				14	42

B - Practical Aspect: (if any)				
Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes
1				
2				

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3				
4				
5				
6				
7				
8				
9				
10				
Number of Weeks /and Units Per Semester				

## V. Teaching strategies of the course:

- Lectures
- Dialogue and discussion
- brainstorming
- Problem solving
- Simulation and practical offers
- Tasks and costs
- Self-learning
- Collaborative learning

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## VI. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Research on how to manage software projects	a1,b2,c1,c2,d1	5 <sup>th</sup>	2
2	Project documentation	a1,b2,c1,c2,d1	6 <sup>th</sup>	4
3	UML Use in Project Analysis	a1,b1, b2,c1,c2,d1	11 <sup>th</sup>	2
4	Design a project	a1,b1,b2,c1,c2,d1	12 <sup>th</sup>	2

## VII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Tasks and Assignments	5 <sup>th</sup> , 6 <sup>th</sup> , 11 <sup>th</sup> , 12 <sup>th</sup>	10	10 %	a1,b1, c1,c2,d1
2	Quiz(1)	9 <sup>th</sup>	5	5 %	a1,b2,c1,c2
3	Midterm Exam	11 <sup>th</sup>	20	20 %	a2,b2,c1,c2
4	Quiz(2)	14 <sup>th</sup>	5	5 %	a1, a2,a1,b2,c1,c2
5	Final Exam (theoretical)	16 <sup>th</sup>	60	60 %	a1,a2,a1,b2,c1,c2,d1

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## VIII. Learning Resources:

- Written in the following order: ( Author - Year of publication – Title – Edition – Place of publication – Publisher).

### 1- Required Textbook(s) ( maximum two ).

- 1-Budgen, 2019, "Software Engineering", second ed., Addison-Wesley.
2. Eric J. Braude: 2017, "Software Engineering: "From Programming to Architecture"; John Wiley

### 2- Essential References.

- عبدالمجيد أحمد غالب الخليدي (٢٠١٦): هندسة البرمجيات ، دار النشر والطباعة -جامعة صنعاء.  
زاهر الحاج حسين، ٢٠٠٦م، "هندسة البرمجيات ثنائية الهندسة والادارة"، شعاع للنشر والعلوم، سوريا .

### 3- Electronic Materials and Web Sites etc.

- 1-Tsui, Frank , Orlando Karam and Barbara Bernal ,2013, *Essentials of Software Engineering*, Jones & Bartlett Learning , Sudbury.
- 2-Sommerville, Ian ,2019, *Software Engineering*, Addison-Wesley , Boston, MA.

## IX. Course Policies:

Unless otherwise stated, the normal course administration policies and rules of the Faculty of Computer and Information Technology apply. For the policy, see: -----

The University Regulations on academic misconduct will be strictly enforced. Please refer to -----

### 1 Class Attendance:

A student should attend not less than 75 % of total hours of the subject; otherwise he will not be able to take the exam and will be considered as exam failure. If the student is absent due to illness, he/she should bring a proof statement from university Clinic

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2	<b>Tardy:</b> For late in attending the class, the student will be initially notified. If he repeated lateness in attending class, he will be considered as absent.
3	<b>Exam Attendance/Punctuality:</b> A student should attend the exam on time. He is Permitted to attend an exam half one hour from exam beginning, after that he/she will not be permitted to take the exam and he/she will be considered as absent in exam.
4	<b>Assignments &amp; Project</b> The assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time.
5	<b>Cheating:</b> For cheating in exam, a student will be considered as fail. In case the cheating is repeated three times during his/her study the student will be disengaged from the Faculty.
6	<b>Plagiarism:</b> Plagiarism is the attending of a student the exam of a course instead of another student. If the examination committee proofed a plagiarism of a student, he will be disengaged from the Faculty. The final disengagement of the student from the Faculty should be confirmed from the Student Council Affair of the university.
7	<b>Other policies:</b> <ul style="list-style-type: none"> <li>- Mobile phones are not allowed to use during a class lecture. It must be closed, otherwise the student will be asked to leave the lecture room</li> <li>- Mobile phones are not allowed in class during the examination.</li> <li>- Lecture notes and assignments my given directly to students using soft or hard copy</li> </ul>

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## Faculty of Computer & Information Technology

### Department of Computer Science

### Program of Computer Science

### Course syllabus of Software Engineering

**Course No ( ..... )**

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## Template for Course Plan (Syllabus)

I. - Information about Faculty Member Responsible for the Course:						
Name of Faculty Member	Dr-Abdualmajed Ahmed Al-Khulaidi	Office Hours				
Location & Telephone No.	774448040	SAT	SUN	MON	TUE	WED
E-mail	alkhulaidi@mail.ru					

II. Course Identification and General Information:					
1-	Course Title:	Software Engineering			
2-	Course Number & Code:				
3-	Credit hours:	C.H			
		Th.	Seminar	Pr.	F. Tr.
		2	-	2	-
4-	Study level/year at which this course is offered:	3 <sup>rd</sup> Level -1 <sup>st</sup> Semester			
5-	Pre –requisite (if any):	Mathematics (1).			
6-	Co –requisite (if any):	None			
7-	Program (s) in which the course is offered	CS			
8-	Language of teaching the course:	English/Arabic			

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9-	<b>System of Study:</b>	Term based system
10-	<b>Mode of delivery:</b>	Full Time
11-	<b>Location of teaching the course:</b>	Faculty of Computer and Information Technology

### III. Course Description:

This course introduces the student to the basics and techniques required in software engineering. That help him understand how to develop software systems, where the course takes an introduction to software engineering and its principles, software, methodologies and models of software engineering, requirements engineering, the nature of programming and its cost, software engineering based on the elements, Software architecture, software project management, software testing, software maintenance, software quality. Software Engineering is the branch of computer science that creates practical, cost-effective solutions to computing and information processing problems, preferentially by applying scientific knowledge, developing software systems in the service of mankind. This course covers the fundamentals of software engineering, including understanding system requirements, finding appropriate engineering compromises, effective methods of design, and testing, team software development, and the application of engineering tools. The course will combine a design, strong technical focus with a capstone project providing the opportunity to practice engineering knowledge, skills, and practices in a realistic development setting with a real client.

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#### IV. Intended learning outcomes (ILOs) of the course:

- Brief summary of the knowledge or skill the course is intended to develop:
  - a.1 -Explain the basic concepts in software engineering.
  - a.2-Describes how to choose the appropriate methodology in software engineering.
  - b.1- Explore the information needed in the analysis and design process in software projects.
  - b.2-Analyze the complex software to meet customer needs.
  - c.1-Apply software engineering techniques in software project management.
  - c.2-Building software that works on different operating systems.
  - d.1-Communicates effectively with others and works in one team spirit while designing software projects.
  - d.2-Writing technical reports and creating solutions to problems facing the system in the operating system environment.

#### V. Course Content:

- Distribution of Semester Weekly Plan of Course Topics/Items and Activities.

##### A – Theoretical Aspect:

Order	Topics List	Week Due	Contact Hours
1	General introduction to software engineering and its principles	1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup>	9
2	Software and its classifications	4 <sup>th</sup>	3

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3	Software procedures and methodologies and principles of analysis and design	5 <sup>th</sup> , 6 <sup>th</sup>	6
4	The nature, cost, and development of the software	7 <sup>th</sup>	3
5	Software Project Management	8 <sup>th</sup>	3
6	Requirements Engineering	9 <sup>th</sup>	3
7	UML modeling language	10 <sup>th</sup>	3
8	Midterm Exam	11 <sup>th</sup>	3
9	Software testing	12 <sup>th</sup>	3
10	Software maintenance	13 <sup>th</sup>	3
11	Software quality	14 <sup>th</sup> , 15 <sup>th</sup>	6
12	Final Exam	16 <sup>th</sup>	3
Number of Weeks /and Units Per Semester		16	48

B – Practical Aspect: (if any)			
Order	Topics List	Week Due	Contact Hours
1			
2			
3			
4			

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5			
6			
7			
8			
9			
Number of Weeks /and Units Per Semester			

VI. Teaching strategies of the course:				
VII. Assignments:				
No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Research on how to manage software projects	a1,b2,c1,c2,d1	5 <sup>th</sup>	2
2	Project documentation	a1,b2,c1,c2,d1	6 <sup>th</sup>	4
3	UML Use in Project Analysis	a1,b1, b2,c1,c2,d1	11 <sup>th</sup>	2

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4	Design a project	a1,b1,b2,c1,c2,d1	12 <sup>th</sup>	2
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VIII. Schedule of Assessment Tasks for Students During the Semester:				
Assessment	Type of Assessment Tasks	Week Due	Mark	Proportion of Final Assessment
1	Tasks and Assignments	5 <sup>th</sup> , 6 <sup>th</sup> , 11 <sup>th</sup> , 12 <sup>th</sup>	10	10 %
2	Quiz(1)	9 <sup>th</sup>	5	5 %
3	Midterm Exam	11 <sup>th</sup>	20	20 %
4	Quiz(2)	14 <sup>th</sup>	5	5 %
5	Final Exam (theoretical)	16 <sup>th</sup>	60	60 %

IX. Learning Resources:
<ul style="list-style-type: none"> <li>Written in the following order: ( Author – Year of publication – Title – Edition – Place of publication – Publisher).</li> </ul>
<b>1- Required Textbook(s) ( maximum two ).</b>
<p>1-Budgen: 2019, "Software Engineering", second ed., Addison-Wesley.</p> <p>2. Eric J. Braude, 2017, "Software Engineering: "From Programming to Architecture"; John Wiley</p>
<b>2- Essential References.</b>
<p>عبدالماجد أحمد غالب الخليدي، ٢٠١٦، هندسة البرمجيات، دار النشر والطباعة - جامعة صنعاء.</p> <p>زاهر الحاج حسين، ٢٠٠٦، "هندسة البرمجيات ثنائية الهندسة والإدارة"، شعاع للنشر والعلوم، سوريا - حلب.</p>

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### 3- Electronic Materials and Web Sites etc.

- 1-Tsui, Frank , Orlando Karam and Barbara Bernal (2013) *Essentials of Software Engineering*, Jones & Bartlett Learning , Sudbury.
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2	<b>Tardy:</b> For late in attending the class, the student will be initially notified. If he repeated lateness in attending class he will be considered as absent.
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5	<b>Cheating:</b> For cheating in exam, a student will be considered as fail. In case the cheating is repeated three times during his/her study the student will be disengaged from the Faculty.
6	<b>Plagiarism:</b> Plagiarism is the attending of a student the exam of a course instead of another student. If the examination committee proofed a plagiarism of a student, he will be disengaged from the Faculty. The final disengagement of the student

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Dr. Ahmed Al-shalabi	Dr. Anwar Al-Shamiri	Dr. Nagi Al-Shibani	Assoc. Prof. Dr.Huda Al.Emad

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	from the Faculty should be confirmed from the Student Council Affair of the university.
7	<b>Other policies:</b> <ul style="list-style-type: none"> <li>- Mobile phones are not allowed to use during a class lecture. It must be closed, otherwise the student will be asked to leave the lecture room</li> <li>- Mobile phones are not allowed in class during the examination.</li> <li>- Lecture notes and assignments may be given directly to students using soft or hard copy</li> </ul>

اللجنة الإشرافية			
م.	الاسم	الصفة	التوقيع
١	أ.م.د. عبد الماجد الخليدي	نائب عميد الكلية للشؤون الأكاديمية	
٢	أ.م.د. احمد مجاهد	نائب عميد مركز التطوير الأكاديمي وضمان الجودة	
٣	د. حسين الأشول	ممثل المركز في الكلية	
٤	أ.د. إبراهيم المطاع	نائب رئيس الجامعة للشؤون الأكاديمية	

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