Course Specification of Compiler Design

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
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			Prof. Dr. Qassim Mohammed Abbas

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وحدة ضمان الجودة

I. Course Identification and General Information:

1	**Course Title:**	Compiler Design				
2	**Course Code & Number:**	………..				
3	**Credit hours:**		C.H				TOTAL
			Th.	Seminar	Pr	Tr.	
			2	-	2	-	*3*
4	**Study level/ semester at which this course is offered:**	3rd Level-2nd semester				
5	**Pre –requisite (if any):**	None				
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.Ghale Al-Gaphari				
13	**Date of Approval**					

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II.   Course Description:

This course introduces the principles of compiler design, with an emphasis on general solutions to common problems as well as techniques for putting the extensive theory into practice. Topics include specification of languages and its relation to automata, lexical analysis, finite state machines, context free languages, LL and LR parsing methods, syntax directed translation, error recovery, code generation, and portability. It is compulsory course.

III. Course Intended learning outcomes (CILOs) of the course		Referenced PILOs (Only write code number of referenced Program Intended learning outcomes)
a.1	Describe the design of a compiler including its phases and components.	A1, A6
a.2	Describe current developments in compiler design and implementation.	
b.1	Analyze the similarities and differences among various parsing techniques and grammar transformation technique.	B4, B6
b.2	Design a well-structured lexical analyzer.	
c.1	Design a well-structured parser based on context free grammar.	C1,C2
c.2	Employ the parsing tree technique in conducting code generation.	C2
d.1	Evaluate compiler code based on optimization technique.	D1, D6
d.2	Work with peers on a group project.	

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(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- Describe the design of a compiler including its phases and components.	Lectures Debate Cooperative learning Brain storming Practical proof	Written Exam year work to assess mental and general skills, knowledge and understanding.
a2-Describe current developments in compiler design and implementation.	Lectures Debate Cooperative learning Brain storming Practical proof	Written Exam Year work to assess mental and general skills, knowledge and understanding

(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Analyze the similarities and differe among various parsing techniques and grammar transformation technique.	Lectures Debate Cooperative learning Brain storming Practical proof	Year work to assess mental and general skills, knowledge and understanding
b2. Design a well-structured lexical analyzer.	Lectures Debate Cooperative learning Brain storming	Year work to assess mental and general skills, knowledge and understanding

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	Practical proof	

(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. Design a well-structured parser based on context free grammar.	Lectures Debate Cooperative learning Brain storming Practical proof	Practical exam to evaluate practical professional skills.
C2. Employ the parsing tree technique in conducting code generation..	Lectures Debate Cooperative learning Brain storming Practical proof	Practical exam to evaluate practical professional skills.

(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1- Evaluate a compiler code based on optimization technique.	Lectures Exercises Practical exercises Use modern references Access to scientific research Use libraries and the Internet	Exam Quizzes Homework
d2- Work with peers on a group project.	Lectures	Exam Quizzes

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	Exercises	Homework
	Practical exercises	
	Use modern references Access to scientific research Use libraries and the Internet	

IV. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	contact hours
1	Introduction	a1, c2, b1, d1, a2	▪ Introduction to finite state automata. ▪ Compilers importance in building source programs. ▪ Formal Languages, Compilers and their phases and functionalities.	1 week	2
2	lexical Analysis	a1, d1, b1, c2, b2	▪ what's Lexemes? ▪ what's a token? ▪ how to build token? ▪ Regular expression and FSA.	3 week	6
3	Source code tokenization	a1,b1,a2, b2,c1,d1,c2	▪ How to analyze source code into characters?	2 weeks	

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			▪ How to construct tokens? ▪ Tokens classification: keywords, identifiers and operators. ▪ Difficulties in scanning.		4
4	Formalism for Syntactic Analysis.	a1, a2, b1, b2, d1	▪ Context Free Grammar ▪ Derivation ▪ Abstract and Concrete Parsing tree ▪ Ambiguity	2 week	4
5	Parsing Techniques	a1,b1,a2, b2,c1,d1, c2	▪ top-down. ▪ bottom-up techniques	3 week	6
6	Semantic Analysis	b2, d1, a2, c1	▪ attribute grammars, ▪ translation schemes, type inference, ▪ symbol tables.	3 weeks	6
Number of Weeks /and Units Per Semester				**14**	**28**

B - Practical Aspect: (if any)

Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes
1	Introduction	2 weeks	4	a1,a2

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2	Regular expressions and tokenization.	2 weeks	4	a1, d1, b1, c2, b2
3	Context-free grammars	1 week	4	a1,b1,a2, b2,c1,d1,c2
4	Constructing Small lexical Analyzer	3 weeks	4	a1,a2,b2,c1
5	Constructing small Parser	3 weeks	4	a1,a2, b1, b2,c1,d1, c2
6	Semantic Analysis	1 week	4	b2,d1,a2,c1
7	Code Generation	2 week	4	a1,b1,a2, b2,c1,d1
Number of Weeks /and Units Per Semester		14	28	

V. Teaching strategies of the course::

- Lectures
- Debate
- Cooperative learning
- Brain storming
- Practical proof
- Use modern references
- Access to scientific research
- Use libraries and the Internet

VI. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1				
2				

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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					
2					
3					
4					

VIII. Learning Resources:

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

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

2- Essential References.

3- Electronic Materials and Web Sites *etc*.

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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
2	**Tardy:** 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	**Exam Attendance/Punctuality:** 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	**Assignments & Project** The assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time.
5	**Cheating:** 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	**Plagiarism:** 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	**Other policies:** - 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 - Mobile phones are not allowed in class during the examination.

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	- Lecture notes and assignments my given directly to students using soft or hard copy

Faculty of Computer & Information Technology

Department of Computer Science

Program of Computer Science

Course syllabus of Compiler Design

Head of Department	Vise Dean for Quality Assurance	Dean of the Faculty	Dean of Academic Development center and Quality
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I. - Information about Faculty Member Responsible for the Course:

Name of Faculty Member		Office Hours					
		SAT	SUN	MON	TUE	WED	THU
Location& Telephone No.							
E-mail							

II. Course Identification and General Information:

1	Course Title:	Compiler Design
2	Course Code & Number:	……………

3	Credit hours:	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2	-	2	-	3

4	Study level/ semester at which this course is offered:	3rd Level- 2nd semester
5	Pre –requisite (if any):	None
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

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III. Course Description:

This course introduces the principles of compiler design, with an emphasis on general solutions to common problems as well as techniques for putting the extensive theory into practice. Topics include specification of languages and its relation to automata, lexical analysis, finite state machines, context free languages, LL and LR parsing methods, syntax directed translation, error recovery, code generation, and portability. It is compulsory course.

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

- Brief summary of the knowledge or skill the course is intended to develop:

a1. Describe the design of a compiler including its phases and components.

a2. Describe current developments in compiler design and implementation.

b1. Analyze the similarities and differences among various parsing techniques and grammar transformation technique.

b2. Design a well-structured lexical analyzer.

c1. Design a well-structured parser based on context free grammar.

c2. Employ the parsing tree technique in conducting code generation.

d1. Evaluate compiler code based on optimization technique.

d2. Work with peers on a group project.

V. Course Content:

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

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A – Theoretical Aspect

Order	Topics List	Week Due	contact hours
1	Introduction	1st	2
2	lexical Analysis	2nd-4th	6
3	Source code tokenization	5th,6th	4
4	Mid-term Exam	7th	2
5	Formalism for Syntactic Analysis.	8th ,9th	4
	Parsing Techniques	10th -12th	6
6	Semantic Analysis	13th -15th	6
7	Final-exam	16th	2
Number of Weeks /and Units Per Semester		16	32

B – Practical Aspect: *(if any)*

Order	Topics List	Week Due	Contact Hours
1	Introduction	1st, 2nd	4
2	regular expressions and tokenization.	3rd,4th	4
3	context-free grammars	5th ,6th	4
4	Constructing Small lexical Analyzer	7th ,8th	4
5	Mid Exam	9th	2

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6	Constructing small Parser	10th ,11th	4
7	Semantic Analysis	12th ,13th	4
8	Code Generation	14th ,15th	4
Number of Weeks /and Units Per Semester		**15**	**30**

VI. Teaching strategies of the course:

- Lectures
- Debate
- Cooperative learning
- Brain storming
- Practical proof
- Use modern references
- Access to scientific research
- Use libraries and the Internet

VII. Assignments:

No	Assignments	Aligned CILOs (symbols)	Week Due	Mark
1				
2				

VIII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment

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1				
2				
3				
4				
5				

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اللجنة الإشرافية

م.	الاســـــم	الصـــــــفة	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	

Head of Department	Vise Dean for Quality Assurance	Dean of the Faculty	Dean of Academic Development center and Quality
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