



## Course Specification

**Course Name:** Compilers ]  
**Course Code:** CS419 ]

### I. Basic Course Information

Major or minor element of program: Major ]  
Department offering the course: Computer Science Department ]  
Academic level: 400 Level ]  
Semester in which course is offered: Second (spring) Semester ]  
Course pre-requisite(s): CS317 Concepts of Programming Languages ]  
Credit Hours: 3  
Contact Hours Through:

Lecture	Tutorial*	Practical*	Total
2.5	0.0	1.5	4.0

\* 1.5 hours for **either** Tutorial or Practical

Approval date of course specification: January 2015

### II. Overall Aims of Course

[Students will see the theory behind different components of a compiler, the programming techniques used to put the theory in practice, and the interfaces used to modularize the compiler. ]

### III. Program ILOs covered by course

Program Intended Learning Outcomes (By Code)			
Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
[K1,K16,K18 ]	[I13,I17 ]	[P3,P12 ]	[G2,G6 ]



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### IV. Intended Learning Outcomes of Course (ILOs)

#### a. Knowledge and Understanding

On completing the course, students should be able to:

- K.1 Explain the several phases of the compiler.
- K.2 Explain how to define a regular expression that generates a target language.
- K.3 Explain how programs are written in high level languages parsed in different techniques.
- K.4 Explain how to produce an abstract syntax tree for a target language
- K.5 Explain why and how visitor pattern is used in making semantic analysis. ]

#### b. Intellectual/Cognitive Skills

On completing the course, students should be able to:

- I.1 Use regular expression and finite automata to design new language.
- I.2 Analyze written program syntactically and semantically.
- I.3 Create a tiny grammar containing left recursion and use it to demonstrate that left recursion is not a problem for LR parsing.
- I.4 Create LR-DFA for specific grammar. ]

#### c. Practical/Professional Skills

On completing the course, students should be able to:

- P.1 Writing MiniJava Programs.
- P.2 Use the JAVACC software to create and languages' parsers. ]

#### d. General and Transferable Skills

On completing the course, students should be able to:

- G.1 Acquire written communication skills
- G.2 Acquire oral communication skills.
- G.3 Acquire team working skills. ]

### V. Course Matrix Contents

	Main Topics / Chapters	Duration (Weeks)	Course ILOs Covered by Topic (By ILO Code)			
			K & U	I.S.	P.S.	G.S.
1-	Introduction	1	K1			
2-	Lexical Analysis.	2	K2	I1,I3,I4	P1	G3
3-	Parsing	3	K3	I2,I3	P1,P2	G3
4-	Recursive Descent Parsing	1	K4	I2	P1,P2	G3
5-	Predictive Parsers	2	K5	I2		G1,G2
6-	LR Parsers	2				G1,G2
7-	Syntax Directed Translation	2				G1,G2
	<b>Net Teaching Weeks</b>	<b>13</b>				



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VI. Course Weekly Detailed Topics / hours / ILOs

Week No.	Sub-Topics	Total Hours	Contact Hours	
			Theoretical Hours	Practical Hours*
1	Introduction	2.5	2.5	
2	Regular Expression and definition	4	2.5	1.5
3	NFA	4	2.5	1.5
4	Transfer NFA to DFA	4	2.5	1.5
5	Design of Lexical Analysers	4	2.5	1.5
6	Grammars and Ambiguity	4	2.5	1.5
7	<b>Midterm Exam</b>			
8	Removing Left Recursion and Left Factoring	4	2.5	1.5
9	First and Follow operators	4	2.5	1.5
10	Construction of Predictive Parsing Tables	4	2.5	1.5
11	Predictive Parsing	4	2.5	1.5
12	Canonical Items	4	2.5	1.5
13	Construction of LR Parsing Tables	4	2.5	1.5
14	Syntax Directed Translation	4	2.5	1.5
15	<b>Final Exam</b>			
<b>Total Teaching Hours</b>		<b>51</b>	<b>33</b>	<b>18</b>

\* No Practical/Tutorial during the first week of the semester

VII. Teaching and Learning Methods

Teaching/Learning Method	Selected Method	Course ILOs Covered by Method (By ILO Code)			
		K & U	Intellectual Skills	Professional Skills	General Skills
Lectures & Seminars	X	All	All		
Tutorials					
Computer lab Sessions					
Practical lab Work	X	All	All	All	
Reading Materials					
Web-site Searches					
Research & Reporting					
Problem Solving / Problem-based Learning					
Projects					
Independent Work					
Group Work	X				All
Case Studies					
Presentations					
Simulation Analysis					
Others (Specify):					



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VIII. Assessment Methods, Schedule and Grade Distribution

Assessment Method	Selected Method	Course ILOs Covered by Method (By ILO Code)				Assessment Weight / Percentage	Week No.
		K & U	I.S.	P.S.	G.S.		
Midterm Exam	[X]	[All]	[All]	[ ]	[ ]	[10%]	7
Final Exam	[X]	[All]	[All]	[ ]	[ ]	60%	15
Quizzes	[X]	[All]	[All]	[ ]	[ ]	[5%]	[3]
Course Work	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Report Writing	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Case Study Analysis	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Oral Presentations	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Practical	[X]	[ ]	[ ]	[All]	[ ]	[10%]	[4,5,6,7,8,9,10,11,12]
Group Project	[X]	[ ]	[ ]	[All]	[All]	[15%]	[13,14,15]
Individual Project	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Others (Specify):	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

IX. List of References

<b>Essential Text Books</b>	<ul style="list-style-type: none"> <li>[Compilers: Principles, Techniques and Tools. A. Aho, R. Sethi, J. Ullman. 2nd Edition]</li> </ul>
<b>Course notes</b>	<ul style="list-style-type: none"> <li>[Dr provides slides.]</li> </ul>
<b>Recommended books</b>	<ul style="list-style-type: none"> <li>[Modern Compiler Implementation in JAVA, Andrew W. Apple.]</li> </ul>
<b>Periodicals, Web sites, etc ...</b>	<ul style="list-style-type: none"> <li>[None]</li> </ul>

X. Facilities required for teaching and learning

<ul style="list-style-type: none"> <li>[JDK,</li> <li>[JAVACC</li> <li>[MiniJAVA Manual.]</li> </ul>
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Course coordinator: [Dr. Nouh Sabry]

Head of Department: [Prof. Abeer El Korany]

Date: January 2015