



# Course Specifications

Institution:	Majmaah University
Academic Department :	College of Science in Zulfi, Department of Computer Science and Information.
Programme :	Computer Science and Information
Course :	Compiler Design
Course Coordinator :	Dr. Naveed Ejaz
Programme Coordinator :	Associate Prof. Yosry Azzam.
Course Specification Approved Date :	22/ 12 / 1435 H



## A. Course Identification and General Information

1 - Course title :	Compiler Design	Course Code:	CSI 413
2. Credit hours :	(3)		
3 - Program(s) in which the course is offered:	Computer Science & Information		
4 – Course Language :	English		
5 - Name of faculty member responsible for the course:	Dr. Naveed Ejaz		
6 - Level/year at which this course is offered :	7th		
7 - Pre-requisites for this course (if any) :	<ul style="list-style-type: none"> <li>• CSI 222</li> <li>• CSI 221</li> </ul>		
8 - Co-requisites for this course (if any) :	None		
9 - Location if not on main campus :	( College of Science in Zulfi )		
10 - Mode of Instruction (mark all that apply)			
A - Traditional classroom	<input checked="" type="checkbox"/>	What percentage?	80%
B - Blended (traditional and online)	<input checked="" type="checkbox"/>	What percentage?	10 %
D - e-learning	<input type="checkbox"/>	What percentage?	..... %
E - Correspondence	<input type="checkbox"/>	What percentage?	..... %
F - Other	<input checked="" type="checkbox"/>	What percentage?	10 %
Comments :	.....		

## B Objectives

<p>What is the main purpose for this course?</p> <p>The goal of this course is to introduce the design and implementation of compilers. Topics include: compiler organization, algorithms for lexical, syntactic and semantic analysis, top-down and bottom-up parsing (e.g., recursive descent, LL, LR, LALR parsing), symbol table organization, error detection and recovery, intermediate and object code generation, and code optimization. Student has to implement a compiler for a simple high level language (like mini C) as a project .</p> <p>Briefly describe any plans for developing and improving the course that are being implemented :</p> <ol style="list-style-type: none"> <li>1. Using group discussion through the internet with course attending students.</li> <li>2. Updating the materials of the course to cover the new topics of the field.</li> </ol>
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## C. Course Description

### 1. Topics to be Covered

List of Topics	No. of Weeks	Contact Hours
<b>1. Introduction to Compilers:</b> The role of language translation in the programming process, Comparison of interpreters and compilers, Language translation phases, Machine dependent and machine independent aspects of translation, Language translation as a software engineering activity	1	3
<b>2. Lexical Analysis:</b> Application of regular expressions in Lexical Analysis, Scanning, hand coded scanner vs. automatically generated scanners, formal definition of tokens, implementation of finite state automata.	3	9
<b>3. Syntax Analysis and Parsing:</b> Revision of formal definition of grammars, BNF and EBNF, Bottom-up vs. Top-down parsing, Tabular vs. Recursive-descent parsers, Error handling,	3	9
<b>4. Parser Generators:</b> Automatic generation of tabular parsers, Symbol table management, Use of tools in support of the translation process	2	6
<b>5. Semantic Analysis:</b> Data type as set of values with set of operations, data types, Type- checking models, Semantic models of User defined types, Parametric polymorphism, Subtype polymorphism, Type checking algorithms.	2	6
<b>6. Intermediate Code Generation</b> Intermediate and object code, intermediate representations, implementation of code generators	3	9

### 2. Course components (total contact hours and credits per semester):

	Lecture	Tutorial	Laboratory	Practical	Other:	Total
<b>Contact Hours</b>	<b>30</b>	.....	<b>30</b>	.....	.....	<b>60</b>





Credit	<b>30</b>	.....	<b>15</b>	.....	.....	<b>45</b>
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**3. Additional private study/learning hours expected for students per week.**

<b>5</b>
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The private self-study is crucial for this course. It includes:

- Carefully reading the topics in the textbook and reference book,
- Browsing the related websites,
- Solving the chapter exercises,
- Discussing the course topics with the instructor in his office hours,
- Watching the related video lectures

The total workload of the student in this course is then:  $60 + 5 * 15 = 135$  work hours.

**4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy**

	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
<b>1.0</b>	<b>Knowledge</b>		
<b>1.1</b>	Understand the structure of compilers	Lectures	Written Exam
<b>1.2</b>	Understand the basic techniques used in compiler construction such as lexical analysis, top-down, bottom-up parsing, context-sensitive analysis, and intermediate code generation	Lab demonstrations Case studies Individual presentations	Homework assignments Lab assignments Class Activities Quizzes
<b>1.3</b>	Understand the basic data structures used in compiler construction such as abstract syntax trees, symbol tables, three-address code, and stack machines		
<b>2.0</b>	<b>Cognitive Skills</b>		
<b>2.1</b>	Explain the core issues of Compiler design.	Lectures	Written Exam
<b>2.2</b>	Design and implement a compiler using a software engineering approach	Lab demonstrations Case studies	Homework assignments Lab assignments
<b>2.3</b>	Identify problems, and explain, analyze, and evaluate various design strategies of compilers.	Individual presentations Brainstorming	Class Activities Quizzes





	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
<b>3.0</b>	<b>Interpersonal Skills &amp; Responsibility</b>		
<b>3.1</b>	Work in a group and learn time management.	Small group	Written Exam
<b>3.2</b>	Learn how to search for information through library and internet.	discussion Whole group	Homework assignments
<b>3.3</b>	Present a short report in a written form and orally using appropriate scientific language.	discussion Brainstorming Presentation	Lab assignments Class Activities Quizzes
<b>4.0</b>	<b>Communication, Information Technology, Numerical</b>		
<b>4.1</b>	Communicate with teacher, ask questions, solve problems, and use computers.	Small group discussion	Written Exam Homework assignments
<b>4.2</b>	Use Information technology and computer skills to gather information about a selected topic.	Whole group discussion	Lab assignments Class Activities
<b>4.3</b>	Operate questions during the lecture, work in groups, and communicate with each other and with me electronically, and periodically visit the sites I recommended.	Brainstorming Presentation	Quizzes
<b>5.0</b>	<b>Psychomotor</b>		
	N/A		

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

	Assessment task	Week Due	Proportion of Total Assessment
<b>1</b>	First written mid-term exam	6	15%
<b>2</b>	Second written mid-term exam	12	15%
<b>3</b>	Presentation, class activities, and group discussion	Every week	10%
<b>4</b>	Homework assignments	After Every chapter	10%
<b>5</b>	Practical exam	15	10%
<b>6</b>	Final written exam	16	40%
<b>7</b>	<b>Total</b>		100%





## D. Student Academic Counseling and Support

1. 6-office hours per week in the lecturer schedule.
2. The contact with students by e-mail , mobile, office telephone and website.

## E. Learning Resources

### 1. List Required Textbooks :

R Sethi , J D Ullman & Addison-Wesley : Compilers: Principals, Techniques, and Tools, 3rd , 2007, Addison-Wesley.

### 2. List Essential References Materials :

Modern Compiler Implementation in Java, Cambridge University Press, 2003

### 3. List Recommended Textbooks and Reference Material :

None

### 4. List Electronic Materials :

<https://www.coursera.org/>.

### 5. Other learning material :

Video and presentations that are available with the instructor.

## F. Facilities Required

### 1. Accommodation

- Class Rooms
- Computer Labs
- Library

### 2. Computing resources

- Smart Board

### 3. Other resources

None

## G Course Evaluation and Improvement Processes

### 1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching:

- Analysis of students' results.
- Observation during work.
- Students' evaluations.
- Colleagues' evaluations.
- Evaluation questionnaire filled by the students.
- Interview a sample of students enrolled in the course to take their opinions.

### 2 Other Strategies for Evaluation of Teaching by the Program/Department





**Instructor :**

- Self-assessment.
- External evaluation.
- Periodic review of course (the Commission of study plans).

**3 Processes for Improvement of Teaching :**

- Taking into account the recommendations yielded from the internal review of the course.
- Guidelines about course teaching provided by the by study plans commission.
- Department Guidelines about faculty member performance on the basis of direct observation.
- Training and development.
- Workshops to improve the educational process.

**4. Processes for Verifying Standards of Student Achievement**

Instructors of the course working together with Head of Department to adopt a unique process of the evaluation.

**5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement :**

- Comparison of the course to its counterparts offered in similar departments.
- Periodic revision of course description by faculty member.
- Periodic revision of course description by the study plans and schedules Commission.
- Update learning resources related to the course to ensure that the course is kept up with developments in the field.
- Make use of statistical results of course evaluation made by students to improve and develop the course.
- Giving the opportunity for students to express their opinions about what is taught and receive suggestions and study their effectiveness.

**Course Specification Approved**

**Department Official Meeting No ( ..... ) Date ... / .... / ..... H**

**Course's Coordinator**

**Name :** Dr. Naveed Ejaz

**Signature :** .....

**Date :** 22/ 12 / 1435 H

**Department Head**

**Name :** Assoc. Prof. Yosry Azzam

**Signature :** .....

**Date :** 22/ 12 / 1435 H

