



جمهورية مصر العربية

وزارة التعليم العالي والبحث العلمي

Ministry of Higher Education and Scientific Research



المعهد العالي للحاسبات وتكنولوجيا المعلومات
مدينة الشروق - القاهرة
شعبة علوم الحاسب

Course specification

Course Code: CS 321

Course Title: Compiler Design & Theory

Academic Year: 2023/2024

Course specification
(CS 321 - Compiler Design & Theory)

Course Outline

Faculty:	<i>HICIT- (Higher Institute for Computers & Information Technology-El Shorouk Academy)</i>		
Programme(s) on which the course is given:	Undergraduate program in Computer Science		
Major or minor element of programme:	Compulsory		
Department offering the program	Department of Computer Science		
Department offering the course:	Department of Computer Science		
Level	Third Level		
Date of specification approval	--/--/2023		

Basic Information

Code:	CS 321	Title:	Compiler Design & Theory	
Prerequisites:	CS 220 Computer Organization & Assembly Language			
Weekly Hours:				
Lecture: 2	Exercise: -	Practical: 2	Total: 3 credit hours	

Professional Information

Course Aims:

The student will learn principles of compiler construction and operation. Topics will include: lexical analysis, symbol tables, parsing, type checking, optimization, and code generation.

Program ILOs Covered by Course

Knowledge and understanding	Intellectual Skills	Professional and practical skills	General and Transferable skills
A10	B1,B2,B4,B15	C10	D12

Intended learning outcomes of course (ILOs)

a. Knowledge and Under-Standing:

- a1. Define the basic phases of Compilation. [A10]
- a2. Explain how compilers operate. [A10]

b. Intellectual Skills:

b1. Analyze the significance of the several phases through which a typical Program is compiled.
[b1, b2, b4, b15]

c. Professional and practical skills

c1. Assess typical compilation phases. [C10]
c2. Implement simple lexical and syntax analysers. [C10]

d. General and transferable skills

d1. Work in a group to design and implement a typical high level language compiler [D12]
d2. Present the implemented compiler and make a demo. [D12]

Contents		
Topic	Contact Hours	
	lecture	Lab
Introduction to compiler theory	2	2
Scanning & Finite Automata	4	4
Context- Free Grammars & Parsing	6	6
Semantic Analysis	2	2
Runtime Environment	4	2
Code Generation	4	2
Implementation project in compiler design	2	4
Selected Topics (Source Code Optimization)	2	2
Course project	2	4

Teaching and learning methods	
Teaching and learning methods	Used
Lectures	√
Tutorial Exercises	
Practical Lab	√
Discussions.	√
Self – Learning (Reading material, Websites search,)	√
Self-studies	-
Group work	√
Presentation	√
Problem solving/problem solving learning based	√
Case study	√
Synchronous E-Learning	-
Video lectures	√
Asynchronous E-Learning	√

Student assessment methods & Schedule

Methods	Used	Week#
Midterm Exam	√	8
Final Exam	√	16
Course Project	√	3-14
Course Work & Quizzes	√	2-14
Practical Exam	√	15

Assessment Weight

Assessment	Weight %
Mid Term Exam	15
Practical Exam and Project	15
Final Exam	60%
Course Work & Quizzes	10%
Total	100

Course Work & Quizzes

Short Exams, Assignments, Research, Reports, Presentations
Class/Project discussion

List of references

Essential books (textbooks)	<ul style="list-style-type: none"> - Louden, K. C. (1997, January 24). Compiler Construction: Principles and Practice. - Aho, A., Lam, M., Sethi, R., & Ullman, J. (2013, July 26). Compilers: Principles, Techniques, and Tools: Pearson New International Edition. Pearson.
Course notes	E-Learning Portal <ul style="list-style-type: none"> - http://lambda.uta.edu/cse5317/notes.pdf - http://www.sai.msu.su/sal/F/1
Recommended books	Morgan, B. (2004, October 1). Building an Optimizing Compiler.
Periodicals, website	<ul style="list-style-type: none"> - Power point presentations of all course materials - All labs material - [https://moodle.sha.edu.eg/course/view.php?id=2269]
Videos link	<ul style="list-style-type: none"> - Video of lectures and sections - [https://drive.google.com/drive/folders/1UfeRLar1OYCOIJcHEpluBQnZA7k5kllH]

Required Facilities

Tools & SW (Technology facilities):	<ul style="list-style-type: none"> - Microsoft Visual Studio 2019 - Microsoft TEAMS to create virtual classrooms for lectures, discussions for project. - Portal (MOODLE) to make electronic quizzes and electronic midterm exam. - portal (MOODLE) to upload project deliverable and assignment.
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	- academy portal (MOODLE) to upload electronic material.	
Teaching facilities:	Whiteboard	√
	Computer Lab	√
	Data show	√
	E-Learning	√
	Videos	√
	Website	√

Course Content/ILO Matrix

Course Contents	Knowledge & understanding		Intellectual skills	Professional and practical skills		General	
	a1	a2	b1	c1	c2	d1	d2
Introduction to compiler theory	x						
Scanning & Finite Automata	x	x	x	x	x		
Context- Free Grammars & Parsing	x	x	x	x	x		
Semantic Analysis	x	x	x	x	x		
Runtime Environment		x	x		x		
Code Generation	x	x	x	x	x		
Selected Topics (Source Code Optimization)	x		x	x	x		
Course project			x	x	x	x	x

Learning Method /ILOs Matrix

Learning Methods	Knowledge and understanding		Intellectual skills	Professional and practical skills		General	
	a1	a2	b1	c1	c2	d1	d2
Lectures	x	x	x	x	x		
Tutorial Exercises			x	x	x		
Reading material	x	x	x	x	x		
Websites search	x	x	x		x	x	x
Research and reporting	x	x				x	x
Discussions.			x	x	x	x	x

Assessment Methods /ILOs Matrix

Assessment Methods	Knowledge & understanding		Intellectual skills	Professional & practical skills		General	
	a1	a2	b1	c1	c2	d1	d2
Electronic Mid Term Exam	x	x	x				
Final Exam	x	x	x				
Electronic Course Project	x	x	x	x	x	x	x
Electronic Course Work & Quizzes	x	x	x	x	x	x	x

Course ILOs Vs Program ILOs

Course ILOs \ Prog ILOs		Knowledge & understanding	Intellectual skills				Professional and practical skills	General
		A10	B1	B2	B4	B15	C10	D12
Knowledge and understanding	a1	√						
	a2	√						
Intellectual skills	b1		√	√	√	√		
Professional and practical skills	c1						√	
	c2						√	
General skills	d1							√
	d2							√

Course Coordinator: Dr. Ahmed El-Abbassy ().

Head of Department: Dr. Ahmed El-Abbassy ().

Date: --/--/2023