

Compilers

Course Definition





Syrian Arab Republic
Ministry of Higher Education
And Scientific Research
Syrian Virtual University



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وزارة التعليم العالي والبحث العلمي

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1. Basic Information:

Course Name	Compiler
Course Code	BCM601
Number of Presentational Sessions*	2×12
Number of Synchronous Sessions**	12
Number of Shorter Tests	2
Number of Exams***	1
Theoretical Sessions Work Load (hrs.)	72
Practical Sessions Work Load (hrs.)	36
Credit Hours	6

^{*}Each presentational session comprises both recorded lecture (1.5 hrs.) and interactive learning content (1.5 hrs.).

N.B.

Generally, each chapter requires two presentational sessions: one for the recorded content and one for the interactive content (unless the chapter is too long, in which case it may require more sessions (. This note applies to synchronous sessions as well, where each chapter requires one synchronous session generally.

^{**}Each synchronous session comprises the interactive lecture carried out in real time in a virtual class (1.5 hrs.).

^{***} The final exam is 2 hrs. long.

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2. Prerequisites courses:

Course	Code
Automata & Formal Languages	BAU501

3. Course Objectives:

The "Compiler" course is one of the basic courses of IT engineering. It introduces the basic principals and theoretical background and different techniques of compilers design and realization.

The course focuses on analysis methods implemented by compilers to get source code programs main components, as well as, on basic methods of developing programs equivalent semantically to their source codes.

The different steps in the complier structure are discussed based on Automation and Formal Languages.

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4. Learning Outcomes (LO):

By the end of this course, the learner is expected to acquire and learn the following subjects:

- Understand Compiler structure
- Understand Lexical Analysis
- Understand Syntactical Analysis
- Understand symbol table and semantic tree
- Understand Semantic Analysis
- Understand Code Generation
- Understand Code Optimization
- Competence in Lexical tool
- Competence in Syntactical tool

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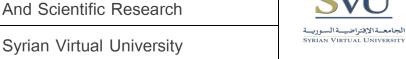
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5. Assessment Results:

			Assessment Type				
Chapter Number	Chapter Title Objectives		Interactive Content & Recorded Sessions	Applied Activities (Synch. Sessions)	Final Exam*/ Shorter Tests**	Presentations and Interviews***	Reports***
CH1	Introduction	Comprehension -Analytical Thinking -Tools and Application Hands- On	✓	✓	✓	✓	✓
CH2	Compiler Structure	Comprehension -Analytical Thinking -Tools and Application Hands- On	√	√	✓	✓	✓
СН3	Lexical Analysis	Comprehension -Analytical Thinking -Tools and Application Hands- On	✓	✓	✓	✓	✓
CH4	Lexical Analysis Tool – Lex	Comprehension -Analytical Thinking -Tools and Application Hands- On	✓	✓	√	✓	√

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		Communication					
		Comprehension					
2112	Syntactical	-Analytical					
CH5	Analysis	Thinking -Tools	✓	√	✓	✓	√
		and Application					
		Hands- On					
	Curata atical	Comprehension					
	Syntactical	-Analytical					
CH6	Analysis	Thinking -Tools	✓	✓	✓	\checkmark	✓
	Tool –	and Application					
	Bison	Hands- On					
		Comprehension					
	Semantic Analysis	-Analytical					
CH7		Thinking -Tools	✓	✓	✓	\checkmark	✓
		and Application					
		Hands- On					
		Comprehension					
	Code Generation and Optimisation	-Analytical					
CH8		Thinking -Tools	√	✓	✓	✓	✓
		and Application					
		Hands- On					
		Tialius- OII					

^{*}The final exam is two hours long and is given at the end of the course.

^{**}Shorter tests are about 30 minutes long and are given after three or four lectures throughout the semester during synchronous sessions.

^{***}Presentations, interviews, and reports are submitted once after each three or four lectures throughout the semester during synchronous sessions.

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6. Course Syllabus:

Chapter	Subject	Content	Number of Learning Objects	Number of synchron ous Learning Objects
CH1	Introduction	 Compiler concept. Compilers types. Different compilers. 	3	1
CH2	Compiler Structure	 Description of compiler steps. Analysis step. Synthesis and generation steps. Parallel steps. Terminology differences. 	5	2
СН3	Lexical Analysis	 Analyze the program to tokens. Token's types. Rules for every token's types. 	3	1
CH4	Lexical Analysis Tool – Lex	 Explain Flex Execute to test Assignment Correct the assignment 	5	2
CH5	Syntactical Analysis	 Understand Lexical analysis Types of lexical analysis: LL1, LSR, LR1, LALR 	6	3

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CH6	Syntactical AnalysisTool – Bison	 Explain Bison Execute to test Assignment Correct the assignment 	6	
CH7	Semantic Analysis	 Semantic Tree Symbol table Type checking 	2	
CH8	Code Generation and Optimisation	 Code generation Optimization Assignment to execute Follow up 	4	

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7. Practical Activity:

• Tools and Labs:

Tool Name	Description
Flex	Tool to Build Lexical Analysis
Bison	Tool to Build Syntactical Analysis
Dothlot /Othor	Programming Tool for object
DotNet/Other	oriented

• Practical Activities per Chapters:

Chapter	Activities Type	Remarks
CH1	☑ Exercises	
	☑ Homework	
	☐ Webinars	
	□ Project	
	☑ Experiment	
	□ Other	
CH2	☑ Exercises	
	☑ Homework	
	□ Webinars	
	□ Project	
	☑ Experiment	
	□ Other	

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СН3	☑ Exercises	
	☑ Homework	
	☑ Webinars	
	□ Project	
	☑ Experiment	
	□ Other	
CH4	☑ Exercises	
	☑ Homework	
	□ Webinars	
	□ Project	
	☑ Experiment	
	□ Other	
	☑ Exercises	
	☑ Homework	
011.6	□ Webinars	
CH5	□ Project	
	☑ Experiment	
	□ Other	
CH6	☑ Exercises	
	☑ Homework	
	□ Webinars	
	□ Project	
	☑ Experiment	
	□ Other	

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CH7	☑ Exercises	
	☑ Homework	
	☐ Webinars	
	□ Project	
	☑ Experiment	
	□ Other	
CH8	☑ Exercises	
	☑ Homework	
	☐ Webinars	
	☑ Project	
	☑ Experiment	
	□ Other	

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8. References:

- 1. Introduction to Compilers and Language Design, Second Edition, Prof. Douglas Thain, 2020.
- 2. Basics of Compiler Design, Anniversary edition, Torben Ægidius Mogensen, 2010. ISBN 978-87-993154-0-6.
- 3. Theory Principles of Compiler Design Alfred V. Aho, Jeffrey D. Ullman 1980.