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<b>Course:</b>	Optimizing Compilers – 0907543 (3 Cr. – Core Course)
<b>Catalog Data:</b>	Lexical analysis, regular expressions, deterministic and non-deterministic finite automata, context-free grammars, top-down parsing, syntax trees, scopes and symbol tables, type checking, intermediate-representation generation, machine-code generation, register allocation, code scheduling, data-flow analysis, Scalar Optimization, Peephole optimizations, dependence analysis.
<b>Prerequisites by Course:</b>	Data Structures (0907346) and Computer Design (0907432)
<b>Prerequisites by Topic:</b>	Students are assumed to have sufficient knowledge of computer architecture, assembly language and commonly used data structures, such as trees and graphs. Students are also assumed to have good programming skills in at least one of the following languages: C, C++ or Java.
<b>Textbook:</b>	Cooper and Torczon, Engineering a Compiler, Morgan Kaufmann, 2 <sup>nd</sup> edition, 2011
<b>Additional References:</b>	<ol style="list-style-type: none"><li>1. Charles N. Fischer, Ron K. Cytron, Richard LeBlanc Jr., Crafting A Compiler, 2010</li><li>2. Alfred Aho, Jeffrey Ullman, Monica S. Lam, and Ravi Sethi, Compilers: Principles, Techniques, and Tools, 2<sup>nd</sup> edition, 2006</li></ol>
<b>Course Website:</b>	
<b>Schedule &amp; Duration:</b>	15 Weeks, 30 lectures, 75 minutes each (including exams)
<b>Student Material:</b>	Text book, class handouts, lecture notes, and any additional reading assigned by the instructor
<b>Minimum College Facilities:</b>	Classroom with whiteboard and projection display facilities, library, and computer laboratory.
<b>Course Outcomes and Relation to ABET Program Outcomes:</b>	Upon successful completion of this course, a student should be able to: <ol style="list-style-type: none"><li>1. Describe the terminology and representation of formal languages and grammars [1].</li><li>2. Understand the use of lexical analysis, parsing, semantics analysis and code generation [1].</li><li>3. Understand the use of control and data flow analysis in optimizing compilers [1].</li><li>4. Design and implement a simple compiler based on their knowledge of the previous three points [7].</li></ol>

**Course Topics:**

1. Overview of A Compiler (Chapter 1)
2. Scanners (Chapter 2)
3. Grammars and Parsing (Chapters 3)
4. Semantics analysis and intermediate representation generation (Chapters 4, 5, 6 and 7)
5. Program optimization (Chapters 8, 9 and 10)
6. Code generation (Chapters 11, 12 and 13)

**Computer Usage:** Practical aspects of the course will be covered by a class project

**Attendance:** Class attendance will be taken every class and the university's policies will be enforced in this regard.

**Grading policy:**

Project	20%
Midterm Exam	30%
Final Exam	50%

**Instructors:** Dr. Fahed Jubair ( [f.jubair@ju.edu.jo](mailto:f.jubair@ju.edu.jo) )  
Office Hours: Thursday: 12:30 – 1:30  
Monday: 9:00 – 10:00

**Class Time and Location:** Monday and Wednesday: 11:30 – 1:00, CPE001

**Program Outcomes (PO)**

1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3	an ability to communicate effectively with a range of audiences
4	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.