Kingdom of Saudi Arabia
Ministry of Education
Northern Border University
Faculty of Computing and Information Technology
Department of Computer Sciences

المملكة العربية السعودية
وزارة التعليم
جامعة الحدود الشمالية
كلية الحاسبات و تقنية المعلومات
قسم علوم الحاسبات

COURSE SYLLABUS

CPCS301 - PROGRAMMING LANGUAGES

Course Information			
Type	Required	**Prerequisite(s)**	CPCS203 **And** CPCS222
Credit Hours	3	**Contact Hours**	4

Course Description

The objective of this course is to provide a comprehensive coverage of the fundamental concepts of programming languages by discussing the design issues of the various languages constructs, examining the design choices for these constructs in some of the most common languages, and critically comparing design alternatives. It discusses the formal methods of describing the syntax and semantics of programming languages.

Course Learning Outcomes (CLO)

Upon successful completion of this course, a student should be able to:

1. Determine programming domains, language evaluation criteria, and the major programming language paradigms.
2. Understand compilation process, and basic concepts of compiler construction phases.
3. Describe issues related to lexical, syntax, semantic, and identify principles of formal language theory.
4. Identify problems related to the concept of names, bindings, scopes, data types, and lifetime.
5. Function effectively in a team work to find a solution of practical problems and projects, then implement it with different languages.
6. Classify a stated impact of computing related to programming languages as a local or global impact on individuals, organizations and society.
7. Identify the course of action, given a scenario, which is in-line with their professional, ethical, legal and social responsibilities.

Textbook(s)			
Title	Programming Language Pragmatics: Paradigm and Infrastructure		
Author(s)	Michael L. Scott	**Publisher**	Morgan Kaufmann
Edition	3	**Year**	2009

References

Book	Website
1. Robert W. Sebesta, "Concepts of Programming Languages", Addison Wesley; 10 editions, January 12, 2012 2. Benjamin C. Pierce," Advanced Topics in Types and Programming Languages," 2004, The MIT Mit Press.	

Evaluation	
Assessment Tools	**Marks**
Class participation	**5%**
Assignments & Discussions	**10%**
Quizzes	**5%**
Labs	**20%**
Mid Term Exam	**20%**
Final Exam	**40%**

Tentative Topics Covered		
Week No	**Topic**	**Lab Titles**
1	Introduction Art of Language Design, Programming Language Spectrum.	
2	Introduction Compilation and Interpretation; Programming Environments; Compilation Overview.	Introduction to Programs
3	Programming Language Syntax Tokens and Regular Expressions; Context-Free Grammars; Derivations and Parse Trees.	Elementary Programming
4	Programming Language Syntax Generating a Finite Automaton; Scanner Code; Table-Driven Scanning.	Elementary Programming
5	Programming Language Syntax Lexical Errors; Pragmas; Parsing.	IF Statement
6	Programming Language Syntax Recursive Descent; Writing an LL(1) Grammar; Table-Driven Top-Down Parsing.	IF Statement
7	Programming Language Syntax Bottom-Up Parsing; Syntax Errors.	Selection (if-else)
8	Names, Scopes, and Bindings The Notion of Binding Time; Object Lifetime and Storage Management; Static Allocation.	Selection (switch)
9	Names, Scopes, and Bindings Stack-Based Allocation; Heap-Based Allocation; Garbage Collection.	Loops (while)
10	Names, Scopes, and Bindings Static Scoping; Nested Subroutines; Declaration Order.	Loops (do-while)
11	Names, Scopes, and Bindings Modules; Module Types and Classes; Dynamic Scoping.	Loops (for)
12	Names, Scopes, and Bindings Symbol Tables; Association Lists and Central Reference Tables; The Meaning of Names within a Scope (Aliases, Overloading).	Methods
13	Names, Scopes, and Bindings The Binding of Referencing Environments; Subroutine Closures. First-Class Values and Unlimited Extent.	Methods
14	Semantic Analysis Attribute Grammars; Evaluating Attributes; Action Routines.	One Dim. Array
15	Semantic Analysis Space Management for Attributes; Bottom-Up Evaluation; Top-Down Evaluation ;Tree Grammars and Syntax Tree Decoration.	Lab Evaluation