

Branch Name:	Information and Communication Technology
Program Code	ET107
Semester/Year:	Semester V/ Third Year
Course Name:	Compiler Design
Course Code:	2ET1070505T
Pre-requisite:	Data Structures and Algorithms

Course Objectives:

1. Learn the design principles of a Compiler.
2. Learn the various parsing techniques and different levels of translation.
3. Learn how to optimize and effectively generate machine codes
4. To introduce LEX and YACC tools.
5. To learn to develop algorithms to generate code for a target machine.

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								
					Theory (Marks)				Practical (Marks)				Total (Marks)
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
3	3	-	-	3	24	60	16	40	-	-	-	-	100

Subject Contents:

Sr. No	Topic	Total Hours	Weightage (%)
1	Introduction Overview of the Translation Process, A Simple Compiler, Difference between interpreter, assembler and compiler. Overview and use of linker and loader, types of Compiler, Analysis of the Source Program, The Phases of a Compiler, Cousins of the Compiler, The Grouping of Phases, Lexical Analysis, Hard Coding and Automatic Generation Lexical Analyzers, Front-end and Back-end of compiler, pass structure	6	10
2	Lexical Analyzer Introduction to Lexical Analyzer, Input Buffering, Specification of Tokens, Recognition of Tokens, A Language for Specifying Lexical Analyzers, Finite Automata From a Regular Expression, Design of a Lexical Analyzer Generator, Optimization of DFA	8	15
3	Parsing Theory Top Down and Bottom up Parsing Algorithms, Top-Down Parsing, Bottom-Up Parsing, Operator-Precedence Parsing, LR Parsers, Using Ambiguous Grammars, Parser Generators, Automatic Generation of Parsers. Syntax-Directed Definitions, Construction of Syntax Trees, Bottom-Up Evaluation of S-Attributed Definitions, L-Attributed Definitions, syntax directed definitions and translation schemes	9	25
4	Error Recovery Error Detection & Recovery, Ad-Hoc and Systematic Methods	4	10

5	Intermediate Code Generation Different Intermediate Forms, Syntax Directed Translation Mechanisms and Attributed Mechanisms And Attributed Definition.	4	10
6	Run Time Memory Management Source Language Issues, Storage Organization, Storage-Allocation Strategies, and Access to Non local Names, Parameter Passing, Symbol Tables, and Language Facilities for Dynamic Storage Allocation, Dynamic Storage Allocation Techniques.	4	10
7	Code Optimization Global Data Flow Analysis, A Few Selected Optimizations like Command Sub Expression Removal, Loop Invariant Code Motion, Strength Reduction	5	10
8	Code Generation Issues in the Design of a Code Generator, The Target Machine, Run-Time Storage Management, Basic Blocks and Flow Graphs, Next-Use Information, A Simple Code Generator, Register Allocation and Assignment, The DAG Representation of Basic Blocks, Peephole Optimization, Generating Code from DAGs, Dynamic Programming Code-Generation Algorithm, Code Generator Generators.	4	10

List of Reference Books:

1. Compilers: Principles, Techniques and Tools By Aho, Lam, Sethi, and Ullman, Second Edition, Pearson, 2014.
2. Steven S. Muchnick, "Advanced Compiler Design and Implementation, "Morgan Kaufmann Publishers – Elsevier Science, India, Indian Reprint 2003
3. The Theory and Practice of Compiler writing, J. P. Tremblay and P. G. Sorenson, TMH, 1 December 1985
4. Compiler Construction-Principles and Practice, Kenneth C Loudon, Cengage Learning, 24 January 1997

Course Learning Outcomes(CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Design and implement a prototype compiler.	3 Applying 4 Analyzing
CLO2	Use the different compiler construction tools.	5Evaluating
CLO3	Classify and construct grammars for different languages and vice-versa.	4Analyzing 2Understanding
CLO4	Able to design and implement LL and LR parsers	3Applying

Mapping of CLOs with POs & PSOs

Course Learning Outcomes	Program Outcomes(POs)												Program Specific Outcomes(PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CLO1	H	H	H	L	M	L					L	L	M	L	L	M
CLO2	M	M	M	M	M	M			M		M	M	M	M	M	M
CLO3	M	H	M	M	M						L	L	M	M	L	L
CLO4	M	L	M	M	M				M		M	M	M	M	L	L

H: High, M: Medium, L: Low