
بسم الله الرحمن الرحيم

Introduction

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Course Detail

BS CS 5th Semester Fall 2022-2026

Course: Theory of Programming Languages

Course Code: CS IT 507

Lecture: 1 (11-09-2024)

Introduction

- **Course Name: Theory of Programming Languages (PLT)**
- **Credit Hours: 3(3-0)**
- **Prerequisites: Programming Basics**

Outline

- Define PLT
- Important Keywords of PLT
- Programming Languages
- Model of Computation

Theory of Programming Languages

The **theory of programming languages** is a branch of computer science that focuses on the design, implementation, analysis, and classification of programming languages. It deals with understanding the fundamental principles behind how languages function and how they can be used to solve problems efficiently.

Important Keywords of PLT

Sr. No	Keyword	Sr. No	Keyword	Sr. No	Keyword	Sr. No	Keyword
1	Syntax	11	Imperative Programming	21	Formal Methods	31	Concurrency
2	Semantics	12	Functional Programming	22	Denotational Semantics	32	Recursion
3	Grammar	13	Object-Oriented Programming (OOP)	23	Operational Semantics	33	Backus-Naur Form (BNF)
4	Lexical Analysis	14	Logic Programming	24	Axiomatic Semantics	34	Hoare Logic
5	Parsing	15	Compilation	25	Abstract Syntax Tree (AST)	35	Invariants
6	Type System	16	Interpretation	26	Higher-Order Functions	36	Memory Management
7	Static Typing	17	Garbage Collection	27	Modules	37	Paradigms
8	Dynamic Typing	18	Concurrency	28	Monads	38	Closures
9	Polymorphism	19	Lambda Calculus	29	Control Flow	39	First-Class Functions
10	Abstraction	20	Control Structures	30	Data Flow	40	Coroutines

Programming Languages

- As the spoken languages are the way of communication between humans.
- Programming languages or Computer Programming languages are the way of communication between computer(machine) and human.

Models of Computation

- Computer science is the study of computers and programs, the collections of instructions that direct the activity of computers.
- Theoretical computer science uses models and analysis to study computers and computation.

Models of Computation

Computer scientists have developed models

For machines, such as

the random-access and Turing machines;

for languages , such as

regular and context-free languages

for programs, such as

straight-line and branching programs;

Models of Computation

for systems of programs,

such as compilers and operating systems.

Models have also been developed

for data structures, such as

heaps,

for databases, such as

the relational and object-oriented databases.

Models of Computation

The **theory of computation** is a highly theoretical area of computer science that has challenged some great minds. A **model of computation** is a model which describes how an output of a mathematical function is computed on given an input. A model describes how units of computations, memories, and communications are organized.

THANKS