Reasons for Studying Concepts of PL	1. Increased ability to express ideas 2. Improved background for choosing appropriate languages 3. Increased ability to learn new languages 4. Better understanding of significance of implementation 5. Better use of languages that are already known 6. Overall advancement of Computing
Scientific Application Use	Large numbers of floating point computations; use of arrays
First Scientific Programming Language	Fortran
Business Application Use	Produce reports, use decimal numbers and characters
First Business Programming Language	COBOL
Artificial Intelligence Application Use	Symbols rather than numbers manipulated; use of linked lists
Artificial Intelligence Programming Language	LISP
What does Systems Programming need?	Needs efficiency because of continuous use
Systems Programming Language	C
Web Software Use	Eclectic collection of languages: markup (e.g.,HTML), scripting (e.g., PHP), general-purpose (e.g., Java)
Meaning of Readability	the ease with which programs can be read and understood
Meaning of Writability	the ease with which a language can be used to create programs
Meaning of Reliability	conformance to specifications, performs to specifications
Meaning of Cost	Ultimate total cost
Language Evaluation Criteria	Readability, Writability, Reliability, Cost
Characteristics of Readability	Overall Simplicity, Orthogonality, Data Types, Syntax Considerations
Characteristics of Writability	Simplicity and Orthogonality, Support for Abstraction, Expressivity
Characteristics of Reliability	Type checking, Exception handling, Aliasing, Readability and Writability
Characteristics of Cost	Training programmers to use it, Writing, Executing, and Maintaining a program, Reliability
Other Evaluation Criteria	Portability, Generality, Well-definedness
Influences on Language Design	Computer Architecture and Program Design Methodologies
Languages are developed around what architecture?	Von Neumann Architecture
What type of languages are dominant because of Von Neumann computers?	Imperative Languages
von Neumann Architecture Program	Fetch-execute-cycle
Where are data and programs found in the Von Neumann Architecture?	Memory
Parts of the Von Neumann Architecture	Memory, Results of Operation, Instructions and Data, Arithmetic and Logic Unit, Control Unit, Input and Output Devices, Central Processing Unit
What programming methodologies influenced the 1950s and early 1960s?	Simple applications; worry about machine efficiency
What programming methodologies influenced the late 1960s?	People efficiency, readability, better control structures
What programming methodologies influenced the late 1970s?	process-oriented to data-oriented, data abstraction
What programming methodologies influenced the middle 1980s?	Object-oriented programming
What are the four language categories?	Imperative, Functional, Logic, Markup/Programming Hybrid
What is the focus of imperative languages?	variables, assignment statements, and iteration
What are examples of imperative language?	C, Java, Perl, JavaScript, Visual BASIC .NET, C++
What is the focus of functional language?	Make computations by applying functions to given parameters

What are examples of Functional Language	LISP, Scheme, ML, F#
What is logic language based on?	rule-based (rules are specified in no particular order)
What is an example of a Logic Language	Prolog
What are examples of markup hybrid languages?	JSTL, XSLT
What are the three implementation methods?	compilation, pure interpretation, and hybrid implementation systems
What happens in compilation implementation?	Programs are translated into machine languhe
what is the use of compilation implementation?	Large commercial applications
what is the use of pure interpretation implementation?	when small programs or when efficiency is not an issue
What happens in pure interpretation implementation?	Programs are interpreted by another program known as an interpreter, no translation
What happens in hybrid implementation systems?	There is a compromise between compilers and pure interpreters
what is the use of hybrid implementation systems?	Small and medium systems when efficiency is not the first concern
What are the four phases of compilation process?	1. Lexical Analysis 2. Syntax Analysis 3. Semantics Analysis 4. Code Generation
What is a load module?	The user and system code together
What is linking and loading?	The process of collecting system program units and linking them to a user program
What is the von Neumann Bottleneck?	The primary limiting factor in the speed of computers (connection speed between a computer's memory and its processor)
What are examples of Pure Interpretation languages?	JavaScript and PHP
What are examples of Hybrid Implementation Systems?	Perl, Java Virtual Machine
What happens in Just-in-Time Implementation Systems?	Initially translates programs to an intermediate language then into machine code
What are preprocessors used for?	To specify that code from another file is to be included
Examples of preprocessors	#include #define
What are examples of Programming Environments?	UNIX, Microsoft Visual Studio.NET, NetBeans
What are programming environments?	A collection of tools used in software development