

Credits 06

GE-4: Programming in Python

Credits 04

GE4T: Programming in Python

**Course Contents:**

**Planning the Computer Program:**

Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation.

**Techniques of Problem Solving:**

Flowcharting, decision table, algorithms, Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming.

**Overview of Programming :**

Structure of a Python Program, Elements of Python

**Introduction to Python:**

Python Interpreter, Using Python as calculator, Python shell, Indentation. Atoms, Identifiers and keywords, Literals, Strings, Operators(Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, Increment or Decrement operator)

**Creating Python Programs:**

Input and Output Statements, Control statements(Branching, Looping, Conditional Statement, Exit function, Difference between break, continue and pass.), Defining Functions, default arguments, Errors and Exceptions.

**Iteration and Recursion:** Conditional execution, Alternative execution, Nested conditionals, The return statement, Recursion, Stack diagrams for recursive functions ,Multiple assignment, The while statement, Tables, Two-dimensional tables

**Strings and Lists:** String as a compound data type, Length, Traversal and the for loop, String slices, String comparison, A find function, Looping and counting, List values, Accessing elements, List length, List membership, Lists and for loops, List operations, List deletion. Cloning lists, Nested lists

**Object Oriented Programming:** Introduction to Classes, Objects and Methods, Standard Libraries.

**Data Structures:** Arrays, list, set, stacks and queues.

**Searching and Sorting:** Linear and Binary Search, Bubble, Selection and Insertion sorting.

**Strings and Lists:**String as a compound data type, Length, Traversal and the for loop, String slices, String comparison, A find function, Looping and counting, List values, Accessing elements, List length, List membership, Lists and for loops, List operations, List deletion. Cloning lists, Nested lists

**Object Oriented Programming:** Introduction to Classes, Objects and Methods, Standard Libraries

**Data Structures:** Arrays, list, set, stacks and queues.

**Searching and Sorting:** Linear and Binary Search, Bubble, Selection and Insertion sorting.

**Suggested Readings:**

1. <http://docs.python.org/3/tutorial/index.html>
2. <http://interactivepython.org/courselib/static/pythonds>
3. T. Budd, Exploring Python, TMH, 1st Ed, 2011
4. How to think like a computer scientist: learning with Python / Allen Downey, Jeffrey Elkner, Chris Meyers. 1st Edition – Freely available online.2012

**Practical:**

1. Using for loop, print a table of Celsius/Fahrenheit equivalences. Let  $c$  be the Celsius temperatures ranging from 0 to 100, for each value of  $c$ , print the corresponding Fahrenheit temperature.
2. Using while loop, produce a table of sines, cosines and tangents. Make a variable  $x$  in range from 0 to 10 in steps of 0.2. For each value of  $x$ , print the value of  $\sin(x)$ ,  $\cos(x)$  and  $\tan(x)$ .
3. Write a program that reads an integer value and prints —leap year! or —not a leap year!.
1. Write a program that takes a positive integer  $n$  and then produces  $n$  lines of output shown as follows.  
For example enter a size: 5  
\*  
\*\*  
\*\*\*  
\*\*\*\*  
\*\*\*\*\*
5. Write a function that takes an integer  $_n$  as input and calculates the value of  $1 + 1/1! + 1/2! + 1/3! + \dots + 1/n$
6. Write a function that takes an integer input and calculates the factorial of that number.
7. Write a function that takes a string input and checks if it's a palindrome or not.
8. Write a list function to convert a string into a list, as in `list('_abc')` gives `[a, b, c]`.
9. Write a program to generate Fibonacci series.
10. Write a program to check whether the input number is even or odd.
11. Write a program to compare three numbers and print the largest one.
12. Write a program to print factors of a given number.
13. Write a method to calculate GCD of two numbers.
14. Write a program to create Stack Class and implement all its methods. (Use Lists).
15. Write a program to create Queue Class and implement all its methods. (Use Lists)
16. Write a program to implement linear and binary search on lists.
17. Write a program to sort a list using insertion sort and bubble sort and selection sort.

Or

**GE-4: Programming in VB/GAMBAS**

Credits 06

**GE4T: Programming in VB/GAMBAS**

Credits 04

**Course Contents:****GUI Environment:**

Introduction to graphical user interface (GUI), programming language (procedural, object oriented, event driven), the GUI environment, compiling, debugging, and running the programs.

**Controls:**

Introduction to controls textboxes, frames, check boxes, option buttons, images, setting orders and styles, the shape control, the line control, working with multiple controls and their properties, designing the user interface, keyboard access, tab controls, default & cancel property, coding for controls

**Operations:**

Data types, constants, named & intrinsic, declaring variables, scope of variables, val function, arithmetic operations, formatting data.

**Decision Making:**

If statement, comparing strings, compound conditions (and, or, not), nested if statements, case structure, using if statements with option buttons & check boxes, displaying message in message box, testing whether input is valid or not.

**Modular programming:**

Menus, sub-procedures and sub-functions defining / creating and modifying a menu, using common dialog box, creating a new sub-procedure, passing variables to procedures, passing argument by value or by reference, writing a function/ procedure.

**Forms Handling:**

Multiple forms creating, adding, removing forms in project, hide, show method, load, unload statement, me keyword, referring to objects on a different forms.

**Iteration Handling:**

Do/loops, for/next loops, using msgbox function, using string function

**Arrays and Grouped Data Control:**

Arrays - 1-dimension arrays, initializing an array using for each, user-defined data types, accessing information with user-defined data types, using list boxes with array, two dimensional arrays. lists, loops and printing list boxes & combo boxes, filling the list using property window / add item method, clear method, list box properties, removing an item from a list, list box/ combo box operations.

**Database Connectivity:**

Database connectivity of forms with back end tool like mysql, populating the data in text boxes, list boxes etc. searching of data in database using forms. Updating/ editing of data based on a criterion

**Suggested Readings :**

1. Reference: Programming in Visual Basic 6.0 by Julia Case Bradley, Anita C. Millispangh (Tata Mcgraw Hill Edition 2000 (Fourteenth Reprint 2004))

Credits 02

**GE4P: Programming in VB/GAMBAS Lab****Practical:**

1. Print a table of numbers from 5 to 15 and their squares and Cubes.
2. Print the largest of three numbers.
3. Find the factorial of a number n.
4. Enter a list of positive numbers terminated by zero. Find the sum and average of these numbers.
5. A person deposits Rs. 1000 in a fixed account yielding 5% interest. Complete the amount in the account at the end of each year for n years.
6. Read n numbers. Count the number of negative numbers, positive numbers and zeros in the list.
7. Read n numbers. Count the number of negative numbers, positive numbers and zeroes in the list. use arrays.
8. Read a single dimension array. Find the sum and average of these numbers.
9. Read a two dimension array. Find the sum of two 2D Array.

10. Create a database Employee and Make a form in VB 6.0 to allow data entry to **Employee Form** with the following command buttons:

**Employee Form**

<b>Employee Name:</b>	<input type="text"/>	<input type="button" value="NEXT"/>
<b>Employee Id:</b>	<input type="text"/>	
<b>Date of Joining:</b>	<input type="text"/>	
<b>Designation:</b>	<input type="text"/>	
<b>Department:</b>	<input type="text"/>	
<b>Address:</b>	<input type="text"/>	
<b>Basic Pay:</b>	<input type="text"/>	

  

<input type="button" value="PREV"/>
<input type="button" value="FIRST"/>
<input type="button" value="LAST"/>
<input type="button" value="ADD"/>
<input type="button" value="DELETE"/>
<input type="button" value="SAVE"/>
<input type="button" value="CANCEL"/>

Or

**GE-4: Information Security and Cyber Laws**  
**GE4T: Information Security and Cyber Laws**

**Credits 06**

**Credits 04**

**Course Contents:**

**Course Introduction:**  
Computer network as a threat, hardware vulnerability, software vulnerability, importance of data security.

**Digital Crime:**

Overview of digital crime, criminology of computer crime.

**Information Gathering Techniques:**

Tools of the attacker, information and cyber warfare, scanning and spoofing, password cracking, malicious software, session hijacking.

**Risk Analysis and Threat:**

Risk analysis, process, key principles of conventional computer security, security policies, authentication, data protection, access control, internal vs external threat, security assurance, passwords, authentication, and access control, computer forensics and incident response

**Introduction to Cryptography and Applications:**

Important terms, Threat, Flaw, Vulnerability, Exploit, Attack, Ciphers, Codes, Caesar Cipher, Rail-Fence Cipher, Public key cryptography (Definitions only), Private key cryptography (Definition and Example)

**Safety Tools and Issues :**

Firewalls, logging and intrusion detection systems, Windows and windows XP / NT security, Unix/Linux security, ethics of hacking and cracking.

**Cyber laws to be covered as per IT 2008:**

- Chapter 1: Definitions
- Chapter 2: Digital Signature And Electronic Signature
- [Section 43] Penalty and Compensation for damage to computer, computer system, etc.
- [Section 65] Tampering with Computer Source Documents
- [Section 66 A] Punishment for sending offensive messages through communication service, etc.
- [Section 66 B] Punishments for dishonestly receiving stolen computer resource or communication device
- [Section 66C] Punishment for identity theft
- [Section 66D] Punishment for cheating by personation by using computer resource
- [Section 66E] Punishment for violation of privacy
- [Section 66F] Punishment for cyber terrorism
- [Section 67] Punishment for publishing or transmitting obscene material in electronic form
- [Section 67A] Punishment for publishing or transmitting of material containing sexually explicit act, etc. in electronic form [Section 67B] Punishment for publishing or transmitting of material depicting children in sexually explicit act, etc. in electronic form
- [Section 72] Breach of confidentiality and privacy

**Suggested Readings:**

1. M. Merkow, J. Breithaupt, Information Security Principles and Practices, Pearson Education.2005
2. G.R.F. Snyder, T. Pardoe, Network Security, Cengage Learning, 2010
3. A. Basta, W.Halton, Computer Security: Concepts, Issues and Implementation, Cengage Learning India, 2008

**GE4P: Information Security and Cyber Laws Lab****Credits 02****Practical:**

1. Demonstrate the use of Network tools: ping, ipconfig, ifconfig, tracert, arp, netstat, whois
2. Use of Password cracking tools : John the Ripper, Ophcrack. Verify the strength of passwords using these tools.
3. Perform encryption and decryption of Caesar cipher. Write a script for performing these operations.
4. Perform encryption and decryption of a Rail fence cipher. Write a script for performing these operations.
5. Use nmap/zenmap to analyse a remote machine.
6. Use Burp proxy to capture and modify the message.
7. Demonstrate sending of a protected word document.
8. Demonstrate sending of a digitally signed document.
9. Demonstrate sending of a protected worksheet.
10. Demonstrate use of steganography tools.
11. Demonstrate use of gpg utility for signing and encrypting purposes.