Course title: Basic computer programming			
Course code: NRC 103	**No. of credits:** 1	**L-T-P:** 2-2-12	**Learning hours**: 10
Pre-requisite course code and title (if any): None			
Department: Energy and Environment			
Course coordinator(s):	**Course instructor(s):** Ms Pooja Choudhary		
Contact details:			
Course type: Optional Audit	**Course offered in:** Semester 1 as bridge course		

Course description

The course aims to teach basic programming and computational concepts to students with little or no previous coding experience. It will introduce basic computer programming and problem solving in structured program logic environment. After the course, students will develop confidence in their ability to apply programming techniques to problems especially with respect to climate modelling.

Course objectives

- The main objective of the course to build foundation for Climate modelling course which will be offered in subsequent semester.

Course contents

Module	Topic	L	T	P
1.	Course Outline I. Introduction to Computers and Programming a) Hardware and Software b) Number System, Programs and Data	1	1	
2.	II. Input, Processing, and Output a) Designing a Program b) Input, Output, and Variables c) Variable Assignment and Calculations d) Variable Declarations and Data Types e) Named Constants f) Hand Tracing a Program g) Documenting a Program	1	1	
3.	III. Modules a) Introduction to Modules b) Defining and Calling a Module c) Passing Arguments to Modules d) Local Variables, Global Variables and Global Constants			2
4.	IV. Decision Structures and Boolean Logic a) Introduction to Decision Structures b) Dual Alternative Decision Structures c) Comparing Strings d) Nested Decision Structures e) The Case Structure f) Logical Operators g) Boolean Variables			2

5.	V. Repetition Structures a) Introduction to Repetition Structures b) Condition-Controlled Loops: While, Do-While, and Do-Until c) Count-Controlled Loops and the For Statement f) Nested Loops			2
6.	VI. Functions a) Introduction to Functions b) Writing Your Own Functions c) More Library Functions			2
7.	VII. Arrays a) Array Basics b) Sequentially Searching an Array c) Processing the Contents of an Array e) Two-Dimensional Arrays			2
	Total	**2**	**2**	**12**

Evaluation criteria

Course grades will be based on the following criteria:

- Assignments and final practical examination: 50% each

Learning outcomes

Upon completion of the course, students would be able to:

- Upon successful completion of this course, the student will be able to:
- Describe the major components in problem solving for a computer program.
- Apply top-down concepts in algorithm design.
- Create flowcharts to illustrate program algorithm or process.
- Analyze and write pseudocode to illustrate compact and informal high-level descriptions of computer programming algorithms.
- Define variables, Loops and arrays used in program methodology.
- Implement input and output to access and process files.
- Describe and apply object-oriented programming methodology.

Pedagogical approach

Tutorial and practical

Materials

Suggested Readings

1. Gelernter D. and Jagannathan S. (1990) Programming Linguistics, The MIT Press.
2. Goldschlager L. (1998) A Lister Computer Science - A Modern Introduction Prentice Hall.
3. John C.M. (2002) Concepts in Programming Languages, Cambridge University Press.

Additional information (if any)

This course has practical methodology to orient students towards learning basics of programming.

Student responsibilities

The students are expected to submit assignments in time and come prepared with

readings when provided.

Course Reviewers

The course is reviewed by the following experts.

1. Mr Jagdish Mutharia, IT Division, TERI, New Delhi.
2. Mr Sanjay Kumar, IT Consultancy, Gurgaon, Haryana.