

TITLE of course: COMPUTATIONAL PHYSICS**Nodal Department of HEI to run course:****Broad Area/Sector:** Scientific Computing**Sub Sector:** Computation**Nature of course:** Progressive**If Progressive:** Level I**Suggestive Sector Skill Council:** IT-ITES Sector Skill Council**Aliened NSQF Level:****Expected Course Fees:** Free/ Paid :**Stipend to student expected from Industry:****Number of Seats:****Course Code:** (Credits-3: Theory-01, Practical-02)**Max. Marks:** Internal + External (25+75) **Min. Passing Marks:****Name of proposed Skill/Training Partner:****Job Prospects (Expected Fields of Occupation):** Scientific Programming, Research.

Syllabus					
Unit	Topics	General/Skill component	Theory/Practical/ OJT/Internship/Training	No. of Theory Hours	No. of Skill Hours
I	Algorithms and Flowcharts	Introduction: Importance of computers in Physics, Basics of scientific computing, Binary and decimal arithmetic, Floating point numbers, Sequence, Single and double precision, Underflow and overflow, Algorithms, Flowchart.	<ol style="list-style-type: none"> Exercises on syntax on usage of FORTRAN Exercises on Input, Output and arithmetic operations. 	5	10

II	Scientific Programming (Part I)	Development of FORTRAN, Basic elements of FORTRAN: Character Set, Constants and their types, Variables and their types, Keywords, Variable Declaration, Concept of instruction and program, Operators and their types, Expressions and their types. FORTRAN Statements.	<ol style="list-style-type: none"> 1. To print out all natural even/ odd numbers between given limits. 2. To find maximum, minimum and range of a given set of numbers. 3. To evaluate sum of finite series and the area under a curve. 	4	20
III	Scientific Programming (Part II)	Control Statements: Types of Logic (Sequential, Selection, Repetition), Branching statements, Looping Statements, Jumping Statements, Types of Arrays, DIMENSION Statement, Functions and Subroutines, RETURN, CALL, COMMON and EQUIVALENCE Statements.	<ol style="list-style-type: none"> 1. Exercises on Loop programming. 2. To find the product of two matrices 3. To find a set of prime numbers and Fibonacci series. 4. To find the roots of a quadratic equation. 	6	30

Suggested Readings:

- Rajaraman, V., “Computer Programming in Fortran 90 and 95”, PHI Learning Pvt. Ltd., India, 2006, 1e.
- Lipschutz, S. and Poe, A., “Schaum’s Outline of Theory and Problems of Programming with Fortran”, Mc-Graw Hill International, 1982, 5e.
- Verma R. C., Ahluwalia, P. K., Sharma, K. C., “Computational Physics: An Introduction”, New Age International Publishers, New Delhi, 1999, 1e.

Suggested Digital platforms/ web links for reading

- Uttar Pradesh Higher Education Digital Library: <http://heecontent.upsdc.gov.in/Home.aspx>
- Swayam Prabha-DTH Channel: <https://www.swayamprabha.gov.in/index.php/home>

Suggested OJT/Internship/Training/Skill partner: Institution

Suggested Continuous Internal Evaluation (CIE) Methods:

Assessment Criteria for Outcomes: Theory/MCQ/Practical/Project/Viva

Theory: Test / Quiz / Assignment / Seminar/ Class Interaction.

Practical: Record File (depending upon the no. of experiments performed out of the total assigned experiments)/ Viva Voce/ Class Interaction

Course Prerequisites: To study this course, a student must have the subject: Physics in 12th / Mathematics in 12th.

Suggested equivalent Online Courses

1. Swayam - Government of India, <https://swayam.gov.in/>
2. National Programme on Technology Enhanced Learning (NPTEL), <https://nptel.ac.in/course.html>

Any remarks/ Suggestions

The institution may add/modify the experiments of the same standard in the paper.

Books published in Hindi & other Reference/Text Books may be added to this list by individual institutes.

Other Digital Platforms/Web Links and Equivalent Online Courses may be added by individual institutes.
