Programme	Bachelor of Science in Solid State Physics (BS SS Physics)	**Course Code**	**IDIT-301**	**Credit Hours**	2 (2-0)
Course Title	**Information Technology in Physics**				

Course Introduction

This course focuses on the application of information technology in solving and understanding complex physical problems in solid state physics. Students will learn to use and develop software tools that simulate physical systems, analyze experimental data, and model predictions.

Learning Outcomes

By the end of this course, students should:

1. Acquire fundamental computational skills applicable to a broad range of physical sciences.
2. Develop proficiency in numerical methods and algorithms for solving physical problems.
3. Gain hands-on experience with computational tools, software, and high-performance computing environments.
4. Learn to analyze and interpret data from physical experiments and simulations.

	Course Content	**Assignments/Readings**
Week 1	**Unit-I** 1.1 Introduction to Computational Solid State Physics	What is computational physics?
Week 2	**Unit-II** 2.1 Overview of computational solid state physics, its significance, and basic computational tools and languages commonly used in the field (e.g., Python, MATLAB)	Significance of computational solid state physics
Week 3	**Unit-III** 3.1 Numerical Methods in Solid State Physics	Numericals solutions
Week 4	**Unit-IV** 4.1 Techniques for numerical integration, differentiation, solving differential equations, and linear algebra	Applications in physical simulations
Week 5	**Unit-V** 5.1 Introduction to quantum mechanics from a computational perspective, including the simulation of quantum systems, quantum algorithms,	Basics of quantum computing

Week 6	**Unit-VI** 6.1 Methods for simulating statistical and thermodynamic systems, Monte Carlo methods, and molecular dynamics simulations	Practice
Week 7	**Unit-VII** 7.1 Data Analysis in Solid State Physics	Collect data and analyze
Week 8	Mid Term Exams	
Week 9	**Unit-VIII** 8.1 Techniques for handling and analyzing large data sets from experiments or simulations	Analyze data using simulations
Week 10	**Unit-IX** 9.1 signal processing, noise reduction, and pattern recognition.	Practice
Week 11	**Unit-X** 10.1 High-Performance Computing in Solid State Physics	Solve problems
Week 12	**Unit-XI** 11.1 Utilization of high-performance computing (HPC) resources for large-scale simulations	Solve exercise
Week 13	**Unit-XII** 12.1 Introduction to parallel computing, and GPUs	What is parallel computing?
Week 14	**Unit-XIII** 13.1 Project Work: Students undertake a project that involves modeling a physical system.	Project work
Week 15	**Unit-XIV** 14.1 Project Work: Performing simulations, and analyzing results, culminating in a presentation of their findings	Presentations
Week 16	Final Term Exams	

Textbooks and Reading Material

1. Deitel, P. and H. Deitel. 2013. C++ How to Program. 9th Ed. Prentice Hall, Upper Saddle
2. River, NJ, USA.
3. Hanly & Koffman. 2009. Problem Solving and Program Design in C, 6th edition. AddisonWesley. Boston, MA, USA.
4. Kochan, S. G. 2014, Programming in C. 4th Ed. Pearson Education, Addison-Wesley,
5. Boston, MA, USA.

6. Mustafa T., T. Mehmood, I. Saeed and A. R. Sattar. 2008. Object Oriented Programming using C++. IT-Series publications, Faisalabad, Pakistan.

Teaching Learning Strategies

1. Course Teaching
2. Presentations
3. Quiz

Assignments: Types and Number with Calendar

1.
2.
3.
4.

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Continuous assessment includes: Classroom participation, assignments, presentations, viva voce, attitude and behavior, hands-on-activities, short tests, projects, practical, reflections, readings, quizzes etc.
3.	Final Assessment	40%	Written Examination at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.