

**Department of Computer Science
University of Peshawar**

UNDERGRADUATE CURRICULUM

BCS

Code: BCS121

Credit hours: 4

Programming Language-I(C++)

Overview of Arrays and Functions

- a) Arrays (Fundamentals, Arrays as Class member data, as Objects, Strings)
- b) Function (Declaration, Calling, passing arguments, returning values)
- c) Function overloading inline functions.

Structures and Unions

Structures (Structure specification & definition, Accessing structure elements)

Enumerated Data Type and Storage Classes

Enumerated data declaration and use, Automatic, External and Static variables, Registers

Introduction to Objects Oriented programming

- a) Advantages of Object Oriented approach, Objects
- b) Classes, Inheritance, Reusability, creating new data types
- c) Polymorphism, overloading.

Dealing with Classes and Objects in C++

- a) Specifying and using Classes and Objects, Constructors and Destructors
- b) Objects and function argument, Returning objects from functions

Operator overloading, Inheritance, pointer, special functions, and Files & Streams

Operator overloading (Unary operators, Binary operators, Data Conversion, pitfalls)

- a) Inheritance
 - 1. Derived and Base Classes, Derived Class Constructors
 - 2. Overriding member functions, class hierarchies, Public & Private Inheritance.
 - 3. Levels of Inheritance, Multiple inheritance.
- b) Pointers
 - 1. Address and Pointers, Pointers and Arrays
 - 2. Pointers and Functions, Pointers and Strings, Memory allocation and de allocation
- c) Some Special Types of Functions
 - 1. Virtual Functions, friend functions, static functions.
- d) Files and Streams
 - 1. Streams, String 1/O, Character 1/O Object 1/O with multiple objects
 - 2. File pointers, Disk 1/O with member functions, error Handling
 - 3. Redirection of input and Output Command Line Arguments, Printer Output.

Books:

Robert Lafore, Turbo C++, 2nd Edition, SAMS Publishing, 1997.

Code: BCS122

Credit Hours: 3

Mathematics-II(Calculus-II)

Vector-I

- a) Vectors

- b) Vector Analysis

Vector-II

- a) Calculus of vectors
- b) Application of Vector Calculus

Infinite Series

- a) Sequence, Monotonic Sequence, Infinite Series
- b) Convergence, integral Tests, Convergence Test, Comparison Test
- c) Alternating Series, Conditional Convergence

Functions of Several Variables

- a) Functions of several variables
- b) Limit and continuity of function of several variables
- c) Partial derivatives

Hyperbolic Functions

- a) Hyperbolic Functions
- b) Calculus of Hyperbolic Functions

Higher Integration

- a) Reduction Formula
- b) Some more techniques of integration

Application of integration

- a) Line integral
- b) Multiple integrals
- c) Double and triple integrals

First order differential equations

First order differential equations

Second order differential equations

Second order differential equations/

Books:

1. *Antom Howard, Calculus, John Wiley & Sons Inc, 1999.*
2. *George B.Thomas, Ross L. Finney, Maurice D. Weir, Frank R. Giordano, CALCULUS, 10th Edition, Addison Wesley Publishing Company, 2002.*

Code: BCS123

Credit Hours:3

Physics

Electrostatics

- a) Coulomb's Law
- b) Coulomb's Law and its experimental verification
- c) Electric Charge
- d) Charge quantized
- e) Electric fields
- f) Gauss' Law
- g) Electric Potential
- h) Flux of electric field, Gauss's law and its application
- i) Electric potential as line integral potentials due to charge distribution, potential and field due to bipole
- j) Capacitors and dielectrics
- k) Equation of continuity

- l) Capacity of a spherical and parallel plate capacitor, polarization of matter
- m) Gauss's law in dielectrics, electric susceptibility and dielectric constant
- n) Energy density of electrostatic field

Electric Current and Magnetic Fields

- a) Current and magnetic field, electric current, Ohm's law
- b) Equation of continuity
- c) Field due to a current interaction of magnetic field with current
- d) Magnetic induction vector B. Biot Savart law
- e) Field due to a straight and circular current
- f) Ampere's law, Ampere's circuital theorem
- g) Fields due to a solenoid and a toroid, thermo electrically feedback
- h) Peltier and Thomson's effect, total e.m.f in thermocouple
- i) Photo Voltaic effect piezoelectric effect
- j) Faraday's law, Faraday's law of electromagnetic induction and its differential form
- k) Self induction, self inductance of a toroidal solenoid, mutual induction
- l) Mutual inductance of toroidal solenoid
- m) Magnetic fields in matter-I, magnetization vector, the magnetic intensity
- n) Vector H
- o) Magnetic energy, dia, para and ferro magnetism hysteresis

Maxwell's Equations

- a) Maxwell's equations
- b) Maxwell's equations, wave equations and its plane, wave solution in free space
- c) Relation between the propagation vector and Poynting vector
- d) Electric and magnetic vectors in a plane wave

Books:

Halliday, D., Resnick, R., & Walker, J., Fundamentals of Physics extended, 5th Edition, John Wiley & Sons, New York, 1997.

Code: BCS124

Credit Hours:4

Discrete Mathematics

Logic: propositional logic, rules of propositional logic, predicate logic, symbols, tautologies, quantifiers, inference rules, Introduction to Logic Programming.

Recursion: definition, recursive function, examples of recursive functions.

Sets: terminology, operations, set identities.

Counting: sum rule, product rule, pigeon-hole principle, permutations, combinations, using trees in counting, inclusion-exclusion principle, discrete probability.

Trees and Graphs: terminology, binary trees, recursive definition of a binary tree, applications of binary trees, directed and un-directed graphs, adjacency matrix.

Boolean Algebra: Boolean operators and functions, functional completeness, combinational circuits.

Functions and Relations: types of functions, types of relations.

Regular Expressions: regular grammar, context-free grammar.

Books:

K. H. Rosen, Discrete Mathematics and its Applications, 5th Edition, McGraw-Hill, 2002.

Code: BCS125

Credit Hours: 3

Pakistan Studies

- a) Ideology of Pakistan in the historical perspective
- b) Two nation theory
- c) Pakistan movement
- d) Creation of Pakistan and role of Quaid-e-Azam
- e) Initial difficulties
- f) Islamization in Pakistan
- g) The land of Pakistan

Books:

1. *M. Ikram Rabbani, A comprehensive book of Pakistan Studies, 3rd Edition, The Caravan Press, Lahore, Pakistan, 2001.*
2. *I.H. Qureshi, The struggle for Pakistan.*
3. *Waheed-uz-Zaman, Towards Pakistan.*
4. *K.K. Aziz, The making of Pakistan.*

Islamic Studies

- a) Definition and meaning of Islam
- b) The place of Quran in Islamic World Nations
- c) The Hadith
- d) The Political System of Islam
- e) The Legal System of Islam
- f) Principles of an Islamic state and chances of their people

Books:

1. *S. Abul A'la Maududi, The Islamic Law and Constitution, 12th Edition, Islamic Publications(Pvt) Ltd, Lahore, Pakistan, 1997.*
2. *Farkhanda Noor Muhammad, ISLAMIAT for Students, 2nd Edition, Ferozsons(Pvt) Ltd, Lahore, Pakistan, 2000.*
3. *Anwar H. Syed Islam, Politics and National Solidarity.*
4. *M.A. Hai, A handbook of Islam.*
5. *Al-Quran(a contemporary translation).*
6. *Ishtiaq Ahmad, The concept of an Islamic state.*
7. *Dr. Ismail Al Farooqi, Jinnah and Pakistan of Islamic identify.*