UTTARAKHAND TECHNICAL UNIVERSITY DEHRADUN

SYLLABUS AND ORDINANCES

Wef-2010-11
SYLLABUS

FOR

BACHELOR OF COMPUTER APPLICATIONS (BCA)

SYLLABUS

FOR

1. Attendance

1.1 Every candidate is required to attend all the lectures, tutorials, practical and other prescribed curricular and co-curricular activities. It can be condoned up to 25% on medical grounds or for other genuine reasons.

1.2 A further relaxation of attendance up to 15% can be given by Principal/Dean/ Director of the Institute for the students, who have been absent with prior permission, for reasons acceptable to Head of the Institution/ College/ University.

1.3 No candidate will be allowed to appear in the end semester examinations if he/she does not satisfy the overall average attendance requirements as per clause 3.1 and clause 3.2.

2. Duration

2.1 Total duration of the BCA Course shall be three years, each year comprising two semesters.

2.2 Each semester shall normally have teaching for the 90 working days.

2.3 A student failing 2 times in I and / or II semester (of first year) and ineligible for the carry over system (clause 8) shall not be permitted to continue studies further.

2.4 Maximum time allowed for completing the BCA course will be 5 (five) years. Those who are unlikely to satisfy the condition shall not be allowed to continue the studies any further.

3. Curriculum

3.1 The 3 (Three) years curriculum will be divided into six semesters. Each semester include lectures, tutorials, practical and seminars as defined in the scheme of instructions and examinations.

3.2 It will also include co-curricular and extra curricular activities as prescribed from time to time by the Institute/college/university.

4. Examination

4.1 Student's performance will be evaluated through continuous assessment in the form of Class Tests, Assignments, Quizzes, Viva voce/Practical etc. There shall

also be an examination at the end of each semester in theory subjects, practical and project.

4.2 The distribution of marks for the class tests, quiz test, assignments, end semester theory, practical, project, seminar and other examination shall be as per the prescribed scheme of examination.

4.3 The maximum marks for the theory subjects shall consist of marks allotted for end semester examination and sessional work.

4.4 The maximum marks for the practical shall consist of marks allotted for practical examination and sessional work.

4.5 Pass/fail in a subject shall be declared on the basis of total marks obtained in theory/practical examination and the sessional award for theory/practical subjects.

4.6 The minimum pass marks in the theory subjects (including sessional marks) shall be 40%.

4.7 The minimum pass marks in the practical subjects (including sessional marks) shall be 50%.

4.8 The marks of the previous semester(s) shall not be added in declaring the result of any semester examination.

4.9 To pass a semester candidate must secure 50% of aggregate marks in that semester.

4.10 No merit position shall be awarded to a candidate who has qualified for promotion to higher classes with back papers.

4.11 The student failing in the project only but satisfying all other requirements including obtaining 50% or more marks in aggregate will be allowed to submit a new / modified project at any time after three months of the declaration of result without repeating the whole session.

5. Promotion Rules

5.1 A candidate satisfying all the conditions under clause 6 shall be promoted to the next semester.

5.2 A candidate not satisfying the above conditions but failing in not more than 2 subjects (Theory and/or practical) of a semester examination shall be governed by the clause No. 8.

5.3 All other candidates will be required to repeat the semester either as regular candidate, after re-admission or opting for ex-studentship. This facility is however subject to the time limits stipulated in clause No. 4.

6. Promotion under carry-over system

6.1 A candidate who fails in the category of clause No. 7.2 shall become eligible for provisional promotion to next semester and the carry-over system as per the following table.

For promotion to & exam	Max. permitted no. of carry over subjects of semester					
	I	II	III	IV	V	VI
II	2	-	-	-	-	-
III	2	2	-	-	-	-
IV	2	2	2	-	-	-
V	-	-	2	2	-	-
VI	-	-	2	2	2	-

Admission to & Semester Exams. not Permitted	Carry over subjects not cleared of semester		
V	I	&	II

6.2 No separate carry-over Examination will be held for any subject except for BCA Final year. Any candidate eligible for the carry-over system shall have to appear in the carry over subjects in the subsequent University Examination for the same semester.

7. Ex-studentship

Sessional marks in the subject of an ex-student shall remain the same as those secured by him/her earlier.

8. Result

Results at the end of final year will be declared with the following weightages:

I year	100%
II year	100%
III year	100%

9. Award of Division
9.1 If candidate passes all examinations in single attempt and secures 75% or more in aggregate marks he/she shall be placed in the First Division with Honours.
9.2 If candidate passes all examinations and secures aggregate marks of 60% or more but less than 75% **OR** greater than or equal to 75% after back in any examination, he/she shall be placed in First Division.
9.3 If candidate passes all examinations and secures aggregate marks of 50% or more but less than 60%, he/she shall be placed in Second Division.

10. Seminar and Project

10.1 Candidate must secure 50% marks to pass in seminar and project.

11.   Grace Marks

A candidate shall be entitled to grace marks of a maximum of 5 in any one subject in a semester to enable him to pass, provided he is failing in only one subject and has secured the necessary minimum aggregate. The grace marks shall not be added to the marks of the subject or to the aggregate. The grace marks will not be awarded to enable a candidate to pass in a practical or project.

15.   Scrutiny shall be allowed as per the rules of the University. Revaluation is not permitted.

Bachelor of Computer Application

Programme Structure

SEMESTER - I

BCA101 : Programming in 'C'

BCA102 : Fundamental of Computers

BCA103: Mathematical foundation of Computer Science

BCA104 : Business Communications

BCAP11 : Programming in 'C'

BCAP12 : PC Packages(Introduction to Operating system & MS Office)

SEMESTER - II

BCA201 : Data Structure & File Organization

BCA202 : Programming in C++

BCA203 : System Analysis and Design

BCA204 : Digital Electronics

BCAP21 : Data Structure & File Organization

BCAP22 : Programming in C++

FIRST SEMESTER:

S. No	Course No.	Subject	Evaluation – Scheme							
			Period			Sessional			Examination	
			L	T	P	TA	CT	TOT	ESE	Sub. Total
Theory										
1.	BCA101	Programming in 'C'	3	1	-	10	20	30	70	100
2.	BCA102	Fundamental of Computers	3	1	-	10	20	30	70	100
3.	BCA103	Mathematical Foundation of Computer Science	3	1	-	10	20	30	70	100
4.	BCA104	Business Communication	3	1	-	10	20	30	70	100
Practical										
1.	BCAP11	Programming in 'C'	-	-	4	50	-	50	100	150
2.	BCAP12	PC Packages(Introduction to Operating system & MS Office)	-	-	4	50	-	50	100	150
		Total	12	4	8	-	-	220	480	700

SECOND SEMESTER:

S. No	Course No.	Subject	Evaluation – Scheme							
			Period			Sessional			Examination	
			L	T	P	TA	CT	TOT	ESE	Sub. Total
Theory										
1.	BCA201	Data Structure & File Organization	3	1	-	10	20	30	70	100
2.	BCA202	Programming in C++	3	1	-	10	20	30	70	100
3.	BCA203	System Analysis and Design	3	1	-	10	20	30	70	100
4.	BCA204	Digital Electronics	3	1	-	10	20	30	70	100
Practical										
1.	BCAP21	Data Structure & File Organization	-	-	4	50	-	50	100	150
2.	BCAP22	Programming in C++	-	-	4	50	-	50	100	150
		Total	12	4	8	-	-	220	480	700

TA	: Teacher Assessment	Total Period = 24
CT	: Class Test	Total Marks = 700
ESE	: End Semester Examination	
SUB TOT.	: Subject Total	
TOT.	: Total	

BCA101 : Programming in 'C'

Programming in C: History, Introduction to C Programming Languages, Structure of C programs, compilation and execution of C programms. Debugging Techniques, Data Types and Sizes, Declaration of variables, Modifiers, Identifiers and keywords, Symbolic constants, Storage classes (automatic, external, register and static), Enumerations, command line parameters, Macros, The C Preprocessor

Operators: Unary operators, Arithmetic & logical operators, Bit wise operators, Assignment operators and expressions, Conditional expressions, precedence and order of evaluation. Control Statements: if-else, switch, break, continue, the comma operator, go to statement.

Loops: for, while, do-while.

Functions: built-in and user-defined, function declaration, definition and function call, parameter passing: call by value, call by reference, recursive functions, multifile programs.

Arrays: Linear arrays, multidimensional arrays, Passing arrays to functions, Arrays and strings.

Structure and Union: Definition and differences, self-referential structure. And address of (&) operator, pointer to pointer, Dynamic Momory Allocation, calloc and malloc functions, array of pointers, function of pointers, structures and pointers.

File: File Handling in C

References:

1. V. Rajaraman, "Fundamentals of Computers", PHI
2. Pater Norton's "Introduction to Computer", TMH
3. Hahn, "The Internet complete reference", TMH
4. Peter Nortton's, "DOS Guide", Prentice Hall of India
5. Gottfried, "Programming in C, Schaum's Series Tata McGraw Hill

BCA102 : Fundamental of Computers

Introduction to Computers: Computer hardware Components, Disk Storage, memory, keyboard, mouse, printers, monitors, CD etc., and their functions, Comparison Based analysis of various hardware components.

Basic Operating System Concepts: MS-DOS, WINDOWS, Functional knowledge of these operating systems. Introduction to Basic Commands of DOS, Managing File and Directories in various operating Systems, Introduction to internet, Basic terms related with Internet, TCP/IP.

Algorithm development, techniques of problem solving, flowcharting, stepwise refinement algorithms for searching, sorting (exchange and insertion), merging of ordered lists.

Programming : Representation of integer, character, real, data types, constraints and variables, arithmetic expressions, assignment statement, logical expression; sequencing, alteration and interaction, arrays, string processing sub programs, recursion, files and pointers.

Structured programming concepts : Top down design, development of efficient programs; Program correctness; Debugging and testing of programs.

Element of a computer processing system : Hardware CPU, storage devices and media, VDU, input-output devices, data communication equipment software-system software, application software.

Programming languages : Classification, machine code, assembly language, higher level languages, fourth generation languages.

References :
Raja Raman V : Fundamentals of Computers
Sanders D.H. : Computers Today

BCA103: Mathematical foundation of Computer Science

Relation: Type and compositions of relations, Pictorial representation of relations, Equivalence relations, Partial ordering relation.

Function: Types, Composition of function, Recursively defined function.

Mathematical Induction: Piano's axioms, Mathematical Induction, Discrete Numeric Functions and Generating functions, Simple Recurrence relation with constant coefficients, Linear recurrence relation without constant coefficients, Asymptotic Behaviour of functions

Algebric Structures: Properties, Semi group, monoid, Group, Abelian group, properties of group, Subgroup, Cyclic group, Cosets, Permutation groups, Homomorphism, Isomorphism and Automorphism of groups.

Prepositional Logic: Preposition, First order logic, Basic logical operations, Tautologies, Contradictions, Algebra of Proposition, Logical implication, Logical equivalence, Normal forms, Inference Theory, Predicates and quantifiers, Posets, Hasse Diagram.

References:

1. Liptschutz, Seymour, "Discrete Mathematics", TMH.
2. Trembley, J.P. & R. Manohar, "Discrete mathematical Structure with Application to Computer Science", TMH.
3. Kenneth H. Rosen, "Discrete Mathematics and its applications', TMH.
4. Doerr Alan and Levasseur Kenneth, "Applied Discrete Structure for Computer Science, Galgotia Pub. Pvt. Ltd.
5. Gersting "Mathematical Structure for Computer Science", WH freeman and Macmillan
6. Kumar Rajendra, "Theory of Automata: Languages and Computation", PPM
7. Hopcroft J.E. Uliman J.D., "Introduction to Automata Theory, Language and Computation" Narosa Pub. House, New Delhi.
8. C.L.Liu "Elements of Discrete Maehmatics", McGraw Hill.
9. Peter Grossman, "Discrete Mathematics for Computer", Palgrave Macmillian.

BCA104 : Business Communications

Perception, nature and importance, perceptual organization, perceptual interpretation, social perception motivation, characteristics of needs, models of motivation, theories of motivation.
Learning and behaviouristic theories, cognitive theories, social learning theories.

Personality, theories of personality, measurement of personality.

Communication : Fundamentals, downward and upward communication, other forms of communication. Attitudes nature effects, measurement and changing attitudes.

Fundamentals of Technical Communications, Oral Communication and Written Communication , Public Speaking, negotiations, Presentation skills, Transactional Analysis and Ego-states, Role of communication in IT.

BCA201 : Data Structure & File Organization

Introduction: Basic Terminology, Elementary Data Organization, Data Structure operations, Algorithm Complexity and Time-Space trade-off. Arrays: Array Definition, Representation and Analysis, Single and Multidimensional Arrays, address calculation, application of arrays, Character String in C, Character string operation, Array as Parameters, Ordered list, Sparse Matrices, and Vector. Stacks: Array Representation and Implementation of stack, Operations and Stacks: Push and POP, Array Representation of Stack, Linked Representation of stack, Operations Associated with Stacks, Application of stack, Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack. Recursion: Recursive definition and processes.

Queues: Array and linked representation and implementation of queues, Operations on Queue; Create, Add, Delete, Full and Empty, Circular queue, Dequeue, and Priority Queue. Link List: Representation and implementation of Singly linked lists, Two-way Header List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to from Linked Lists, Insertion and deletion Algorithms, Doubly linked list, Linked List of Array, Polynomial representation and addition, Generalized linked list, Garbage Collection and Compaction.

Trees: Basic terminology, Binary Tree, Binary tree representation algebraic Expressions, Complete Binary Tree, Extended Binary Tree, Array and Linked Representation of Binary trees, Traversing Binary trees, Threaded Binary trees. Traversing Threaded Binary tree, Huffman algorithm. Searching and Hashing: Sequential search, comparison and analysis, Hash Table, Hash Function, Collection Resolution Strategies, Hash Table Implementation.

Sorting: Insertion Sort, Bubble sorting, Quick Sort, Two way Merge Sort, Trees: Binary Search (BST), Insertion and Deletion in BST.

References:

1. Horowitz and Sahani, "Fundamentals of data Structures" Galgotia
2. R. Kruse etal, "Data Structures and Program Design in C" Person Education
3. A.M. Tenenbaum etal, "Data Structures and Program Design in C" Person Education
4. Lipschutz, "Data Structure", TMH
5. K Loudon, "Mastering Algorithms With C", Shroff Publishers and Distributors
6. Bruno R Preiss, "Data Structure and Algorithms with Object Oriented Design Pattern in C++, Jhon Wiley & Sons, Inc.
7. Adm Frozdek, "Data Structures and Algorithms in C++" Thomson Asia
8. Pal G. Sorenson, "An Introduction to Data Structures with Application", TMH

BCA202 : Programming in C++

Introduction: Introduction to OOP, Basic Concepts of OOP, Applications of OOP. Introduction to C++, Introduction to C++ stream I/O, declarations in C++, Creating New data types in C++, function Prototypes, Inline functions, Reference Parameters, Const Qualifier, Dynamic memory allocation, default arguments, Unary Scope resolution operator, Linkage specifications.

Class, Constructors, Friend Class : Introduction, Comparing class with Structure, Class Scope, Accessing Members of a class, Constructor, Destructor, Const objects, Const member functions, Friend class, Friend function, This pointer, Data abstraction and Information hiding, container classes and Iterators

Overloading & Inheritance: Operator Overloading, Fundamentals, Restrictions, Overloading stream, Insertion and stream extraction operators, Overloading unary & binary operators, Converting between types, Overloading ++ and --. Inheritance, Introduction, Protected members, Casting base _class pointers to derived _class pointers Overloading Base class members in a Derived class, Public, Protocols and Private inheritance, Direct base classes and Indirect Base Classes, Using Constructors and Destructors in Derived classes, Implicit Derived class object to base class object conversion.

Virtual Functions : Introduction, Type fields and switch statements, Virtual functions, Abstract base classes and concrete classes, Polymorphism, Dynamic binding, Virtual destructors.

C++ Stream I/O : Streams, Stream Input, Stream Output, Unformatted I/O, Stream manipulators, Stream format states, Stream error, States.

References:

1. Deitel H.M. & Deitel P.J. – "How to Program C++" – PHI – 2003
2. Al stevenes – "C++ Programming" – Wiley dreamtech – 2003.
3. Herbert Scheldt, "Complete Reference".
4. E. Balagurusamy "Object Oriented Programming with C++".
5. Yashwant Kanetkar, "Let Us C++".
6. C++ Programming by Herbert Scheldt – 2004.

BCA203 : System Analysis and Design

System Concepts and Information System Environment: The System Concept, Definition, Characteristics of Systems, Elements of a System, Open and Closed and closed system, Formal & Informal Information Systems, Computer based Information Systems, Management Information System, Decision Support System, General Business Knowledge, and Interpersonal Communicational System.

The System Development Life Cycle: Recognition of needs, Impetus for System Change, Feasibility Study, Analysis, Design, Implementation, Post implementation & Maintenance.

The Role of the Systems Analyst: Role of the Analyst, Analyst/User Interface, Behavioral issues.

Systems Planning & Initial Investigation: Strategies for Determining Information Requirement, Problem Definition & Project initiation, Background Analysis, Fact Analysis, Review of Written Documents, Onsite Observations, Interviews & Questionnaires, Fact Analysis, Performance Analysis, Efficiency Analysis, Service Analysis.

Information Gathering: Kind of Information needed. Information about the firms, Information gathering tools, the art of Interviewing, Arranging the Interview, Guides to Successful Interview, Types of Interviews and Questionnaires, The Structured and Unstructured Alternatives.

The Tools of Structured Analysis: The Dataflow Diagram (DFD), Data Dictionary, Decision Trees and Structured English.

Feasibility Study: System performance, Economic Feasibility, Technical Feasibility, Behavioral Feasibility, Steps in Feasibility Analysis.

Input/Output and Forms Design: Input Design, CRT Screen Design, Output Design, Requirements form Design.

References:

1. Elias M.Awad, "Systems Analysis & Design" Galgotia Publication
2. Hoffer, "Modern Systems Analysis & Design" Addision Wesley
3. Kendall, "Introduction to System Analysis & Desogm", McGraw Hill

BCA204 : Digital Electronics

Representation of information & Basic Building Blocks: Introduction to Computer, Computer hardware generation, Number System: Binary, Octal, Hexadecimal, Character Codes (BCD), ASCII, EBCDIC and their conversion. Logic gates, Boolean Algebra, K-map simplification, Half Adder, Full Adder, Subtractor, Decoder, Encoders, Multiplexer, Demultiplexer.

Basic Organization: Operational flow chart (Fetch, Execute, Instruction Cycle), Organization of Central Processing Unit, Hardwired & micro programmed control unit, Single Organization, General Register Organization, Stack Organization, Addressing modes, Instruction formats, data transfer & Manipulation, I/O Organization, Bus Architecture, Programming Registers.

Memory Organization: Memory hierarchy, Main memory (RAM/ROM) chips), Auxiliary memory, Associative memory, Cache memory, Virtual memory, Memory Management Hardware, hit/miss ratio, magnetic disk and its performance, magnetic Tape etc.

I/O Organization: Peripheral devices, I/O interface, Modes of Transfer, Priority Interrupt, Direct Memory Access, Input-Output Processor, and Serial Communication. I/O Controllers, Asynchronous data transfer.

References:

1. Willam Stalling, "Computer Organization & Architecture" Pearson Education Asia
2. Mano Morris, "Computer System Architecture" PHI
3. Zaky & Hamacher, "Computer Organization: McGraw Hill
4. B. Ram, "Computer Fundamental Architecture & Organization" New Age
5. Tannenbaum, "Structured Computer Organization" PHI.