UTTARAKHAND TECHNICAL UNIVERSITY
DEHRADUN

SYLLABUS AND ORDINANCES

Wef-2010-11
SYLLABUS

FOR

B.Sc. (Computer Science) Programme

Ordinance
for
B.Sc. (Computer Science) Programme 2007 & onwards
Uttrakhand Technical University,Dhradun

1. Admission

Admission to the B.Sc.(Computer Science) Ist semester will be made as per rules prescribed by the Academic Council of the University **or** as per guidelines prescribed by the State Govt. from time to time.

2. Eligibility

Intermediate Science with Mathematics.

3. Attendance

3.1 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.

3.2 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.

3.3 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.

4. Duration

4.1 Total duration of the B.Sc.(Computer Science) Course shall be three years, each year comprising two semesters.

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

4.3 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.

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

5. Curriculum

5.1 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.

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

6. Examination

6.1 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.

6.2 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.

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

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

6.5 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.

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

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

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

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

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

6.11 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.

7. Promotion Rules

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

7.2 A candidate not satisfying the above conditions but failing in not more than 3 subjects (Theory and/or practical) of a semester examination shall be governed by the clause No. 8.

7.3 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.

8. Promotion under carry-over system

8.1 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

8.2 No separate carry-over Examination will be held for any subject except for B.Sc.(Computer Science) 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.

9. Ex-studentship

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

10. Result

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

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

11. Award of Division

11.1 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.

11.2 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.

11.3 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.

12. Seminar and Project

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

13. 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.

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

Uttrakhand Techinical University,Dherdun.
B.Sc. (Computer Science)

Programme Structure

SEMESTER - I

BSCS101 : Fundamental of Computer

BSCS102 : Mathematical Foundation of Computer Science

BSCS103 : Digital Electronics

BSCS104 : Programming in 'C'

BSCSP11 : Programming in 'C'

BSCSP12 : PC Packages(Introduction to DOS & MS Office)

SEMESTER - II

BSCS201 : Data Structures using C

BSCS202 : Computer Based Numerical Techniques

BSCS203 : System Analysis and Design

BSCS204 : Operating System

BSCSP21 : Data Structures

BSCSP22 : Computer Based Numerical Techniques 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.	BSCS101	Fundamental of Computer	3	1	-	10	20	30	70	100
2.	BSCS102	Mathematical Foundation of Computer Science	3	1	-	10	20	30	70	100
3.	BSCS103	Digital Electronics	3	1	-	10	20	30	70	100
4.	BSCS104	Programming in 'C'	3	1	-	10	20	30	70	100
Practical										
1.	BSCSP11	Programming in 'C'	-	-	4	50	-	50	100	150
2.	BSCSP12	PC Packages(Introduction to DOS & MS Office)	-	-	4	50	-	50	100	150
		Total	12	4	8	-	-	220	480	700

Total Period = 24
Total Marks = 700

SECOND SEMESTER:

S. No	Course No.	Subject	Evaluation – Scheme							
			Period			Sessional			Examination	
			L	T	P	TA	CT	TOT	ESE	Sub. Total
Theory										
1.	BSCS201	Data Structures using C	3	1	-	10	20	30	70	100
2.	BSCS202	Computer Based Numerical Techniques	3	1	-	10	20	30	70	100
3.	BSCS203	System Analysis and Design	3	1	-	10	20	30	70	100
4.	BSCS204	Operating System	3	1	-	10	20	30	70	100
Practical										
1.	BSCSP21	Data Structures	-	-	4	50	-	50	100	150
2.	BSCSP22	Computer Based Numerical Techniques in C	-	-	4	50	-	50	100	150
		Total	12	4	8	-	-	220	480	700

TA : Teacher Assessment
CT : Class Test
ESE : End Semester Examination
SUB TOT. : Subject Total
TOT. : Total

Total Period = 24
Total Marks = 700

BSCS101 : Fundamental of Computer

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

BSCS102 : 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.

BSCS103 : 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.

BSCS104 : 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.

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

BSCS201 : Data Structures using C

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, recursion in C.

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.

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

BSCS202 : Computer Based Numerical Techniques

Floating point Arithmetic: Representation of floating point numbers, Operations, Normalization, Pitfalls of floating point representation, Errors in numerical computation. Iterative Methods: Zeros of a single transcendental equation and zeros of polynomial using Bisection Method, Iteration method, Regula-Falsi method, Newton Raphson method, Secant method, Rate of convergence of iterative methods.

Simultaneous Linear Equations: Solutions of system of Linear equations, Gauss Elimination direct method and pivoting, III conditioned system of equations, Refinement of solution. Gauss Seidal iterative method, Rate of Convergence. Interpolation and approximation: Finite Differences, Difference tables. Polynomial Interpolation: Newton's forward and backward formula Central Difference Formulae: Gauss forward and backward formula, stirling's Bassel's Everett's formula. Interpolation with unequal intervals: Language's Interpolation, Newton Divided difference formula, Hermite's interpolation Approximation of function by Taylor's series and Chebyshev polynomial.

Numerical Differentiation and Integration: Introduction, Numerical Differentiation, Numerical Integration, Trapazoidal rule, Simpon's rules, Boole's Rule Euler-Maclaurin Formula Solution of Differential Equations: Picard's Method, Euler's Method, Taylor's Method, Runge-Kutta methods, Predictor-corrector method, Automatic error monitoring, stability of solution.

References:

1. Rajaraman V., :Computer Oriented Numerical Methods". PHI
2. Gerald and Wheatley, "Applied Numerical Analyses", AW
3. Jain, Lyengar and Jain, "Numerical Methods for Scientific and Engineering Computations:, New Ager Int.
4. Grewal B.S., "Numerical methods in Engineering and Science. Khanna Publishers, Delhi.
5. T.Veerarajan, T Ramchandran, "Theory and Problems of Numerical Methods", TMH

BSCS203 : 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: Historical Perspective, Academic & Personal Qualifications, the multifaceted role of the Analyst, The 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

BSCS204 : Operating System

Operating system- definition, simple batch system, Time sharing system, Real time system, storage hierarchy, operating system service.

Process concept, process Scheduling, operating on process, co-operating process.

CPU Scheduling concepts, Scheduling algorithms, process synchronization, critical section problem, synchronization hardware, semaphores.

Deadlocks, deadlock characterization, deadlock prevention, avoidance detection and recovery.

Storage management Resident monitor, Logical versus physical address space, swapping, and segmentation, SCM.

Virtual memory, Demand paging, page replacement and page replacement algorithms, allocation of frames, thrashing.

File System: File supports, access methods, allocation methods-contiguous, linked and index allocation, directory system – single level, tree structured, acyclic graph and general graph directory, file protection.

Secondary storage structure: Disk structures, disk scheduling disk management, allocation methods, free space management.

References:

1. Peterson Abraham & Silbesschatz, Peter Galvin: Operating system concepts. .
2. Mandnick and Donovan : Operating system (Mc–Graw Hill) 1996.
3. Tanenbaum A.S. : Modern Operating system, (PHI) 1998.
4. Growley, : Operating system a design Approach .