Central University of Himachal Pradesh
(Established under Central Universities Act 2009)
PO BOX: 21, DHARAMSHALA, DISTRICT KANGRA – 176215, HIMACHAL PRADESH
www.cuhimachal.ac.in

Course Code: CSI-410

Course Name: Object Oriented Programming Using C++

Credit Equivalent: 2 Credits (One credit is equivalent to 10 hours of lectures / organised classroom activity / contact hours; 5 hours of laboratory work / practical / field work / Tutorial / teacher-led activity and 15 hours of other workload such as independent individual / group work; obligatory / optional work placement; literature survey / library work; data collection / field work; writing of papers / projects / dissertation / thesis; seminars, etc.)

Course Objectives: The course is designed to

- This module will acquaint the student with the fundamental concepts of software construction in an object-oriented framework and develop basic competence in applying those concepts.
- It will introduce inheritance and software structuring concepts that provide the object-oriented approach to software development with much of its power.
- Students' programming capability will be enhanced through substantial practical work and increased knowledge of software development methodology.

Attendance Requirement:

Students are expected to attend all lectures in order to be able to fully benefit from the course. A minimum of 75% attendance is a must failing which a student may not be permitted to appear in examination.

Evaluation Criteria:

1. Mid Term Examination: 25%
2. End Term Examination: 50%
3. Continuous Internal Assessment: 25%
   - i) Assignment 10%
   - ii) Class Participation 5%
   - ii) Class Tests 10%

Course Contents

Unit-1 **[4 hours]**

Basic concepts of Object Oriented programming - Object, Classes, Inheritance, Encapsulation, Polymorphism and Overloading. C++ Programming Basics-program construction, input/outputs,

preprocessor directives, comments, declaration and definitions of variables, manipulators, tokens, expressions, control structures.

Arrays - defining, accessing elements, initialization.

Structures - basic concepts and usage, defining of structure variable, accessing structure members, other features of structure.

Functions- declaration, calling and definition, passing arguments- call by value/reference. Returning values from function.

Managing console input output operations.

Unit-2 **[4 hours]**

Objects and Classes- specifying class, creating objects, accessing class members, defining member function, static data members, static member functions, arrays of objects, object as function arguments, friend functions, returning objects, function overloading.

Constructer and destructor.

Unit-3 **[4hours]**

Operator Overloading- Overloading unary operator, binary operator, data conversion-between basic types, between objects and basic data types, objects and different classes.

Inheritance-Concept of derived and base class, accessing base class members, Single inheritance, multiple inheritance, hierarchical inheritance, multilevel inheritance, hybrid inheritance, constructor in derived classes

Unit-4 **[4 hours]**

Pointers- pointer variables, accessing variables, Pointers and arrays, Pointers and functions, pointers to object, this pointer.

Virtual Functions-Functions accessed with pointers, virtual member functions accessing with pointers, late binding, pure virtual functions, abstract classes, virtual base classes.

Unit-5 **[4 hours]**

Exception handling.

Working with files- classes for file stream operations, opening and closing a file, detecting end-of-file, file modes, file pointers and their manipulations, sequential input and output operations, updating a file, error handling, command line arguments.

Prescribed Text Books:

1. Balabugusamy, E. "Object Oriented Programming with C++", Second Edition. Tata McGraw Hill.
2. Lafore, Robert, "Object Oriented Programming in Turbo C++", Galgotia Publications Pvt. Ltd. .

Suggested Additional Reading

1. Herbert Schildt, " C++ The Complete Reference " - TMH Publication ISBN 0-07-463880-7
2. R. Subburaj, " Object Oriented Programming With C++ ", Vikas Publishing House, New Delhi.isbn 81-259-1450-1
3. M Kumar " Programming In C++", TMH Publications

4. Ashok . N. Kamthane, " Object Oriented Programming with ANSI & Turbo C++", Pearson Education Publication, ISBN 81-7808-772-3

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Course Code: CSI-414 B

Course Name: LAB-C++

Credit Equivalent: 2 Credits (One credit is equivalent to 10 hours of lectures / organised classroom activity / contact hours; 5 hours of laboratory work / practical / field work / Tutorial / teacher-led activity and 15 hours of other workload such as independent individual / group work; obligatory / optional work placement; literature survey / library work; data collection / field work; writing of papers / projects / dissertation / thesis; seminars, etc.)

Course Objectives: The course is designed to

- This module will acquaint the student with the fundamental concepts of software construction in an object-oriented framework and develop basic competence in applying those concepts.
- It will introduce inheritance and software structuring concepts that provide the object-oriented approach to software development with much of its power.
- Students' programming capability will be enhanced through substantial practical work and increased knowledge of software development methodology.

Attendance Requirement:

Students are expected to attend all lectures in order to be able to fully benefit from the course. A minimum of 75% attendance is a must failing which a student may not be permitted to appear in examination.

Evaluation Criteria:

4. Mid Term Examination: 25%
5. End Term Examination: 50%
6. Continuous Internal Assessment: 25%

iii)	Assignment	20%
ii)	Class Participation	5%

Course Contents

Unit-1 **[4 hours]**

Programming examples on basic concepts of Object Oriented programming - Object, Classes, Inheritance, Encapsulation, Polymorphism and Overloading. C++ Programming Basics-program construction, input/outputs, preprocessor directives, comments, declaration and definitions of variables, manipulators, tokens, expressions, control structures.

Programming examples on arrays - defining, accessing elements, initialization.

Programming examples on Structures - basic concepts and usage, defining of structure variable, accessing structure members, other features of structure.

Programming examples on Functions- declaration, calling and definition, passing arguments- call by value/reference. Returning values from function.

Programming examples on Managing console input output operations.

Unit-2 **[4 hours]**

Programming examples on Objects and Classes- specifying class, creating objects, accessing class members, defining member function, static data members, static member functions, arrays of objects, object as function arguments, friend functions, returning objects, function overloading.

Programming examples on Constructer and destructor.

Unit-3 **[4hours]**

Programming examples on Operator Overloading- Overloading unary operator, binary operator, data conversion-between basic types, between objects and basic data types, objects and different classes.

Programming examples on Inheritance-Concept of derived and base class, accessing base class members, Single inheritance, multiple inheritance, hierarchical inheritance, multilevel inheritance, hybrid inheritance, constructor in derived classes

Unit-4 **[4 hours]**

Programming examples on Pointers- pointer variables, accessing variables, Pointers and arrays, Pointers and functions, pointers to object, this pointer.

Programming examples on Virtual Functions-Functions accessed with pointers, virtual member functions accessing with pointers, late binding, pure virtual functions, abstract classes, virtual base classes.

Unit-5 **[4 hours]**

Programming examples on Exception handling.

Programming examples on Working with files- classes for file stream operations, opening and closing a file, detecting end-of-file, file modes, file pointers and their manipulations, sequential input and output operations, updating a file, error handling, command line arguments.

Prescribed Text Books:

3. Balabugusamy, E. "Object Oriented Programming with C++", Second Edition. Tata McGraw Hill.
4. Lafore, Robert, "Object Oriented Programming in Turbo C++", Galgotia Publications Pvt. Ltd. .

Suggested Additional Reading

5. Herbert Schildt, " C++ The Complete Reference " - TMH Publication ISBN 0-07-463880-7
6. R. Subburaj, " Object Oriented Programming With C++ ", Vikas Publishing House, New Delhi.isbn 81-259-1450-1
7. M Kumar " Programming In C++", TMH Publications
8. Ashok . N. Kamthane, " Object Oriented Programming with ANSI & Turbo C++", Pearson Education Publication, ISBN 81-7808-772-3

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Course Code: CSI431

Course Name: Algorithm Design

Credit Equivalent: 04 Credits (One credit is equivalent to 10 hours of lectures / organised classroom activity / contact hours; 5 hours of laboratory work / practical / field work / Tutorial / teacher-led activity and 15 hours of other workload such as independent individual / group work; obligatory / optional work placement; literature survey / library work; data collection / field work; writing of papers / projects / dissertation / thesis; seminars, etc.)

Course Objectives: The course is designed

• To be able to carry out the Analysis of various Algorithms for mainly Time and Space Complexity.

• develop efficient algorithms for simple computational tasks and reasoning about the correctness of them. Through the complexity measures, different range of behaviours of algorithms and the notion of tractable and intractable problems will be understood

Attendance Requirement:

Students are expected to attend all lectures in order to be able to fully benefit from the course. A minimum of 75% attendance is a must failing which a student may not be permitted to appear in examination.

Evaluation Criteria:

7. Mid Term Examination: 25%

8. End Term Examination: 50%

9. Continuous Internal Assessment: 25%

i)	Assignments	5%
ii)	Class participation	5%
iii)	Class tests	10%
iv)	Quiz	5%

Course Contents:

Unit I **(4 Hours)**

Algorithms, Designing algorithms, analyzing algorithms, asymptotic notations, Introduction to divide and conquer technique, analysis, design and comparison of various algorithms based on this technique, example binary search, merge sort, quick sort, strassen's matrix multiplication.

Unit II **(4 Hours)**

Study of Greedy strategy, examples of greedy method like optimal merge patterns, Huffman coding, minimum spanning trees, knapsack problem, job sequencing with deadlines, single source shortest path algorithm

Unit III **(4 Hours)**

Concept of dynamic programming, problems based on this approach such as 0/1 knapsack, multistage graph, reliability design, Floyd-Warshall algorithm.

Unit IV **(4 Hours)**

Backtracking concept and its examples like 8 queen's problem, Hamiltonian cycle, Graph coloring problem etc. Introduction to branch & bound method, examples of branch and bound method like travelling salesman problem etc. Meaning of lower bound theory and its use in solving algebraic problem.

Unit V **(4 Hours)**

Binary search trees, height balanced trees, 2-3 trees, B-trees, basic search and traversal techniques for trees and graphs (In order, preorder, postorder, DFS, BFS), NP-completeness.

Prescribed Text Book:

1. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, ~~Co~~mputer Algorithms/C++‖ 2nd Edition, Universities Press, 2007.

Suggested Additional Reading:

1. Cormen, T.H., Leiserson, C.E., Rivest, R.L. and Stein, C., ~~In~~troduction to Algorithms‖2nd Edition, Prentice Hall of India Pvt. Ltd, 2003.

2. Aho, A.V., Hopcroft J.E. and Ullman, J.D., ~~Th~~e Design and Analysis of Computer Algorithms‖ Pearson Education, 1999.

3. Sara Baase and Allen Van Gelder, ~~Co~~mputer Algorithms, Introduction to Design and Analysis‖3rd Edition, Pearson Education, 2009.

4 . Dasgupta; algorithms; TMH

5. Michael T Goodrich, Robarto Tamassia, Algorithm Design, Wiely India

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Course Code: CSI440

Course Name: Information Security and Cryptography

Credit Equivalent: 04 Credits (One credit is equivalent to 10 hours of lectures / organised classroom activity / contact hours; 5 hours of laboratory work / practical / field work / Tutorial / teacher-led activity and 15 hours of other workload such as independent individual / group work; obligatory / optional work placement; literature survey / library work; data collection / field work; writing of papers / projects / dissertation / thesis; seminars, etc.)

Course Objectives: The course is designed

• To be able to carry out the Analysis of various Algorithms for mainly Time and Space Complexity.

• develop efficient algorithms for simple computational tasks and reasoning about the correctness of them. Through the complexity measures, different range of behaviours of algorithms and the notion of tractable and intractable problems will be understood

Attendance Requirement:

Students are expected to attend all lectures in order to be able to fully benefit from the course. A minimum of 75% attendance is a must failing which a student may not be permitted to appear in examination.

Evaluation Criteria:

10. Mid Term Examination: 25%

11. End Term Examination: 50%

12. Continuous Internal Assessment: 25%

v)	Assignments	5%
vi)	Class participation	5%
vii)	Class tests	10%
viii)	Quiz 5%	

Course Contents:

UNIT-I

Classical Encryption Techniques: Symantec Cipher model, substitution Techniques, tranposition techniques, rotor machines, steganography.

Block Ciphers and the Data Encyption standards: Simplified DES, block cipher principles, the data encryption standard, the strength of DES, differential and linear cryptanalysis, blockcipher design principles, block cipher modes of operation.

Advanced Encryption Standard: Evaluation Criteria for AES, the AES cipher.

Contemporary symmetric ciphers: Triple DES, blowfish.

Confidentiality using symmetric encryption: Placement of Encryption function, traffic confidentiality, key distribution, and random number generation.

UNIT-II

Public key Encryption and Hash functions : Prime numbers, Fermat's and Euler's Theorems, testing for primality, the chinese remainder theorem, discrete logarithms.

Public key cryptography and RSA: Principles of Public key cryptosystems, the RSA algorithm.

Key Management other public key cryptosystems: Key management, diffie-Hallman key exchange, elliptic curve arithmetic, and elliptic curve cryptography.

UNIT-III

Message authentication and Hash function

: AuthenticationRequirements, Authentication functions, messageauthentication codes, hash functions, security of hash function and MACs.

Hash Algorithms: MD5 message digest algorithm, secure Hash algorithm, ripemd-160, HMAC.

Digital Signature and Authentication protocols: Digital signatures, Authentication protocols, and digital signature standard.

Authentication Applications: Kerberos, X.509 Authenticationservice.

UNIT-IV

Electronic Mail Security: Pretty Good privacy, S/MIME.

IP Security: IP Security overview, IP security architecture,authentication header, encapsulating security payload, combining security associations, key management.

Web Security: Web security considerations, Secure sockets layer and transport layer security, secure electronic transaction.

UNIT-V

Part four system security: Intruders, intrusion detection, and password management.

Malicious software: Viruses and related threats, virus countermeasures.

Firewalls: Firewall Design Principles, Trusted systems.

BOOKS

1. William Stallings "Cryptography and Network Security", 3 ed, Pearson Education.
2. W.Stallings " Network security Essential " Applications & Standards", Pearson ed.
3. Kanfren "Network Secirity : Private Communications in apublic world 2/e
4. Eric Maiwald " Network Secirity : A Preginner's Guide, second ed.", Tata Mcgraw Hill.
5. Roberta Bragg " Mark Rhodes, Ousley & Keith Strassberg Network Secirity : The Complete Reference " Tata McGraw Hill.
6. Eric Maiwald "Fundamentals of Network Security" Wiley India.

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PO BOX: 21, DHARAMSHALA, DISTRICT KANGRA – 176215, HIMACHAL PRADESH

Website: www.cuhimachal.ac.in

Course Code: CSI 531

Course Name: Theory of Computation

Credit Equivalent: 04 Credits (One credit is equivalent to 10 hours of lectures / organised classroom activity / contact hours; 5 hours of laboratory work / practical / field work / Tutorial / teacher-led activity and 15 hours of other workload such as independent individual / group work; obligatory / optional work placement; literature survey / library work; data collection / field work; writing of papers / projects / dissertation / thesis; seminars, etc.)

Course Objectives: The course is designed to cover the underlying concepts and techniques used in Theory of Computation. In this syllabus we cover finite automata, pushdown automata, Context free grammars and Turing machines.

Attendance Requirement:

Students are expected to attend all lectures in order to be able to fully benefit from the course. A minimum of 75% attendance is a must failing which a student may not be permitted to appear in examination.

Evaluation Criteria:

13. Mid Term Examination: 25%

14. End Term Examination: 50%

15. Continuous Internal Assessment: 25%

i)	Assignment	10%
ii)	Class participation	5%
iii)	Class test	5%
iv)	Quiz	5%

Course Contents:

Unit-I: **(08 Hours)**

Alphabet, Strings and their properties, Definition of an automation, Description of a finite Automation, Transition graph, transition function, Acceptability of a string by a Finite Automation, Deterministic and nondeterministic FSM'S, Equivalence of DFA and NDFA, Mealy & Moore machines, Minimization of finite automata.

Unit-II: **(08 Hours)**

Chomsky classification of Languages, Languages and their relation, Languages and Automata, Regular sets, regular expression, Regular Grammars, Finite state machine and regular expression, Pumping lemma for regular sets, Application of pumping lemma, closure properties of regular sets.

Unit-III: **(08 Hours)**

Introduction to CFG, Context-free languages and Derivation Trees, Ambiguity in context-free Grammars, simplification of context-free Grammars, Normal forms for context-free Grammars – Chomsky normal form and Greiback normal form.

Unit-IV: **(09 Hours)**

Pushdown Automata: Definitions – Moves – Instantaneous descriptions – Deterministic pushdown automata – Pushdown automata and CFL, PDA corresponding to given CFG, CFG corresponding to a given PDA, pumping Lemma for context-free Languages, Closure properties of CFL's.

Unit-V: **(07 Hours)**

Introduction, TM model Representation of Turing machines, languages acceptability of TM, Design of TM, Universal TM & Other modification, Church's hypothesis, Properties of recursive and Recursively enumerable languages.

Tractable and Untractable Problems: P, NP, NP complete and NP hard problems

Prescribed Text Book:

1. John E. Hopcroft, Jeffery Ullman,"Introduction to Automata theory, Langauges & computation" , Narosa Publishers.

2. K.L.P Mishra & N.Chandrasekaran,"Theory of Computer Science", PHI Learning

Suggested Additional Reading:

- John C Martin, "Introdution to languages and theory of computation", McGraw Hill
- Daniel I.A. Cohen,"Introduction to Computer Theory",Wiley India.
- Peter Linz, "An Introduction to Formal Languages and Automata", Jones & Bartlett Learning