Courses offered by the Department
Spring Semester 2020(Jan- June 2020)

Name of School: School of Mathematics Computer & Information Sciences

Name of Department: Computer Science & Informatics

Name of Programme of Study: M.Sc. IT

Courses for Semester IV (Four)

Sr. No.	Course Code	Course Name	Credits	Teacher
1.	CSI 419	Compiler Design	4	Keshav Rawat
2.	CSI 426A	Operating system concept	4	Sandeep Sood
3.	CSI431	Algorithm Design	4	Ajay Kumar
4.	CSI503	Java Programming	4	Manoj Dhiman
5.	CSI506	E-Governance, E-Business and E-Learning	2	Sandeep Sood
6.	CSI508A	LAB- Java	2	Sandeep , Ajay Kumar & Manoj Dhiman

Course Code: CSI419

Course Name: Compiler 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 learn how a compiler works.
- To use of formal attributed grammars for specifying the syntax and semantics of programming languages.
- To Working knowledge of the major phases of compilation, particularly lexical analysis, parsing, semantic analysis, and code generation.

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

Course Contents:

Unit-I Introduction to Compiler & Lexical Analysis (08 hours)

Introduction of Compiler, Major data Structure in compiler, BOOT Strapping, Compiler structure: analysis-synthesis model of compilation, various phases of a compiler, Lexical analysis: Input buffering , Specification & Recognition of Tokens, LEX.

Unit-II Syntax Analysis (9 hours)

Syntax analysis: CFGs, Top down parsing, Brute force approach, recursive descent parsing, transformation on the grammars, predictive parsing, bottom up parsing, operator precedence parsing, LR parsers (SLR,LALR, LR).

Unit-III Syntax Directed Translation & Intermediate Code Generation (09 hours)

Syntax directed definitions: Construction of Syntax trees, Bottom up evaluation of S-attributed definition, L-attribute definition, Top down translation, Bottom Up evaluation of inherited attributes Recursive Evaluation, Analysis of Syntax directed definition.

Intermediate code generation: Declarations, Assignment statements, Boolean expressions, Case statements.

Unit-IV Type Checking & Run Time Environment (07 hours)

Type checking: type system, specification of simple type checker.

Run time Environment: storage organization, Storage allocation strategies, parameter passing, dynamic storage allocation, and Symbol table.

Unit –V Code Optimization & Code Generation (07 hours)

Introduction to Code optimization: sources of optimization of basic blocks, loops in flow graphs, dead code elimination, loop optimization, Introduction to global data flow analysis, Code Improving transformations, peephole optimization.

Code Generation: Issues in the design of code generator, Basic block and flow graphs, Register allocation and assignment, DAG representation of basic blocks.

Prescribed Text Book:

1. A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools, Pearson Education

Suggested Additional Reading:

1. Raghavan, Compiler Design, TMH Pub.
2. Louden. Compiler Construction: Principles and Practice, Cengage Learning
3. A. C. Holub. Compiler Design in C, Prentice-Hall Inc., 1993.

4. Mak, writing compiler & Interpreters, Willey Pub.

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

Course Code: CSI 426 A

Course Name: Operating Systems and System Softwares

Credits Equivalent: 4 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:

To learn the various aspects of operating systems such as process management, memory management, I/O management, protection , security etc.

Attendance Requirements:

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%
   - Assignments: 10%
   - Class Tests: 10%
   - Class Participation: 5%

Course Contents

Unit-I   **(10Hours)**

Introduction: Definition, Structure and Functions of Operating System, Types of operating systems.

Process Management: Process states, State Transitions, Process Control block, Context Switching, Process Scheduling, Scheduling algorithm, Threads.

Unit-II (6 Hours)

Inter process synchronization and communication: need, Mutual exclusion, semaphore and hardware support for mutual exclusion, queuing implementation, and classical Problem in concurrent programming, critical region and conditional critical region, Monitors, Messages, Deadlock.

Unit-III (8 Hours)

Memory Management: Address Binding, Dynamic Loading and Linking Concepts, Logical and Physical Addresses, Contiguous Allocation, fragmentation, Paging, Segmentation, Virtual Memory, Demand Paging, Page fault, Page replacement algorithms, Thrashing, Working Set Model.

Unit-IV (8 Hours)

Storage Management: File Attributes, File Types, File Access Methods, Directory Structure, File System Organization and Mounting, file system implementation, directory system implementation, Allocation Methods, Free Space management, Secondary storage management, I/O system.

Unit-V (8 Hours)

Protection.

Security.

System Software: Definition, their types, Loader, linker, editor, Assembler, Compiler, Interpreter.

Case Studies: Linux/window NT/Window XP/ Window 2007

Prescribed Text Books

1. Operating system concepts, by Gagne Greg, Abraham Silberschatz and Peter B. Galvin , Addison Wesley 8th Edition.
2. Dhamdhere, Operating system, TMH

References:

1. Modern operating Systems, A S Tanenbaum, PHI.
2. William Staling, Operating System.

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

v)	Assignments	5%
vi)	Class participation	5%
vii)	Class tests	10%
viii)	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, ―Computer Algorithms/C++‖, 2nd Edition, Universities Press, 2007.

Suggested Additional Reading:

1. Cormen, T.H., Leiserson, C.E., Rivest, R.L. and Stein, C., ―Introduction to Algorithms‖, 2nd Edition, Prentice Hall of India Pvt. Ltd, 2003.
2. Aho, A.V., Hopcroft J.E. and Ullman, J.D., ―The Design and Analysis of Computer Algorithms‖, Pearson Education, 1999.
3. Sara Baase and Allen Van Gelder, ―Computer 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: CSI 503

Course Name: Java Programming

Credits Equivalent: 4 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 objective is to understand fundamentals of object-oriented programming in Java, including classes, methods, inheritance, packages, interfaces, multithreading, exception handling. The course also provide introduction to applet programming and AWT kit.

Attendance Requirements: 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%

    * Assignments: 20%
    * Class Participation: 5%

Contents

UNIT 1 (**8 Hrs**)

Object oriented programming, features of java, general structure of java program, sample program, lexical issues, data types, variables, type conversion and casting, operators and expressions, controls statements, arrays, functions.

UNIT II (**10 Hrs**)

Class fundamentals & objects, Methods, constructors, this keyword, garbage collection, overloading methods & constructors, using object as arguments, returning objects, recursion, nested and inner classes, inheritance, using super, method overriding, dynamic method dispatch, using abstract classes, using final with inheritance.

UNIT III (**12 Hrs**)

Packages: Introduction, java API packages, using system packages, naming conventions, creating packages, accessing a package, using a package, adding a class to a package.
Interfaces: Defining interfaces, extending interfaces, implementing interfaces, accessing interface variables.
Multithreading: Introduction, creating threads, creating multiple threads, thread priorities, synchronization, and communication.
Exception handling: Introduction, exception types, uncaught exceptions, using try, catch, throw and throws, java's built in exceptions, creating own exception subclasses.
Applets programming: introduction, applet architecture, an applet Skelton, the HTML APPLET tag, passing parameters to applet.

UNIT IV (**10 Hrs**)

String handling: String constructors, special string operators, character extraction, string comparison, searching strings, modifying a string, string buffer.
Introducing the AWT: working with windows, Using AWT controls menu and menu bars, popup menus, working with layout.

Prescribed text book:
1. Herbert Schildt, "**The Complete Reference**", Tata McGraw Hill.
2. E Balaguruswamy**," Programming with Java**", Tata McGraw Hill.

Reference Books:
- Cay S. Horstmann, Gary Cornell," **Core Java**", Pearson
- James R. Levenick , "Simply JAVA :An Introduction to JAVA programming ",Firewall Media Publication New,Delhi.

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Course Code: CSI 506

Course Name: E Governance, E learning & E Business

Credits Equivalent: 4 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 objective is to understand fundamentals and applicability of Information and Communication Technology (ICT) in various fields such as Governance, Learning and Business.
- The course also provides introduction and detailed study of E Governance, E learning and E Business.
- The recent trends and developments in the fields of E Governance, E learning and E Business will be demonstrated to the students.

Attendance Requirements: 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%
   - Assignments: 15%
   - Class Participation: 5%

- Class Attendance : 5%

Contents

UNIT 1   E-Governance: Introduction, E-Governance & E-Government, Need for e-Governance, Measures, work plan and infrastructure for E-Governance, Scope,(types) of e-Governance, Objectives of e-Governance, Evolution of e-Governance, UN e-Government Survey, Phases of e-Governance, e-Governance Project Development Lifecycle, Software Development Lifecycle vs e-Governance Lifecycle. E Governance: international scenario, Challenges in e-Governance.

UNIT II
E-Governance: Strategies for e-Governance in India, National e-Governance Plan, Mission Mode Projects conceptualized under NeGP: Central Government Category, State Government Category, Integrated Services Category, Components of NeGP: The Institutional Structure, The common Support Infrastructure, The Mission Mode Projects, Recent Initiatives in e-Governance in India: Government to citizen (G2c) initiatives, Government to business (G2B) initiatives, Government to Government (G2G) initiatives

UNIT III
E-Learning: what is learning, why e-learning, concept and definition, e-leaning basics, types of e-learning, computer based learning, internet based learning, completely online mode, the use of e-learning in education, advantages and disadvantages of e-learning, e-learning model-ADDIE model, MERRILL's principles of Instruction (MPI),GAGNE's nine events of instruction, e-learning components, e-learning content, E-Tutoring, E-Coaching, E-Mentoring, collaborative learning, virtual classroom, e-learning in India.

UNIT IV
E-Business: Introduction, Global Online Retail Spending: Statistics and Trends, E-business & E-commerce, E-business environment, E-marketplaces, E-business markets, Technical ingredients of e-business, Electronic business infrastructure, Potential benefits of E-business, Basic E-Commerce Strategies, E-business Types & Categories, Phases of e-Business Development, E-business technology, Technology Issues in Internet Commerce, E-commerce Security,M-Commerce,E-marketing.

UNIT IV
E-Business: E-Business models: Storefront Model-Shopping-cart Technology, Online Shopping Malls, Auction Model, Portal Model, Dynamic Pricing Models: Name-Your-Price Model, Comparison Pricing Model, Demand-Sensitive Pricing model, Offering Free Products and Services, Online Trading and Learning Models, Bartering model, framework for analyzing e-business models, Organizational culture and e-business, Organizational structure and e-business, Managing applications systems for e-business, Management skills for e-business, The performance of e-business, The future of e-business.

Prescribed text book:

3. C. S. R. PRABHU ,"E-GOVERNANCE : CONCEPTS & CASE STUDIES", 2/E, PHI Learning

4. Hossen Najan**,"** Distance Education and E Learning", lambert academic publishing.
5. Ravi Kalakota and Marcia Robinson," E-Business 2.0: Roadmap For Success", Pearson Education;

Reference Books:

- Srinivasa H. Rajeshwari ,"E-Governance in India Concepts and Cases", AP Lambert Academic Publishing
- Hardy Bower," From Distance Education to E-Learning: Lessons Along the Way", John Wiley & Sons
- Parag Kulkarni, Sunita Jahirabadkar, Pradip Chande, "E Business ",Oxford University Press

Contents

UNIT 1   (**8 Hrs**)

Object oriented programming, features of java, general structure of java program, sample program, lexical issues, data types, variables, type conversion and casting, operators and expressions, controls statements, arrays, functions.

UNIT II   (**10 Hrs**)

Class fundamentals & objects, Methods, constructors, this keyword, garbage collection, overloading methods & constructors, using object as arguments, returning objects, recursion, nested and inner classes, inheritance, using super, method overriding, dynamic method dispatch, using abstract classes, using final with inheritance.

UNIT III   (**12 Hrs**)

Packages: Introduction, java API packages, using system packages, naming conventions, creating packages, accessing a package, using a package, adding a class to a package.

Interfaces: Defining interfaces, extending interfaces, implementing interfaces, accessing interface variables.

Multithreading: Introduction, creating threads, creating multiple threads, thread priorities, synchronization, and communication.

Exception handling: Introduction, exception types, uncaught exceptions, using try, catch, throw and throws, java's built in exceptions, creating own exception subclasses.

Applets programming: introduction, applet architecture, an applet Skelton, the HTML APPLET tag, passing parameters to applet.

UNIT IV   (**10 Hrs**)

String handling: String constructors, special string operators, character extraction, string comparison, searching strings, modifying a string, string buffer.

Introducing the AWT: working with windows, Using AWT controls menu and menu bars, popup menus, working with layout.

Prescribed text book:

6. Herbert Schildt, "**The Complete Reference**", Tata McGraw Hill.
7. E Balaguruswamy,**" Programming with Java**", Tata McGraw Hill.

Reference Books:

- Cay S. Horstmann, Gary Cornell," **Core Java**", Pearson
- James R. Levenick , "Simply JAVA :An Introduction to JAVA programming ",Firewall Media Publication New,Delhi.

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Course Code: CSI 508A

Course Name: LAB-Java

Credits 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 objective is to understand fundamentals of object-oriented programming in Java, including classes, methods, inheritance, packages, interfaces, multithreading, exception handling. The course also provide introduction to applet programming and AWT kit.

Attendance Requirements: 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%
   - Lab Assignments: 20%
   - Class Participation: 5%

Contents

UNIT 1   (**4 Hrs**)
   - Installing java and configuring java, Some Sample program.
   - Programming example on data types, variables, type conversions, and operators.
   - Programming examples on control statements.
   - Programming example on Arrays and Functions.

UNIT II   (**5 Hrs**)
   - Programming examples on classes, objects.
   - Programming examples on methods and constructors.
   - Programming examples using object as arguments, returning objects, recursion, nested and inner classes.
   - Programming examples in Inheritance, using super.
   - Programming examples using method overriding, dynamic method dispatch, using abstract classes, using final with inheritance.

UNIT III   (**6 Hrs**)
   - Programming examples on Packages.
   - Programming examples on interfaces.
   - Programming examples on Multithreading.
   - Programming examples on Exception handling.
   - Programming examples on Applets programming.

UNIT IV   (**5 Hrs**)
   - Programming examples on String handling.
   - Programming examples on working with windows, AWT controls, menu and layout.

Prescribed text book:
1. Herbert Schildt, "**The Complete Reference**", Tata McGraw Hill.

2. E Balaguruswamy**," Programming with Java**", Tata McGraw Hill.

Reference Books:

- Cay S. Horstmann, Gary Cornell," **Core Java**", Pearson
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