

Department of Computer Science

CURRICULUM DOCUMENT OF M.SC COMPUTER SCIENCE PROGRAM

1. Department of computer science

2. Department of Computer Science Vision Statement

To be a model department in the fields of Computer Science and Information Technology. Develop such a workforce that can take active part in the fields of data communication, networking, databases, artificial intelligence and software engineering etc. Maintain focus on technical skill and research in related fields.

3. Department of Computer Science Mission Statement

The program is to prepare students understand all the basic concepts of Computer Science fields. Provide an environment where students can get deep understanding in their chosen sub-field and to get technical skill in the various tools. They may be able to do research in the problems still unsolved in various fields. Moreover, to do critical review of the work done so far in Computer Science.

5. Program Mission Statement

In the M.Sc program the students will be not only taught all the basic subjects of the information technology, but even they will be provided hands-on experience through lab practices. This program will open the door of further study and computer skills.

6. Objective of the Program

Objective 1: (Core knowledge of Computer Science fields)

To

- a. Teach the fundamental concepts in data communication, networking, languages, operating system, algorithms, databases and software engineering.
- b. Enable students to apply the theoretical knowledge at labs.
- c. Have hands on experience on language programs, generation of databases, usage of software application tools and creation of websites.
- d. Solve the problems concerning topics being taught.
- e. Be able to use the techniques, skills and modern tools necessary for problem solutions.

Objective 2: (Autonomy in the field of study)

To

- a. Create an ability of self-study and understanding.
- b. Enable students to have critical analysis of taught lessons.
- c. Be able to bring up new ideas and to have critical review of the problem related to a topic.

Objective 3: (Teamwork and communication skills)

To

- a. Enable students work in a team to achieve a goal.
- b. Encourage students to speak out their thoughts fluently and confidently.

Objective 4: (Deep Understanding in fields related to the course / Research and Thesis/ Program Project)

To

- a. Train students in accessing online resources, databases and digital libraries.
- b. Assign the task to critically relate and compare the solutions given by researchers to various problems in the field.
- c. Explore issues and propose their solutions in various IT technologies and protocols. Moreover use different tools to do project in various fields.

7. Program Outcomes

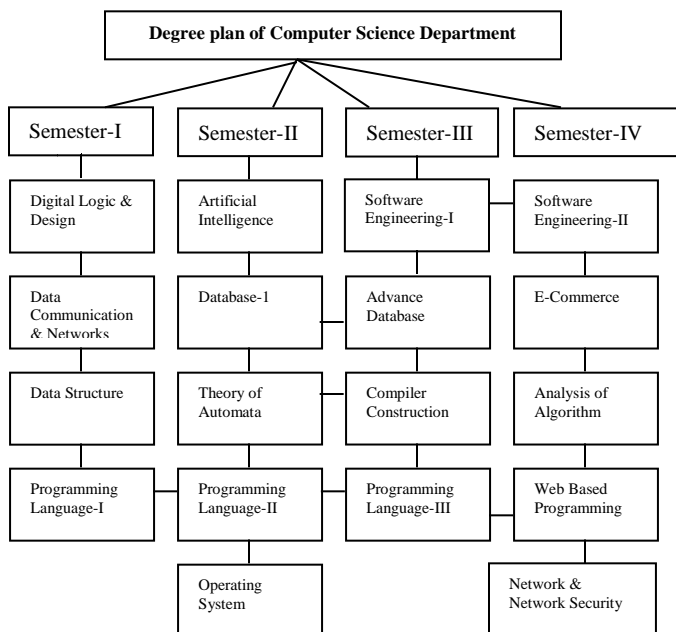
- A thorough understanding of computer technology
- Practical skill in the use of computer technologies
- The ability to conceive, design, and implement software systems, using appropriate existing technologies where available, and producing creative solutions when necessary
- The ability to work in teams, with other computer scientists as well as non-computer scientists; to communicate, orally and in writing, with specialists and non-specialists, about computer technology
- Integrity in their professional dealings, and sensitivity to ethical issues that arise in society's use of computers
- Detailed knowledge of at least one advanced area of Computer Science
- For students who contemplate a career in research, experience working in a research group, and knowledge of the mores and ethics of the research community

Program Objectives	Program Outcomes													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1a	<	-	-	-	-	-	-	-	-	-	-	-	-	-
1b	-	<	>	<	-	-	-	-	-	-	-	-	-	-
1c	-	<	<	<	-	-	-	-	-	-	-	-	-	-
1d	<	>	<	>	-	-	-	-	-	-	-	-	-	-
1e	-	<	<	>	-	-	-	-	-	-	-	-	-	-
2a	-	-	-	-	<	>	>	-	-	-	-	-	-	-
2b	-	-	-	-	>	-	<	-	-	-	-	-	-	-
2c	-	-	-	-	<	>	>	-	-	-	-	-	-	-
3a	-	-	-	-	-	-	-	<	-	>	>	-	-	-
3b	-	-	-	-	-	-	-	-	<	>	<	-	-	-
4a	-	-	-	-	-	-	-	-	-	-	-	-	>	<
4b	-	-	-	-	-	-	-	-	-	-	-	<	-	-
4c	-	-	-	-	-	-	-	-	-	-	-	<	>	>

Table 4.2: Outcomes versus objectives

8. Two years study program

9. Degree plan



10. Scheme of studies

M.Sc in Computer Science
Scheme of Studies for the four Semesters (2018 onwards)

SEMESTER-I

Course Code	Course Title	Credit Hours
CSC-526	Digital Logic and Design	4(4,0)
CSC-511	Data Communication and Networks	4(4,0)
CSC-510	Data Structures	4(3,1)
CSC-503	Programming Language-I	4(3,1)
ENG-	Functional English-I	2(2,0)

SEMESTER-II

Course Code	Course Title	Credit Hours
CSC-543	Artificial Intelligence	4(4,0)
CSC-527	Database-1	3(2,1)
CSC-513	Theory of Automata	3(3,0)
CSC-514	Programming Language-II	4(3,1)
CSC-532	Operating System	4(4,0)
ENG-	Functional English-II	2(2,0)

SEMESTER-III

Course Code	Course Title	Credit Hours
CSC-638	Advanced Databases	3(3,0)
CSC-639	Programming Language-III	4(3,1)
CSC-629	Compiler Construction	4(3,1)
CSC-631	Software Engineering-1	4(3,1)

SEMESTER-IV

Course Code	Course Title	Credit Hours
CSC-642	Software Engineering-II	4(4,0)
CSC-615	E-Commerce	4(3,1)
CSC-640	Analysis of Algorithm	4(4,0)
CSC-617	Web based Programming	3(2,1)
CSC-626	Network and Network Security	3(3,0)
CSC-699	Project	6

11. Semester wise details of course offered in each semester

Semester-I

Digital Logic and Design

Course Code: CSC-526

Credit Hours: 4 (4, 0)

Course Objective:

Objective of the course is to understand the internal working logic and design of digital systems especially of basic computer system components. It starts with the idea of introducing different number systems and ways of conversion from one to the other number system. Course gives understanding of Boolean Algebra. In order to perform an operation like addition, subtraction, decoding and multiplexing etc, it shows ways to produce an efficient Boolean Function and then to implement these functions via logic gates. It provides knowledge of ICs and logic gates that constitute the basic ICs. Moreover it shows designing of Combinational and Sequential Circuits.

Intended Learning Outcomes:

1. Students will easily do conversion from one number system to another and will be able to do subtraction through addition.
2. Students are expected to minimize a Boolean expression thus creating an efficient logic diagram for an operation.
3. They will learn basic combinational and sequential circuits.

Week Wise Break Down

Week	Topic (s)
1.	Number Systems
2.	Boolean Algebra And Logic gates (1 of 2)
3.	Boolean Algebra And logic Gates (2 of 2)
4.	Simplification of Boolean Functions (1 of 2)
5.	Simplification of Boolean Functions (2 of 2)
6.	Combinational Logic (1 of 2)
7.	Combinational Logic (2 of 2)
8.	Combinational Logic with MSI And LSI (1 of 3)
9.	MID TERM EXAMS
10.	Combinational Logic with MSI And LSI (2 of 3)
11.	Combinational Logic with MSI And LSI (3 of 3)
12.	Sequential Logic (1 of 3)
13.	Sequential Logic (2 of 3)
14.	Sequential Logic (3 of 3)
15.	Registers, Counters And Memory Units (1 of 3)
16.	Registers, Counters And Memory Units (2 of 3)
17.	Registers, Counters And Memory Units (3 of 3)
18.	FINAL TERM EXAMS

Recommended Readings:

- a) Morris Mono, "Digital Logic And Design", Fourth Edition
- b) Thomas L. Floyd, (2005), "Digital Fundamentals", Eight Edition.

Data Communication and Networks

Course Code: CSC-511

Credit Hours: 4 (4,0)

Course Objective:

The aim of this course is to introduce students to the basic concept of computer networks' communication. It will provide a detailed overview of the Network models (OSI, TCP/IP) and Protocol Standards. Emphasis will be given on the understanding of physical and data link layer. The following topics will be covered in the course: Devices operating for inter networking, Analog and digital Transmission, Noise, Media, Encoding, Asynchronous and Synchronous transmission, Error Control, Flow Control, Data Link Protocols (HDLC, PPP), Multiplexing, Spreading, Switched and IP Networks.

Intended Learning Outcomes:

1. Student will get the basic concept of Data Communication.
2. They will know the devices used at different OSI layers, and be able to use appropriate device for internetworking
3. Course expects that students can select an appropriate medium and encoding scheme for data transmission in a particular situation.
4. Students learn how to detect or correct errors at the receiving end and in which situation to request the sender for retransmission of data.

Week Wise Break Down

Week	Topic (s)
1	Introduction to Data Communication
2	Internetworking Devices
3	Network Models
4	Data and Signals
5	Digital Transmission (1 of 2)
6	Digital Transmission (2 of 2)
7	Analog Transmission (1 of 2)
8	Analog Transmission (2 of 2)
9	MID TERM EXAMS
10	Multiplexing and Spreading
11	Transmission Media
12	Switching (1 of 2)
13	Switching (2 of 2)
14	Error Detection and Correction (1 of 2)
15	Error Detection and Correction (2 of 2)
16	Data Link Control (1 of 2)
17	Data Link Control (2 of 2)
18	FINAL TERM EXAMS

Recommended Readings:

- a) Behrouz A. Farouzan, Sophia Chung Fegan, (2006), “Data Communication and Networking”, Fourth Edition
- b) Larry L. Peterson, Bruce S. Davie, (2003-05), “Computer Networks: A System Approach”, Third Edition.

Data Structure

Course No. CSC-510

Credit Hrs: 4(3,1)

Course Objective:

The course is designed to teach students structures and schemes, which allow them to write programs to efficiently manipulate, store, and retrieve data. Students are exposed to the concepts of time and space complexity of computer programs

Intended Learning Outcomes

After the completion of this course student would be able to write efficient programs using different data structures.

Week-Wise Break down

Week	Topic(s)
1.	Introduction of Data Structure
2.	Complexity analysis
3.	Arrays (static and dynamic)
4.	Linked list and its implementation
5.	Stacks (static and dynamic)
6.	Stack implementation in c++
7.	Queues, queues implementation (static and dynamic)
8.	Presentations and Assignments and Revision
9.	MID TERM EXAM
10.	Trees and binary trees implementation in c++
11.	Binary search tree and tree traversal implementation
12.	Operation on tree and its implementation
13.	Conversions from infix to postfix, prefix expression and implementation
14.	Recursion and its applications
15.	Graphs and graph traversal methods
16.	Sorting techniques.
17.	Presentations and Revision
18.	FINAL TERM EXAM

Recommended Readings

- a) Langsam Yedidyal ,Augenstein Moshen J and.Tenenbaum Aaron M “Data Structure Using C And C++”, Prentice Hall International Editions.

- b) Lipschutz Seymour , “*Theory And Problem Of Data Structure*”, Schaum’s Outline Series.

Programming Language –I

Course No. CSC-503

Credit Hrs: 4(3,1)

Course Objectives:

This course is designed to familiarize students with the basic structured programming skills. It emphasizes upon problem analysis, algorithm designing and program development and testing.

Intended Learning Outcomes:

After completion of the course student will be able to write algorithms and design programs using structure programming paradigm.

Week-Wise Break down

	Topic(s)
1.	Introduction: Data Types, Program structure, Preprocessor Directives
2.	Operators(Arithmetic, Conditional, Logical)
3.	Conditional Statements: If, if else, switch, break statements
4.	Loop Control statements: For, Do while, while Loop, use of continue statement
5.	Arrays (Types of arrays Arrays , Strings Arrays)
6.	Function (Declaration, Calling, passing arguments, returning values)
7.	Function overloading and inline functions.
8.	MID TERM EXAM
9.	Passing arguments by value and by address
10.	Using Built in functions
11.	Pointer (What are pointers, how they can be used, Pointer arrays)
12.	Using pointers with arrays
13.	Structures (Structure specification & definition, accessing structure elements)
14.	Enumerated data declaration and use, Automatic, External and Static variables, Registers
15.	Preprocessor Directives(conditional Compilation)
16.	Macros(#define and #undef)
17.	Turbo C Graphics
18.	FINAL TERM EXAM

Recommended Readings:

- a) Robert Lafore (1999). *Object oriented Programming in C++*. Sams Publishing.
- b) Dietel and Dietel (2001). *C/C++ How to program*. Prentice Hall, Inc.
- c) Yashwant Kanetkar (1999). *Let us C*. BPS Publications. New Delhi
- d) Greg Perry and Morcus Jhonson (1992). *Turbo c++ by example*. Inner Media. Inc, Hollis, NH

Semester-II

Artificial Intelligence

Course Code: CSC-543

Credit Hours: 4(4,0)

Course Objective:

Artificial Intelligence (AI) is an emerging area of computer science and a lot of work is underway in order to mature the concepts of this field. This course aims to envelop some important aspects and basic concepts which will help the students to get an insight into the type of topics that AI deals with. It also focuses on set of computational tools and techniques which mimic the human decision making process and capability.

Intended Learning Outcomes:

After the completion of the course, the students will be able to:

- 1. Develop an understanding of the role of AI in various fields of life
- 2. Understand the thinking, reasoning capabilities and expertise of human beings
- 3. Learn various tools for representing human intelligence and expertise in machines
- 4. Knowledge about structure and working of expert systems, natural language processing systems, machine translation systems

Week Wise Break Down

Week	Topic(s)
1.	Introduction to Intelligence, Artificial Intelligence
2.	Introduction to main application areas of Artificial Intelligence
3.	Knowledge Representation & Reasoning: AI Cycle, Knowledge & its types
4.	Formal knowledge representation techniques (Facts, Rules, Semantic networks, Frames, Scripts, logic (Propositional logic, Predicate Calculus))
5.	Reasoning: Types of Reasoning (Deductive, Inductive, Abductive, analogical, common-sense, monotonic, Inference)
6.	Simple Search Algorithms: Simple search algorithms applied to depth first search (DFS) and Breadth first search (BFS), Problems with DFS & BFS
7.	Heuristically informed Searches: Hill Climbing, Beam search, Best First Search
8.	Natural Language Processing (NLP): Components of NLP
9.	MID TERM EXAMS
10.	Steps in NLP, How NLP Programs Work

11.	Introduction to Machine Translation (MT) and its types, Problems, Translation Steps
12.	Strategies of MT, MT Applications, Introduction to Dictionaries and their types, Units of translation
13.	Anaphora, cataphora, cohesion, coherence, ellipse
14.	Expert System, Types, Expert System Structure, Existing Expert Systems
15.	Robotics: Introduction, Laws, main application areas, robot senses, commercially used robots
16.	Virtual Reality: Introduction, main application areas, some existing virtual reality systems
17.	Machine Learning: Introduction, main application areas, some existing virtual reality systems
18.	FINAL TERM EXAMS

Recommended Readings

1. Rich, E. (1991). Artificial Intelligence. Tata McGraw-Hill Books Company. India
2. Frenzel, E.L., et al (1995). Crash Course in Artificial Intelligence & Expert Systems. Sams & Co. Pearson Education Pte.Ltd. India
3. Khan, M.A. (1995). Text Based Machine Translation.
4. Russell, S., et al. (2003). Artificial Intelligence, a Modern Approach. Pearson Education Pte.Ltd. India
5. Bratko, I. (2001). Prolog, Programming for Artificial Intelligence. Pearson Education Pte.Ltd. India
6. Winston, P.H. et al (2005). LISP. Pearson Education Pte.Ltd. India.

Database-I

Code CSC-527

Credit Hrs: 3(2,1)

Course Objective:

The general objective of this course is to provide the fundamental concepts, principles, and hand-on experience on database systems. The course introduces basic database concepts. The students learn different data models, data storage and retrieval techniques and data base design techniques. The course primarily focuses on the relational data models and DBMS concepts.

Intended Learning Outcomes:

After completing the course, the students will be able to:

1. Develop an understanding of the role of data, files and databases in information systems.
2. Be familiar with data modelling concepts (E-R and Class diagrams) used in database development.
3. Develop an appreciation for several DBMS's (Oracle, MS SQL Server, MY SQL)
4. Develop a good understanding of the terminologies and concepts associated with DBMS.
5. Undertake and successfully complete logical database design tasks.
6. Use SQL with confidence to implement a relational database, and to maintain and access data in relational databases using Oracle 9i SQL Plus, PL/SQL and SQL Server.

Week Wise Break Down

Week	Topic(s)
1.	Database Foundation: Introduction, Data and information, Components, Advantages
2.	Data models: Hierarchical, network, relation; comparison
3.	Relational data model, components, Codd's Rules
4.	DB development life cycle
5.	ER Model: Basic constructs, Entities, Keys, attributes, types, data association, degree of relationship, cardinality, gerund
6.	Modeling time-dependent data, Super types, Sub Types
7.	Relation: Characteristics of relation, Converting E-R Model into relations
8.	Normalization: (1NF, 2 NF, 3NF, 4NF, 5NF)
9.	MID TERM EXAMS
10.	Relational algebra, Relational calculus
11.	Database Design(Conceptual, logical, physical) (1 of 2)
12.	Database Design(Conceptual, logical, physical) (2 of 2)
13.	SQL (Introduction): DML, DDL, DCL
14.	SQL Commands: CREATE, ALTER, DELETE, INSERT, UPDATE, DELETE, FUNCTIONS, JOINS
15.	PL/SQL: Declaring variables, writing executable statements, writing explicit cursor, advance explicit cursor concepts, handling exceptions
16.	DBMS Introduction: (MS SQL Server, MYSQL, Oracle) (1 of 2)
17.	DBMS Introduction: (MS SQL Server, MYSQL, Oracle) (2 of 2)
18.	FINAL TERM EXAMS

References:

- a) Hoffer, J.A., et al (2007). *Modern Database Management*. Pearson Education Pte.Ltd. India
- b) Connolly, T. et al (2007). *Database Systems, A Practical Approach to Design, Implementation and Management*. Pearson Education Pte.Ltd. India
- c) Date, C.J. (2006). *An Introduction to Database Systems*. Pearson Education Pte.Ltd. India
- d) Almasri, R. et al. (2006). *Fundamentals of Database Systems*. Pearson Education Pte.Ltd. India.

Theory of Automata

Course No. CSC-513

Credit Hrs: 3(3,0)

Course Objective:

The course aims to develop an appreciation of the theoretical foundations of computer science through study of mathematical & abstract models of computers and the theory of formal languages. Theory of formal languages and use of various abstract machines as 'recognizers' and

parsing will be studied for identifying/validating the synthetic characteristics of programming languages.

Intended Learning Outcomes

After the completion of this course students would be able to understand the behavior/functioning of different software/machines used for recognizing different kind of languages.

Week-Wise Break down

Week	Topic(s)
1.	Introduction of Automata Theory
2.	Languages, Regular expression
3.	Regular expression continue
4.	Finite Automata
5.	NFA
6.	DFA
7.	Conversion, Optimization
8.	Presentations and Assignments and Revision
9.	MID TERM EXAM
10.	Push down Automata
11.	Grammar, Types
12.	CFG
13.	Turing Machine computability and undesirability
14.	Transducers and relationship among them
15.	Compiler writing tools
16.	Language Recognition
17.	Presentations and Revision
18.	FINAL TERM EXAM

Recommended Readings

- Daniel I. A Cohen (Second Edition)“*Introduction to Computer Theory*”.
- Hopcroft John E., Motwani Rajeev, Ullman Jeffrey D.(2005) “*Introduction To Automata Theory, Languages And Computation*”, Pearson Education
- Khiyal Skindar Hayat (2004),“*Theory Of Automata And Computation*”, Roohani Art Press, Islamabad

Programming Language –II

Course Code: CSC-514

Credit Hours: 4 (3, 1)

Course Objectives:

This course aims to focus on object oriented concepts, analysis and software development.

Intended Learning Outcomes:

After completion of the course students will be able to develop programs using Object Oriented Paradigm.

Week Wise Break Down

Week	Topic(s)
1.	Advantages of Object Oriented approach, Specifying and using Classes and Objects, Constructors and Destructors.
2.	Objects and function argument, Returning objects from functions
3.	Operator overloading (Unary operators, Binary operators)
4.	Data Conversion, pitfalls
5.	Use of Const Keyword
6.	Inheritance, Derived and Base Classes, Derived Class Constructors
7.	Overriding member functions, class hierarchies, Public & Private Inheritance. Levels of Inheritance, Multiple inheritance
8.	Use static keyword with data member
9.	MID TERM EXAM
10.	Some Special Types of Functions: Virtual Functions, friend functions, static functions
11.	Streams, String I/O, Character I/O Object I/O with multiple objects
12.	File pointers, Disk I/O with member functions, error Handling
13.	Address and Pointers, Pointers and Arrays
14.	Pointers and Functions, Pointers and Strings, Memory allocation and reallocation
15.	Handling Exceptions
16.	Concept of Function Templates
17.	Concept of class Templates
18.	FINAL TERM EXAM

Recommended Readings:

- a) Robert Lafore (1999). *Object oriented Programming in C++*. Sams Publishing.
- b) Dietel and Dietel (2001). *C/C++ How to program*. Prentice Hall, Inc.
- c) Yashwant Kanetkar (1999) *.Let us C*. BPS Publications. New Delhi
- d) Greg Perry and Marcus Jhonson (1992). *Turbo c++ by example*. Inner Media. Inc, Hollis, NH

Operating System

Course Code: CSC-532

Credit Hours: 4 (4, 0)

Course Objective:

This course intends to teach students the concepts and principles that underlie operating systems. Students will learn about processes and processor management, concurrency and synchronization, memory management schemes, file system and secondary storage management, security and protection, etc. At the end of the course students will understand fundamental operating system abstractions such as processes, threads, files, semaphores, IPC abstractions, shared memory

regions, etc. Moreover they will also understand basic resource management techniques (scheduling or time management, space management). These also include issues of performance and fairness objectives, avoiding deadlocks, as well as security and

Intended Learning Outcomes:

1. Distinguish the fundamental components of operating system.
2. They get knowledge of uni-tasking, multitasking, timesharing operating systems.
3. Students are supposed to recognize various process scheduling mechanisms, benefits and drawbacks of concurrent programming.
4. They learn causes of deadlock, its prevention and avoidance mechanisms.
5. Management of real memory, virtual memory, input/output, processor and file management.

Week-Wise Break down

Week	Topic (s)
1	Background of Hardware
2	Operating System-General Introduction
3	OS As a Resource Manager- Processing Concepts
4	Asynchronous Concurrent Processing (1 of 2)
5	Asynchronous Concurrent Processing (2 of 2)
6	Deadlocks
7	Storage Management-Real Memory
8	Storage Management-Virtual Memory
9	MID TERM EXAM
10	Storage Management-Secondary Memory
11	I/O Management (1 of 2)
12	I/O Management (2 of 2)
13	Information Management (1 of 2)
14	Information Management (2 of 2)
15	Processor Management
16	OS Security
17	UNIX Commands and LINUX Installation
18	FINAL TERM EXAM

Recommended Readings:

- a) William Stallings, (2002), “Operating System”, Fourth Edition
- b) H.M. Dietel, (2008), “Operating Systems”, Third Edition

Semester-III

Advanced Database

Code CSC-638

Credit Hrs: 3(3, 0)

Course Objective:

This course focuses on advance database concepts related to its administration and maintenance. It provides knowledge about database integrity, its importance and the various measures taken to ensure integrity of a database in any given situation. It also introduces the current trends in databases like multimedia database, mobile database, object oriented database and distributed databases.

Intended Outcomes:

After completing this course, the students will:

1. Have an understanding of issues related to database planning, database administration, and roles of the Data Base Administrator
2. Have a good understanding of the various kinds of databases and the support they provide to different levels of management.
3. Be familiar with a broad range of data management issues including data integrity, concurrency and security.

Week Wise Break Down

Week	Topic (s)
1.	Database Administration: Introduction, layers of DB Administration
2.	DBA Functions and Responsibilities
3.	Database Integrity: Introduction, Integrity Rules, Deletion Rules
4.	Rang of values, Not Null, Selection Based Entry(Radio Button, Checkbox)
5.	DB Security: Introduction, Threats to DB Security, Physical Security
6.	Countermeasures(Computer based & non-computer based controls)
7.	Backing Up DB: Basic recovery Facilities, Recovery and restart procedures
8.	Types of DB Failure, Transaction Processing
9.	MID TERM EXAMS
10.	DB Concurrency: Introduction to concurrency, problems due to concurrency
11.	Concurrency control methods(Optimistic approach and pessimistic approach)
12.	Managing dead lock, transaction Integrity
13.	Query Optimization: Need, stages of query optimization, techniques
14.	Distributed DB: Introduction, types, Advantages and disadvantages
15.	Object Oriented DB: Introduction, Differences in object model and design, Object oriented analysis and design
16.	Current Trends: (Introduction, Need, Adv. & disadv., Usage): Data warehousing, data mining
17.	Mobile DB, Multimedia DB, GIS
18.	FINAL TERM EXAMS

References:

- a) Hoffer, J.A., et al (2007). *Modern Database Management*. Pearson Education Pte.Ltd. India
- b) Connolly, T. et al (2007). *Database Systems, A Practical Approach to Design, Implementation and Management*. Pearson Education Pte.Ltd. India
- c) Date, C.J. (2006). *An Introduction to Database Systems*. Pearson Education Pte.Ltd. India
- d) Almasri, R. et al. (2006). *Fundamentals of Database Systems*. Pearson Education Pte.Ltd. India.

PROGRAMMING LANGUAGE-III**Course Code: CSC-639****Credit Hours: 4 (3,1)****Course Objectives:**

As a senior level course aims at uplifting students approach and emphasizes upon development of applications/Applets/Servlets using JAVA language.

Intended Learning Outcomes:

After completion of the course students will be able to develop Applet related applications using JAVA language.

Week Wise Break Down

Week	Topic (s)
1.	Introduction, Data Types, Syntax etc.
2.	Writing Simple Java Console Application
3.	Packages and Interface
4.	Exceptions, Checked and unchecked Exception
5.	Threads, Writing Java Application, The Java Class Libraries
6.	Interthread Communication, Deadlock Handling
7.	Writing Simple Applets
8.	MID TERM EXAMS
9.	Introduction to AWT and Applets, Use of AWT components in Java Application
10.	Event Delegation Modal
11.	Introduction to Servlets, Servlets Life Cycle
12.	Developing Basic Servlets
13.	Using doPost, doGet, Service according to HTML Form Methods
14.	SSI (Server Side Include), Session Management
15.	Data base connectivity
16.	Introduction to RMI and Java Beans
17.	Introduction to JBULIDER
18.	FINAL TERM EXAMS

Recommended Readings:

- a) Herbert Schildt (2005). *The Complete Reference JAVA* (J2SE 5 Edition). McGraw Hill.
- b) Ivon Bayross (2005). *Web enabled Commercial application development using JAVA*. BPS Publications.
- c) John Lewis and William Loftus (1998). *JAVA software solutions*. Addison-Wesley Longman, Inc.
- d) Richard Anderson, Brian Francis. (2001). *Programming in JAVA*. Wrox series Publications.

Compiler Construction

Course No. CSC-629

Credit Hrs: 4 (3, 1)

Course Objective:

At the end of the course students should understand the overall structure of a compiler, and will know significant details of a number of important techniques commonly used. They will be aware of the way in which language features raise challenges for compiler builders.

Intended Learning Outcomes

After the completion of this course students would have clear understand of the purpose and function of each part of the compiler and how they are related with each other and their implementation.

Week-Wise Break down

Week	Course
1.	Introduction of Compilers, history
2.	Classification of Compilers, models
3.	Brief introduction to Phases of compilers
4.	Compilers cousins
5.	Grammar, hierarchy of grammar
6.	Lexical analyzer, token, RE,
7.	FA, DFA, NFA. Thomson construction
8.	Conversion NFA TO DFA
9.	MID TERM EXAMS
10.	Syntax analyzer, topdown parse, recursive decent, predictive parsing
11.	LL(1) parser, Construction of LL(1) Parsing table
12.	LL(1) Grammar, computing first and follow sets
13.	Bottom up parsing, shift reduce parser, handle
14.	Operator precedence operator and stack implementation, operator grammar
15.	LR(1) parsing, semantic analysis.
16.	Intermediate code generation , code optimization. error handling
17.	Presentations and Revision
18.	FINAL TERM EXAMS

Recommended Readings

- a) Aho Alfred V, Sethi Ravi.(2005), “*Compilers Principles, Techniques And Tools*”, Pearson Education.
- b) Hunter Robin (2007), “*The Essence of Compilers*”, Pearson Education.

Software Engineering - I**Code CSC-631****Credit Hrs: 4 (3, 1)****Course Objective:**

To study various software development models and phases of software development life cycle. The concepts of project management, change control, process management, software development and testing are introduced through hands-on Team Projects.

The software project involves research, conceive, plan and develop a real and substantial project related to computer science. It provides an opportunity to the students to crystallize their acquired professional competence in the form of a demonstrable software product. Make oral and written project presentations.

Intended Outcomes:

At the end of the course the student will be able to do analysis in proper way.

Week Wise Break Down

Week	Topic(s)
1.	The evolving role of software, Introduction to software, system, software engineering, system engineering.
2.	DBA Functions and Responsibilities
3.	Software engineering a layered technology, Umbrella activities, Introduction to software process
4.	Process models, Evolutionary process models
5.	Introduction, Importance of project management, 4 P's of project management, Management Spectrum: The People, The Process, The Product, Project, The W5HH principle
6.	Software engineering vs System engineering, Computer Based System, System engineering Hierarchy
7.	Business process engineering, Objectives of ISP
8.	Business Area Analysis, Business level data modeling, Product engineering
9.	MID TERM EXAMS
10.	Requirement Engineering: introduction, user and system requirements, Emergent system properties
11.	Requirement Engineering Process, Communication techniques.
12.	Analysis principles, Information domain, Software requirement specification.
13.	Introduction to analysis modeling, Data Modeling.
14.	Functional Modeling, Behavioral Modeling
15.	Partitioning , Process Specification.
16.	Data Dictionary, visio

17.	MS project.
18.	FINAL TERM EXAMS

References:

- a) “Software Engineering: A Practitioner’s Approach”, Roger S.Pressman ,Mc- Graw-Hill International, 6th Edition, 2001.
- b) “Software Engineering”, Ian Sommerville,5th Edition,

Semester-IV

Software Engineering - II

Code CSC-642

Credit Hrs: 4 (4, 0)

Course Objective:

The student will understand the software design and the complexity involved in it. The students will study techniques for software verification, validation and testing. They would also study reliability and performance issues in software design and development. They would also understand the object oriented concepts.

Intended Outcomes:

At the end of the course the student will be able to optimize the system, making it error free, and concentrate on quality using traditional and object oriented software engineering concepts.

Week-Wise Break down

Week	Topic(s)
1	The Design Process, Design Principles.
2	Design Concepts
3	Functional Independence
4	Data Design, Architectural Design,
5	Procedural design ,The architectural design Process,
6	Transform and Transaction mapping,Design Post processing
7	Interface design, Interface design Guidelines, Human Computer interface design
8	Software testing fundamentals, Software testing principles, Testing levels
9	MID TERM EXAMS
10	White box Testing techniques
11	Black Box Testing Techniques
12	Object oriented concepts and principles
13	Object oriented analysis
14	Object oriented modeling
15	Object oriented design and testing
16	Case studies with functional oriented and object oriented software engineering.
18	FINAL TERM EXAMS

References:

- a) Roger S.Pressman(2001).Software Engineering: A Practitioner’s Approach, 6th Edition,Mc- Graw-Hill International.
- b) Ian Sommerville , 2000, Software Engineering, 5th Edition,
- c) Ian sommerville , 2002, Software Engineering, 5th Edition, Addison Wesley Instant UML by Pierre-Alian Muller,Wrox Publications.

E-Commerce

Course Code: CSC-615

Credit Hours: 4 (3, 1)

Course Objective:

To understand how the Internet and World Wide Web are revolutionizing business processes. To introduce various business models used on the web. To examine marketing, payment, security and legal issues that affect e-businesses. To explore the advantages and disadvantages of creating an online business. To provide conceptual and theoretical knowledge of ECommerce.

Intended Learning Outcomes:

By the end of the module students must demonstrate ability to:

- 1 Discuss basic concepts of e-commerce;
- 2 Discuss and explain theoretical and practical issues of conducting business over the internet and the Web

Week-Wise Break down

Week	Topic (s)
1	Fundamentals of E-Commerce Technologies (1 of 3)
2	Fundamentals of E-Commerce Technologies (2 of 3)
3	Fundamentals of E-Commerce Technologies (3 of 3)
4	Business Models (1 of 2)
5	Business Models (2 of 2)
6	Strategies for E-Commerce
7	Legal Issues (1 of 2)
8	Legal Issues (2 of 2)
9	MID TERM
10	Online Payments (1 of 2)
11	Online Payments (2 of 2)
12	Payment Systems
13	E-Marketing (1 of 3)
14	E-Marketing (2 of 3)
15	E-Marketing (3 of 3)
16	Information Security & E-Commerce Techniques (1 of 2)
17	Information Security & E-Commerce Techniques (2 of 2)
18	FINAL TERM

Recommended Readings:

- a) Dietel And Dietel And Neito, “E-Business And E-Commerce-How to Program”
- b) Information available on the Internet on the above Topics

Analysis of Algorithm

Course No. CSC-640

Credit Hrs: 4(4,0)

Course Objective:

Detailed study of the basic notions of the design of algorithms and the underlying data structures. Several measures of complexity are introduced. Emphasis on the structure, complexity, and efficiency of algorithms

Intended Learning Outcomes

After the completion of this course students would be able to write/analyze efficient algorithms in term of computation time, computer memory and size of input

Week-Wise Break down

Week	Topic(s)
1.	Introduction of algorithms,classification,properties
2.	Complexity analysis,asymptotic notation, usefulness ,limitation.
3.	Big ooh,,omega,recurrence
4.	Methods for solving rcurrence.
5.	Divide and conquere strategy,analysis of merge sort
6.	Insertion sort.heap sort,heapifying procedure
7.	Quick sort,worst,average case analysis.
8.	Presentations and Assignments and Revision
9.	MID TERM EXAM
10.	Address based sorting,radix,bucketbin sort.
11.	Inplace stable sorting ,linear time sorting
12.	Counting sort,dymic programming.
13.	Greedy algorithms, binomial heap
14.	Fibonacci heap, graph,diffent traversal techniques.
15.	Hashing techniques
16.	Summary of different data structures
17.	Presentations and Revision
18.	FINAL TERM EXAM

Recommended Readings

- Corman Thomas H.,Leiserson Charles E, Rivest Ronald L., Stein. Clifford D(2001) "*Introduction To Algorithms*".MIT press.
- Baase Sara, Gelder Allen Van (2000), "*Computer Algorithms, Introduction To Design And Analysis*",Pearson Education.

WEB BASED PROGRAMMING

Course No: CSC-617

Credit Hrs: 3 (2, 1)

Course Objectives

This course aims to focus on designing and implementation of Web applications.

Intended Learning Outcomes

After completion of the course students will be able to develop web applications like Web site and related applications.

Week Wise Break Down

Week	Topic(s)
1.	Internet, Web and HTML Fundamentals, What is HTML, The World Wide Web and Web Servers
2.	Working of Web Browsers, HTML's Role on the Web, Way of launching the Web Site
3.	Creating a Web page and entering Text, Changing and Customizations
4.	Display Text in List, Adding Graphics into Web Pages
5.	Hypertext and Creating Links, Issuing Links with other HTML Tags
6.	Tables, Forms, Images, Frames, Multimedia Objects
7.	Java Script: Data types, arrays
8.	MID TERM EXAM
9.	Control Structures, Object & Function
10.	Event Handling
11.	VB Script :Introduction, Data Types, Syntax
12.	Controls, event handling.etc
13.	Database Connectivity (Using ASP,PHP)
14.	Introduction to VB.Net
15.	Properties,Methods,Eevnt Handling
16.	MDI Applications
17.	Data base Connectivity
18.	FINAL TERM EXAM

Recommended Readings:

- a) Ivon Bayross (2002).*Web enabled Commercial application development using HTML,DHTML,JAVASCRIPT* .BPS Publications.
- b) Richard Anderson, Brain Francis.(2001).*Beginning ASP*. Wrox series Publications
- c) Tariq Mahmood and Imran saeed (200).*A practical approach to Web programming*. IT series, Publications.

Networks and Network Security

Course Code: CSC-626

Credit Hours: 3 (3, 0)

Course Objective:

The course has been categorized into two parts: *Networks* part introduces various ways of multiple accesses, different LAN architectures. It also discusses important Network Layer and Transport Layer protocols along with DNS.

The aim of the second part: *Network Security* is to provide knowledge of security issues. It will give a comprehensive understanding of the security threats and risks, Authentication and Encryption techniques and Security Protocols used at various layers along with Firewalls.

Intended Learning Outcomes:

1. Students will be able to understand basic network and transport layer protocols, on the basis of which advance study of upcoming protocols will be easy for them.
2. Students can communicate securely with her/his friend. They can be sure of the authenticity of the communicating device and integrity of message using appropriate security protocol and cryptographic and signature algorithm.

Week-Wise Break down

Week	Topic (s)
1	Multiple Access
2	LAN Architectures (1 of 2)
3	LAN Architectures (2 of 2)
4	Network Layer (1 of 3)
5	Network Layer (2 of 3)
6	Network Layer (3 of 3)
7	Transport Layer
8	Domain Name System
9	MID TERM
10	Security Threats
11	Cryptography (1 of 2)
12	Cryptography (2 of 2)
13	Network Security (1 of 3)
14	Network Security (2 of 3)
15	Network Security (3 of 3)
16	Security in Internet (1 of 2)
17	Security in Internet (2 of 2)
18	FINAL TERM

Recommended Readings:

- a) Behrouz A. Farouzan, Sophia Chung Fegan, (2006), “Data Communication and Networking”, Fourth Edition
- b) Larry L. Peterson, Bruce S. Davie, (2003-05), “Computer Networks: A System Approach”, Third Edition.