



M.Sc. Software Technology

Curriculum and Syllabus

Regulations 2021

(Based on Choice Based Credit System (CBCS)

and

Learning Outcomes based Curriculum Framework (LOCF))

Effective from the Academic year

2021-2022

Department of Computer Applications

School of Computing Sciences

VELS INSTITUTE OF SCIENCE, TECHNOLOGY & ADVANCED STUDIES
SCHOOL OF COMPUTING SCIENCES
DEPARTMENT OF COMPUTER APPLICATIONS
VISION AND MISSION OF THE DEPARTMENT

VISION

Our Vision is to be a center of excellence in IT education, training and research, aiming towards carrying out advanced research and development in information and software technologies, and in leveraging IT in specific domain areas enabling students to become innovators and entrepreneurs.

MISSION

- To be a department of excellence in technical education, widely known for the development of competent and socially responsible IT professionals, entrepreneurs and researchers.
- To promote professionals with knowledge and understanding, by providing them with latest developments in Computer Applications so that they contribute not only to the progress of software and its applications but even encompass the entire domain of computer technology.
- To impart quality education for long lasting development and opportunity in an extensive career in the various fields of Computer science / Information Technology.
- To increase innovative learning to the needs of Industry and Society
- To be the source of bringing out globally competent pioneering computing professionals, researchers, innovators and entrepreneurs.

VELS INSTITUTE OF SCIENCE, TECHNOLOGY & ADVANCED STUDIES

SCHOOL OF COMPUTING SCIENCES

DEPARTMENT OF COMPUTER APPLICATIONS

PROGRAM EDUCATIONAL OBJECTIVES (PEO)

- PEO1:** Exhibit practical hands on experience on the core and fundamentals like System Software Concepts, Mobile Computing and Application Development, Network Security, Relational Database Systems, Web Technology.
- PEO2:** Display practical knowledge, identify and find solutions on research problems related to the latest trends in software technology such as Advanced Java Programming, Data Exploration using Python, .Net Framework and Architecture etc.
- PEO3:** Be technology-oriented with the knowledge and ability to develop creative solutions, and better understand the effects of future developments of computer systems and technology on people and society
- PEO4:** Be familiar with current research within various fields of Software Technology and to Know the recent developments of IT, future possibilities and limitations, and understand the value of lifelong learning
- PEO5:** Demonstrate knowledge understanding of the scientific and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PROGRAM OUTCOME (PO)

- PO1: Engineering knowledge:** Apply the knowledge of science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2: Problem analysis:** An ability to analyze a problem, and identify and define the IT requirements appropriate to its solution
- PO3: Design/development of solutions:** An ability to design, implement, and evaluate an IT based system, process, component, or program or a Mobile Application to meet desired needs.
- PO4: Conduct investigations of complex problems:** An ability to effectively integrate IT-based solutions into the user environment. An understanding of best practices and standards and their application
- PO5: Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: An ability to use current techniques, skills, and tools necessary for computing practice. An ability to use and apply current technical concepts and practices in the core information technologies

PO7: Communication: Communicate effectively on complex activities with the scientific community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PROGRAMME SPECIFIC OUTCOME (PSO)

PSO1: Communicate software technology concepts, designs, and solutions effectively and professionally. Apply knowledge of computing to produce effective designs and solutions for specific problems.

PSO2: Use software development tools, software systems, and modern computing platforms. Understand how technological advances impact society and the social, legal, ethical and cultural ramifications of computer technology and their usage.

PSO3: Discuss the advancements in the specialized communication technologies such as Mobile Computing, Cloud Computing, Software Management and Quality Assurance, Networking and Database Management Systems.

PSO4: Be familiar in the applications areas like Python, JAVA Programming, .Net Framework, Relational Database Management etc. by allowing the students choose electives in accordance with their areas of interest.

PSO5: Get industrial exposure through the 6 months Industrial Internship in IT industry. To make them employable according to current demand of IT Industry.

BOARD OF STUDIES

S.No	Name & Designation	Address	Role
1	Dr.P.Mayilvahanan Professor & Head	Department of Computer Science, School of Computing Sciences, VISTAS, Chennai.	Chairman
2	Dr. T. Velmurugan Associate Professor & Head	Department of Computer Science, DG Vaishnav College, Chennai.	Industry Expert (External Member)
3	Dr. P. Magesh Kumar Managing Director	Calibsoft Technologies Pvt Ltd., Chennai.	Academic Expert (External Member)
4	Mr.R. Balamurugan Software Engineer	SCOPUS Technologies Ltd., Chennai	Alumni Member
5	Dr.S.Prasanna Professor & Head	Department of Computer Applications, School of Computing Sciences, VISTAS, Chennai	Internal Member
6	Dr. T. Kamalakannan Professor & Head	Department of Information Technology, School of Computing Sciences, VISTAS, Chennai	Internal Member

REGULATIONS 2021

M.Sc., Software Technology

**(Applicable to all the candidates admitted from the academic year
2021-22 onwards)**

1. DURATION OF THE PROGRAMME

- 1.1. Two years (four semesters)
- 1.2. Each academic year shall be divided into two semesters. The odd semesters shall consist of the period from July to November of each year and the even semesters from January to May of each year.
- 1.3 There shall be not less than 90 working days for each semester.

2. ELIGIBILITY FOR ADMISSION

- 2.1. The details of Eligibility for Admission

Bachelor's degree in Computer Science or Computer Science & Technology or Information Technology or B.C.A. degree of Recognized University or any other Degree accepted as equivalent thereto by the Syndicate.

3. MEDIUM OF INSTRUCTION

The medium of instruction is English.

4. CREDIT REQUIRMENTS AND ELIGIBILITY FOR AWARD OF DEGREE

A Candidate shall be eligible for the award of Degree only if he/she has undergone the prescribed course of study in VISTAS for a period of not less than two academic years and passed the examinations of all the prescribed courses of four Semesters earning a minimum of 90 credits for Core Courses and also fulfilled such other conditions as have been prescribed thereof.

5. COURSE

Each course / subject is to be designed under lectures / tutorials / laboratory or field work / seminar / practical training / Assignments / Term paper or Report writing etc., to meet effective teaching and learning needs.

6. COURSE OF STUDY AND CREDITS

In PG Programme, Core courses i.e. major courses that compulsorily required for each of the programme of study (CC), Discipline Specific Elective Course (DSE), Generic Elective (GE) , Internship and Skill Enhancement Course (SEC).

Vels Institute of Science and Technology and Advanced studies (VISTAS)

M.Sc.(Software Technology)

Courses of Study and Scheme of Assessment

M.Sc (Software Technology) Course Components

Component	I Sem	II Sem	III Sem	IV Sem	Total Credits
Core Courses	22	17	17	16	58
Ability Enhancement Courses (AEC)	-	-	-	-	-
Discipline Specific Elective (DSE) & Generic Elective(GEC)	2	10	6	-	24
Skill enhancement Course(SEC)& SI	-	-	-	-	8
Total Credits	24	27	23	16	90

Learning Outcome based Curriculum Framework

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2. Learning Outcomes based approach to Curriculum Planning
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6. Teaching Learning Process
7. Assessment Methods

Learning Outcome based Curriculum Framework

1. Introduction

The learning outcomes-based curriculum framework (LOCF) for the postgraduate programs in Science M.Sc. (Software Technology) is intended to provide a broad framework to create an academic base that responds to the need of the students to understand the basics of Software Technology and its ever evolving nature of applications in explaining all the observed natural phenomenon as well as predicting the future applications to the new phenomenon with a global perspective. The curriculum framework is designed and formulated in order to acquire and maintain standards of achievement in terms of knowledge, understanding and skills in the field of Software Technology. The multicultural fabric of our nation requires that the institutions involved in implementing this curriculum framework also work hard towards providing an environment to create, develop and inculcate rational, ethical and moral attitudes and values to help the creation of knowledge society needed for scientific advancement of our nation. The learning outcome based curriculum framework in M.Sc.,(Software Technology) should also allow for the flexibility and innovation in the program design of the PG education, and its syllabi development, teaching learning process and the assessment procedures of the learning outcomes. The process of learning is defined by the following steps which should form the basis of final assessment of the achievement at the end of the program.

2. Learning Outcomes based approach to Curriculum planning

2.1 Nature and extent of PG program in M.Sc.(Software Technology)

The PG program in M.Sc.(Software Technology) builds on the basic Software taught at the under graduation level in all the Colleges, Universities and like the same in the country. The curriculum design should start with imparting basic computer knowledge and should incorporate important industry need Software. The M.Sc.(Software Technology) curriculum is framed in such way to ignite the young minds of the students to have the urge to innovate and create new approaches for succeeding in Computer field.

2.2 Aims of PG program in M.Sc (Software Technology)

The mission is to emerge as a Global Conglomerate of premier Academic institution for M.Sc.(Software Technology) each taking pride in having nurtured knowledge that will lead to fulfil the aspirations of IT and Telecom industry.

Commit our-self to a mission to excel in Research and to create an atmosphere of effective learning in Software Technology , generate a spirit of questioning, enquiry, induce healthy challenges and competitiveness, feel of complete accomplishment and instinct self-confidence.

3. POSTGRADUATE ATTRIBUTES IN M.SC.(SOFTWARE TECHNOLOGY)

Some of the characteristic attributes of a postgraduate in M.Sc.(Software Technology)

- ❖ **Disciplinary knowledge and skills**
- ❖ **Skilled communicator**
- ❖ **Critical thinker and problem solver.**
- ❖ **Sense of inquiry.**
- ❖ **Team player/worker**
- ❖ **Skilled project manager**
- ❖ **Digitally Efficient**
- ❖ **Ethical awareness / reasoning**
- ❖ **National and international perspective**
- ❖ **Lifelong learners**

4. QUALIFICATION DESCRIPTORS

POST GRADUATE DEGREE OF MASTER OF SCIENCE (SOFTWARE TECHNOLOGY)

4.1 Duration Of The Programme

- ❖ Two years (four semesters)
- ❖ Each academic year shall be divided into two semesters. The odd semesters shall consist of the period from July to November of each year and the even semesters from January to May of each year.
- ❖ There shall be not less than 90 working days for each semester.

4.2 Eligibility for Admission

Completion of any UG degree (Academic Stream) accepted as equivalent thereof by the Syndicate of the Vels Institute of Science, Technology & Advanced Studies.

5. PROGRAMME LEARNING OUTCOMES RELATING TO M.Sc (SOFTWARE TECHNOLOGY)

5.1 Programme Outcome

- PO1: Engineering knowledge:** Apply the knowledge of science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2: Problem analysis:** An ability to analyze a problem, and identify and define the IT requirements appropriate to its solution
- PO3: Design/development of solutions:** An ability to design, implement, and evaluate an IT based system, process, component, or program or a Mobile Application to meet desired needs.
- PO4: Conduct investigations of complex problems:** An ability to effectively integrate IT-based solutions into the user environment. An understanding of best practices and standards and their application
- PO5: Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO6: The engineer and society:** An ability to use current techniques, skills, and tools necessary for computing practice. An ability to use and apply current technical concepts and practices in the core information technologies
- PO7: Communication:** Communicate effectively on complex activities with the scientific community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

5.2 Programme Specific Outcome

- PSO1:** Communicate software technology concepts, designs, and solutions effectively and professionally. Apply knowledge of computing to produce effective designs and solutions for specific problems.
- PSO2:** Use software development tools, software systems, and modern computing platforms. Understand how technological advances impact society and the social, legal, ethical and cultural ramifications of computer technology and their usage.
- PSO3:** Discuss the advancements in the specialized communication technologies such as Mobile Computing, Cloud Computing, Software Management and Quality Assurance, Networking and Database Management Systems.

PSO4: Be familiar in the applications areas like Python, JAVA Programming, .Net Framework, Relational Database Management etc. by allowing the students choose electives in accordance with their areas of interest.

PSO5: Get industrial exposure through the 6 months Industrial Internship in IT industry. To make them employable according to current demand of IT Industry.

6. TEACHING LEARNING PROCESSES

- The teaching learning processes play the most important role in achieving the desired aims and objectives of the postgraduate programs in M.Sc Software Technology as elaborated in detail in the learning based curriculum framework (LOCF). We should therefore have an excellent teaching-learning procedural protocol for all the colleges, universities and other higher education institutions (HEI). To be specific, it is desirable to have:
- Necessary and sufficient infrastructural facilities for the class rooms, and libraries equipped with adequate modern and modular furniture's and other requirements.
- Sufficient infrastructure for ICT and other facilities needed for technology-enabled learning like computer facilities, PCs, laptops, Wi-Fi and internet facilities with all the necessary software's.
- Sufficient number of teachers in permanent position to do all the class room teaching and perform and supervise the work to be done by the students.
- All the teachers should be qualified as per the UGC norms and should have good communication skills.
- Sufficient number of technical and other support staff to run the libraries, equipment and maintain the infrastructural facilities like buildings, electricity, sanitation, cleanliness etc.
- Teachers should make use of all the approaches for an efficient teaching-learning process i.e.
- Class room teachings with lectures using traditional as well as electronic boards.
- Use of Smart class rooms for simulation and demonstration for conveying the difficult concepts of corporate secretary ship in class room teaching and online teaching.
- Tutorials must be an integral part of all the theory and Accountancy courses should have 1to2 tutorials every week depending upon the nature of the course.
- Teaching should be complimented with students seminar to be organized very frequently.
- Guest lectures and seminars should be arranged by eminent teachers to be invited by the concerned college/university/HEI.
- Open-ended project work should be given to all students individually or in group to 2-3 students depending upon the nature of the course.
- Special attempts should be made by the institution to develop problem-solving skills at the PG level. For this purpose a mentor system may be evolved where 3-4 students may be assigned to each faculty member.

- Teaching load should be managed such that the teacher has enough time to interact with the students to encourage an interactive/participative learning.

7. ASSESSMENT METHODS

Since the Learning Objectives are defined clearly for each course in detail, it is easier to design methods to monitor the progress in achieving the learning Objectives during the course and test the level of achievement at the end of the course.

The priority should be given to Formative Assessment for monitoring the progress towards achieving the Learning Objectives while keeping its weightages lower than Summative Assessments.

This is to assure that the students know their strengths and weaknesses periodically through the results of Formative Assessments and make amends for the gaps in their knowledge without affecting their final grades in any significant way..

- Some of the methods suggested for Theory Component with regard to Formative Assessment are:
 - a. Regular Tutorial assignments
 - b. seminar presentations
 - c. Performance in group discussions
 - d. Problem based longer assignments (other than tutorials)
 - e. True/False Tests
 - f. Multiple Choice Tests
 - g. Short Answer Tests
 - h. viva-voce tests
 - i. Any other innovative tests in the context of the course.
- In the case of substantive Summative Assessment for the theory papers, can be a combination of the following:
 - a. Mid -Semester test
 - b. Seminar Report
 - c. Individual /Team Project report
 - d. Oral Presentations of Seminar/Projects
 - e. Viva -Voce Examination on the above reports
 - f. End Semester closed book examination in the pattern of
 - a) Multiple Choice
 - b) Short Answer
 - c) Long Answer
 - vii) End Semester

Here, effectiveness implies gaining knowledge and skill which can be applied to solve practical problems as well as attaining capability of logical thinking and imagination which are conducive to new knowledge and new discoveries. Once the student learns, 'why is it worth learning?' and 'how does it connect to the real world?' The student shall embrace the curriculum in a way which would incite imagination and imbibe a spirit of enquiry in them, so that in future they will opt for further investigations or research. Needless to say, there should be a continuous evaluation system for the students. This will enable the teachers not only to ascertain the overall progress of learning by the students, but also to identify the students who are slow learner and for whom special care should be taken. An appropriate grading system is the 'relative grading system' can also be envisaged for certain papers, introducing a competitive element among the students. All in all, the teacher should act as a facilitator and guide and not as a guardian of curriculum

- HEI can design their own ways and methods to quantify the assessment and evaluation based on the above methods It would then be converted to the letter grades by the procedure described by the template given by the UGC.

Once the letter grade for a course is obtained for a course, it should be done for all the courses offered by the student. Once the letter grades for all the grades are accumulated then a CGPA should be calculated by quantifying the letter grades as described by the template provided by the UGC.

VELS INSTITUTE OF SCIENCE, TECHNOLOGY AND ADVANCED STUDIES
(VISTAS) M.SC SOFTWARE TECHNOLOGY

COURSES OF STUDY AND SCHEME OF ASSESSMENT

(TOTAL NO OF CREDITS: 90)

CodeNo.	Course	Hours/Week				MaximumMarks		
		Lecture	Tutorial	Practical	Credits	CA	SEE	Total
SEMESTER1								
CORE	Mathematical Foundations of Computer Science	4	0	0	4	40	60	100
CORE	Programming in Java	5	0	0	5	40	60	100
CORE	Relational Database Systems	4	0	0	4	40	60	100
CORE	Web Technology	3	0	0	3	40	60	100
CORE	Practical –I Java Programming Laboratory	0	0	6	3	40	60	100
CORE	Practical – II Relational Database Systems Laboratory	0	0	6	3	40	60	100
GE	Soft Skill- I	2	0	0	2			
		18	0	12	24			

**VELS INSTITUTE OF SCIENCE, TECHNOLOGY AND ADVANCED STUDIES
(VISTAS) M.SC SOFTWARE TECHNOLOGY**

COURSES OF STUDY AND SCHEME OF ASSESSMENT

(TOTAL NO OF CREDITS:90)

CodeNo.	Course	Hours/Week				MaximumMarks			
		Lecture	Tutorial	Practical	Credits	CA	SEE	Total	
SEMESTER 2									
CORE	Advanced JAVA Programming	5	0	0	5	40	60	100	
CORE	Software Project Management	4	0	0	4	40	60	100	
CORE	Computer Networks	4	0	0	4	40	60	100	
Business Analytics Stream / Social Computing Stream									
DSE	Discipline Specific Elective -I	4	0	0	4	40	60	100	
DSE	Discipline Specific Elective-II	4	0	4	4	40	60	100	
CORE	Practical III – Advanced Java Laboratory	0	0	4	2	40	60	100	
CORE	Practical IV – Social Computing Laboratory / Exploratory Data Analysis Using MATLAB	0	0	4	2	40	60	100	
GE	Soft Skill- II	2	0	0	2				
		23	0	12	27				

VELS INSTITUTE OF SCIENCE, TECHNOLOGY AND ADVANCED STUDIES
(VISTAS) M.SC SOFTWARE TECHNOLOGY

COURSES OF STUDY AND SCHEME OF ASSESSMENT

(TOTAL NO OF CREDITS: 90)

CodeNo.	Course	Hours/Week			Credits	MaximumMarks			
		Lecture	Tutorial	Practical		CA	SEE	Total	
SEMESTER 3									
CORE	Enterprise Cloud Computing	4	0	0	4	40	60	100	
CORE	.Net Technology	4	0	0	4	40	60	100	
CORE	Software Testing	3	0	0	3	40	60	100	
Business Analytics Stream / Social Computing Stream									
DSE	Discipline Specific Elective -III	3	0	0	3	40	60	100	
DSE	Discipline Specific Elective-IV	3	0	0	3	40	60	100	
CORE	Practical IV - .Net Programming Laboratory	0	0	6	3	40	60	100	
CORE	Practical V – Social Computing Laboratory / Business Analytics Laboratory	0	0	6	3	40	60	100	
		17	0	12	23				

CA - Continuous

Assessment SEE -

Semester End Examination

**VELS INSTITUTE OF SCIENCE, TECHNOLOGY AND ADVANCED STUDIES
(VISTAS) M.SC SOFTWARE TECHNOLOGY**

COURSES OF STUDY AND SCHEME OF ASSESSMENT

(TOTAL NO OF CREDITS:140)

CodeNo.	Course	Hours/Week				MaximumMarks		
		Lecture	Tutorial	Practical	Credits	CA	SEE	Total
SEMESTER 4								
CORE	Project Work/Industry Internship/ Research Work at R & D Lab	0	0	32	16	40	60	100

List of Discipline Specific Elective (DSE)

SEMESTER II

Business Analytical Stream

Subject Code	Title of the Paper
DSE201	Data Mining for Business Intelligence
DSE202	Data Exploration Using Python.
DSE203	Artificial Intelligence
DSE204	Machine Learning
DSE205	Data Visualization Techniques

Social Computing Stream

DSE206	Social Media Programming and Content Design.
DSE207	Advanced Data Structures & Algorithms
DSE208	Business Intelligence and its Applications
DSE209	Internet of Things
DSE210	Next Generation Networks

SEMESTER III

Business Analytical Stream

DSE301	Big Data Analytics & Hadoop
DSE302	Programming Foundations for Data Sciences
DSE303	Design and Analysis of Algorithms
DSE304	Big data with R
DSE305	Deep Learning Techniques and Applications

Social Computing Stream

DSE306	Augmented Reality Technologies
DSE307	Social Computing
DSE308	Social Media Marketing
DSE309	Network and Information Security

DSE310

Cyber Security

List of SEC Papers

Subject Code

Title of the Paper

20GEC01

Soft Skill – I

20GEC02

Soft Skill – II

I SEMESTER

21CMST11 MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE4 0 0 4

Course Objective: To study and understand the concepts of Solving System of Equations- Eigen Values and Eigen Vectors, Functions - injective, surjective and bijective functions, functionally complete set of connectives - Normal forms - Proofs in Propositional calculus - Predicate calculus, Equivalence of DFA and NFA-Equivalence of NFA and Regular Languages.

Unit 1 MATRIX ALGEBRA 12

Matrices, Rank of Matrix, Solving System of Equations-Eigen Values and Eigen Vectors- Inverse of a Matrix - Cayley Hamilton Theorem

Unit II BASIC SET THEORY 12

Basic Definitions - Venn Diagrams and set operations - Laws of set theory - Principle of inclusion and exclusion - partitions- Permutation and Combination - Relations- Properties of relations - Matrices of relations - Closure operations on relations - Functions - injective, surjective and bijective functions.

Unit III MATHEMATICAL LOGIC - 12

Propositions and logical operators - Truth table - Propositions generated by a set, Equivalence and implication - Basic laws- Some more connectives - Functionally complete set of connectives- Normal forms - Proofs in Propositional calculus - Predicate calculus.

Unit IV. FORMAL LANGUAGES - 12

Languages and Grammars-Phrase Structure Grammar-Classification of Grammars-Pumping Lemma for Regular Languages-Context Free Languages.

Unit V. FINITE STATE AUTOMATA - 12

Finite State Automata-Deterministic Finite State Automata(DFA), Non Deterministic Finite State Automata (NFA)-Equivalence of DFA and NFA-Equivalence of NFA and Regular Languages.

TOTAL: 75 HOURS

COURSE OUTCOME:

At the end of this course the students will be able to:

- CO1:** Understand and Solve problems using Rank of Matrix, Solving System of Equations- Eigen Values and Eigen Vectors, Inverse and Cayley Hamilton Theorem.
- CO2:** Solve problems using Laws of set theory - Permutation and Combination - Relations- Properties of relations - Functions - injective, surjective and bijective functions.
- CO3:** Apply the logical structure of proofs and work symbolically with connectives and quantifiers to produce logically valid, correct and clear arguments, Perform set operations on finite and infinite collections of sets and be familiar with properties of set operations, Determine equivalence relations on sets and equivalence classes, Work with functions and in particular bisections, direct and inverse images and inverse functions.
- CO4:** Analyze and manipulate the different concepts in automata theory and formal languages such as formal proofs, regular expressions, regular languages, context – free grammars and explain the power and the limitations of regular languages, context – free languages.
- CO5:** Develop a strong background in reasoning about finite state automata and formal languages. Understanding minimization of deterministic and non-deterministic finite automata.

TEXT BOOKS:

1. Kenneth H.Rosen, Discrete Mathematics and Its Applications , Tata McGraw Hill, Fourth Edition, 2002 (Unit 1,2 & 3).
2. Hopcroft and Ullman, Introduction to Automata Theory, Languages and Computation , Narosa Publishing House, Delhi, 2002. (Unit 4,5)

REFERENCES:

1. A.Tamilarasi&A.M.Natarajan, Discrete Mathematics and its Application , Khanna Publishers, 2nd Edition 2005.

2. M.K.Venkataraman Engineering Mathematics , Volume II, National Publishing Company, 2nd Edition,1989.

WEB SOURCES:

<http://www.math.northwestern.edu/~mlerma/courses/cs310-05s/>

<http://www.cs.cmu.edu/afs/cs/academic/class/15299/handouts/index.html>

Course Objective: To understand the object oriented programming using Java, invoking methods using class libraries, the important topics and principles of software development & be able to use the Java SDK environment to create, debug and run simple Java programs

UNIT I INTRODUCTION TO JAVA 15

Introduction to Java – Features of Java – Object Oriented Concepts – Lexical issues – Data Types – Variables – Arrays – Operators – Control Statements.

UNIT II CLASSES, OBJECTS AND METHODS 15

Classes – Objects – Constructors – Overloading methods – Access control – Static and fixed Methods – String Class – Inheritance – Overriding Methods – Using Super – Abstract Class.

UNIT III PACKAGES 15

Packages – Access Protection – Importing Packages – Interfaces – Exception Handling – Thread – Synchronization – Messaging – Runnable Interface – Inter Thread Communication.

UNIT IV I/O STREAMS 15

I/O Streams – File Streams – Applets – String Buffer – Char Array – Java Utilities – Random, Vector, Calendar and Properties.

UNIT V NETWORK BASICS 15

Network Basics – Socket Programming – Proxy Server – URL – Datagrams – Working With Windows Using AWT Classes. AWT Controls – Layout Management and Menus.

TOTAL: 75 HOURS

COURSE OUTCOME:

At the end of this course the students will be able to:

- CO1:** Create an integrated development environment to write, compile, run, and test simple object-Oriented Java programs.
- CO2:** Demonstrate and make elementary modifications to Java programs that solve real-world Problems.
- CO3:** Validate input in a Java program

CO4: Identify and fix defects and common security issues in code.

CO5: Design version control system to track source code in a project.

TEXT BOOK:

1. P. Naughton & H. Schildt, Java2-The Complete Reference , 5th Edition, Tata McGraw Hill, 2002.

REFERENCES:

1. Cay S. Horstmann, Gray Cornell, Core Java 2 Volume 1 Fundamentals , Addison Wesley, 2003.
2. K. Arnold and J. Gosling, The Java Programming Language , Second Edition.

WEB SOURCES:

https://www.w3schools.com/java/java_intro.asp

[https://en.wikipedia.org/wiki/Java_\(programming_language\)](https://en.wikipedia.org/wiki/Java_(programming_language))

21CMST13

RELATIONAL DATABASE SYSTEMS

4 0 0 4

Course Objective: To introduce basic concepts of RDBMS, to introduce basic concepts of SQL, to introduce the concept of transaction processing, to implement the database normalization using normal forms

UNIT I INTRODUCTION TO DATABASE SYSTEMS 12

Overview – Data Models – Database System Architecture – History of Database Systems. Entry– Relationship Model Basic Concepts – Constraints – keys – Design Issues – Entry Relationship Diagram – Weak Entity Sets – Extended E–R Features – Design of an E–R Database Schema – Reduction of E–R Schema to Tables –UML.

UNIT II RELATIONAL MODEL 12

Algebra – Extended Relational Algebra Operations – Modification of Database – Relational Database Design: Functional Dependencies – Non-loss Decomposition –Functional Dependencies – First – Second - Third Normal Forms - Dependency Preservation– Boyce/Codd Normal Form

Unit III Introduction to Oracle 12

Introduction to Oracle – SQL, Data types –DDL , DML, DCL Commands- SQL Functions SQL queries and sub queries: Creating Simple Queries -Hierarchical Queries - The UNION [ALL], INTERSECT, MINUS Operators - Sorting Query Results - Joins - Using Sub queries – Views - Selecting from the DUAL Table

Unit IV PL/SQL 12

Introduction to PL/SQL – PL/SQL Block –structure - types – Anonymous Blocks – Nested Blocks- decision making and looping structures – Procedure- functions- sequences- cursors- Triggers -Exception Handling

UNIT V FILE ORGANIZATION 12

Storage and File Structures Overview of Physical Storage media – magnetic Disks – RAID – Tertiary Storage – Storage Access – File Organization – Organization of Records in Files – Data – Dictionary Storage – Indexing and hashing.

TOTAL: 60 HOURS

COURSE OUTCOME:

At the end of this course the students will be able to:

- CO1:** Explain the characteristics, architecture of database approach, describe the components, major functions of a database system and their use.
- CO2:** Compare and contrast appropriate data models, including concepts in modeling notation and how they would be used
- CO3:** Demonstrate use of the relational algebra operations from mathematical set theory (union, intersection, difference, and Cartesian product) and the relational algebra operations developed specifically for relational databases (select (restrict), project, join, and division).
- CO4:** Analyze the application of primary, secondary, and clustering indexes, and application of internal and external hashing techniques.
- CO5:** Formulate and Discuss the PL- SQL programming structures, control structures, functions, procedures with the example programs.

TEXT BOOKS:

1. A.Silberchatz, H.Korth, Subarshan, Database System Concepts , McGraw – Hill Higher Education, 6th Edition, 2013.
2. Koch and Liney, Oracle9iThe Complete reference , McGraw–Hill, 2002

REFERENCES:

1. C.J.Date, An Introduction to Database Systems , Pearson Education, Seventh Edition, 2003.
2. Elmasri, Navathe, Fundamentals of Database Systems, Addison Wesley , 3rd Edition,2000.
3. Jeffrey D. Ullman, Jenifer Wisdom, A First Course in Database Systems , Pearson Education Asia, 2001.
4. Bipin C. Desai, An Introduction to Database Systems , Galgotia Publications Pvt. Limited, 2001.
5. Oracle Database Handbook (Oracle Press) 2007.

- CO2:** Understand The client-server architecture of the World Wide Web and its communication protocol HTTP/HTTPS..
- CO3:** Explain Formats and languages used in modern web-pages: HTML, XHTML, CSS, XML, XSLT, JavaScript, DOM
- CO4:** Design Programming web pages with JavaScript/DOM (client).
- CO5:** Formulate Good design, universal design, multi-platform web applications.

TEXT BOOKS:

1. I.Bayross, Teach yourself webtechonology part 1 & 2 , BPB, 2010.
2. Coding with Javascript for Dummies,Chris Minnick, Eva Holland, Wiley Brand ,2015.
3. Michele E. Davis and Jon A. Phillips, Learning PHP and MySQL ,2007 edition.

WEB SOURCES:

<https://www.sisense.com/glossary/relational-database/>

<https://www.oracle.com/in/database/what-is-a-relational-database/>

Course Objective: To understand and apply the fundamentals of core Java and to implement inheritance, polymorphism, interfaces, multithreading, networking. Developing applications using client side and server side programming.

EXPERIMENTS

1. Program to define a structure of a basic JAVA program.
2. Program to define operators, arrays and control structures.
3. Program to define class and constructors. Demonstrate constructors.
4. Program to define class, methods and objects.
5. Program to demonstrate method overloading.
6. Program to define inheritance and show method overriding.
7. Program to demonstrate Packages.
8. Program to demonstrate Exception Handling.
9. Program to demonstrate Multithreading.
10. Program to demonstrate Applet structure
11. Program to demonstrate Graphics programming

TOTAL: 90 HOURS**COURSE OUTCOME:**

At the end of this course the students will be able to:

- CO1:** Identify classes, objects, members of a class and relationships among them needed for a specific problem
- CO2:** Write Java application programs using OOP principles and proper program structuring Demonstrate the concepts of polymorphism and inheritance
- CO3:** Create Java programs to implement error handling techniques using exception handling
- CO4:** Design and develop GUI based applications
- CO5:** Develop graphics applications

Course Objective: This course will help students to learn and implement important commands in SQL, usage of nested and joint queries, procedures and procedural extensions of databases and to understand design and implementation of typical database applications.

EXPERIMENTS

1. Create a database table, add constraints (primary key, unique, check, Not null), insert rows, update and delete rows using SQL DDL and DML commands.
2. Create set of tables, add foreign key constraints and incorporate referential integrity.
3. Query the database tables using different 'where' clause conditions and also implement aggregate functions.
4. Query the database tables and explore sub queries and simple join operations.
5. Query the database tables and explore natural, equi and outer joins.
6. Write user defined functions and stored procedures in SQL.
7. Execute complex transactions and realize DCL and TCL commands.
8. Write SQL Triggers for insert, delete, and update operations in database table.
9. Create View and index for database tables with large number of records.
10. Develop a simple GUI based database application and incorporate all the above-mentioned features.

TOTAL: 90 HOURS

COURSE OUTCOME:

At the end of this course the students will be able to:

- CO1:** Create databases with different types of key constraints.
- CO2:** Write simple and complex SQL queries using DML and DCL commands.
- CO3:** Realize database design using 3NF and BCNF.
- CO4:** Use advanced features such as stored procedures and triggers and incorporate in GUI based application development.
- CO5:** Create and manipulate data using NOSQL database.

SEMESTER II

21CMST21 ADVANCED JAVA PROGRAMMING 5 0 0 5

Course Objective: Develop error-free, well-documented Java programs; develop and test Java network, search engine, and web framework programs. Learn how to write, test, and debug advanced-level Object-Oriented programs using Java.

Unit I – AWT & Swings 15

Applets- Architecture, Basics, skeleton, simple applets, Requesting and Repainting HTML applet tag, passing parameters to applets- Graphics- Font,-Colorclasses

Swing-JApplet, JFrame, JComponent Differences between Component and Container,Icons, JLabel, JTextField, JButton, JCheckBox, JRadioButton,JComboBox

Unit II – Networking 15

Networking basics - Sockets overview - client/server - Reserved Sockets - IP Address -DNS- TCP /IP Client Socket - TCP /IP Server Socket - Datagram - Datagram Packet- Datagram Server and Client.

Unit III RMI 15

RMI- Overview – RMI Architecture - Developing Application with RMI Declaring and implementing remote interfaces –Stub and Skleton –registering Remote objects – writing RMI server –client- EJB Introduction Entity bean –session bean –EJB Transaction.

Unit –IV JSP 15

JSP Introduction to JSP - JSP life cycle - Attributes in JSP - JSP elements - Directives - Declarations - Expressions - Script let - Action Elements - using session Object and Cookies- Working with Java Mail - usage of use Bean Tag.

Unit V- JDBC & Servlets 15

JDBC/ODBC Driver – Connection Procedure with Example - SQL: DDL,DML,TCL – JDBC ResultSet- Metadata - ResultSetMetaData - JDBC Statements- Servlets - Life Cycle of Servlet, Generic Servlet, HTTP Servlet

TOTAL: 75 HOURS

COURSE OUTCOME:

At the end of this course the students will be able to:

CO1: Design and implement programs in the Java programming language that make strong use of classes and objects.

- CO2:** Analyze and apply formatted text to the console output and read/parse console input text using a Scanner object and Usage of such streams for file processing as well as client/server communications tasks.
- CO3:** Apply logical constructs for branching and loops as well as use iterator objects when appropriate.
- CO4:** Learn how to handle exceptions and errors. Students will design and implement custom checked and unchecked exception types
- CO5:** Interpret the usage of input, output, and object stream objects.

TEXT BOOK:

1. Herbert Schildt, Java, The Complete Reference, Mcgraw-Hill Eighth Edition,
2. PHIL HANNA, JSP 2.0: The Complete Reference, McGraw-Hill/Osborne, 2003
3. Advanced Java Programming, Uttam Roy
4. K. SOMASUNDARAM Advanced Programming in Java 2: Updated to J2SE6 with Swing, Servlet and RMI: 1.

REFERENCE

1. DUSTIN R CALLAWAY – InsideServlets , 2nd Edition, 2000.
2. IVAN BAYROSS Web Enabled Commercial Application Development Using JAVA 2.0, 4. -2006
3. J.MCGOVERN,R.ADATIA, Y.FAIN J2EE 1.4 Bible , 2000

WEB SOURCES:

<https://www.tutorialspoint.com/java/index.htm>

<https://www.javatpoint.com/what-is-advance-java>

Course Objective: To define and highlight importance of software project management. To formulate strategy in managing projects. To estimate the cost associated with a project. To plan, schedule and monitor projects for the risk management. To define the software management metrics. To train software project managers and other individuals involved in software project planning and tracking and oversight in the implementation of the software project management process.

UNIT-I: INTRODUCTION 9

Introduction to Competencies – Product Development Techniques – Management Skills – Product Development Life Cycle – Software Development Process.

UNIT-II: DOMAIN PROCESSES 9

Managing Domain Processes – Project Selection Models – Project Portfolio Management – Financial Processes – Selecting a Project Team – Goal and Scope of the Software Project – Project Planning.

UNIT-III: SOFTWARE ESTIMATION 9

Tasks and Activities – Software Size and Reuse Estimating – The SEI CMM – Problems and Risks – Cost Estimation – Effort Measures –COCOMO. A Regression Model – COCOMO II

UNIT-IV: SCHEDULING ACTIVITIES 9

Project Management Resource Activities – Organizational Form and Structure – Software Development Dependencies – Brainstorming – Scheduling Fundamentals – PERT and CPM.

UNIT-V: SOFTWARE QUALITY ASSURANCE 9

Quality Requirements – The SEI CMM – Guidelines – Challenges – Quality Function Deployment – Building the Software Quality Assurance – Plan – Software Configuration Management Principles – Requirements .

TOTAL: 45 HOURS

COURSE OUTCOME:

At the end of this course the students will be able to

- CO1:** Define & Evaluate alternative standards, models and techniques aimed at achieving quality assurance in a variety of software development environments.
- CO2:** Propose and defend innovative solutions to software quality assurance and measurement problems in the context of various software development environments.
- CO3:** Interpret and apply various software cost estimation techniques.

CO4: Develop a software quality plan for a software project - to include sections on change management, configuration management, defect elimination, validation and verification and measurement.

CO5: Discuss the role of software quality assurance in improving the software development process

Text Book:

1. Robert T. Futrell, Donald F. Shafer, Linda I. Safer, Quality Software Project Management , Pearson Education, Asia, 2002.

References:

1. Pankaj Jalote, Software Project Management in Practice , Addison Wesley, 2002.
2. Hughes, Software Project Management, 3rdEdition , Tata McGrawHill, 2004

WEB SOURCES:

https://en.wikipedia.org/wiki/Software_project_management

<https://www.javatpoint.com/software-project-management>

Course Objective: This course will help to understand the network fundamentals and to explore network layer protocols. This course will explore the various application layer functionalities and the link layer services and data communication fundamentals.

UNIT I NETWORKS FUNDAMENTALS 12

Components -Data Representation –Data Flow - Networks- Distributed Processing- Network Criteria -Physical Structures - Network Models -Categories of Networks, Interconnection of Networks: The OSI Model- TCP/IP Protocol Suite- Addressing

UNIT II NETWORK LAYER 12

Network Layer: Logical addressing, Internetworking, IPv4, IPv6, Transition from IPv4 TO IPv6, Tunneling, address mapping, ICMP, IGMP, forwarding, Uni-cast routing protocols, multicast routing protocols.

UNIT III TRANSPORT LAYER 12

Transport Layer: Process to process delivery, UDP and TCP protocols, SCTP, data traffic, congestion, congestion control, QoS, integrated services, differentiated services, QoS in switched networks

UNIT IV APPLICATION LAYER 12

Application Layer – Domain name space, DNS in Internet, Remote Logging, Telnet, electronic mail, FTP, WWW, HTTP, SNMP, Multi-media, Network security

UNIT V FUNDAMENTALS OF DATA COMMUNICATION 12

Communication Model – Data communications – Data Transmission: Concepts and Terminology, Analog and Digital Transmission, Transmission Impairments – Signal Encoding Techniques: Digital Data and Digital Signals – Multiplexing: FDM, TDM, Multiple Channel Access.

TOTAL: 60 HOURS

COURSE OUTCOME:

At the end of this course the students will be able to

- CO1:** Describe the fundamentals of networking
- CO2:** Identify the networking protocol for reliable communications
- CO3:** Select suitable transport layer protocols for network applications
- CO4:** Design new application layer protocols for various applications.
- CO5:** Identify suitable signal encoding techniques for various scenarios

REFERENCES

1. Behrouz A. Forouzan , Data Communications and Networking , Fourth Edition TMH,2006.
2. Andrew S Tanenbaum Computer Networks , 4th Edition, Pearson Education.
3. James F. Kurose, Keith W. Ross, Computer Networking: A Top-Down Approach , Seventh Edition, Pearson Education, 2017.
4. Larry L. Peterson and Bruce S. Davie, Computer Networks: A Systems Approach , Fifth Edition, Morgan Kaufmann Publishers, 2011.
5. William Stallings, Data and Computer Communications , Tenth Edition, Pearson, 2014.
6. Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, Computer Networks: An Open Source Approach , McGraw-Hill, 2012.

WEB SOURCES:

<https://www.javatpoint.com/types-of-computer-network>

https://en.wikipedia.org/wiki/Computer_network

Course Objective: This course gives practical training in HTML to Servlet Communication, JSP Beans used to create JSP program, RMI to create Web Services, Email creation and manipulation, Web applications and Session management is done by students.

List of Experiments:

1. HTML to Servlet Communications
2. Servlet to HTML Communication
3. Applet to Servlet Communication
4. Servlet to Applet Communication
5. Designing online applications with JSP
6. Creating JSP program using JavaBeans
7. Working with Enterprise JavaBeans
8. Performing Java Database Connectivity and storing the students Marks.
9. Creating Web services with RMI.
10. Creating and Sending Email with Java
11. Building web applications for any Departmental Store.
12. Finding Compound Interest and Simple Interest using Session Management.

TOTAL: 60 HOURS

COURSE OUTCOME:

At the end of this course the students will be able to:

- CO1:** Design HTML pages to demonstrate Java Servlets, JSP, Bean and EJB programs.
- CO2:** Implement Dynamic HTML using Servlet and demonstration of service methods, auto web page refresh, Session tracking using cookie and Http Session in Servlet.
- CO3:** Learn the fundamental of connecting to the database.
- CO4:** Demonstrate JSP (page attributes, action tags and all basic tags) and types of EJB application.
- CO5:** Learn to design and code web applications.

21PMST31 EXPLORATORY DATA ANALYSIS USING MATLAB LABORATORY

0042

Course Objective: Students will learn to use interactive features in MATLAB to extract subsets of data and to compute statistics on groups of related data, interactive documents, called live scripts, to capture the steps of your analysis, communicate the results, and provide interactive controls allowing others to experiment by selecting groups of data.

List of Experiments:

1. Data Representation in MATLAB
2. Basic Mathematical Operations
3. Using Vectors
4. Using Functions
5. Calculating Summary Statistics
6. Correlations between Variables
7. Accessing Subsets of Data
8. Performing Calculations by Category
9. Visualizing Results
10. Creating a Live Script & Adding Interactive Controls to a Live Script
11. Importing Dataset
12. Preprocessing - Removing Missing Data , Feature Scaling, Handling Outliers ,
Dealing with Categorical Data
13. K- Means Clustering Algorithm
14. Mean Shift clustering Algorithm
15. Hierarchical Clustering Algorithm
16. K- Nearest Neighbor Algorithm
17. Naïve Bayes Algorithm
18. Decision Trees Algorithm
19. Support Vector Machine Algorithm

TOTAL: 60 HOURS

COURSE OUTCOME:

At the end of this course the students will be able to:

- CO1:** Load Data and perform basic computations on the data, and communicate results to others.
- CO2:** Explore special techniques for handling textual, audio, and image data, which are common in data science and more advanced modeling
- CO3:** Visualize the distribution of data and use visual inspection to address artifacts that affect accurate modeling
- CO4:** Create machine learning models for the given dataset and optimize hyper parameters
- CO5:** Evaluate the results by training several types of classification models

SEMESTER III

21CMST31

ENTERPRISE CLOUD COMPUTING

4 0 0 4

Course objective:

This course introduces the broad perspective of cloud architecture and to understand the concept of Virtualization and design of cloud Services, This course explores the features of cloud simulator, and to apply different cloud programming model as per need and learn to design the trusted cloud Computing system

UNIT I CLOUD ARCHITECTURE AND MODEL 12

Technologies for Network-Based System – System Models for Distributed and Cloud Computing – NIST Cloud Computing Reference Architecture. Cloud Models:- Characteristics –Cloud Services – Cloud models (IaaS, PaaS, SaaS) – Public vs Private Cloud –Cloud Solutions -Cloud ecosystem – Service management – Computing on demand.

UNIT II VIRTUALIZATION 12

Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization - Virtualization Structures - Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices- Virtual Clusters and Resource management – Virtualization for Data-center Automation.

UNIT III CLOUD INFRASTRUCTURE 12

Architectural Design of Compute and Storage Clouds – Layered Cloud Architecture Development – Design Challenges -Inter Cloud Resource Management – Resource Provisioning and Platform Deployment – GlobalExchange of Cloud Resources.

UNIT IV PROGRAMMING MODEL 12

Parallel and Distributed Programming Paradigms – MapReduce , Twister and Iterative MapReduce – HadoopLibrary from Apache – Mapping Applications - Programming Support - Google App Engine, Amazon AWS - Cloud Software Environments -Eucalyptus, Open Nebula, OpenStack, Aneka, CloudSim

UNIT V SECURITY IN THE CLOUD 12

Security Overview – Cloud Security Challenges and Risks – Software-as-a-Service Security – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security –Application Security – Virtual Machine Security - Identity Management and Access Control –Autonomic Security.

TOTAL: 60 HOURS

COURSE OUTCOME:

At the end of this course the students will be able to:

- CO1:** Define Cloud Computing and memorize the different Cloud service and deployment models
- CO2:** Describe importance of virtualization along with their technologies.
- CO3:** Evaluate and use Examine different cloud computing services

CO4: Analyze the components of open stack & Google Cloud platform

CO5: Understand Cloud Computing Security challenges & risks.

TEXT BOOKS

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, Distributed and Cloud Computing, From Parallel Processing to the Internet of Things , Morgan Kaufmann Publishers, 2016.
2. John W.Rittinghouse and James F.Ransome, Cloud Computing: Implementation, Management, and Security , CRC Press, 2010.

References:

1. Toby Velte, Anthony Velte, Robert Elsenpeter, Cloud Computing, A Practical, TMH, 2006.
2. Kumar Saurabh, Cloud Computing – insights into New-Era Infrastructure , Wiley India,2011.
3. George Reese, Cloud Application Architectures: Building Applications and
4. Infrastructure in the Cloud O'Reilly
5. James E. Smith, Ravi Nair, Virtual Machines: Versatile Platforms for Systems and Processes , Elsevier/Morgan Kaufmann, 2005.
6. Katarina Stanoevska-Slabeva, Thomas Wozniak, SantiRistol, Grid and Cloud Computing – A Business Perspective on Technology and Applications , Springer.
7. Ronald L. Krutz, Russell Dean Vines, Cloud Security – A comprehensive Guide to
8. Secure Cloud Computing , Wiley – India, 2010.
9. RajkumarBuyya, Christian Vecchiola, S.ThamaraiSelvi, ‘Mastering Cloud Computing , TMGH,2013.

WEB SOURCES:

<https://www.factioninc.com/blog/what-is-enterprise-cloud>

<https://www.nutanix.com/info/enterprise-cloud>

Course Objective:

The student will have the ability to use visual studio .NET effectively. To create a console based and web based application in .Net..NET is a revolutionary concept on how software should be developed and deployed. An understanding of how to use forms to develop GUI programs under .NET.

UNIT I: INTRODUCTION TO .NET TECHNOLOGIES: 12

Overview of .Net Framework – Feature Of .Net Framework – .Net framework class library – .NET Framework Components – Overview with Focus on CLR, CTS – MSIL – JIT – Assembly – DLL – Meta Data – Application Architecture.

UNIT II: INTRODUCTION TO C# 12

C# Building Blocks: Introduction to C# – Overview – Types – Expressions – Declarations – Statements – Classes and Struts – OOPS – Constructors and Destructors

UNIT III: BASIC WEB SERVER CONTROLS 12

Windows Controls : Basic web server controls – Rich web server Controls – [ToolTip](#) – [ErrorProvider](#) – [MainMenu](#) – [ContextMenu](#) – [Common Dialogs](#) – [Date Time Picker](#) – [MonthCalendar](#) – [Splitter](#) – [HelpProvider](#) – [StatusBar](#) – [Notify Icon](#) – [Print Related](#)

UNIT IV: ADVANCED .NET CONTROLS 12

Web Server List Controls: Check Box List – Radio Button List – Drop Down List – List Box – Bulleted List. Data Controls: Data Grid – Repeater Control – Grid View – Other Web Server Controls: Navigation Controls And Validation Controls.

UNIT V: OBJECTS AND ADVANCED CONCEPTS IN ASP.NET: 12

Request Object – Response Object – State Management for Session, Application, Cookies, Query String – Introduction to ADO.NET – ADO Vs ADO.NET – Connected ADO.NET Architecture – Disconnected ADO.NET Architecture – Data Reader – Data Adapter – ADO.NET Classes.

TOTAL: 60 HOURS**COURSE OUTCOME:**

At the end of this course the students will be able to:

- CO1:** Understand code solutions and compile C# projects within the .NET framework
- CO2:** Design and develop professional console and window based .NET application
- CO3:** Demonstrate knowledge of object-oriented concepts Design user
- CO4:** Experience and functional requirements C#.NET application.
- CO5:** Construct classes, methods, and assessors, and instantiate objects.

TEXT BOOKS:

1. Andrew Troelsen, C# and the .Net platform apress, (UNIT I and UNIT II), 2001.
2. MridulaParihar, et.al. ASP .NET Bible Wiley – Dreamtech India Pvt. Ltd, – 2002.

REFERENCE BOOKS:

1. David S. Platt – Introducing .Net , Microsoft press, 2002.
2. Alex Homer et. Al, professional ASP .NET 1.1 , Wiley Dreamtech India Pvt. Ltd.2004.
3. Rebecaam. Riordan, ADO .NET Step By Step , Microsoft Press.

WEB SOURCES:

<https://www.c-sharpcorner.com/blogs/what-is-net-technology>

https://en.wikipedia.org/wiki/.NET_Framework

Course objective:

To introduce the basics and necessity of Software testing, to introduce various testing techniques along with software production, and to introduce the concepts of Software bugs and its impact

UNIT I INTRODUCTION 9

Software testing background – software bugs- cost of bugs-software testing realities- Testing Axioms – Precision and Accuracy-verification and validation- quality and reliability-testing and quality assurance.

UNIT II SOFTWARE TESTING METHODOLOGY 9

Functional testing, Structural testing – Static and Dynamic testing – low level specification test techniques – Equivalence Partitioning – Data testing – State Testing –formal reviews – coding standards and guidelines – code review checklist– data coverage- code coverage.

UNIT III SOFTWARE TESTING TECHNIQUES 9

Configuration testing –Compatibility tests – foreign language testing – usability testing – testing the documentation - testing for software security – website testing.

UNIT IV AUTOMATED TESTING AND TEST TOOLS 9

Benefits of automation and tools – viewers and monitors – drivers – stubs – stress and load tools – analysis tools- software test automation – random testing –beta testing

UNIT V TEST DOCUMENTATION 9

Goal of Test Planning – test phases – test strategy – resource requirements – test schedule – writing and tracking test cases- Bug tracking systems – metrics and statistics- risks and issues

TOTAL: 45 Hours

COURSE OUTCOME

Upon Completion of the course, the students should be able to:

- CO1:** Discuss the concepts of software testing
- CO2:** Explain the testing techniques

- CO3:** Analyze and classify various types of bugs
- CO4:** Perform automated testing using test tools
- CO5:** Document the testing procedures

TEXT BOOKS:

1. Glenford J. Myers, Tom Badgett, Corey Sandler, The Art of Software Testing , 3rd edition, John Wiley & Sons publication, 2012.
2. Ron Patton, Software testing , second edition, Pearson education, 2009.

REFERENCE BOOKS:

- 1 Boris Beizer, Software testing techniques ,DreamTech Press,2009.
2. Srinivasan Desikan, Gopalaswamy Ramesh, Software testing- Principles and Practices , Pearson education, 2009.

WEB SOURCES:

https://en.wikipedia.org/wiki/Software_testing

<https://www.softwaretestingmaterial.com/software-testing/>

Course Objective: This Lab course will help students to write Console based applications, understand .Net IDE Component Framework programming concepts in .Net Framework and Creating website using ASP.Net Controls.

1. Develop an Application to dynamically load assembly using C#.
2. Implementation of inheritance and operator overloading in C#
3. Implementation of Properties and Indexer in C#
4. Implementation of Delegates and Events in C#.
5. Implementation of Generic Interfaces in C#.
6. Write an application to implement the Inter Thread Communication.
7. Develop an application for a library management system using ADO.NET Connection-Oriented.
8. Develop an application using ADO.NET Connectionless for an Inventory Control System.
9. Develop an ASP.NET Application to validate the form using controls.
10. Develop an ASP.NET Application to implement data binding in data grid and repeater control.
11. Develop an ASP.NET Application to handle session tracking.
12. Develop an ASP.NET Application to implement the cookies.

TOTAL: 90 HOURS

COURSE OUTCOME:

At the end of this course the students will be able to:

- CO1:** Apply the principles of object-oriented programming by developing console based applications
- CO2:** Create user interactive web pages using ASP.Net.
- CO3:** Create a rich GUI for web based applications using a rich set of controls
- CO4:** Create simple data binding applications using ADO.Net connectivity.
- CO5:** Performing Database operations for Windows Form and web applications.

COURSE OBJECTIVE:

This Lab course explores the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability and enable students to have skills that will help them to solve complex real-world problems in for decision support.

EXPERIMENTS

1. R program to illustrate Logical vectors & operators.
2. R program using regular sequences.
3. R program to illustrate data types.
4. R program for matrix operations.
5. R program to illustrate R objects.
6. R program for facing the facts about factors
7. R program to add column and row using data objects.
8. R program to illustrate selection of elements and missing values in matrices.
9. R program to illustrate data frame selection of elements in a data frame.
10. R program to illustrate sorting of data frame.
11. R program to illustrate the working functionality of list.
12. R program for Bind exercises.
13. R program to illustrate comparison of matrices and vectors.
14. R program to create line graphs , bar graphs using plot() function .
15. Write a R program to illustrate built in mathematical functions in R.

TOTAL: 90 HOURS

COURSE OUTCOME:

At the end of this course the students will be able to:

- CO1:** Understand the basics in R programming in terms of constructs, control statements, string functions
- CO2:** Understand the use of R for Big Data analytics
- CO3:** Learn to apply R programming for Text processing
- CO4:** Able to appreciate and apply the R programming from a statistical perspective
- CO5:** Elaborate usage in diverse disciplines to estimate and display results through statistics and research methods.

List of Discipline Specific Elective Courses

Business Analytics Stream

Course Objective: This course explores the importance of business intelligence by describing key business intelligence term, determining the relevance of data to business, aligning business intelligence to organizational strategy, examining CRM concepts and solutions, learning data warehouse concepts and solutions and exploring data mining concepts and solutions

UNIT I- Introduction to Data Mining 12

What is Data Mining –Data mining in the process of Knowledge Discovery-Data Mining Versus KDD-Taxonomy of data mining task-Architecture of Data mining system-Types of database used for mining-Relational Databases-Data Warehouses-Transaction Databases-Object Oriented Databases-Spatial Databases-Temporal Databases-Text And Multimedia Databases-Heterogeneous Databases-Applications of Data Mining.

UNIT II -Business Intelligence an Introduction 12

Introduction, Definition, History and Evolution, Business Intelligence Segments, Difference between Information and Intelligence, Defining Business Intelligence Value Chain, Roles of Business Intelligence in Modern Business, Business Intelligence Applications. - Challenges of BI

UNIT III- Data Preprocessing 12

Why Data Preprocessing – Need for pre-processing-Data cleaning as a process-Data Cleaning-Binning, Outlier Analysis, Integration, Transformation, Data Normalization, Data Reduction, Data Discretization ,Data Aggregation.

UNIT IV- Datamining Techniques 12

Association Rule Mining- TheApriori Algorithm- Classification and Prediction –How does Classification works-Building classifier model-Comparison of classification & prediction techniques-Classification by Decision Tree Induction-Prediction methods.

UNIT V- Cluster Techniques 12

Clusters Analysis: Applications & Requirements- Types of Data in Cluster Analysis-Clustering Methods: k-means and k-medoids clustering-Case Studies-Mining WWW-Mining Text Database-Mining Spatial Database-Applications of datamining in BI.

TOTAL: 60 HOURS

COURSE OUTCOME:

At the end of this course the students will be able to:

- CO1:** Identify the major frameworks of computerized decision support: decision support systems (DSS), data analytics and business intelligence (BI).
- CO2:** Understand the definitions, concepts, and architectures of data warehousing
- CO3:** Describe how analytics are powering consumer applications and

- CO4:** Demonstrate the impact of business reporting, information visualization, and dashboards
- CO5:** Creating a new opportunity for entrepreneurship for analytics.

TEXT BOOKS:

1. J. Han, M. Kamber, Data Mining Concepts and Techniques , Morgan Kaufmann .
2. G. Shmueli, N.R. Patel, P.C. Bruce, Data Mining for Business Intelligence: Concepts, Techniques, and Applications in Microsoft Office Excel with XLMiner .

REFERENCES:

1. PaulrajPonnian, Data Warehousing Fundamentals , John Willey.
2. M. Dunham, Data Mining: Introductory and Advanced Topics , Pearson Education.

WEB SOURCES:

<https://www.wgu.edu/blog/data-mining-business-analytics>

<http://www.blog-geographica.com/2016/11/15/how-data-mining-is-used-to-generate-business-intelligence/>

Course Objective: This course explores to understand how to use the Python standard library to write programs, access various tools, and document and automate analytical processes, and helps to perform data manipulation, analysis, and visualization. Python provides powerful libraries for Machine learning applications and other scientific computations

Unit I PYTHON ESSENTIALS**12**

Data Types (strings, lists, dictionaries, and more), Control Flow (if-then statements, looping), Organizing code (functions, modules, packages), Reading and writing files, Overview of Object-Oriented Programming (OOP)

Unit II NUMPY AND 2D PLOTTING**12**

Understanding the N-dimensional data structure, Creating arrays, Indexing arrays by slicing or more generally with indices or masks, Basic operations and manipulations on N-dimensional arrays, plotting with matplotlib

Unit III PANDAS: PYTHON TOOLKIT FOR DATA ANALYSIS**12**

Data aggregation and reorganization capabilities for data set explorations, including support for labelling data along each dimension, dealing with missing values, and time series manipulations.

Unit IV DATA PREPARATION**12**

Working with Pandas data structures: Series and Data Frames , Accessing your data: indexing, slicing, fancy indexing, Boolean indexing , Data wrangling, including dealing with dates and times and missing data , Adding, dropping, selecting, creating, and combining rows and columns.

Unit V DATA VISUALIZATION & ANALYSIS**12**

Data visualization: scatter plots, line plots, box plots, bar charts, and histograms with matplotlib , Split-apply-combine with DataFrames, Data summarization and aggregation methods , Pandas powerful group by method , Reshaping, pivoting, and transforming your data.

TOTAL: 60 HOURS**COURSE OUTCOME:**

At the end of this course the students will be able to:

CO1: Defines Python Programming basics and essentials, along with Machine Learning for conducting data analytics in Python

- CO2:** Build Hybrid Learning with Guided practice & Weekly Practice quiz questions on the app along with the classroom sessions
- CO3:** Analyze Hands-on application of the Tools
- CO4:** Design Data summarization and aggregation methods
- CO5:** Design App based learning. Connect with Faculty on the App apart from the regular classroom training

TEXT BOOKS

1. Python for Data Analysis: Data Wrangling with Pandas, NumPy, and Ipython
William McKinney, O'Reilly Media
2. Python For Data Analysis – 2013by Wes McKinney , O'Reilly Media

REFERENCES

1. Introduction to Machine Learning with Python: A Guide for Data Scientists
Andreas Muller.
2. Mastering Python for Data Science, Samir Madhavan Samir.

WEB SOURCES:

<https://www.analyticsvidhya.com/blog/2015/04/comprehensive-guide-data-exploration-sas-using-python-numpy-scipy-matplotlib-pandas/>
<https://towardsdatascience.com/data-exploration-and-analysis-using-python>

Course Objective:

To understand the basic concepts of Artificial Intelligence, fuzzy systems and NLP. To understand the various search techniques of AI. To analyze the various knowledge representation and their importance. To familiarize the AI programming using PROLOG.

UNIT-I: INTRODUCTION AND PROBLEM SOLVING 12

Various definitions of AI, Introduction to AI applications and AI techniques, Production systems, control strategies, reasoning - forward & backward chaining, Intelligent Agents

UNIT-II: SEARCH AND GAME PLAYING 12

Breadth first search, depth first search, iterative deepening, uniform cost search, hill climbing, simulated annealing, genetic algorithm search, heuristic search, Best first search, A* algorithm, AO* algorithm, Minmax & game trees, refining minmax, Alpha – Beta pruning, constraint satisfaction

UNIT-III: KNOWLEDGE REPRESENTATION 12

Representations and mappings, Approaches to knowledge Representation, Procedural versus Declarative knowledge; Predictive Logic: Representing Simple facts, Instance and Isa relationships in Logic, Proposition versus Predicate Logic, Computable Functions and Predicates- not, Rules of Inferences and Resolution-not, Forward versus Backward Reasoning, Logic Programming and Horn Clauses

UNIT-IV: AI PROGRAMMING LANGUAGES 12

(PROLOG): Introduction, How Prolog works, Backtracking, CUT and FAIL operators, Built –in Goals, Lists, Search in Prolog.

UNIT-V: APPLICATIONS OF ARTIFICIAL INTELLIGENCE 12

Fuzzy sets/systems, Natural language processing, Speech recognition, Computer vision and Expert systems

TOTAL: 60 HOURS**COURSE OUTCOME:**

At the end of this course the students will be able to:

- CO1:** Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.
- CO2:** Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.
- CO3:** Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
- CO4:** Propose proficiency in developing applications in an 'AI language'
- CO5:** Construct & Demonstrate an ability to share in discussions of AI, its current scope and limitations, and societal implications.

TEXT BOOK:

1. Stuart Russel and Peter Norvig: Artificial Intelligence – A Modern Approach, 2nd Edition Pearson Education
2. Elaine Rich and Kevin Knight: Artificial Intelligence, Tata McGraw Hill 2nd Ed.

REFERENCE:

1. N.P. padhy: Artificial Intelligence and Intelligent Systems, Oxford Higher Education, Oxford University Press
2. R. Akerkar, Introduction to Artificial Intelligence, Prentice-Hall of India, 2005
3. George F Luger: Artificial Intelligence- Structures and Strategies for complex Problem Solving, 4 th Ed. Pearson Education
4. Ivan Bratko :PROLOG Programming 2nd Ed., Pearson Education

WEB SOURCES:

<https://www.investopedia.com/terms/a/artificial-intelligence>

https://en.wikipedia.org/wiki/Artificial_intelligence

Course Objective: This course is an area of statistics that deals with extracting information from data and using it to predict trends and behavior patterns. This course introduces students to the basic concepts and techniques of Machine Learning and to gain experience of doing independent study and research which aids in Predicting an outcome, predicting counts, predicting a value - all these have innumerable use cases in CRM, Fraud detection, Portfolio Management, Sales and Marketing.

UNIT I FOUNDATIONS FOR ML 12

ML Techniques overview -Validation Techniques (Cross-Validations) - Feature Reduction/Dimensionality reduction - Principal components analysis (Eigen values, Eigen vectors, Orthogonality)

UNIT II CLUSTERING 12

Distance measures - Different clustering methods (Distance, Density, Hierarchical) - Iterative distance-based clustering; - Dealing with continuous, categorical values in K-Means - Constructing a hierarchical cluster - K-Medoids, k-Mode and density-based clustering - Measures of quality of clustering

UNIT III CLASSIFICATION NAÏVE BAYES CLASSIFIER 12

Model Assumptions, Probability estimation - Required data processing -M-estimates, Feature selection: Mutual information - Classifier K-Nearest Neighbors -Computational geometry; Voronoi Diagrams; Delaunay Triangulations-K-Nearest Neighbor algorithm; Wilson editing and triangulations -Aspects to consider while designing K-Nearest Neighbor

UNIT IV SUPPORT VECTOR MACHINES 12

Linear learning machines and Kernel space, Making Kernels and working in feature space - SVM for classification and regression problems. Decision Trees - ID4, C4.5, CART Ensembles methods - Bagging & boosting and its impact on bias and variance - C5.0 boosting - Random forest - Gradient Boosting Machines and XGBoost

UNIT V ASSOCIATION RULE MINING 12

The applications of Association Rule Mining: Market Basket, Recommendation Engines, etc.- A mathematical model for association analysis; Large item sets; Association Rules - Apriori: Constructs large item sets with mini sup by iterations; Interestingness of discovered association rules; -Application examples; Association analysis vs. classification -FP-trees

COURSE OUTCOME:

At the end of this course the students will be able to:

- CO1:** Gain knowledge about basic concepts of Machine Learning
- CO2:** Identify machine learning techniques suitable for a given problem
- CO3:** Solve the problems using various machine learning techniques
- CO4:** Apply Dimensionality reduction techniques.
- CO5:** Design application using machine learning techniques.

TEXT BOOKS

1. Bishop, C. (2006). Pattern Recognition and Machine Learning. Berlin: Springer-Verlag.
2. T. Hastie, R. Tibshirani, J. Friedman. The Elements of Statistical Learning, 2e, 2008

REFERENCES

1. The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Trevor Hastie, Robert Tibshirani, and Jerome Friedman
2. Artificial Intelligence: A Modern Approach, Stuart J. Russell and Peter Norvig
3. Deep Learning, Ian Goodfellow, Yoshua Bengio, and Aaron Courville.

WEB SOURCES:

https://www.sas.com/en_in/insights/analytics/machine-learning
https://en.wikipedia.org/wiki/Machine_learning

Course objective: To understand the concepts of different types of visualization and how humans perceive information. Learn the processes, mechanics in implementing principles of design and color to make effective visualizations, learn how to visualize graphs, be exposed to visualization dashboards, and to apply techniques from user-interface design to create an effective visualization system.

UNIT I THE COMPUTER AND THE HUMAN 12

Defining data visualization Visualization workflow-describing data visualization workflow-process in practice

UNIT II VISUALIZATION OF NUMERICAL DATA 12

Data Representation: chart types: categorical, hierarchical, relational, temporal & spatial; 2-D: bar charts, Clustered bar charts, dot plots, connected dot plots, pictograms, proportional shape charts, bubble charts, radar charts, polar charts, Range chart

UNIT III VISUALIZATION OF NON-NUMERICAL DATA 12

Range chart, Box-and-whisker plots, univariate scatter plots, histograms word cloud, pie chart, waffle chart, stacked bar chart, back-to-back bar chart.

UNIT IV VISUALIZATION DASHBOARD 12

Visualization system for large datasets and dashboards, Tools for dashboard, graph data visualization; Annotation

UNIT V 2-D & 3-D DATA VISUALISATION 12

Relevant 2-D charts. 3-D: surfaces, contours, hidden surfaces, pm3d coloring, 3D mapping; multi-dimensional data visualization

TOTAL: 60 HOURS

COURSE OUTCOME:

Upon completion of the course, students will be able to

- CO1:** Understand the concepts of what data visualization is, how it's used, and how Computers display information.
- CO2:** Implement principles of design and color to make data visualizations more effective
- CO3:** Learn how to visualize graphs that depict relationships between data items.

CO4: Compare the various data visualization methods and its usage.

CO5: Designing own visualization system for large datasets and dashboards and to interpret visualization system.

TEXT BOOKS

1. Andy Kirk, Data Visualization A Handbook for Data Driven Design, Sage Publications, 2016 .
2. Philipp K. Janert, Gnuplot in Action, Understanding Data with Graphs, Manning Publications, 2010.

REFERENCE BOOKS

1. Information Dashboard Design-Displaying data for at-a-glance monitoring-Stephen Few
2. Beautiful Visualisation, Looking at data through the eyes of experts by Julie steele.

WEB SOURCES:

<https://www.tableau.com/learn/articles/data-visualization>

<https://www.digiteum.com/data-visualization-techniques-tools/>

Social Computing Stream

DSE206 SOCIAL MEDIA PROGRAMMING AND CONTENT DESIGN 4004

Course Objective

To understand the popular social media such as Facebook, LinkedIn and their impact for creating awareness on the product and to promote business

UNIT 1 SOCIAL BUSINESS FUNDAMENTALS 12

Social business fundamentals-Social feedback Cycle-social Web and Engagement-Social Interactions-Social CRM-Outreach and Influencer relations

UNIT 2 SOCIAL BUSINESS 12

Social Business-Employee as change agents-Social business ecosystem-social profiles-social applications-brand outpost and communities-Social Ecosystem.

UNIT 3 SOCIAL BUSINESS-INNOVATION CYCLE 12

Social Business-innovation cycle-Social CRM and Decision support-social analytics-metrics and measurement-Web Analytics-Business analytics-Best practices in social business

UNIT 4: SOCIAL CRM AND BUSINESS DESIGN 12

Social CRM and business design-Build a social CRM program-Engagement as customer activity in social web-Social object-build on existing social objects-create new social objects-use social objects-

UNIT 5 SOCIAL GRAPH-TOOLS 12

Social graph-tools-Use of social graph-Measure social graph-Social graph applications-Content publishing and sharing-crowd sourcing-ideation-curation and reputation management

TOTAL: 60 HOURS

COURSE OUTCOME:

At the end of this course the students will be able to:

- CO1:** Understand the impact of social media and its appropriate usage
- CO2:** Analyze the content in social media in business..
- CO3:** Apply strategies for promotion of business
- CO4:** Identify the risk and develop CRM.
- CO5:** Build innovative techniques for engaging customer.

TEXT BOOK:

1. Dave Evans with Jake Mckee, Social Media Marketing Wiley publishing Inc.

REFERENCES:

1. Mark D. Hawker, The developer guide to social programming , Addison-Wesley
2. Min-Yuh-Day, Social, Media and Mobile Apps Programming
3. Matthew A. Russell, Mining the Social Web, O'REILLY

WEB SOURCES:

1. <https://sproutsocial.com/insights/social-media-content-strategy/>
2. <https://powerdigitalmarketing.com/blog/social-media-and-web-development-better-together/#gref>

Course Objective: To introduce and practice advanced algorithms and programming techniques necessary for developing sophisticated computer application programs. To get accustomed with various programming constructs such as divide-and-conquer, backtracking, and dynamic programming and also to understand and use various data structures in applications.

UNIT I ANALYSIS OF ALGORITHMS 12

Review of order of growth of functions, recurrences, probability distributions, Average case analysis of algorithms, Randomized Algorithms – Analysis - NP – Complete and NP – Hard Problems – Amortized Analysis

UNIT II HEAPS 12

Min Heap – Min-max Heaps – Leftist heaps – Skew leftist heaps – Binomial Heaps – Lazy binomial heaps – Fibonacci Heaps.

UNIT III TREES 12

AVL Trees – Red-Black Trees – Splay Trees - B trees - Multi-way search trees –Tries

UNIT IV ADVANCED TREE STRUCTURES 12

Point – trees – Quad trees - K-d trees – TV- trees – Segment trees – Static and Dynamic

UNIT V GEOMETRIC ALGORITHMS 12

Geometric algorithms – line segment intersection – Map overlay detection – Voronoi diagram

TOTAL: 60 HOURS

COURSE OUTCOME:

At the end of this course the students will be able to:

- CO1:** Familiarize with algorithmic techniques such as brute force, greedy, and divide and conquer
- CO2:** Apply advanced abstract data type (ADT) and data structures in solving real world problems
- CO3:** Analyze and apply graph data structure to real-life problems
- CO4:** Build a complete algorithmic solution to a given problem by effectively combine fundamental data structures and algorithmic techniques
- CO5:** Identify suitable data structures and develop algorithms for computational geometry problems

TEXT BOOKS

1. H. S. Wilf, Algorithms and complexity, Prentice hall.
2. T. H. Cormen, C. E. Leiserson, R. L. Rivest, Introduction to Algorithms, Prentice hall.
3. Sahni, Data Structures, Algorithms, and Applications in C++, Silicon Press, 2/e, 2005

REFERENCES

1. A.S.Tanenbaum, Y. Langsam, and M.J. Augenstein DataStructures Using C -, PHI/Pearson education.
2. Jon Kleinberg and Eva Tardos , Algorithm Design, Jon Kleinberg and Eva Tardos, Pearson

WEB SOURCES:

1. <https://algs4.cs.princeton.edu/home/>
2. <https://www.csc.lsu.edu/~kundu/dstr/1-intr.pdf>
3. <https://btechgeeks.com/advanced-data-structure-notes/>

DSE208 BUSINESS INTELLIGENCE AND ITS APPLICATION 4 0 0 4

Course Objective: To understand the concept of business intelligence and the methods for creating, deploying and interaction with various tools for data and report generation.

UNIT-1 BUSINESS INTELLIGENCE 12

Introduction:-purpose and structure of business intelligence systems:-understanding multidimensional analysis concepts- Business intelligence architectures: Cycle of a business intelligence analysis – Enabling factors in business intelligence projects – Development of a business intelligence system – Ethics and business intelligence.

UNIT-2 BUSINESS INTELLIGENCE PROJECTS 12

Business intelligence projects:-wizard to create cube:-parent-child dimension:-adding measure and measure groups of a cube:-calculated members:-creating, deploying and browsing a cube

UNIT-3 MDX 12

Using MDX to retrieve values:-calculation scripting:-creation of API's:-Creating reference using financial analysis cubes:-interaction with cubes:-creating standard and drilled down actions

UNIT-4 CREATING PERSPECTIVES 12

Creating perspectives:-MDX queries:-Microsoft EXCEL with analysis services:-Data mining concepts:-creating data for data mining:-model creation:-

UNIT-5 DATA MINING QUERIES AND REPORTS 12

Creating data mining queries and reports:-Understanding DMX Language using SQL Server reporting services to develop reports:- mapping mining structures to source data columns:using cube sources:-configuring algorithm parameters

TOTAL: 60 HOURS

COURSE OUTCOME:

At the end of this course the students will be able to:

- CO1:** Explain the fundamentals of business intelligence.
- CO2:** Link data mining with business intelligence.
- CO3:** Apply various modeling techniques.
- CO4:** Explain the data analysis and knowledge delivery stages.

CO5: Apply business intelligence methods to various situations

TEXT BOOK

1. Wilfried Grossman, Rinderle Ma Stefanie Fundamentals of Business Intelligence springer.
2. Efraim Turban, Ramesh Sharda, Dursun Delen, Decision Support and Business Intelligence Systems , 9th Edition, Pearson 2013.

REFERENCES:

1. Larissa T. Moss, S. Atre, Business Intelligence Roadmap: The Complete Project Lifecycle of Decision Making , Addison Wesley, 2003.
2. Carlo Vercellis, Business Intelligence: Data Mining and Optimization for Decision Making , Wiley Publications, 2009.
3. David Loshin Morgan, Kaufman, Business Intelligence: The Savvy Manager's Guide , Second Edition, 2012.
4. Cindi Howson, Successful Business Intelligence: Secrets to Making BI a Killer App , McGraw-Hill, 2007.
5. Ralph Kimball , Margy Ross , Warren Thornthwaite, Joy Mundy, Bob Becker, The Data Warehouse Lifecycle Toolkit , Wiley Publication Inc.,2007.

WEB SOURCES:

<http://www.tgpct.com/CSE-QP/7SEM/Big-Data-Unit-4-5-6.pdf>

<https://www.win.tue.nl/~mpechen/courses/TIES443/handouts/lecture02.pdf>

<http://www.smaa.fi/static/tbi/2012/tbi-2012-11.pdf>

DSE209 INTERNETS OF THINGS 4004

Course Objective: This course gives a foundation in the Internet of Things, including the components, tools, and analysis by teaching the concepts behind the IoT and a look at real-world solutions.

UNIT I INTRODUCTION 12

Introduction: IoT data and Bigdata, Challenges of IoT Analytics Applications. IoT Analytics lifecycle and Techniques.

UNIT II IOT, CLOUD AND BIGDATA 12

Cloud –Based IoT Platform, data analytics for the IoT, WAZIUP software platform, iKaaS software platform

UNIT III DEVELOPMENT TOOLS 12

Introduction, VITAL Development Environment, Vital Nodes: PPI Modes, system nodes, service nodes, Query systems, query services, query sensors.

UNIT IV IOT ANALYTICS AS A SERVICE 12

Architecture for IoT Analytics as a service, Sensing as a service, Scheduling, metering and service delivery

UNIT V IOT ANALYTICS APPLICATIONS 12

Management System of Smart Building, IoT based information management system for energy efficiency in smart buildings – edge based IoT analytics

TOTAL: 60 HOURS

COURSE OUTCOME:

At the end of this course the students will be able to:

- CO1:** Understand the definition and significance of the Internet of Things
- CO2:** Discuss the architecture, operation, and business benefits of an IoT solution
- CO3:** Examine the potential business opportunities that IoT can uncover
- CO4:** Explore the relationship between IoT, cloud computing, and big data
- CO5:** Identify how IoT differs from traditional data collection systems

TEXT BOOKS:

1. John Soldatos Building Blocks for IoT Analytics Internet-of-Things Analytics River Publishers
2. [Andrew Minteer](#) Analytics for the Internet of Things (Iot) Ingram short title

REFERENCES:

1. [HwaiyuGeng](#) Internet of Things and Data Analytics Handbook [Wiley](#)

WEB SOURCES:

<https://www.slideshare.net/mazlan1/internet-of-things-iot-we-are-at-the-tip-of-an-iceberg>

<https://www.csc2.ncsu.edu/faculty/mpsingh/papers/tmp/notes-IoT.pdf>

Course Objective: To learn the fundamentals of 5G internet. To understand the concept of small cells in 5G mobile networks. To learn the mobile clouds in 5G network context. To understand the role of cognitive radios in 5G networks and to learn the security issues in 5G networks.

UNIT I PERVASIVE CONNECTED WORLD AND 5G INTERNET 12

Historical Trend of Wireless Communications – Evolution of LTE Technology to Beyond 4G –5G Roadmap – Ten Pillars of 5G – Internet of Things and Context Awareness – Networking Reconfiguration and Virtualization Support – Mobility – Quality of Service Control–Emerging Approach for Resource over Provisioning.

UNIT II SMALL CELLS FOR 5G MOBILE NETWORKS 12

Introduction to Small Cells – Capacity Limits and Achievable Gains with Densification – Mobile Data Demand – Demand vs. Capacity – Small Cell Challenges.

UNIT III COOPERATION FOR NEXT GENERATION WIRELESS NETWORKS 12

Introduction – Cooperative Diversity and Relaying Strategies: Cooperation and Network Coding, Cooperative ARQ MAC Protocols – PHY Layer Impact on MAC Protocol Analysis: Impact of Fast Fading and Shadowing on Packet Reception for QoS Guarantee, Impact of Shadowing Spatial Correlation – Study: NCCARQ, PHY Layer Impact.

UNIT IV MOBILE CLOUDS AND COGNITIVE RADIO 12

Introduction – The Mobile Cloud – Mobile Cloud Enablers – Network Coding – Overview of Cognitive Radio Technology in 5G Wireless – Spectrum Optimization using Cognitive Radio – Relevant Spectrum Optimization Literature in 5G – Cognitive Radio and Carrier Aggregation – Energy Efficient Cognitive Radio Technology.

UNIT V SECURITY AND SELF ORGANISING NETWORKS 12

Overview of Potential 5G Communications System Architecture – Security Issues and Challenges in 5G Communications Systems – Self Organising Networks: Introduction, Self Organising Networks in UMTS and LTE, The Need for Self Organising Networks in 5G, Evolution towards Small Cell Dominant HetNets.

TOTAL: 60 HOURS

COURSE OUTCOME:

At the end of this course the students will be able to:

- CO1:** Compare the 5G network with older generations of networks.
- CO2:** Identify suitable small cells for different applications in 5G networks.
- CO3:** Analyze 5G network scenarios.
- CO4:** Create applications to mobile cloud.
- CO5:** Design applications with 5G network support.

TEXT BOOKS:

1. Jonathan Rodriguez, Fundamentals of 5G Mobile Networks , Wiley, 2015.
2. Yin Zhang, Min Chen, Cloud Based 5G Wireless Networks – Springer Briefs in Computer Science , Springer, 2016.

REFERENCES:

1. Athanasios G. Kanatas, Konstantina S. Nikita, Panagiotis (Takis) Mathiopoulos, New Directions in Wireless Communications Systems: From Mobile to 5G , CRC Press, 2017.

WEB SOURCES:

<https://www.slideshare.net/apnic/next-generation-network-architecture>

<https://www.geeksforgeeks.org/next-generation-network-ngn/>

<http://www.cs.ust.hk/~hamdi/Class/CSIT560-S13/Notes-13/IP1.pdf>

SEMESTER III

Business Analytical Stream

DSE301 BIG DATA ANALYTICS AND HADOOP 3 0 0 3

Course Objective To understand the key issues in big data management and its associated applications in intelligent business and scientific computing and the tools required to manage and analyze big data like Hadoop, NoSql, Map Reduce and to students to have skills that will help them to solve complex real-world problems in for decision support.

UNIT 1 BIG DATA 9

Introduction to Big Data, Characteristics of Data, and Big Data, Evolution of Big Data, Definition of Big Data, Challenges with bigdata, Why Big data? Data Warehouse environment, Traditional Business Intelligence versus Big Data. State of Practice in Analytics, Introduction to big data analytics and Classification of Analytics, Challenges& importance of Big Data, Big Data Technologies, Data Analytics Life Cycle.,

UNIT 2 DATA ANALYSIS 9

Evolution of analytic scalability – Convergence – parallel processing systems – Cloud computing –grid computing – map reduce – enterprise analytic sand box – analytic data sets – Analytic methods –analytic tools – Cognos – Microstrategy - Pentaho. Analysis approaches – Statistical significance –business approaches – Analytic innovation – Traditional approaches – Iterative

UNIT 3 PREDICTIVE ANALYTICS AND VISUALIZATION 9

Predictive Analytics – Supervised – Unsupervised learning – Neural networks – Kohonen models –Normal – Deviations from normal patterns – Normal behaviours – Expert options – Variable entry -Mining Frequent itemsets - Market based model – Apriori Algorithm –Decision Trees, Naïve Bayes, Time Series Analysis, Box Jenkins methodology, Text Analysis, Steps, Text Analysis Example.

UNIT 4 HADOOP 9

Data Product, Building Data Products at Scale with Hadoop, Data Science Pipeline and Hadoop Ecosystem, Operating System for Big Data, Concepts, Hadoop Architecture, Spark Basics,

UNIT 5 THE HADOOP ECOSYSTEM 9

The Hadoop ecosystem - Introduction to Hadoop - Hadoop components: MapReduce/Pig/Hive/HBase - Loading data into Hadoop - Handling files in Hadoop - Getting data from Hadoop

COURSE OUTCOME:

At the end of this course the students will be able to:

- CO1:** Understand fundamental techniques and principles in achieving big data analytics with scalability and streaming capability
- CO2:** Identify the characteristics of datasets and compare the trivial data and big data for various applications
- CO3:** Implement machine learning techniques and computing environment that are suitable for the applications under consideration
- CO4:** Solve problems associated with batch learning and online learning, and the big data characteristics such as high dimensionality, dynamically growing data and in particular scalability issues
- CO5:** Apply scaling up machine learning techniques and associated computing techniques and technologies

TEXT BOOKS:

1. Seema Acharya, Subhashini Chellappan, Big Data and Analytics , Wiley Publication, 2015.
2. Benjamin Bengfort and Jenny Kim, Data Analytics with Hadoop-An Introduction for Data Scientists, O'Reilly 2016.

REFERENCE BOOKS:

1. Judith Hurwitz, Alan Nugent, Dr. Fern Halper, Marcia Kaufman, Big Data for Dummies , John Wiley & Sons, Inc., 2013.
2. Tom White, Hadoop: The Definitive Guide , O'Reilly Publications, 2011.
3. Kyle Banker, Mongo DB in Action , Manning Publications Company, 2012.
4. Russell Bradberry, Eric Blow, Practical Cassandra A developers Approach , Pearson Education, 2014.

DSE 302 PROGRAMMING FOUNDATIONS OF DATA SCIENCES 3 0 0 3

Course Objective: To provide strong foundation for data science and application area related to it and understand the underlying core concepts and emerging technologies in data science.

Unit-1 DATA SCIENCE 9

Definition – Data Science – Why Data Science – Data Scientist – Data Science Process – Data Preparation – Data Exploration – Data Modelling

Unit-2 BIG DATA 9

Big Data – Characteristics of big data – general Techniques for Big Data – data storage for big data - Applications of Big data- case study.

Unit-3 MACHINE LEARNING 9

Machine Learning – Definition- Key Elements of machine learning - types machine learning algorithms - supervised and unsupervised algorithms -Application of machine learning .

Unit-4 DEEP LEARNING 9

Deep Learning – Definition - Feed Forward Networks – Optimization for deep learning algorithms – Applications of Deep Learning algorithms

Unit-5 DATA VISUALIZATION 9

Introduction to Data Visualization – Data Visualization options and Filters – Ethics and Tools: Data Science ethics – future Trends of Data science – Data Science Tools.

TOTAL: 45 HOURS

COURSE OUTCOME:

At the end of this course the students will be able to:

- CO1:** Understand the fundamental concepts of data science
- CO2:** Evaluate the data analysis techniques for applications handling large data
- CO3:** Demonstrate the various machine learning algorithms used in data science
- CO4:** Visualize and present the inference using various tools
- CO5:** Learn to think through the ethics surrounding privacy, data sharing and algorithmic decision-making

TEXT BOOKS

1. EMC Education Services, Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data , Wiley publishers, 2015.
2. Bart Baesens, Analytics in a Big Data World: The Essential Guide to Data Science and its Applications , Wiley Publishers, 2015

REFERENCES

1. AnandRajaraman and Jeffrey Ullman, Mining Massive Data sets , Cambridge University Press, 2014
2. Michael Minelli, Michele Chambers, Ambiga Dhiraj , Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends , John Wiley & Sons, 2013

WEB SOURCES

<https://analyticsindiamag.com/7-popular-data-science-presentations-on-slideshare/>

https://nathancarter.github.io/MA346-course-notes/_build/html/chapter-1-intro-to-data-science.html

Course Objective: Analyze the asymptotic performance of algorithms and students can write rigorous correctness proofs for algorithms. Also they can demonstrate a familiarity with major algorithms and data structures. Apply important algorithmic design paradigms and methods of analysis

UNIT I INTRODUCTION 9

Introduction Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithm Efficiency – Analysis Framework – Asymptotic Notations and its properties – Mathematical analysis for Recursive and Non-recursive algorithms.

UNIT II BRUTE FORCE AND DIVIDE-AND-CONQUER 9

Brute Force - Closest-Pair and Convex-Hull Problems-Exhaustive Search - Traveling Salesman Problem - Knapsack Problem - Assignment problem. Divide and conquer methodology – Merge sort – Quick sort – Binary search

UNIT III DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE 9

Computing a Binomial Coefficient – Warshall’s and Floyd’ algorithm – Optimal Binary Search Trees – Knapsack Problem and Memory functions. Greedy Technique– Prim’s algorithm-Kruskal'sAlgorithmDijkstra's Algorithm-Huffman Trees.

UNIT IV ITERATIVE IMPROVEMENT 9

The Simplex Method-The Maximum-Flow Problem – Maximum Matching in Bipartite GraphsThe Stable marriage Problem

UNIT V COPING WITH THE LIMITATIONS OF ALGORITHM 9

Power Limitations of Algorithm Power-Lower-Bound Arguments-Decision Trees-P, NP and NPComplete Problems--Coping with the Limitations - Backtracking – n-Queens problem – Hamiltonian Circuit Problem – Subset Sum Problem-Branch and Bound – Assignment problem – Knapsack Problem – Traveling Salesman Problem- Approximation Algorithms for NP – Hard Problems – Traveling Salesman problem – Knapsack problem.

TOTAL: 45 HOURS

COURSE OUTCOME:

At the end of this course the students will be able to:

- CO1:** Argue the correctness of algorithms using inductive proofs and Analyze worst-case running times of algorithms using asymptotic
- CO2:** Understand the techniques for designing efficient algorithms: recursion, divide-and-conquer, dynamic programming, balancing and backtracking
- CO3:** Describe the problems on sets and sequences: merging, sorting, searching, and selection (including external memory)
- CO4:** Analyze Graph/Network algorithms, String matching algorithms , Optimization algorithms LP, IP, SDP.
- CO5:** Describe the classes P, NP, and NPComplete and be able to prove that a certain problem is NP-Complete

TEXT BOOKS:

1. A. Aho, J. Hopcroft and J. Ullman The Design and Analysis of algorithms
2. D. E. Knuth The Art of Computer Programming , Vol. I & Vol. 2

REFERENCES:

1. Horowitz Ellis, SahaniSartaz, R. Sanguthevar Fundamentals of Computer Algorithms .
2. Goodman: Introduction to Design and Analysis Of Algorithms,

WEB SOURCES:

<http://cs.uef.fi/pages/franti/asa/notes.html>

<http://web.uettaxila.edu.pk/CMS/SP2013/seAAbs/notes/lec1.ppt>

Course objectives: Be exposed to big data , Learn the different ways of Data Analysis, Be familiar with data streams and Learn the basic understanding of R programming, data structures, functions, how to work with packages, files and know about the data visualization and data management techniques using R tool.

UNIT I: INTRODUCTION TO BIG DATA 9

Analytics – Nuances of big data – Value – Issues – Case for Big data – Big data options Team challenge – Big data sources – Acquisition – Nuts and Bolts of Big data. Features of Big Data -Security, Compliance, auditing and protection - Evolution of Big data – Best Practices for Big data Analytics - Big data characteristics - Volume, Veracity, Velocity, Variety – Data Appliance and Integration tools.

UNIT II: DATA ANALYSIS 9

Evolution of analytic scalability – Convergence – parallel processing systems – Cloud computing –grid computing – map reduce – enterprise analytic sand box – analytic data sets – Analytic methods –analytic tools – Cognos – Microstrategy - Pentaho. Analysis approaches – Statistical significance –business approaches – Analytic innovation – Traditional approaches – Iterative

UNIT III: PREDICTIVE ANALYTICS AND VISUALIZATION 9

Predictive Analytics – Supervised – Unsupervised learning – Neural networks – Kohonen models –Normal – Deviations from normal patterns – Normal behaviours – Expert options – Variable entry -Mining Frequent itemsets - Market based model – Apriori Algorithm – Handling large data sets in Main memory- IBM for Big Data – Map Reduce Framework - Hadoop – Hive - – Sharding – NoSQL Databases - S3 -Hadoop Distributed file systems

UNIT IV: INTRODUCTION TO R 9

Overview of R programming - Evolution of R - Applications of R programming – Basic syntax - Basic Concepts of R, Control flow of R -R packages - Data Reshaping: Joining Columns and Rows in a Data Frame - Merging Data Frames - Melting and Casting.

UNIT V: DATA VISUALIZATION AND DATA MANAGEMENT USING R 9

Data visualization in R and Data Management - Bar Chart, Dot Plot, Scatter Plot (3D), Spinning Scatter Plots, Pie Chart - Histogram (3D) [including colorful ones], Overlapping Histograms –

Boxplot, Plotting with Base and Lattice Graphics Missing Value Treatment - Outlier Treatment
- Sorting Datasets - Merging Datasets - Binning variables.

TOTAL: 45 HOURS

COURSE OUTCOME:

At the end of this course the students will be able to:

- CO1:** Understand the key issues in big data management and its associated applications in intelligent business and scientific computing
- CO2:** Design distributed file systems and Apply Stream data model.
- CO3:** Apply data visualization and data management techniques.
- CO4:** Use R to create sophisticated figures and graphs.

TEXT BOOKS:

1. Frank J Ohlhorst, Big Data Analytics: Turning Big Data into Big Money , Wiley and SAS BusinessSeries, 2012.
2. Colleen Mccue, Data Mining and Predictive Analysis: Intelligence Gathering and Crime Analysis ,Elsevier, 2007
3. Michael Berthold, David J. Hand, Intelligent Data Analysis , Springer, 2007.
4. Norman Matloff , The Art of R Programming-a tour of statistical software design , William Pollock, 2011.
5. Paul Teetor R Cookbook: Proven Recipes for Data Analysis, Statistics, and Graphics , O'Reilly Cookbooks, O'Reilly Media , 2011.

REFERENCES:

1. AnandRajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge UniversityPress, 2012.
2. Bill Franks, Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams withAdvanced Analytics , Wiley and SAS Business Series, 2012.
3. Paul Zikopoulos, Chris Eaton, Paul Zikopoulos, Understanding Big Data: Analytics for EnterpriseClass Hadoop and Streaming Data , McGraw Hill, 2011.

4. Pete Warden, Big Data Glossary, O'Reilly, 2011.
5. Jiawei Han, Micheline Kamber Data Mining Concepts and Techniques , Second Edition, Elsevier,Reprinted 2008.
6. Glenn J. Myatt, Making Sense of Data, John Wiley & Sons, 2007.

WEB SOURCES:

<https://rviews.rstudio.com/2019/07/17/3-big-data-strategies-for-r/>

<https://www.slideshare.net/GWOcon/big-data-analytics-with-r>

Course Objective: To understand the basics of machine learning and deep learning and to apply the Machine learning principles. To study the deep learning architectures. Explore and create deep learning applications with tensor flow.

UNIT-I: INTRODUCTION 9

Introduction to different types of learning, Supervised and Unsupervised learning – Reinforcement learning- Basics of Neural Network – Limits of Traditional Computing – Machine Learning – Neuron – FF Neural Networks – Types of Neurons – Softmax output layers

UNIT-II: TENSOR FLOW 9

Tensor flow – Variables – Operations – Placeholders – Sessions – Sharing Variables – Graphs – Visualization

UNIT-III: CONVOLUTION NEURAL NETWORKS 9

Convolution Neural Network – Feature Selection – Max Pooling – Filters and Feature Maps – Convolution Layer – Applications

UNIT-IV: RECURRENT NEURAL NETWORKS 9

Recurrent Neural Network – Memory cells – sequence analysis – word2vec- LSTM - Memory augmented Neural Networks – NTM – Application

UNIT-V: REINFORCEMENT LEARNING 9

Reinforcement Learning – MDP – Q Learning – Applications

TOTAL: 45 HOURS

COURSE OUTCOME:

At the end of this course the students will be able to:

CO1: Interpret the basics of Machine learning.

CO2: Design and develop machine learning applications

CO3: Analyze the various applications of Convolution Neural Networks, Artificial Neural Networks, Recurring Neural Networks

CO4: Explore, Evaluate different neural networks

CO5: Apply the concepts of deep learning in real life problems

TEXTBOOK:

1. R.Rojas and J. Feldman, Neural Networks: A Systematic Introduction (1st ed.), Springer, 1996.
2. Nikhil Buduma, Nicholas Locascio, Fundamentals of Deep Learning: Designing NextGeneration Machine Intelligence Algorithms , O'ReillyMedia, 2017.

REFERENCES:

1. Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning (Adaptive computation and Machine Learning series , MITPress, 2017.
2. E. Alpaydin, Introduction to Machine Learning, Prentice Hall of India, 2006.
3. B. Yegnanarayana, Artificial Neural Networks, Prentice-Hall of India, 2006
4. S. Haykin, Neural Networks: A Comprehensive Foundation (2nd ed.), Prentice Hall, 1999

WEB SOURCES

<https://cs.uwaterloo.ca/~mli/Deep-Learning-2017-Lecture5CNN.ppt>

http://cs229.stanford.edu/notes2020spring/cs229-notes-deep_learning.pdf

TEXT BOOKS:

1. Jon Peddie, Augmented Reality, Where we will all live Springer International Publishing
2. Schmalstieg/Hollerer , Augmented Reality: Principles Addison-Wesley (22 June 2016)

REFERENCES:

1. Gregory Kipper and Joseph Rampolla Augmented Reality: An Emerging Technologies Guide to AR Syngress; 1st Edition (December 3, 2012)
2. Paul Mealy Virtual & Augmented Reality For Dummies For Dummies (8 June 2018)

WEB SOURCES

<http://danielschristian.com/presentations/VR-AR-MR-Daniel-Christian-March2017.pdf>

<https://www.geeksforgeeks.org/virtual-reality-augmented-reality-and-mixed-reality/>

Course Objective: To endow students with a base of knowledge and attitudes for them to critically examine existing social computing services, and become familiar with the approach of using socio-technical designs for supporting aspects of social behaviors and activities

UNIT 1 ONLINE SOCIAL NETWORKS (OSNS) 9

Introduction - Types of social networks (e.g., Twitter, Facebook), Measurement and Collection of Social Network Data - Social Networks - Basic Structure and Measures -Basics of Text Processing over Social Data- Entity linking and entity resolution for Social data

UNIT 2 STUDYING CHARACTERISTICS OF OSNS 9

Studying Characteristics of OSNs - - Information Diffusion- Experimental studies over OSNs, - Sampling

UNIT 3 FUNDAMENTALS OF SOCIAL DATA ANALYTICS 9

Social media data- Social media providers - Social media analytics techniques- Random Walks- Random Walks on Graphs- Supervised Random Walks Recommendation Systems Heterogeneous Information Networks

UNIT 4 APPLIED SOCIAL DATA ANALYTICS 9

Recommendation Systems - Community identification and link prediction- Diffusion, Language Dynamics Link Prediction, Voter Model

UNIT 5 OTHER ADVANCED TOPICS 9

Online experiments for Computational Social Science - Big Data Sampling

TOTAL: 45 HOURS

COURSE OUTCOME:

At the end of this course the students will be able to:

- CO1:** Understand the models of social computing are prevalent among end-users, such as Wikipedia, social networking sites (e.g., Facebook), micro blogging (e.g., Twitter how these technologies influence human behaviors
- CO2:** Identify the key issues around social computing, a using computing techniques and artifacts to support, mediate, and understand aspects of social behaviors and social interactions
- CO3:** Analyse the prominent ways of Social media in the world today, and to understand certain principles and techniques of social computing

CO4: Evaluate the specific design instances and user studies, so that students may better understand how general ideas of social computing can be applied to specific research and design contexts

TEXT BOOKS:

1. Matthew A. Russell. Mining the Social Web: Data Mining Facebook, Twitter, LinkedIn, Google+, Github, and More, 2nd Edition, O'Reilly Media, 2013.
2. Jennifer Golbeck, Analyzing the social web, Morgan Kaufmann, 2013.

REFERENCES :

1. Charu Aggarwal (ed.), Social Network Data Analytics, Springer, 2011.

WEB SOURCES:

http://cse.iitkgp.ac.in/~pawang/courses/SC16/Social_media_analytics.pdf

https://cse.iitkgp.ac.in/~pawang/courses/SC16/nlp_social3.pdf

Course Objective: This course takes an in-depth look at Internet social networks, social media platforms and online advertising to offer students an advantage in many positions involving marketing, consulting and brand management both on the buyer and seller side of social media

UNIT 1 SOCIAL MEDIA MARKETING 9

Social Media marketing - 7 myths of social marketing - history of social media marketing - characteristics of a successful social media marketer - - careers in social media marketing - social media plan - social media marketing planning cycle - social web - social media marketing goals - social media objectives - - 8 C's of Strategy Development - Self-promotion versus building army of advocates on the social web

UNIT 2 MARKETS ON THE SOCIAL WEB 9

Audience targeting - SMM targeting process- big data and its role in SMM target - contents of SMM media plan - optimization means in SMM - - uses of keywords, hashtags, and emojis in targeting branded posts - best practices for targeting branded posts

UNIT 3 ENGAGEMENT FOR SOCIAL MEDIA 9

Rules of engagement for SMM - permission vs. interruption marketing - initial entry strategy of Passive vs. Active - the principles for success in social media engagement - - the rules of effective social media interaction - SMM ethics - ethical social media decisions - global perspective of SMM

UNIT 4 SOCIAL NETWORKS 9

Types of social media platforms with emphasis on on social networks - history of social networks indicating they have grown in the United State and globally - - benefits of target marketing with social networks - ways both B2C and B2B marketers use social networks - white label social networking - predictions about the future of social networks - best practices for marketing with social media platforms

UNIT 5 MICROBLOGS 9

Microblogging - history of microblogging - uses for microblogging - benefits of marketing with microblogs - building brands with Twitter - - microblogging marketing objectives - creating an effective Twitter channel- microblogging and the market objectives- Developing a personal branding plan using microblogging

COURSE OUTCOME:

At the end of this course the students will be able to:

- CO1:** Evaluate information and material that are presented on various online platforms.
- CO2:** Analyze and evaluate consumer behavior and digital media based on some Basic theory of social networks online and offline (graph theory, sociology).
- CO3:** Analyze B2B marketing on social media and evaluate marketing effectiveness variables (engagement)
- CO4:** Use Social Media Analytics and Monitoring and to devise brand strategies on social media.
- CO5:** Develop a personal branding plan using microblogging

TEXT BOOKS:

1. Barker & Barker Social Media Marketing: A Strategic Approach, 2nd Edition
2. Zarrella, Dan. The social media marketing book. O'Reilly Media, Inc. , 2009.

REFERENCES:

1. Nadda, V. K., Dadwal, S. S., & Firdous, A. (2015). Social media marketing. In Handbook of Research on Integrating Social Media into Strategic Marketing (pp. 359-379). IGI Global.
2. Prasad, P., & Saigal, P. Social media marketing: Tools and techniques. In Application of gaming in new media marketing , IGI Global.

WEB SOURCES :

https://ccs.instructure.com/courses/1396406/files/72951427?module_item_id=19785503

https://ccs.instructure.com/courses/1396406/files/72951428?module_item_id=19785504

Couse Objectives : To understand the fundamentals of Cryptography, to acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity, the various key distribution and management schemes, how to deploy encryption techniques to secure data in transit across data networks and to design security applications in the field of Information technology

UNIT I INTRODUCTION**9**

An Overview of Computer Security-Security Services-Security Mechanisms-Security Attacks-Access Control Matrix, Policy-Security policies, Confidentiality policies, Integrity policies and Hybrid policies.

UNIT II CRYPTOSYSTEMS & AUTHENTICATION**9**

Classical Cryptography-Substitution Ciphers-permutation Ciphers-Block Ciphers-DESModes of Operation- AES-Linear Cryptanalysis, Differential Cryptanalysis- Hash Function- Message Authentication Codes - Authentication Protocols

UNIT III PUBLIC KEY CRYPTOSYSTEMS**9**

Introduction to Public key Cryptography- Number theory- The RSA Cryptosystem and Factoring Integer- Attacks on RSA- Digital Signature Algorithm-Finite Fields-Elliptic Curves Cryptography- Key management – Session and Interchange keys, Key exchange and generation-PKI

UNIT IV SYSTEM IMPLEMENTATION**9**

Design Principles, Representing Identity, Access Control Mechanisms, Information Flow and Confinement Problem Secure Software Development: Secured Coding - Vulnerabilities - Buffer Overflows - Incomplete mediation Command Injection - Redirection - Inference – Application Controls

UNIT V NETWORK SECURITY**9**

Secret Sharing Schemes-Kerberos- Pretty Good Privacy (PGP)-Secure Socket Layer (SSL)- Intruders – HIDS- NIDS - Firewalls - Viruses

TOTAL: 45 HOURS

COURSE OUTCOME:

At the end of this course the students will be able to:

- CO1:** Implement basic security algorithms required by any computing system.
- CO2:** Analyze the vulnerabilities in any computing system and hence be able to design a security solution.
- CO3:** Analyze the possible security attacks in complex real time systems and their effective countermeasures
- CO4:** Identify the security issues in the network and resolve it.
- CO5:** Evaluate security mechanisms using rigorous approaches, including theoretical derivation, modeling, and simulations

TEXT BOOKS

1. William Stallings, Cryptography and Network Security: Principles and Practices , Third Edition, Pearson Education, 2006.
2. Matt Bishop , Computer Security art and science , Second Edition, Pearson Education, 2002
3. Wade Trappe and Lawrence C. Washington, Introduction to Cryptography with Coding Theory Second Edition, Pearson Education, 2007

REFERENCES

1. Jonathan Katz, and Yehuda Lindell, Introduction to Modern Cryptography, CRC Press, 2007
2. Douglas R. Stinson, Cryptography Theory and Practice , Third Edition, Chapman & Hall/CRC, 2006
3. Wenbo Mao, Modern Cryptography – Theory and Practice , Pearson Education, First Edition, 2006.
4. Network Security and Cryptography, Menezes Bernard, Cengage Learning, New Delhi, 2011

WEB SOURCES

<http://xml.coverpages.org/OWASPTopTen.pdf>

<https://www.slideshare.net/gichelleamon/network-security-12322065>

Course Objectives: To provide an understanding of computer forensics fundamentals, to analyze various computer forensics technologies, to identify methods for data recovery, to apply the methods for preservation of digital evidence and to learn about the types of attacks and remedial actions in the context of systems, networks, images and videos.

UNIT I INCIDENT AND INCIDENT RESPONSE 9

Introduction to Security Threats: Introduction, Computer Crimes, Computer Threats and Intrusions, Telecommunication Fraud, Phishing, Identity Theft, Cyber Terrorism and Cyber War – Need for Security: Information Security, OS Security, Database Security, Software Development Security – Security Architecture – Introduction to Incident – Incident Response Methodology – Steps – Activities in Initial Response Phase After Detection of an Incident.

UNIT II FILE STORAGE AND DATA RECOVERY

9

File Systems – FAT, NTFS, NTFS Encrypting File System – Forensic Analysis of File Systems – Storage Fundamentals – Initial Response and Volatile Data Collection from Windows System – Initial Response and Volatile Data Collection from UNIX System – Forensic Duplication – Tools – Discovery of Electronic Evidence – Identification of Data – Reconstructing Past Events – Networks.

UNIT III NETWORK AND EMAIL FORENSICS

9

Network Evidence – Types of Network Monitoring – Setting Up a Network Monitoring System– Network Data Analysis – Email Clients – Email Tracing – Internet Fraud – Spam Investigations Mobile Forensics – Subscriber Identity Module (SIM) Investigations – Wireless Device Investigations – PDA Investigations.

UNIT IV SYSTEM FORENSICS 9

Data Analysis: Analysis Methodology – Investigating Live Systems (Windows and Mac OS) – Hacking: Investigating Hacker Tools – Ethical Issues – Cybercrime. Forensic and Investigative Tools – Forensic Equipments for Evidence Collection – Post Exploitation.

UNIT V IMAGE AND VIDEO FORENSICS 9

Recognizing a Graphics File – Data Compression – Locating and Recovering Graphics Files- Identifying Unknown File Formats – Copyright Issues with Graphics – Fraud using Image and Video – Detection of Fraud in Images and Video.

COURSE OUTCOME:

At the end of this course the students will be able to:

- CO1:** Recognize attacks on systems.
- CO2:** Design a counter attack incident response and incident-response Methodology.
- CO3:** Illustrate the methods for data recovery, evidence collection and data Seizure.
- CO4:** Understand network and email attacks and forensic investigation with Tools.
- CO5:** Use forensic tools and collect evidences of a computer crime.

TEXT BOOKS:

1. Kevin Mandia, Jason T. Luttgens, Matthew Pepe, Incident Response and Computer Forensics , Tata McGraw-Hill, 2014.
2. Bill Nelson, Amelia Philips, Christopher Stueart, Guide to Computer Forensics and Investigations , Cengage Learning, 2018.
3. John R. Vacca, Computer Forensics , Firewall Media, 2009.

REFERENCES:

4. Eoghan Casey, Handbook Computer Crime Investigation's Forensic Tools and Technology , Academic Press, 2001.
5. Davide Cowen, Computer Forensics: A Beginners Guide , McGraw-Hill, 2011.
6. Rafay Baloch, Ethical Hacking and Penetration Testing Guide , Auerbach Publications, 2014.

WEB SOURCES:

1. <https://search.slidegeeks.com/powerpoint/Cyber-Security>
2. <https://lecturenotes.in/subject/611/cyber-security-cs>

Generic Elective (GE)

21GEC01

SOFTSKILLS – I

- 2 0 0 2

Course Objective: To enable participants Business Communication Skills ,enhance participants E-mail writing skills and impart Leadership and Team Bonding skills

- | | | |
|-----------|---|-----------|
| 1. | READING COMPREHENSION AND VOCABULARY | 06 |
| | Filling the blanks – Cloze Exercise – Vocabulary building – Reading and answering Questions. | |
| 2. | LISTENING AND ANSWERING QUESTIONS. | 06 |
| | Listening and writing – Listening and sequencing sentences – Filling in the blanks – Listening and answering questions. | |
| 3. | GROUP DISCUSSIONS | 06 |
| | Why GD part of a selection process – Structure of a GD – strategies in GD – Team Work – Body Language | |
| 4. | CONVERSATION. | 06 |
| | Face to face Conversation and Telephone conversation. | |
| 5. | SELF- INTRODUCTION AND ROLE PLAY | 06 |

TOTAL: 30 HOURS

COURSE OUTCOME:

At the end of this course the students will be able to:

- CO1:** Prioritize power of understanding and aids assimilation of vocables.
Vocabulary to charge communication with educated words
- CO2:** Develop comprehensive knowledge through listening leading to answering questions
- CO3:** Build observation power and infuse self-confidence through group discussions
- CO4:** Identify methodology for befitting constructional ability
- CO5:** Experiments with inward looking and visualization of the ‘otherness’ of situations

REFERENCES

- Barun K. Mitra. Personality Development and Soft Skills. Oxford University Press. New Delhi.2011.
- S.P. Sharma. Personality Development. Pustaq Mahal. New Delhi. 2010.Meenakshi Raman and Sangeetha Sharma. Technical Communication. Oxford University Press. New Delhi. 2009.
- Tiko, Champa & Jaya Sasikumar. Writing with a Purpose.OUP. New Delhi. 1979

WEB SOURCE:

- <https://www.skillsyouneed.com/ips/communication-skills.html>
- <https://blog.smarp.com/top-5-communication-skills-and-how-to-improve-them>
- <https://blog.hubspot.com/service/phone-etiquette>

Course Objective: To enable students to develop their communication skills effectively, enhance students Reading, Writing, Listening and Speaking skills and develop their self-confidence through communication

1. PRESENTATION SKILLS	06
Elements of an effective presentation – structure of presentation – voice modulation – Audience analysis – Body language	
2. SOFT SKILLS	06
Time Management – Articulateness – Assertiveness – Stress management	
3. RESUME / REPORT PREPARATION / LETTER WRITING	06
Structuring the resume / Report – Business letters – E-Mail Communication	
4. INTERVIEW SKILLS	06
Kinds of Interviews – Required by Skills – Corporate Culture – Mock Interviews	
5. 30 FREQUENTLY ASKED QUESTIONS	06

TOTAL: 30 HOURS

COURSE OUTCOME:

At the end of this course the students will be able to:

- CO1:** Illustrate the essential of presentation skills, thoughts, structure, voice modulation, audience analysis and body language
- CO2:** Utilize the psychological skills pertaining to time management, articulation, assertion and stress management
- CO3:** Construct methodology for preparation of resume, reports, business letters and email communication
- CO4:** Appraise learners with varied skills needed for expose to interviews
- CO5:** Categorize the nature of questions asked usually in interviews

REFERENCES

- Barun K.Mitra. Personality Development and soft skills. Oxford University Press. New Delhi. 2011.
- S P Sharma. Personality Development. Pustaq Mahal. New Delhi. 2010.
- Meenakshi Raman and Sangeetha Sharma. Technical Communication. Oxford University Press. New Delhi. 2009.

WEB SOURCES

- <https://www.skillsyouneed.com/ips/communication-skills.html>
- <https://www.businessnewsdaily.com/5836-top-interviewing-skills.html>
- <https://gdpi.hitbullseye.com/Group-Discussion.php>