IV Year – I Semester
Data Mining & Warehousing

Unit 1
**Warehouse**: What is it, Who Need It, and Why?, Things to Consider, Managing the Data Warehouse, Getting ready for your project, Picking a target and moving forward, Project management benefits, The Scope statement, Work breakdown structure, Project estimating, Scope creep & tracking project’s progress

Unit 2

Unit 3 **Data mining** – Introduction, Data mining on what kind of data, Data mining functionalities classification of Data mining systems, Major issues in Data mining

**Mining Association rules in large databases** - Association rule mining, Mining single-Dimensional Boolean association rules from Transactional databases, Mining multi-Dimensional Association rules from relational Databases and Data Warehouses

Unit 4 **Classification and Prediction** - Introduction classification by decision tree induction, Bayesian Classification. Other classification methods, classification by back propagation, Prediction, classifier accuracy

Unit 5 **Cluster analysis** – Introduction, types of data in cluster analysis, a categorization of major clustering methods, partitioning methods, hierarchical methods


Text books

<table>
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<tr>
<th>Author</th>
<th>Title</th>
<th>Publisher</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Michael Corey, Michael Abbey, Ian Abramson, Ben Taub</td>
<td>Oracle 8i Data Warehousing</td>
</tr>
<tr>
<td>2</td>
<td>Jiawei Han Micheline Kamber</td>
<td>Data mining &amp; Techniques</td>
</tr>
</tbody>
</table>
### Reference books

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<tr>
<th></th>
<th>Author</th>
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<tbody>
<tr>
<td>2</td>
<td>Ralph Kimball</td>
<td>The Data Warehousing Toolkit</td>
<td>Wiley</td>
</tr>
<tr>
<td>3</td>
<td>Margaret H. Dunham</td>
<td>Data mining - Introductory and advanced topics</td>
<td>Pearson Education</td>
</tr>
</tbody>
</table>
IV Year – I Semester
Mobile Computing

Unit 1 Introduction: Wireless Networks, Structured and Unstructured Networks, Mobile Systems, 3G Networks, Next Generation Networks (NGN), Mobile Computing in Next Generation Networks (NGN), Applications of Mobile Computing in NGN, Location Based Services

Unit 2 Mobile Computing Architectures: Global Systems for Mobile Communications (GSM), General Packet Radio Service (GPRS), International Telecommunications Union (ITU) – T standards, NGN Architecture, Core Network, Access Network, Wi-Fi, WiMAX, Cellular Networks, Bluetooth

Unit 3 Mobility Management: Entities and Terminology, Mobility Management in GSM and GPRS, Home Location Register (HLR), Visitor Location Register (VLR), Features of IPv4 and IPv6, Mobile IP, IP Packet Delivery, changes in IPv6 for Mobile IPv6


Handover Management: Entities and Terminology, Types of Handovers, Handover Detection, Strategies for Handover Detection- Mobile Controlled Handover, Network Controlled Handover, Mobile assisted Handover, Handover Failures

### Text book

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<thead>
<tr>
<th>Author</th>
<th>Title</th>
<th>Publisher</th>
</tr>
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<tbody>
<tr>
<td>Jochen Schiller</td>
<td>Mobile Communications</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt; Edition Pearson Education</td>
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### Reference books

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<thead>
<tr>
<th>Author</th>
<th>Title</th>
<th>Publisher</th>
</tr>
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<tbody>
<tr>
<td>Mukesh Singhal and Niranjan G Shivaratri</td>
<td>Advanced Concepts in Operating Systems</td>
<td>TMH</td>
</tr>
</tbody>
</table>
IV Year – I Semester
Compiler Design

Unit 1     Introduction to Compiling, A simple One-pass Compiler,
Unit 2     Lexical Analysis, Syntax Analysis,
Unit 3     Syntax-directed translation, Type checking,
Unit 4     Run-time environments, Intermediate code generation
Unit 5     Code generation, Code Optimization

Text books

<table>
<thead>
<tr>
<th>Author</th>
<th>Title</th>
<th>Publisher</th>
</tr>
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<tbody>
<tr>
<td>Alfred V. Aho,</td>
<td>Compilers – Principles,</td>
<td>Pearson Education</td>
</tr>
<tr>
<td>Ravi Sethi,</td>
<td>Techniques and Tools</td>
<td></td>
</tr>
<tr>
<td>Jeffrey D. Ullman</td>
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Reference books

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<th>Title</th>
<th>Publisher</th>
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<tbody>
<tr>
<td>J.P. Bannett</td>
<td>Introduction to Compiling</td>
<td>McGraw Hill</td>
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<tr>
<td></td>
<td>Techniques</td>
<td></td>
</tr>
<tr>
<td>Tremblay &amp;</td>
<td>Compiler Writing</td>
<td>McGraw Hill</td>
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<tr>
<td>Sorenson</td>
<td></td>
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<tr>
<td>Dhamdhere</td>
<td>Compiler Construction</td>
<td>MacMilan</td>
</tr>
</tbody>
</table>
**IV Year – I Semester**

**Network Security**

**Unit 1**

**Introduction:** Security trends, the OSI security architecture, security attacks, security services, security mechanisms, a model for network security.

**Classical encryption techniques:** Symmetric cipher model, Substitution techniques, Transposition techniques, Rotor machines, Steganography.

**Block cipher and the data encryption standard:** Block cipher principles, the strength of DES, Differential and linear cryptanalysis, Block cipher design principles.

**Confidentiality using Symmetric Encryption:** Placement of encryption function, Traffic confidentiality, key distribution, random number generator.

**Unit 2**

**Public key cryptography and RSA:** Principles of public key crypto systems, The RSA algorithm

**Key management:** Other public-key crypto systems: Key management, Diffie-Hellman key exchange.

**Message authentication and hash functions:** Authentication requirements, Authentication functions, message authentication codes, Hash functions, security of hash functions and MACs.

**Unit 3**

**Digital signatures and authentication protocols:** Digital signatures, Authentication protocols, Digital Signature standard

**Authentication Applications:** Kerberos, X.509 authentication service

**Unit 4**

**Email Security:** Pretty good privacy, S/MIME

**IP security:** IP security overview, IP security architecture, Authentication header, Encapsulating security payload, combining security associations, key management.

**Web security:** Web security considerations, Secure Socket Layer and transport layer security, Secure electronic transaction.

**Unit 5**

**Intruders:** Intruders, Intrusion detection, password management

**Malicious Software:** Viruses and related threads, virus counter measures, distributed denial of service attacks.

**Firewalls:** Firewall Design principles, trusted systems, common criteria for information technology, security evaluation.
Text books

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<tr>
<th></th>
<th>Author</th>
<th>Title</th>
<th>Publisher</th>
</tr>
</thead>
</table>
| 1 | William Stallings | Cryptography and Network Security  | Fourth edition, PHI
|   |               |                                      | Chapters: 1,2,3,7,9,10,11,13,14,15,16,17,18,19,20 |

Reference books

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<tr>
<th></th>
<th>Author</th>
<th>Title</th>
<th>Publisher</th>
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</table>
**IV Year – I Semester**  
**Scientific and Technical Writing**

<table>
<thead>
<tr>
<th>UNIT 1</th>
<th>Communicating in Science and Technology, Writers and Experts, General versus Scientific/technical writing</th>
</tr>
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<tbody>
<tr>
<td>UNIT 2</td>
<td>Scientific and technical style, pitfalls in scientific/technical writing, scientific and technical documents</td>
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</table>
| UNIT 3 | **Reports and Proposals** : Specific types of reports  
**Research Articles and Papers** : Structure of Research papers, Writing for Readers and Writing for listeners |
| UNIT 4 | **Instructions and Manuals** : The audience, the writers, structure and layout, logic development |
| UNIT 5 | Language and rapport, A writing-editing sequence to maximize usability  
**Case Study** : prepare a sample article for publication |

**References**

## IV Year – I Semester

### TCP/IP

**Unit 1**  
**Methods of Information Transmission:** Synchronous Transmission, Packet Transmission, Asynchronous Transmission, Virtual Circuit,  

**Computer Networking:** layer 1 routing, layer 2 routing, layer 3 routing,  

**Introduction to Network Protocols:** OSI Reference Model, TCP/IP Protocol Stack, UDP/IP, Domain Name System, Telnet, FTP, HTTP, E-mail, SMTP, WWW.  

**Unit 2**  

**IPV4:** IPv4 address format, IP Classes, Network address, Host Address, Subnet mask, IPv4 Header  

**Unit 3**  
**Routing:** Forwarding and Screening, Routing Processing, Handling Routing Tables, Routing Protocols, Neutral Exchange Point  

**IPV6:** Next Versions of IPV6 Datagram, ICMP version 6 Protocol: Address Resolution, Router Discovery, Redirect, IP Addresses  

**Unit 4**  
**Transmission Control Protocol:** TCP Segments, TCP Header options, Establishing and Terminating a connection with TCP, Determining the connection state, Response delay techniques, Window Technique, Network congestion, The window scale factor.  

**User Datagram Protocol:** Fragmentation, Broadcasts and Multicasts  

**Unit 5**  
**CISCO Routers:** Interface Identification, Cables, Memory, Console. Commands, Configuration, Debugging  

### Text Books

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<tr>
<th>Author</th>
<th>Title</th>
<th>Publisher</th>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 E.Bryan Carne</td>
<td>A Professional’s Guide to Data Communication in a TCP/IP World</td>
<td>Artech House, Inc</td>
<td>1.6, 1.7</td>
</tr>
<tr>
<td>2 Libor Dostálek, Alena Kabelová</td>
<td>Understanding TCP/IP</td>
<td>PACKT Publishing</td>
<td>1.2, 1.3, 1.4, 1.5, 5.1 to 5.7, 9.1 to 9.8, 10, Appendix-A</td>
</tr>
</tbody>
</table>
**IV Year – I Semester**  
**Compiler Design Lab**

1. Implementation of symbol table.
2. Develop a lexical analyzer to recognize a few patterns in c (ex. Identifiers, constants, comments, operators etc.)
4. Generate yacc specification for a few syntatic categories.
   
   a) Program to recognize a valid arithmetic expression that uses operator +, -, * and /.
   b) Program to recognize a valid variable which starts with a letter followed by any number of letter or digits.
   c) Implementation of calculator using lex and yacc.
5. Convert the bnf rules into yacc form and write code to generate abstract syntax tree.
6. Implement type checking
7. Implement control flow analysis and data flow analysis.
8. Implement any one storage allocation strategies(heap, stack, static)
9. Construction of DAG
10. Implement the back end of the compiler which takes the three address code and produces the 8086 assembly language instructions that can be assembled and run using a 8086 assembler. The target assembly instructions can be simple move, add, sub, jump. Also simple addressing modes are used.
11. Implementation of simple code optimization techniques (constant folding, etc.)
IV Year – I Semester
Mini Project

Follow SDLC process for real time applications and develop sample application project

The objective of the project is to motivate the students to work in emerging/latest technologies, help the students to develop ability, to apply theoretical and practical tools/techniques to solve real life problems related to industry, academic institutions and research laboratories. Students are expected to do planning, analyzing, designing, coding, and implementing the project. The initiation of project should be with the project proposal. The synopsis approval will be given by the project guides. The project proposal should include the following:

1. Title
2. Objectives
3. Input and output
4. Details of modules and process logic
5. Limitations of the project
6. Tools/platforms, Languages to be used
7. Scope of future application

The Project work should be either an individual one or a group of not more than three members and submit a project report at the end of the semester. The students shall defend their dissertation in front of experts during viva-voce examinations.
IV Year – I Semester
TCP/IP Lab

1. Write a program to create socket, bind server's well-known port, wait for client connection to complete and close the connection
2. Write a simple program that can read a host name and convert it to an IP address.
3. Java Program to Send a Message from Client to Server and Receive a Response Back Using Socket Programming
5. Live Code for a chat server.
6. Write a program to implement Hashset API
7. Write a program to implement Linkedlist API
8. Write a program to implement Stack API
9. Write a program to implement Arraylist API
10. Write a program to implement Hashtable API
IV Year – II Semester
Software Testing

Unit 1  **Introduction**: Some Software Failures, Testing Process, Terminologies, Limitations of Testing, The V Shaped Software Life Cycle Model


Unit 2  **Software Verification**: Verification Methods, SRS Document Verification, SDD Document Verification, Source Code Reviews, User Documentation Verification

**Metrics and Models in Software Testing**: Software Metrics, Categories of Metrics, Object Oriented Metrics used in Testing, What should we measure during Testing?

Unit 3  **Functional Testing**: Boundary Value Analysis, Equivalence Class Testing, Decision Table Based Testing, Cause-Effect Graphing Technique

Unit 4  **Structural Testing**: Control Flow Testing, Data Flow Testing, Slice Based Testing, Mutation Testing


**Text books**

<table>
<thead>
<tr>
<th>Author</th>
<th>Title</th>
<th>Publisher</th>
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<tbody>
<tr>
<td>Yogesh Singh</td>
<td>Software Testing</td>
<td>Cambridge University Press</td>
</tr>
</tbody>
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**Reference books**

<table>
<thead>
<tr>
<th>Author</th>
<th>Title</th>
<th>Publisher</th>
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</thead>
</table>
ELECTIVE – II : Image Processing

Unit 1  **Introduction** : Examples of fields that use digital image processing, fundamental steps in digital image processing, components of image processing system. Digital Image Fundamentals: A simple image formation model, image sampling and quantization, basic relationships between pixels

Unit 2  **Image enhancement in the spatial domain** : Basic gray-level transformation, histogram processing, enhancement using arithmetic and logic operators, basic spatial filtering, smoothing and sharpening spatial filters, combining the spatial enhancement methods

  **Image restoration** : A model of the image degradation/restoration process, noise models, restoration in the presence of noise—only spatial filtering, Weiner filtering, constrained least squares filtering, geometric transforms; Introduction to the Fourier transform and the frequency domain, estimating the degradation function.

Unit 3  **Color Image Processing** : Color fundamentals, color models, pseudo color image processing, basics of full–color image processing, color transforms, smoothing and sharpening, color segmentation

  **Image Compression** : Fundamentals, image compression models, error-free compression, lossypredictive coding, image compression standards

Unit 4  **Morphological Image Processing** : Preliminaries, dilation, erosion, open and closing, hit or miss transformation, basic morphologic algorithms.

  Image Segmentation : Detection of discontinuous, edge linking and boundary detection, thresholding, region–based segmentation.

Unit 5  **Object Recognition** : Patterns and patterns classes, recognition based on decision–theoretic methods, matching, optimum statistical classifiers, neural networks, structural methods – matching shape numbers, string matching (p.nos: 693-735).

Text Books :

Unit 1  Algorithms for Query Processing and Optimization: Translating SQL queries into relational algebra- algorithms for external sorting-algorithms for select and join operations-algorithms for project and set operations-implementing aggregate operations and outer joins-combining operations using pipelining-using heuristics in query optimization.

Unit 2  Data base systems architecture and the system Catalog: System architectures for DBMSs, Catalogs for Relational DBMSs, System catalog information in oracle. Practical database design and tuning:Physical Database Design in Relational Databases-an overview of Database Tuning in Relational systems.

Unit 3  Distributed DBMS Concepts and Design: Introduction-function and architecture of a Distributed DBMS- Distributed Relational Database Design-transparencies in a Distributed DBMS-Date’s Twelve Rules for Distributed DBMS. Distributed DBMS-Advanced Concepts: Distributed Transaction Management-Distributed Concurrency Control-Distributed Deadlock Management-Distributed Database Recovery-The X/Open Distributed Transaction processing model-Replication Servers.


Emerging database technologies and applications: Hadoop, Big Data characteristics, NO SQL databases, BASE, Brewer’s theorem, Relationship between CAP, ACID and No SQL databases, comparison with Relational databases, No SQL databases types, Comparative study of NoSQL products, Case studies using MongoDB and Cassandra.
## Text books

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<th>Author</th>
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<tr>
<td>S Ceri and Palgetti</td>
<td>Principles of distributed databases</td>
<td>TMH</td>
</tr>
<tr>
<td>Gaurav Vaish</td>
<td>Getting started with No SQL Databases</td>
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## Reference books

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<tr>
<th>Author</th>
<th>Title</th>
<th>Publisher</th>
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</table>
ELECTIVE II: API Programming and Social Network Design

UNIT 1  Windows 95/NT programming, menus, input controls, visual design, System integration

UNIT 2  Advantages of Win32, Obsolete and Delete functions Sample program Creating main window, creating main window using existing classes, Messages when creating windows

UNIT 3  Windows Class data, attaching data to window, Change the appearance of windows

UNIT 4  Getting connected, what is a social network, Propinquity, Homophily, Basic network concepts, Dyada and Triads, Density, Structural Holes, The small world, Multiplexity,

UNIT 5  Network Segmentation, Psychological foundations of social networks, Small groups, Leadership and social networks

Text Books :

ELECTIVE III : Mobile Applications

Unit 1


VUIs and Mobile Apps- Text-to-Speech Techniques- Using dialogs in android Programming, Designing the Right UI

Unit 2

**Intents and Services**: Android Intents and Services, Characteristics of Mobile Applications, Successful Mobile Development. **Storing and Retrieving Data**: Synchronization and Replication of Mobile Data, Getting the Model Right, Android Storing and Retrieving Data- Jquery, SQLLite, Android data backup.

Unit 3

**Communications Via Network and the Web**: State Machine, Correct Communications Model, Android Networking and Web-JSON in Android-Handling Media with web.

**Telephony**: Deciding Scope of an App, Wireless Connectivity and Mobile Apps, Android Telephony.

**Notifications and Alarms**: Performance, Performance and Memory Management- Android memory and performance optimization, Android Notifications and Alarms-- Scheduling of jobs with Alarm manager and job scheduler.

Unit 4


**Multimedia**: Mobile Agents and Peer-to-Peer Architecture, Android Multimedia, Location – Mobility and Location Based Services- GPS, Android Location API.

Unit 5

**Putting It All Together**: Packaging and Deploying-creating libraries for Android applications, Android Field Service App.

**Security and Hacking**: Active Transactions, More on Security, Hacking Android.

**Text books**

2. Erik Hellman, Android Programming: Pushing the Limits, John wiley and sons ltd, 2014

**Reference books**

ELECTIVE III : Computer Vision

UNIT 1  IMAGE PROCESSING FOUNDATIONS : Review of image processing techniques – classical filtering operations – thresholding techniques – edge detection techniques – corner and interest point detection – mathematical morphology – texture


Reference Books:
ELECTIVE III : NEXT GENERATION NETWORKS


UNIT 2  IMS AND CONVERGENT MANAGEMENT : IMS Architecture - IMS services, QoS Control and Authentication, Network and Service management for NGN, IMS advantages, Next Generation OSS Architecture – standards important to oss architecture, Information framework, OSS interaction with IMS, NGN OSS function/ information view reference model, DMTF CIM

UNIT 3  MPLS AND VPN : Technology overview –MPLS & QoS, MPLS services and components – layer 2 VPN, layer 2 internetworking, VPN services, signaling, layer 3 VPN –Technology overview, Remote Access and IPsec integration with MPLS VPN


UNIT 5  NGN Management : Network Management and Provisioning – Configuration, Accounting, performance, security, case study for MPLS, Future enhancements – Adaptive self healing networks

Text Books :


Reference Books :

