



MANONMANIAM SUNDARANAR UNIVERSITY,  
TIRUNELVELI-12

## SYLLABUS

### UG - COURSES – AFFILIATED COLLEGES

Course Structure for BCA  
(Choice Based Credit System)

(with effect from the academic year 2023-2024 onwards )



Semester-VI				
Part	Subject Status	Subject Title	Subject Code	Credit
III	CORE	RDBMS WITH PL/SQL	EMCA61	4
III	CORE	IMAGE PROCESSING	EMCA62	4
III	CORE	PL/SQL LAB	EMCAP6	4
III	ELECTIVE	ROBOTICS AND ITS APPLICATIONS/ COMPUTER NETWORKS	EECA61/ EECA62	3
III	ELECTIVE	INTRODUCTION TO DATA SCIENCE/ DATA MINING AND WAREHOUSING	EECA6A/ EECA6B	3
IV	NAAN MUDHALVAN	OPEN SOURCE SOFTWARE TECHNOLOGIES		2
V		EXTENSION ACTIVITY	E5EA61	2



**Total Marks: 100 Internal Exam: 25 marks + External Exam: 75 marks**

**A. Scheme for internal Assessment:**

Maximum marks for written test: **20 marks**

**3 internal tests**, each of **1 hour** duration shall be conducted every semester.

To the average of the **best two** written examinations must be added the marks scored in. The **assignment** for 5 marks.

The break up for internal assessment shall be:

Written test- 20 marks; Assignment -5 marks Total - 25 marks

**B. Scheme of External Examination**

**3 hrs.** examination at the end of the semester

A – Part : 1 mark question two - from each unit

B – Part : 5 marks question one - from each unit

C – Part : 8 marks question one - from each unit

➤ **Conversion of Marks into Grade Points and Letter Grades**

S.No	Marks	Letter Grade	Grade point (GP)	Performance
1	90-100	O	10	Outstanding
2	80-89	A+	9	Excellent
3	70-79	A	8	Very Good
4	60-69	B+	7	Good
5	50-59	B	6	Above Average
6	40-49	C	5	Pass
7	0-39	RA	-	Reappear
8	0	AA	-	Absent

➤ **Cumulative Grade Point Average (CGPA)**

$$CGPA = \frac{\Sigma (GP \times C)}{\Sigma C}$$

- **GP** = Grade point, **C** = Credit
- CGPA is calculated only for Part-III courses
- CGPA for a semester is awarded on cumulative basis

➤ **Classification**

- First Class with Distinction : CGPA  $\geq$  7.5\*
- First Class : CGPA  $\geq$  6.0
- Second Class : CGPA  $\geq$  5.0 and  $<$  6.0
- Third Class : CGPA  $<$  5.0



# RDBMS WITH PL/ SQL

## Course Objectives

- Describe basic concepts of database system
- Design a Data model and Schemas in RDBMS
- Competent in use of SQL
- Analyze functional dependencies for designing robust Database
- Describe basic concepts of database system

## UNIT I

Introduction to DBMS– Data and Information - Database – Database Management System – Objectives - Advantages – Components - Architecture. ER Model: Building blocks of ER Diagram – Relationship Degree – Classification – ER diagram to Tables – ISA relationship – Constraints – Aggregation and Composition – Advantages

## UNIT II

Relational Model: CODD’s Rule- Relational Data Model -Key-Integrity– Relational Algebra Operations – Advantages and limitations – Relational Calculus – Domain Relational Calculus - QBE.

## UNIT III

Structure of Relational Database. Introduction to Relational Database Design - Objectives – Tools – Redundancy and Data Anomaly – Functional Dependency - Normalization – 1NF – 2NF – 3NF – BCNF. Transaction Processing – Database Security.

## UNIT IV

**SQL:** Commands – Data types – DDL - Selection, Projection, Join and Set Operations – Aggregate Functions – DML – Modification - Truncation - Constraints – Subquery.

## UNIT V

**PL/SQL:** Structure - Elements – Operators Precedence – Control Structure – Iterative Control - Cursors - Procedure - Function - Packages – Exceptional Handling - Triggers.

## Text Book

1. S.Sumathi, S. Esakkirajan, “Fundamentals of Relational Database Management System”, Springer International Edition 2007.

## Reference Books

1. Abraham Silberchatz, Henry F. Korth, S. Sudarshan, “Database System Concepts”, McGraw Hill 2019, 7<sup>th</sup> Edition.
2. Alexis Leon & Mathews Leon, “Fundamentals of DBMS”, Vijay Nicole Publications 2014, 2<sup>nd</sup> Edition.



### Web Resources

1. NPTEL & MOOC courses titled Relational Database Management Systems
2. <https://nptel.ac.in/courses/106106093/>
3. <https://nptel.ac.in/courses/106106095/>

## IMAGE PROCESSING

### Course Objectives

- To learn fundamentals of digital image processing.
- To learn about various 2D Image transformations
- To learn about various image enhancement processing methods and filters
- To learn about various classification of image segmentation techniques
- To learn about various image compression techniques

### UNIT I

**Digital Image Fundamentals:** Image representation - Basic relationship between pixels, Elements of DIP system -Applications of Digital Image Processing - 2D Systems - Classification of 2D Systems - Mathematical Morphology- Structuring Elements- Morphological Image Processing - 2D Convolution - 2D Convolution Through Graphical Method -2D Convolution Through Matrix Analysis

### UNIT II

**2D Image transforms:** Properties of 2D-DFT - Walsh transform - Hadamard transform- Haar transform- Discrete Cosine Transform- Karhunen-Loeve Transform - Singular Value Decomposition

### UNIT III

**Image Enhancement:** Spatial domain methods- Point processing- Intensity transformations - Histogram processing- Spatial filtering- smoothing filter- Sharpening filters - Frequency domain methods: low pass filtering, high pass Filtering- Homomorphic filter

### UNIT IV

**Image segmentation:** Classification of Image segmentation techniques - Region approach – Clustering techniques - Segmentation based on thresholding - Edge based segmentation - Classification of edges- Edge detection - Hough transform- Active contour

### UNIT V

**Image Compression:** Need for compression -Redundancy- Classification of image- Compression schemes- Huffman coding- Arithmetic coding- Dictionary based compression -Transform based compression



**Text Books**

1. S Jayaraman, S Esakkirajan, T Veerakumar, Digital image processing, Tata McGraw Hill, 2015
2. Gonzalez Rafael C, Digital Image Processing, Pearson Education, 2009

**Reference Books**

1. Jain Anil K , Fundamentals of digital image processing: , PHI,1988
2. Kenneth R Castleman , Digital image processing:, Pearson Education,2/e,2003
3. Pratt William K , Digital Image Processing: , John Wiley,4/e,2007

**Web Resources**

1. [https://kanchiuniv.ac.in/coursematerials/Digital\\_imageprocessing-VijayaRaghavan.pdf](https://kanchiuniv.ac.in/coursematerials/Digital_imageprocessing-VijayaRaghavan.pdf)
2. [http://sdeuoc.ac.in/sites/default/files/sde\\_videos/DigitalImageProcessing3rdR.Gonzalez CR.Woods-ilovepdf-compressed.pdf](http://sdeuoc.ac.in/sites/default/files/sde_videos/DigitalImageProcessing3rdR.Gonzalez CR.Woods-ilovepdf-compressed.pdf)
3. <https://dl.acm.org/doi/10.5555/559707>
4. <https://www.ijert.org/image-processing-using-web-2-0-2>

## PL/SQL LAB

**Course Objectives**

- To enable the students to learn the designing of data base systems, foundation on the relational model of data and normal forms.
- To understand the concepts of data base management system, design simple Database models
- To learn and understand to write queries using SQL, PL/SQL.
- To enable the students to learn DML.
- To understand the concepts of Cursor

**Exercises****I. SQL**

1. DDLCOMMANDS
2. DMLCOMMANDS
3. TCLCOMMANDS

**II. PL/SQL**

4. FIBONACCI SERIES
5. FACTORIAL
6. STRING REVERSE
7. SUM OF SERIES
8. TRIGGER



### III. CURSOR

9. STUDENT MARK ANALYSIS USING CURSOR

### IV. APPLICATION

10. LIBRARY MANAGEMENT SYSTEM
11. STUDENT MARK ANALYSIS

#### Text Books

1. Coronel, Morris, Rob, "Database Systems, Design, Implementation and Management", Ninth Edition
2. Nilesh Shah, "Database Systems Using Oracle", 2nd edition, Pearson Education India, 2016

#### Reference Books

1. Abraham Silberschatz, Henry F.Korth and S.Sudarshan, "Database System Concepts", McGraw Hill International Publication, VI Edition
2. Shio Kumar Singh, "Database Systems", Pearson publications, II Edition

#### Web Resources

1. Web resources from NDL Library, E-content from open-source libraries

### ELECTIVE: *ROBOTICS AND ITS APPLICATIONS/ COMPUTER NETWORKS*

## ROBOTICS AND ITS APPLICATIONS

#### Course Objective

- To understand the robotics fundamentals.
- To understand the sensors and matrix methods
- To understand the Programming language ROS
- To study about the applications of robotics
- To learn about the future trends of robotics

#### UNIT I

##### Introduction to Robotics

Definition and history of robotics - Types of robots (industrial, mobile, service, etc.) - Key components of a robot: sensors, actuators, controllers - Overview of applications in various industries

#### UNIT II

##### Robotic Hardware

Actuators: electric motors, servos, and pneumatic systems - Sensors: types and applications (proximity, vision, tactile, etc.) - Microcontrollers and processors in robotics - Design and construction of robotic systems



**UNIT III****Robot Programming**

Programming languages for robotics: Python, C++, ROS (Robot Operating System) - Basics of ROS: nodes, topics, services - Writing and executing basic robot programs - Simulation tools: Gazebo, V-REP

**UNIT IV****Applications of Robotics**

Industrial automation and manufacturing- Robotics in healthcare: surgery, rehabilitation, assistive robots - Service robotics: domestic robots, logistics, customer service - Robotics in entertainment: animatronics, gaming, VR

**UNIT V****Ethics and Future Trends**

Ethical considerations in robotics - Legal and societal implications - Future trends: AI in robotics, collaborative robots (cobots), swarm robotics - Case studies of emerging robotic technologies

**Text Books**

1. Introduction to Robotics: Mechanics and Control, John J. Craig
2. Robotics: Modelling, Planning and Control, Bruno Siciliano, Lorenzo Sciavicco, Luigi Villani, and Giuseppe Oriolo
3. Robot Programming: A Guide to Controlling Autonomous Robots, Cameron Hughes and Tracey Hughes

**Reference Books**

1. Learning ROS for Robotics Programming, Enrique Fernandez, Aaron Martinez, and Luis Sanchez
2. Artificial Intelligence: A Modern Approach, Stuart Russell and Peter Norvig

**Web Resources**

1. [https://www.tutorialspoint.com/artificial\\_intelligence/artificial\\_intelligence\\_roboticsm](https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_roboticsm)
2. <https://www.geeksforgeeks.org/robotics-introduction/>

**COMPUTER NETWORKS****Course Objective**

To understand the concept of Data communication and Computer network  
 To get a knowledge on routing algorithms.  
 To impart knowledge about networking and inter networking devices  
 To study about Network communication.  
 To learn the concept of Transport layer



## **UNIT I**

Introduction – Network Hardware – Software – Reference Models – OSI and TCP/IP Models – Example Networks: Internet, ATM, Ethernet and Wireless LANs - Physical Layer – Theoretical Basis for Data Communication - Guided Transmission Media

## **UNIT II**

Wireless Transmission - Communication Satellites – Telephone System: Structure, Local Loop, Trunks and Multiplexing and Switching. Data Link Layer: Design Issues – Error Detection and Correction.

## **UNIT III**

Elementary Data Link Protocols - Sliding Window Protocols – Data Link Layer in the Internet - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols – Bluetooth

## **UNIT IV**

Network Layer - Design Issues - Routing Algorithms - Congestion Control Algorithms – IP Protocol – IP Addresses – Internet Control Protocols.

## **UNIT V**

Transport Layer - Services - Connection Management - Addressing, Establishing and Releasing a Connection – Simple Transport Protocol – Internet Transport Protocols (ITP) - Network Security: Cryptography.

### **Text Book**

1. A.S. Tanenbaum, “Computer Networks”, 4th Edition, Prentice-Hall of India, 2008.

### **Reference Books**

1. B.A. Forouzan, “Data Communications and Networking”, Tata McGraw Hill, 4<sup>th</sup> Edition, 2017
2. F.Halsall, “Data Communications, Computer Networks and Open Systems”, Pearson Education, 2008
3. D.Bertsekas and R. Gallager, “Data Networks”, 2<sup>nd</sup> Edition, PHI, 2008.
4. Lamarca, “Communication Networks”, Tata McGraw- Hill, 2002

### **Web Resources**

1. [https://en.wikipedia.org/wiki/Computer\\_network](https://en.wikipedia.org/wiki/Computer_network)
2. <https://citationsy.com/styles/computer-networks>



ELECTIVE: *INTRODUCTION TO DATA SCIENCE/ DATA MINING AND WAREHOUSING***INTRODUCTION TO DATA SCIENCE****Course Objective**

- To learn about the basics of Data Science and Big data.
- To learn about overview and building process of Data Science.
- To learn about various Algorithms in Data Science.
- To learn about Hadoop Framework.
- To learn about case study about Data Science.

**UNIT I**

**Introduction:** Benefits and uses – Facts of data – Data science process – Big data ecosystem and data science

**UNIT II**

**The Data science process:** Overview – research goals - retrieving data - transformation – Exploratory Data Analysis – Model building

**UNIT III**

**Algorithms:** Machine learning algorithms – Modeling process – Types – Supervised – Unsupervised - Semi-supervised

**UNIT IV**

**Introduction to Hadoop:** Hadoop framework – Spark – replacing Map Reduce – NoSQL – ACID – CAP – BASE – types

**UNIT V**

**Case Study:** Prediction of Disease - Setting research goals - Data retrieval – preparation - exploration - Disease profiling - presentation and automation

**Text Book**

1. Davy Cielen, Arno D. B. Meysman, Mohamed Ali, “Introducing Data Science”, manning publications 2016

**Reference Books**

1. Roger Peng, “The Art of Data Science”, lulu.com 2016.
2. Murtaza Haider, “Getting Started with Data Science – Making Sense of Data with Analytics”, IBM press, E-book.
3. Davy Cielen, Arno D.B. Meysman, Mohamed Ali, “Introducing Data Science: Big Data, Machine Learning, and More, Using Python Tools”, Dreamtech Press 2016.
4. Annalyn Ng, Kenneth Soo, “Numsense! Data Science for the Layman: No Math Added”, 2017, 1<sup>st</sup> Edition.
5. Cathy O'Neil, Rachel Schutt, “Doing Data Science Straight Talk from the Frontline”, O'Reilly Media 2013.
6. Lillian Pierson, “Data Science for Dummies”, 2017 II Edition

**Web Resources**

1. <https://www.w3schools.com/datascience/>
2. [https://en.wikipedia.org/wiki/Data\\_science](https://en.wikipedia.org/wiki/Data_science)
3. <http://www.cmap.polytechnique.fr/~lepennec/en/post/references/refs/>



# DATA MINING AND WAREHOUSING

## Course Objectives

- To provide the knowledge on Data Mining and Warehousing concepts and techniques
- To study the basic concepts of Data Mining, Architecture and Comparison.
- To study a set of Mining Association Rules, Data Warehouses.
- To study about Classification and Prediction, Classifier Accuracy
- To study the basic concepts of cluster analysis, Cluster Methods

## UNIT I

Introduction: Data mining – Functionalities – Classification – Introduction to Data Warehousing – Data Preprocessing: Preprocessing the Data – Data cleaning – Data Integration and Transformation – Data Reduction

## UNIT II

Data Mining, Primitives, Languages and System Architecture: Data Mining – Primitives – Data Mining Query Language, Architecture of Data mining Systems. Concept Description, Characterization and Comparison: Concept Description, Data Generalization and Summarization, Analytical Characterization, Mining Class Comparison – Statistical Measures.

## UNIT III

Mining Association Rules: Basic Concepts – Single Dimensional Boolean Association Rules From Transaction Databases, Multilevel Association Rules from transaction databases – Multi dimension Association Rules from Relational Database and Data Warehouses.

## UNIT IV

Classification and Prediction: Introduction – Issues – Decision Tree Induction – Bayesian Classification – Classification of Back Propagation. Classification based on Concepts from Association Rule Mining – Other Methods. Prediction – Introduction – Classifier Accuracy

## UNIT V

Cluster Analysis: Introduction – Types of Data in Cluster Analysis, Partitioning Methods – Hierarchical Methods-Density Based Methods – GRID Based Method – Model based Clustering Method

## Text Books (Latest Editions)

1. Han and M. Kamber, “Data Mining Concepts and Techniques”, 2001, Harcourt India Pvt. Ltd, New Delhi.



**References Books** (Latest editions)

1. K.P. Soman, ShyamDiwakar, V. Ajay “Insight into Data Mining Theory and Practice “, Prentice Hall of India Pvt. Ltd, New Delhi
2. Parteek Bhatia, „Data Mining and Data Warehousing: Principles and Practical Techniques“, Cambridge University Press, 2019

**Web Resources**

1. <https://www.topcoder.com/thrive/articles/data-warehousing-and-data-mining#:~:text=Data%20warehousing%20is%20a%20method,compiled%20in%20the%20data%20warehouse.>
2. <https://www.javatpoint.com/data-mining-cluster-vs-data-warehousing>
3. <https://www.tutorialspoint.com/Data-Warehousing-and-Data-Mining>

## NAAN MUDHALVAN

### OPEN SOURCE SOFTWARE TECHNOLOGIES

**Course Objective**

- Able to Acquire and understand the basic concepts in Java, application of OOPS concepts.
- Acquire knowledge about operators and decision-making statements.
- To Identify the significance and application of Classes, arrays and interfaces and analyzing java arrays
- Understand about the applications of OOPS concepts and analyze over riding and Packages through Java programs.
- Can create window-based programming using applet and graphics programming.

**UNIT I**

Open Source–open source vs. commercial software–What is Linux –Free Software–Where I can use Linux-Linux kernel–Linux distributions

**UNIT II**

Introduction Linux Essential Commands –File System concept –Standard Files –The Linux Security Model – Introduction to Unix –Unix Components Unix Files–File Attributes and Permission Standard I/O –Redirection– Pipes and Filters–Grep and Stream Editor

**UNIT III**

Introduction - Apache Explained – Starting, Stopping and Restarting Apache – Modifying the Default configuration – Securing Apache – Set user and Group

**UNIT IV**

MySQL: Introduction to MySQL – The show databases and table – The USE command –Create Database and Tables – Describe Table–Select, Insert, Update and Delete statement database.



## UNIT V

Introduction –PHP Form processing – Database Access with PHP–MySQL, MySQL Functions–Inserting Records–Selecting Records–Deleting Records–Update Records.

### Text Books

1. James Lee and Brent Ware—Open Source Web Development with LAMP
2. LINUX, Apache, MySQL, Perl and PHP, Dorling Kindersley (India) Pvt. Ltd, 2008.

### Reference Books

1. Eric Rosebrock, Eric Filson, —Setting up LAMP: Getting Linux, Apache, MySQL and PHP and working together, John Wiley and Sons, 2004.
2. Anthony Butcher, —Teach Yourself MySQL in 21days, 2<sup>nd</sup> Edition, Sams Publication.
3. Rich Bower, Daniel Lopez Ridreejo, Alian Liska, —Apache Administrator, s Hand Publication.
4. Tammy Fox, —Red Hat Enterprise Linux5 Administration Unleashed, Sams Publication.
5. Naramore Eligabette, Gerner Jason, Wrox Press, Wiley Dreamtech Press, —Beginning PHP5, Apache, MySQL Web Development, 2005

### Web Resources

1. Introduction to Open-Source and its benefits-Geeks for Geeks
2. <https://www.bing.com/>

