

MANGALORE UNIVERSITY



National Education Policy – 2020 [NEP-2020]

**Curriculum Structure:
B.Sc. Basic and Honors Degree Syllabus for III and IV
semesters
And
Open Elective Courses in Computer Science**

CURRICULUM STRUCTURE

Program: BSc (Basic and Honors)

Subject: Computer Science

1. Computer Science as MAJOR with another Subject as MINOR (Table IIA of Model Curriculum)
2. Computer Science as MAJOR with another Subject also as MAJOR (Table IIIA of Model Curriculum)
3. Computer Science as MINOR with another Subject as MAJOR (As per Table IIA of Model Curriculum)

Sem.	Discipline Specific Core Courses (DSC)	Hour / Week		DS Elective Courses	Hours/ Week
		Theory	Lab		
III	DSC-3: Object Oriented Programming Concepts and Programming in JAVA	4			
	DSC-3 Lab: JAVA Lab		4		
IV	DSC-4: Database Management Systems	4			
	DSC-4 Lab: DBMS Lab		4		

Syllabus for BSc (Basic and Honors), Semesters III and IV

Semester: III

Course Title: Object Oriented Programming Concepts and Programming in Java	Course code: DSC3
Total Contact Hours: 52	Course Credits: 04+02
Formative Assessment Marks: 40	Duration of SEE/Exam: 02 Hours
Summative Assessment Marks: 60	

Course Outcomes (COs):

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

- Understand the object-oriented concepts and JAVA Technology.
- Java technology enabled solutions for various applications
- Understand the Java features to implement concurrency, parallelism etc.
- Demonstrate the basic principles of creating Java applications with GUI.

SYLLABUS

DSC3: Object Oriented Programming Concepts and Programming in Java

Contents	Hours
Unit-1	
Introduction to Java: Basics features of Java programming, Java program structure, Java Virtual Machine, Constants, Variables, Data Types, Operators, Control structures: if , if ...else , else if ladder, switch statements Looping Structures: for, while, do...while, for-each	13
Unit-2	
Objects and Classes: Basics of objects and classes, Methods and objects, Constructors, Method Overloading, Finalizer, Visibility modifiers, Arrays in Java, built-in classes: Math, String, Character, String Buffer and their methods. this reference. Inheritance and Polymorphism: Inheritance, Super and Sub class, Overriding, Polymorphism, Dynamic binding, Casting objects, Abstract methods and Classes, Interfaces, Packages, Built-in packages: io, util, lang, awt.	13
Unit-3	
Event and GUI programming: Event handling in Java, Event types, Mouse and key events, GUI Basics, Panels, Frames, Layout Managers: Flow Layout, Border Layout, Grid Layout, GUI components: Buttons, Check Boxes, Radio Buttons, Labels, Text Fields, Text Areas, Combo Boxes, Lists, Scroll Bars, Sliders, Menus, Dialog Box. Applet and its life cycle, Introduction to Swing, Exceptional Handling Methods	13
Unit-4	
I/O programming: Text and Binary I/O, Binary I/O classes, Object I/O, Random Access Files. Multithreading in Java: Thread life cycle and methods, Runnable interface, Thread synchronization. Introduction to Network Programming : Network Basics and Remote Method Invocation (RMI) Java Database Connectivity: JDBC Driver Types, JDBC Packages, Overview of the JDBC process, Database Connection.	13

Text Books:

1. Programming with Java, By E Balagurusamy – A Primer, 4th Edition, McGraw Hill Publication.

Reference Books:

2. Core Java Volume I – Fundamentals, By Cay S. Horstmann, Prentice Hall.
3. Object Oriented Programming with Java: Somashekara M.T., Guru, D.S., Manjunatha K.S, 1st Edition, PHI Learning 2017.
4. Java 2 - The Complete Reference, Herbert Schildt, 5th Edition, McGraw Hill Publication, 2017.
5. Java - The Complete Reference, Herbert Schildt, 7th Edition, McGraw Hill Publication, 2017.

Semester: IV

Course Title: Database Management System	Course code: DSC4
Total Contact Hours: 52	Course Credits: 04+02
Formative Assessment Marks: 40	Duration of SEE/Exam: 02 Hours
Summative Assessment Marks: 60	

Course Outcomes (COs):

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

- Understand the various database concepts and the need for database systems.
- Identify and define database objects, enforce integrity constraints on a database using different modeling techniques
- Design a data model and Schemas in RDBMS.
- Identify entities and relationships and draw ER diagram for a given real-world applications.
- Realization of ER models through Relational Model using SQL
- Formulate queries in Relational Algebra, Structured Query Language (SQL) for database manipulation.
- Understand the transaction processing and concurrency control techniques.

DSC7: Database Management System (DBMS)

Contents	Hours
Unit-1	
<p>Database Architecture: Introduction to Database systems, Applications, Characteristics, Database users, Data models, Database schema, Database architecture, Data independence, Database languages, Classification of DBMS.</p> <p>E-R Model: Entity-Relationship modeling: E-R Model Concepts, Entity, Entity types, Entity sets, Attributes, Types of attributes, Relationships between the entities. Relationship types, Roles and structural constraints, degree and cardinality ratio of a relationship. Weak entity, E-R diagram</p>	13
Unit-2	
<p>Relational Data Model: Relational model concepts, Characteristics of relations.</p> <p>Relational model constraints: Domain constraints, Key Constraints, Primary & Foreign Key Constraints, Integrity Constraints, and Null Values.</p> <p>Data Normalization: Functional dependencies, Normalization, First normal form, Second normal form, Third normal form, Boyce-Codd normal form.</p> <p>Transaction Management: Introduction to Transaction Processing, Single user & multiuser systems, Transaction states, Transaction Properties, Transactions: read & write operations, Need of concurrency control, The lost update problem, Dirty read problem, Types of failures.</p>	13
Unit-3	
<p>INTERACTIVE SQL: Table fundamentals, Oracle data types, Create Table command, Inserting data into table, Viewing Data in the table, sorting data in a table, Creating a table from a table, Inserting data into a table from another table, Delete operations, Updating the contents of a table, Modifying the structure of tables, Renaming tables, destroying tables, displaying table structure.</p> <p>DATA CONSTRAINTS: Types of data constraints, IO constraints-The PRIMARY KEY constraint, The FOREIGN KEY constraint, The UNIQUE KEY constraint, Business Rule Constraints, NULL value concepts, NOT NULL constraints, CHECK constraint, DEFAULT VALUE concepts.</p> <p>OPERATIONS ON TABLE DATA: Arithmetic Operators, Logical Operators, Range Searching, Pattern Matching, Oracle Table – DUAL, Oracle Function-Types, Aggregate Function, Date Conversion Function. GROUPING DATA FROM TABLES IN SQL, Group By Clause, Having Cause, Subqueries, JOINS, UNION, INTERSECTION, MINUS Clauses</p>	13
Unit-4	
<p>INTRODUCTION TO PL/SQL: The Generic PL/SQL Block, PL/SQL: The character set, Literals, PL/SQL data types, Variables, Logical comparisons, Displaying User Messages on The VDU Screen, Comments. Control Structures - Conditional Control, Iterative Control</p> <p>PL/SQL Transactions: Cursors-Types of Cursors, Cursor Attributes. Explicit cursor- Explicit cursor Management, Cursor for loop</p> <p>PL/SQL Database Objects: Procedures and Functions, Oracle Packages, Error Handling in PL/SQL.</p>	13

Text Books:

1. Fundamentals of Database Systems, Ramez Elamassri, Shankant B. Navathe, 7th Edition, Pearson, 2015

Reference Books:

2. An Introduction to Database Systems, Bipin Desai, Galgotia Publications, 2010.
3. Introduction to Database System, C J Date, Pearson, 1999.
4. Database Systems Concepts, Abraham Silberschatz, Henry Korth, S.Sudarshan, 6thEdition, McGraw Hill, 2010.
5. Database Management Systems, Raghu Rama Krishnan and Johannes Gehrke, 3rd Edition, McGraw Hill, 2002

Skill Enhancement Course: SEC for other Programmes

Semester: III

Course Title: Artificial Intelligence	Course Credits: 2
Total Contact Hours: 13 hours of theory and 26 hours of practical	Duration of SEE: 01 Hour
Formative Assessment Marks: 20 marks	Summative Assessment Marks: 30 marks

Course Outcomes (COs):

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

- Appraise the theory of Artificial intelligence and list the significance of AI.
- Discuss the various components that are involved in solving an AI problem.
- Illustrate the working of AI Algorithms in the given contrast.
- Analyze the various knowledge representation schemes, Reasoning and Learning techniques of AI.
- Apply the AI concepts to build an expert system to solve the real-world problems.

Course Contents:

Contents	Hours
Unit-1	
<p>Overview of AI: Definition of Artificial Intelligence, Philosophy of AI, Goals of AI, Elements of AI system, Programming a computer without and with AI, AI Techniques, History of AI.</p> <p>Intelligent Systems: Definition and understanding of Intelligence, Types of Intelligence, Human Intelligence vs Machine Intelligence.</p>	05
Unit-2	
<p>AI Applications: Virtual assistance, Travel and Navigation, Education and Healthcare, Optical Character Recognition, E-commerce and Mobile Payment Systems, Image based Search and Photo Editing.</p> <p>AI Examples in daily life: Installation of AI apps and instructions to use AI apps.</p>	05
Unit-3	
<p>Robotics: Introduction to Robotics, Difference in Robot System and Other AI Program, Components of a Robot.</p>	03

<p>Laboratory Activities:</p> <ul style="list-style-type: none"> • Amazon Alexa: https://play.google.com/store/apps/details?id=com.amazon.dee.app&hl=en&am p:gl=US • Google Lens: https://play.google.com/store/search?q=google+lens&c=apps&hl=en&gl=US • Image to Text to Speech ML OCR: https://play.google.com/store/apps/details?id=com.mlscanner.image.text.sp eech&hl=en_IN&gl=US • Google Pay: https://play.google.com/store/apps/details?id=com.google.android.apps.nbu .paisa.user&hl=en_IN&gl=US • Grammarly: https://play.google.com/store/search?q=grammarly&c=apps&hl=en_IN&gl= • Google Map: https://play.google.com/store/search?q=google+maps&c=apps&hl=en&gl=U S • FaceApp: https://play.google.com/store/apps/details?id=io.faceapp&hl=en_IN&gl=US • Socratic: https://play.google.com/store/apps/details?id=com.google.socratic&hl=en_I N&gl=US • Google Fit: Activity Tracking: https://play.google.com/store/apps/details?id=com.google.android.apps.fitne ss&hl=en_IN&gl=US • SwiftKey Keyboard: https://swiftkey-keyboard.en.uptodown.com/android • E-commerce App: https://play.google.com/store/apps/details?id=com.jpl.jiomart&hl=en_IN&gl= US 	26
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Text Books:

1. Wolfgang Ertel, "Introduction to Artificial Intelligence", 2nd Edition, Springer International Publishing 2017.
2. Michael Negnevitsky, "Artificial Intelligence A Guide to Intelligent Systems", 2nd Edition, Pearson Education Limited 2005.

Reference Books:

1. https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_tutorial.pdf
2. Kevin Knight, Elaine Rich, Shivashankar B. Nair, "Artificial Intelligence", 3rd Edition, July 2017.

Reference Links:

1. Voice Assistant: <https://alan.app/blog/voiceassistant-2/>
2. Browse with image: <https://www.pocket-lint.com/apps/news/google/141075-what-is-google-lens-and-how-does-it-work-and-which-devices-have-it>
3. OCR: <https://aws.amazon.com/what-is/ocr/>
4. Mobile Payment system: <https://gocardless.com/en-us/guides/posts/how-do-mobilepayment-systems-work/>
5. Grammarly: <https://techjury.net/blog/how-to-use-grammarly/#gref>
6. Travel & Navigation: <https://blog.google/products/maps/google-maps-101-ai-powernew-features-io-2021/>
7. AI in photo editing: <https://digital-photography-school.com/artificial-intelligencechanged-photo-editing/>
8. AI in education: <https://www.makeuseof.com/what-is-google-socratic-how-does-itwork/>
9. AI in health and fitness: <https://cubettech.com/resources/blog/implementing-machinelearning-and-ai-in-health-and-fitness/>
10. E-commerce and online shopping: <https://medium.com/@nyxonedigital/importanceof-e-commerce-and-online-shopping-and-why-to-sell-online-5a3fd8e6f416>

Question Paper Pattern for Skill Enhancement Course

Artificial Intelligence

Duration: 1 Hour

Max. Marks: 30

Part-A

(This section shall contain four questions from each unit. Each question carries one mark)

Unit-1:

- 1.
- 2.
- 3.
- 4.

Unit-2:

- 5.
- 6.
- 7.
- 8.

Unit-3:

- 9.
- 10.
- 11.
- 12.

Part-B

(This section shall contain two full questions from each unit having an internal choice. Each full question carries six marks)

Unit-1:

- (a) Six mark question with sub-questions **OR** (b) Six mark question with sub-questions

Unit-2:

- (a) Six mark question with sub-questions **OR** (b) Six mark question with sub-questions

Unit-3:

- (a) Six mark question with sub-questions **OR** (b) Six mark question with sub-questions

Open Elective for III Semester: Programming in C

Course Title: Programming in C Concepts	Course Credits: 3 (3L+0T+0P)
Semester: III	Duration of SEE: 02 Hours
Total Contact Hours: 42	SEE: 60 Marks IA: 40 Marks

Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

- Read, understand and trace the execution of programs written in C language
- Write the C code for a given problem
- Perform input and output operations using programs in C
- Write programs that perform operations on arrays
- Understand functions and file concepts of C language

Course Contents:

Contents	Hours
Unit-1	
<p>Overview of C: Importance of C Program, Basic structure of a C-program, Execution of a C Program.</p> <p>C Programming Basic Concepts: Character set, Tokens, Keywords, Constants, Symbolic constants, Variables, Data types,</p> <p>Input and output with C: Formatted I/O functions – <i>printf</i> and <i>scanf</i>, control strings and escape sequences, output specifications with <i>printf</i> functions; Unformatted I/O functions to read and display single character and a string-<i>getchar</i>, <i>putchar</i>, <i>gets</i> and <i>puts</i> functions.</p>	11
Unit-2	
<p>Operators & Expressions: Arithmetic operators; Relational operators; Logical operators; Assignment operators; Increment & Decrement operators; Bitwise operators; Conditional operator; Operator Precedence and Associativity; Evaluation of arithmetic expressions;</p> <p>Control Structures: Decision Making and Branching -Decision making with if statement, simple if statement, the if else statement, nesting of if...else statements, the else if ladder, the switch statement, ?: operator, the go to statement.</p>	11

Unit-3	
<p>Looping Structures: Decision making and looping - The while statement, the do statement, for statement, nested loops, exit, break, Jumps in loops.</p> <p>Derived data types in C: Arrays-declaration, initialization and access of one-dimensional and two-dimensional arrays.</p>	10
Unit -4	
<p>Handling of Strings: Declaring and initializing string variables, reading strings from terminal, writing strings to screen, String handling functions - <i>strlen, strcmp, strcpy, strstr and strcat</i>; Character handling functions - <i>toascii, toupper, tolower, isalpha, isnumeric</i>.</p> <p>Functions: Basics of functions, Parameter Passing, Simple functions</p> <p>File handling: Basics of file programming concepts- <i>fprintf</i> and <i>fscanf</i>, and example programs</p>	10

Text Book:

1. E.Balagurusamy, Programming in ANSI C ,7th Edition, Tata McGraw Hill

Reference Books:

2. Herbert Scheldt, C: The Complete Reference, 4th Edition.
3. Brian W. Kernighan and Dennis Ritchie, The C Programming Language, Second Edition.

Open Elective for III Semester: R Programming

Course Title: R PROGRAMMING	Course Credits: 3 (3L+0T+0P)
Semester: III	Duration of SEE: 02 Hours
Total Contact Hours: 42	SEE: 60 Marks IA: 40 Marks

Course Outcomes (COs):

- Understand the basics of Fundamentals of R.
- Understands the loading, retrieval techniques of data.
- Understand how data is analyzed and visualized using statistic functions.

Course Contents:

Contents	Hours
Unit-1	
Introduction to R: Basics, Advantages of R over Other Programming Languages - R Studio: R command Prompt, R script file, Comments – Handling Packages in R: Installing R Package, Commands: installed.packages(), package Description(), help(), find. Package (), library () - Input and Output – Entering Data from keyboard – Printing fewer digits or more digits – Special Values functions: NA, Inf and –inf. R Data Types: Vectors, Lists, Matrices, Arrays, Factors, Data Frame R - Variables: Variable assignment, Data types of Variable, Finding Variable ls(), Deleting Variables.	11
Unit-2	
R Operators: Arithmetic Operators, Relational Operators, Logical Operator, Assignment Operators, Miscellaneous Operators R Decision Making: if statement, if – else statement, if – else if statement, switch statement R Loops: repeat loop, while loop, for loop - Loop control statement: break statement, next statement. R-Functions : function definition, Built in functions: mean(), paste(), sum(), min(), max(), seq(), user-defined function, calling a function, calling a function without an argument, calling a function with argument values R-Strings – Manipulating Text in Data: substr(), strsplit(), paste(), grep(), toupper(), tolower() R Vectors – Sequence vector, rep function, vector access, vector names, vector math, vector recycling, vector element sorting R List - Creating a List, List Tags and Values, Add/Delete Element to or from a List, Size of List, Merging Lists, Converting List to Vector R Matrices – Accessing Elements of a Matrix, Matrix Computations: Addition, subtraction, Multiplication and Division	11

Unit-3	
<p>R Arrays: Naming Columns and Rows, Accessing Array Elements, Manipulating Array Elements, Calculation Across Array Elements</p> <p>R Factors –creating factors, generating factor levels gl().</p> <p>Data Frames –Create Data Frame, Data Frame Access, Understanding Data in Data Frames: dim(), nrow(), ncol(), str(), Summary(), names(), head(), tail(), edit() functions - Extract Data from Data Frame</p> <p>Expand Data Frame: Add Column, Add Row - Joining columns and rows in a Data frame rbind() and cbind() – Merging Data frames merge() – Melting and Casting data melt(), cast().</p>	10
Unit-4	
<p>Loading and handling Data in R: Getting and Setting the Working Directory – getwd(), setwd(), dir()</p> <p>R-CSV Files - Input as a CSV file, Reading a CSV File, Analyzing the CSV File: summary(), min(), max(), range(), mean(), median(), apply() - Writing into a CSV File</p> <p>R -Excel File – Reading the Excel file.</p>	10

Text Book:

1. Sandip Rakshit, R Programming for Beginners, McGraw Hill Education (India), 2017, ISBN : 978-93-5260-455-5.

Reference Books:

2. Seema Acharya, Data Analytics using R, McGrawHill Education (India), 2018, ISBN: 978-93-5260-524-8.
3. Tutorials Point (I) simply easy learning, Online Tutorial Library (2018), R Programming, Retrieved from https://www.tutorialspoint.com/r/r_tutorial.pdf.
4. Andrie de Vries, JorisMeys, R for Dummies A Wiley Brand, 2nd Edition, John Wiley and Sons, Inc, 2015, ISBN: 978-1-119-05580-8.

Open Elective for IV Semester: Python Programming Concepts

Course Title: Python Programming Concepts	Course Credits: 3 (3L+0T+0P)
Semester: IV	Duration of SEE: 02 Hours
Total Contact Hours: 42	SEE: 60 Marks IA: 40 Marks

Course Outcomes (COs):

- Explain the basic concepts of Python Programming.
- Demonstrate proficiency in handling of loops and the creation of functions.
- Identify the methods to create and manipulate string data types.
- Understand the notion of arrays, lists, tuples and their applications

Course contents:

Contents	Hours
Unit-1	
Introduction to Features and Applications of Python; Python Versions; Installation of Python; Python Command Line mode and Python IDEs; Simple Python Program. Identifiers; Keywords; Statements and Expressions; Variables; Operators; Precedence and Association; Data Types; Indentation; Comments;	10
Unit-2	
Built-in Functions- Console Input and Console Output, Type Conversions; Python Libraries; Importing Libraries with Examples; Illustrative programs; Libraries for graphics and image handling. Python Control Flow: Types of Control Flow; Control Flow Statements- if, else, elif, while loop, break, continue statements, for loop Statement; range() and exit () functions; Illustrative programs.	10
Unit-3	
Strings: Creating and Storing Strings; Accessing Sting Characters; the str() function; Operations on Strings- Concatenation, Comparison, Slicing and Joining, Traversing; Format Specifiers; Escape Sequences; Raw and Unicode Strings; Python String Methods; Illustrative programs. Other data types: Basics of arrays, lists, tuples and related functions	11
Unit-4	
Python Functions: Types of Functions; Function Definition- Syntax, Function Calling, Passing Parameters/arguments, the return statement; Default Parameters; Command line Arguments; Key Word Arguments; Illustrative programs	11

Text Book:

1. Python Programming: Using Problem Solving Approach, Reema Thareja, June 2017.

Reference Books:

1. Learning with Python, Allen Downey, Jeffrey Elkner, Chris Meyers, 2015
(Freely available online 2015.
@<https://www.greenteapress.com/thinkpython/thinkCSpy.pdf>)
2. Introduction to Python Programming, Gowrishankar S et al., CRC Press, 2019.
3. <http://www.ibiblio.org/g2swap/byteofpython/read/>
4. http://scipy-lectures.org/intro/language/python_language.html
5. <https://docs.python.org/3/tutorial/index.html>

Open Elective for IV Semester: E-COMMERCE

Course Title: E-Commerce	Course Credits: 3 (3L+0T+0P)
Semester: IV	Duration of SEE: 02 Hours
Total Contact Hours: 42	SEE: 60 Marks IA: 40 Marks

Course Outcomes (COs):

- Compare how internet and other information technologies support business processes.
- Demonstrate an overall perspective of the importance of application of internet technologies in business administration
- Explain the basic business management concepts.
- Demonstrate the basic technical concepts relating to E-Commerce.
- Identify the security issues, threats and challenges of E-Commerce.

Course Contents:

Contents	Hours
Unit-1	
Introduction to E-Commerce and Technology Infrastructure Working of Web - HTML Markup for Structure - Creating simple page - Marking up text - Adding Links - Adding Images - Table Markup - Forms - HTML5, Building an E-Commerce Website, Mobile Site and Apps Systematic approach to build an E-Commerce: Planning, System Analysis, System Design, Building the system, Testing the system, Implementation and Maintenance, Optimize Web Performance – Choosing hardware and software – Other E-Commerce Site tools – Developing a Mobile Website and Mobile App	11
Unit-2	
E-Commerce Security and Payment Systems E-Commerce Security Environment – Security threats in E-Commerce – Technology Solutions: Encryption, Securing Channels of Communication, Protecting Networks, Protecting Servers and Clients – Management Policies, Business Procedure and Public Laws - Payment Systems	11
Unit-3	
Business Concepts in E-Commerce Digital Commerce Marketing and Advertising strategies and tools – Internet Marketing Technologies – Social Marketing – Mobile Marketing – Location based Marketing – Ethical, Social, Political Issues in E-Commerce	10
Unit-4	
Project Case Study Case Study: Identify Key components, strategy, B2B, B2C Models of E-commerce Business model of any e-commerce website - Mini Project : Develop E-Commerce project in any one of Platforms like Woo-Commerce, Magento or Opencart	10

Text Book:

1. Kenneth C. Laudon, Carol Guercio Traver - E-Commerce, Pearson, 10th Edition, 2016

Reference Books:

1. <http://docs.opencart.com/>
2. <http://devdocs.magento.com/>
3. <http://doc.prestashop.com/display/PS15/Developer+tutorials>
4. Robert Ravensbergen, —Building E-Commerce Solutions with WooCommerce, PACKT, 2nd Edition.