Nallamuthu Gounder Mahalingam College (Autonomous)

Pollachi

# B.Sc Computer Science with Data Analytics

# 2022 Batch - III and IV Semesters

## 1.1.1 b) POs, PSOs and COs as separate document

| Programme Outcomes (POs) | |
|---|---|
| **On successful completion of the B.Sc. Computer Science with Data Analytics** | |
| **PO1** | **Disciplinary knowledge:** Capable to apply the knowledge of mathematics, algorithmic principles and computing fundamentals in the modelling and design of computer based systems of varying complexity |
| **PO2** | **Scientific reasoning/ Problem analysis:** Ability to critically analyse, categorizes, formulate and solve the problems that emerges in the field of computer science with Data Analytics |
| **PO3** | **Problem solving:** Able to provide software solutions for complex Data Analysis problems or processes that meet the specified needs with appropriate consideration for the public health and safety and the cultural, societal and environmental considerations |
| **PO4** | **Environment and sustainability:** Understand the impact of software solutions in environmental and societal context and strive for sustainable development |
| **PO5** | **Modern tool usage:** Use contemporary techniques, skills and tools necessary for integrated solutions |
| **PO6** | **Ethics:** Function effectively with social, cultural and ethical responsibility as an individual or as a team member with positive attitude**.** |
| **PO7** | **Cooperation / Team Work:** Function effectively as member or leader on multidisciplinary teams to accomplish a common objective. |
| **PO8** | **Communication Skills**: An ability to communicate effectively with diverse types of audience and also able to prepare and present technical documents to different groups. |
| **PO9** | **Self-directed and Life-long Learning:** Graduates will recognize the need for self-motivation to engage in lifelong learning to be in par with changing technology |
| **PO10** | **Research:** Enhance the research culture and uphold the scientific integrity and objectivity. |

| Program Specific Outcomes (PSOs) | |
|---|---|
| After the successful completion of **B.Sc. Computer Science with Data Analytics** program, the students are expected to | |
| PSO1 | Impart education with domain knowledge and key technologies in data science and business analytics like data mining, machine learning, No SQL, visualization techniques, predictive modelling, and statistics effectively and efficiently in par with the expected quality standards for Data analyst professional. |
| PSO2 | Ability to apply the mathematical, technical and critical thinking skills in the discipline of Data analytics to find solutions for complex problems. |

# COURSE OUTCOME

# III SEMESTER

| **Programme Code:** | B.Sc | | | **Programme Title:** | B.ScComputer Science with Data Analytics | |
|---|---|---|---|---|---|---|
| **Course Code:** | 22UDA308 | | | **Title** | **Batch:** | 2022 - 2025 |
| | | | | **Core V: Problem Solving using Python** | **Semester:** | III |
| **Lecture Hrs./Week or Practical Hrs./Week** | 5 | **Tutorial Hrs./Sem.** | 75 | | **Credits: 4** | 4 |

## Course Outcome

On the successful completion of the course, students will be able to

| CO Number | CO Statement | Knowledge Level |
|---|---|---|
| CO1 | Develop solutions to simple computational problems. | K1 |
| CO2 | Decompose a Python program into functions. | K2 |
| CO3 | Represent compound data using Python lists, tuples and dictionaries. | K3 |
| CO4 | Apply OOPs concepts in real-time Python applications. | K4 |
| CO5 | Apply the python library functions for machine learning | K5 |

| **Programme Code:** | B.Sc | | | **Programme Title:** | B.ScComputer Science with Data Analytics | |
|---|---|---|---|---|---|---|
| **Course Code:** | 22UDA309 | | | **Title** | **Batch:** | 2022 – 2025 |
| | | | | **Core V: Relational Data Base Management System** | **Semester:** | III |
| **Lecture Hrs./Week or Practical Hrs./Week** | 5 | **Tutorial Hrs./Sem.** | 75 | | **Credits: 4** | 4 |

## Course Outcome

On the successful completion of the course, students will be able to

| CO Number | CO Statement | Knowledge Level |
|---|---|---|
| CO1 | Describe basic concepts of database system | K1 |
| CO2 | Design a Data model and Schemas in RDBMS | K2 |
| CO3 | Competent in use of SQL | K3 |
| CO4 | Analyze functional dependencies for designing robust Database | K4 |
| CO5 | Applications using PL/SQL | K5 |

| Programme Code: | B.Sc | | | Programme Title: | B. Sc Computer Science with Data Analytics | |
|---|---|---|---|---|---|---|
| Course Code: | 22UDA3A1 | | | Title | Batch: | 2022 – 2025 |
| | | | | Generic Elective Allied III: Introduction to Linear Algebra | Semester: | III |
| Lecture Hrs./Week or Practical Hrs./Week | 4 | Tutorial Hrs./Sem. | 60 | | Credits: 4 | 4 |

**Course Outcome**

On the successful completion of the course, students will be able to

| CO Number | CO Statement | Knowledge Level |
|---|---|---|
| CO1 | Explain the concept/theory in linear algebra, to develop dynamic and graphical views to the related issues of the chosen topics as outlined in "course content," and to formally prove theorems | K1 |
| CO2 | Recognize the basic applications of the chosen topics and their importance in the modern science | K2 |
| CO3 | Develop simple mathematical models, and apply basic linear algebra techniques learned from the chosen topics to solve simple problems | K3 |
| CO4 | Report and communicate effectively with others and present mathematical results in a logical and coherent fashion | K4 |
| CO5 | Appraise the power and beauty of mathematics, and solve problems independently and collaboratively as part of a team | K5 |

| Programme Code: | B.Sc | | | Programme Title: | B.Sc Computer Science with Data Analytics | |
|---|---|---|---|---|---|---|
| Course Code: | 22UDA310 | | | Title | Batch: | 2022 - 2025 |
| | | | | Core Lab III Programming Lab in Python | Semester: | III |
| Lecture Hrs./Week or Practical Hrs./Week | 4 | Tutorial Hrs./Sem. | 60 | | Credits: | 2 |

**Course Outcome**

On the successful completion of the course, students will be able to

| CO Number | CO Statement | Knowledge Level |
|---|---|---|
| CO1 | Knowledge of various python tools and python program execution | K3 |
| CO2 | Solve Problems using control structures, functions, list, tuples and dictionaries | K4 |
| CO3 | Solve problems using OOPs concept, file handling and python libraries | K5 |

| Programme Code: | B.Sc | | | Programme Title: | B.Sc Computer Science with Data Analytics | |
|---|---|---|---|---|---|---|
| Course Code: | 22UDA311 | | | Title | Batch: | 2022 - 2025 |
| | | | | Core lab IV: RDBMS Lab | Semester: | III |
| Lecture Hrs./Week or Practical Hrs./Week | 4 | Tutorial Hrs./Sem. | 60 | | Credits: 4 | 4 |

**Course Outcome**

On the successful completion of the course, students will be able to

| CO Number | CO Statement | Knowledge Level |
|---|---|---|
| CO1 | Implement programs using object oriented database systems. | K3 |
| CO2 | Construct programs in PL/SQL with real time applications. | K4 |
| CO3 | Gain knowledge about PL/SQL commands. | K5 |

# COURSE OUTCOME

# IV SEMESTER

| Programme Code: | B.Sc | | | Programme Title: | B. Sc Computer Science with Data Analytics | |
|---|---|---|---|---|---|---|
| Course Code: | 22UDA412 | | | Title | Batch: | 2022 - 2025 |
| | | | | Core VII: R Programming for Data Science | Semester: | IV |
| Lecture Hrs./Week or Practical Hrs./Week | 4 | Tutorial Hrs./Sem. | 60 | | Credits: 4 | 3 |

**Course Outcome**

On the successful completion of the course, students will be able to

| CO Number | CO Statement | Knowledge Level |
|---|---|---|
| CO1 | Apply the knowledge of R concepts. | K1 |
| CO2 | To understand how to read the larger datasets in R. | K2 |
| CO3 | To get knowledge on managing data frames. | K3 |
| CO4 | Analyze and understand the control structures and functions. | K4 |
| CO5 | Investigate debugging and loop functions in R. | K5 |

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|---|---|---|---|---|---|---|
| **Programme Code:** | B.Sc | | | **Programme Title:** | Bachelor of Science (Computer Science with Data Analytics) | |
| **Course Code:** | 22UDA413 | | | **Title** | **Batch:** | 2022 - 2025 |
| | | | | **Core VII: Data Mining** | **Semester:** | IV |
| **Lecture Hrs./Week or Practical Hrs./Week** | 4 | **Tutorial Hrs./Sem.** | 60 | | **Credits:** | 3 |

## Course Outcome

On the successful completion of the course, students will be able to

| CO Number | CO Statement | Knowledge Level |
|---|---|---|
| CO1 | Apply the knowledge data mining to mine the data. | K1 |
| CO2 | Analyze the complexity and correctness of the association rule. | K2 |
| CO3 | Choose the appropriate clustering algorithm for a specified application. | K3 |
| CO4 | Apply and implement decision tree design techniques. | K4 |
| CO5 | Apply temporal and spatial data mining. | K5 |

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|---|---|---|---|---|---|---|
| **Programme Code:** | B.Sc | | | **Programme Title:** | Bachelor of Science (Computer Science with Data Analytics) | |
| **Course Code:** | 22UDA4E1 | | | **Title** | **Batch:** | 2022 - 2025 |
| | | | | **Domain Specific Elective I: Fundamentals of Cloud Computing** | **Semester:** | IV |
| **Lecture Hrs./Week or Practical Hrs./Week** | 4 | **Tutorial Hrs./Sem.** | 60 | | **Credits: 4** | 4 |

**Course Outcome**

On the successful completion of the course, students will be able to

| CO Number | CO Statement | Knowledge Level |
|---|---|---|
| CO1 | Understand the basic knowledge on virtualization | K1 |
| CO2 | Understand the concept of cloud computing services and its business value | K2 |
| CO3 | Analyze various web based applications for collaborating everyone in cloud computing | K3 |
| CO4 | Assess various industrial platforms for the developments | K4 |
| CO5 | Analyze on cloud mobility and governance. | K5 |

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|---|---|---|---|---|---|---|
| **Programme Code:** | B.Sc | | | **Programme Title:** | Bachelor of Science (Computer Science with Data Analytics) | |
| **Course Code:** | 22UDA414 | | | **Title** | **Batch:** | 2022 - 2025 |
| | | | | **Core Lab III Programming Lab in R** | **Semester:** | III |
| **Lecture Hrs./Week or Practical Hrs./Week** | 4 | **Tutorial Hrs./Sem.** | 75 | | **Credits:** | 2 |

**Course Outcome**

On the successful completion of the course, students will be able to

| CO Number | CO Statement | Knowledge Level |
|---|---|---|
| CO1 | Understand the basics in R programming in terms of constructs, control statements, string functions | K3 |
| CO2 | Implement data frames and lists. | K4 |
| CO3 | Design applications in R using File concept. | K5 |

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|---|---|---|---|---|---|---|
| **Programme Code:** | B.Sc | | | **Programme Title:** | Bachelor of Science (Computer Science with Data Analytics) | |
| **Course Code:** | 22UDA415 | | | **Title** | **Batch:** | 2022 - 2025 |
| | | | | **Core Lab VI Data Mining Lab** | **Semester:** | III |
| **Lecture Hrs./Week or Practical Hrs./Week** | 4 | **Tutorial Hrs./Sem.** | 75 | | **Credits:** | 2 |

## Course Outcome

On the successful completion of the course, students will be able to

| CO Number | CO Statement | Knowledge Level |
|---|---|---|
| CO1 | Learn to execute data mining tasks using a data mining toolkit (such asWEKA) and visualize the results. | K3 |
| CO2 | Demonstrate the working of algorithms for data mining tasks such association classification. | K4 |
| CO3 | Apply various clustering algorithms on the given data set. | K5 |

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|---|---|---|---|---|---|---|
| **Programme Code:** | B.Sc | | | **Programme Title:** | BSc Computer Science with Data Analytics | |
| **Course Code:** | 22UDA4S1 | | | **Title** | **Batch:** | 2022 - 2025 |
| | | | | **SEC I: Data Science Foundation** | **Semester:** | III |
| **Lecture Hrs./Week or Practical Hrs./Week** | 2 | **Tutorial Hrs./Sem.** | 30 | | **Credits:** | 2 |

## Course Outcome

On the successful completion of the course, students will be able to

| CO Number | CO Statement | Knowledge Level |
|---|---|---|
| CO1 | Define the data science process | K1 |
| CO2 | Steps of Data Science process | K2 |
| CO3 | NumPy process for numerical computation | K3 |
| CO4 | Use the Python Libraries for Data Wrangling | K4 |
| CO5 | Apply visualization Libraries in Python to interpret and explore data | K5 |

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# B.Sc Computer Science with Data Analytics

## 2023 Batch - I and II Semesters

## 1.1.1 b) POs, PSOs and COs as separate document

| Programme Outcomes (POs) | |
|---|---|
| **On successful completion of the B.Sc. Computer Science with Data Analytics** | |
| **PO1** | **Disciplinary knowledge:** Capable to apply the knowledge of mathematics, algorithmic principles and computing fundamentals in the modeling and design of computer based systems of varying complexity |
| **PO2** | **Scientific reasoning/ Problem analysis:** Ability to critically analyze, categorizes, formulate and solve the problems that emerges in the field of computer science with Data Analytics |
| **PO3** | **Problem solving:** Able to provide software solutions for complex Data Analysis problems or processes that meet the specified needs with appropriate consideration for the public health and safety and the cultural, societal and environmental considerations |
| **PO4** | **Environment and sustainability:** Understand the impact of software solutions in environmental and societal context and strive for sustainable development |
| **PO5** | **Modern tool usage:** Use contemporary techniques, skills and tools necessary for integrated solutions |
| **PO6** | **Ethics:** Function effectively with social, cultural and ethical responsibility as an individual or as a team member with positive attitude**.** |
| **PO7** | **Cooperation / Team Work:** Function effectively as member or leader on multidisciplinary teams to accomplish a common objective. |
| **PO8** | **Communication Skills**: An ability to communicate effectively with diverse types of audience and also able to prepare and present technical documents to different groups. |
| **PO9** | **Self-directed and Life-long Learning:** Graduates will recognize the need for self-motivation to engage in lifelong learning to be in par with changing technology |
| **PO10** | **Research:** Enhance the research culture and uphold the scientific integrity and objectivity. |

| Program Specific Outcomes (PSOs) | |
|---|---|
| After the successful completion of **B.Sc. Computer Science with Data Analytics** program, the students are expected to | |
| PSO1 | Impart education with domain knowledge and key technologies in data science and business analytics like data mining, machine learning, No SQL, visualization techniques, predictive modeling, and statistics effectively and efficiently in par with the expected quality standards for Data analyst professional. |
| PSO2 | Ability to apply the mathematical, technical and critical thinking skills in the discipline of Data analytics to find solutions for complex problems. |

## COURSE OUTCOME

## I SEMESTER

| | | | | | | |
|---|---|---|---|---|---|---|
| **Programme Code:** | B.Sc | | | **Programme Title:** | B. Sc Computer Science with Data Analytics | |
| **Course Code:** | 23UDA101 | | | **Title** | **Batch:** | 2023 - 2026 |
| | | | | | **Semester:** | I |
| **Lecture Hrs./Week or Practical Hrs./Week** | 5 | **Tutorial Hrs./Sem** - | 5 | **Core Course I: Programming in C** | **Credits:** | 4 |

**Course Outcome**

On the successful completion of the course, students will be able to

| CO Number | CO Statement | Knowledge Level |
|---|---|---|
| CO1 | Remembering the history, importance and basic structure of C programming | K1 |
| CO2 | Interpret the concepts of variables, constants, operators and various types of expressions | K2 |
| CO3 | Apply the concept of Decision-making statements and looping constructs for solving basic programs | K3 |
| CO4 | Use the concepts of files and pointers inside a C program | K4 |
| CO5 | Develop programs incorporating all the C language constructs | K5 |

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|---|---|---|---|---|---|---|
| **Programme Code:** | B.Sc | | | **Programme Title:** | B. Sc Computer Science withData Analytics | |
| **Course Code:** | 23UDA102 | | | **Title** | **Batch:** | 2023 - 2026 |
| | | | | | **Semester:** | I |
| **Lecture Hrs./Week or Practical Hrs./Week** | 5 | **Tutorial Hrs./Sem** - | - | **Core Course II: Digital Electronics** | **Credits:** | 4 |

**Course Outcome**

On the successful completion of the course, students will be able to

| CO Number | CO Statement | Knowledge Level |
|---|---|---|
| CO1 | Gain knowledge about the number systems and coding systems | K1 |
| CO2 | Understand about Boolean Algebra & its function, DeMorgans Theorems. | K2 |
| CO3 | Understand about Logic gates and circuits. | K3 |
| CO4 | Have knowledge on Combinational logic circuit. | K4 |
| CO5 | Learning Sequential logic circuits such as flip flop and counter | K5 |

| **Programme Code:** | B.Sc, | | | **Programme Title:** | B.ScComputer Science withData Analytics | |
|---|---|---|---|---|---|---|
| **Course Code:** | 23UDA1A1 | | | **Title** | **Batch:** | 2023 - 2026 |
| | | | | **Generic Elective Allied I : Mathematical Foundation for Data Science** | **Semester:** | I |
| **Lecture Hrs./Week or Practical Hrs./Week** | 4 | **Tutorial Hrs./Sem** | 5 | | **Credits:** | 4 |

**Course Outcome**

On the successful completion of the course, students will be able to

| CO Number | CO Statement | Knowledge Level |
|---|---|---|
| CO1 | Understand the concepts of equivalence formulas | K1 |
| CO2 | Work with normal forms, | K2 |
| CO3 | Understand the mathematical tools that are needed to solve optimizationproblems, | K3 |
| CO4 | Model the problems in computer science using graphs andtrees | K4 |
| CO5 | Work with trees and fundamental circuits | K5 |

| **Programme Code:** | B.Sc | | | **Programme Title:** | B.ScComputer Science with Data Analytics | |
|---|---|---|---|---|---|---|
| **Course Code:** | 23UDA103 | | | **Title** | **Batch:** | 2023 - 2026 |
| | | | | **Core Course: Lab I Programming Lab in C** | **Semester:** | I |
| **Lecture Hrs./Week or Practical Hrs./Week** | 4 | **Tutorial Hrs./Sem.** | 60 | | **Credits:** | 2 |

**Course Outcome**

On the successful completion of the course, students will be able to

| CO Number | CO Statement | Knowledge Level |
|---|---|---|
| CO1 | Apply the various basic programming constructs like decision making statements. Looping statements, functions, structures,pointers and files | K3 |
| CO2 | Design programs using the concept of files in C and be able to simulate operations | K4 |
| CO3 | Determine the efficient techniques in programming to solvevarious scientific problems | K5 |

## II SEMESTER

| **Programme Code:** | B.Sc | | | **Programme Title:** | B.Sc Computer Science withData Analytics | |
|---|---|---|---|---|---|---|
| **Course Code:** | 23UDA204 | | | **Title** | **Batch:** | 2023 - 2026 |
| | | | | **Core Course III: Problem Solving using Python** | **Semester:** | II |
| **Lecture Hrs./Week or Practical Hrs./Week** | 4 | **Tutorial Hrs./Sem.** | 5 | | **Credits: 4** | 4 |

**Course Outcome**

On the successful completion of the course, students will be able to

| CO Number | CO Statement | Knowledge Level |
|---|---|---|
| CO1 | Develop solutions to simple computational problems. | K1 |
| CO2 | Decompose a Python program into functions. | K2 |
| CO3 | Represent compound data using Python lists, tuples anddictionaries | K3 |
| CO4 | Apply OOPs concepts in real-time Python applications. | K4 |
| CO5 | Apply the python library functions for machine learning | K5 |

| **Programme Code:** | B.Sc | | | **Programme Title:** | B.Sc Computer Science with Data Analytics | |
|---|---|---|---|---|---|---|
| **Course Code:** | 23UDA205 | | | **Title** | **Batch:** | 2023 - 2026 |
| | | | | **Core Course IV: Data Structures** | **Semester:** | II |
| **Lecture Hrs./Week or Practical Hrs./Week** | 4 | **Tutorial Hrs./Sem.** | - | | **Credits:** | 4 |

**Course Outcome**

On the successful completion of the course, students will be able to

| CO Number | CO Statement | Knowledge Level |
|---|---|---|
| CO1 | Define the concept of Data structure and list the variousclassifications of data Structures like array, stack and Queue | K1 |
| CO2 | Demonstrate how linked lists, Linked Staak and Linked Queue works | K2 |
| CO3 | Defines Trees and Binary Trees and its Working | K3 |
| CO4 | Illustrate the various file organizations like Sequential, Random andthe concept of Hash Table | K4 |
| CO5 | Design algorithms for various sorting and searching techniques | K5 |

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|---|---|---|---|---|---|---|
| **Programme Code:** | B.Sc | | | **Programme Title:** | Bachelor of Science (Computer Science with Data Analytics) | |
| **Course Code:** | 22UDA2A2 | | | **Title** | **Batch:** | 2022 - 2025 |
| | | | | **ALLIED II: Statistics and Probability** | **Semester:** | II |
| **Lecture Hrs./Week or Practical Hrs./Week** | 4 | **Tutorial Hrs./Sem.** | 60 | | **Credits:** | 4 |

**Course Outcome**

On the successful completion of the course, students will be able to

| CO Number | CO Statement | Knowledge Level |
|---|---|---|
| CO1 | Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon. | K1 |
| CO2 | Understand the basic concepts of one- and two-dimensional random variables and apply in engineering applications. | K2 |
| CO3 | Apply the concept of testing of hypothesis for small and large samples in real life problems | K3 |
| CO4 | Apply the basic concepts of classifications of design of experiments in the field of agriculture and statistical quality control. | K4 |
| CO5 | Have the notion of sampling distributions and statistical techniques used in engineering and Management problems. | K5 |

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|---|---|---|---|---|---|---|
| **Programme Code:** | B.Sc | | | **Programme Title:** | B.ScComputer Science with Data Analytics | |
| **Course Code:** | 23UDA206 | | | **Title** | **Batch:** | 2023 - 2026 |
| | | | | **Core Course: Lab II Programming Lab in Python** | **Semester:** | II |
| **Lecture Hrs./Week or Practical Hrs./Week** | 4 | **Tutorial Hrs./Sem.** | 60 | | **Credits:** | 2 |

## Course Outcome

On the successful completion of the course, students will be able to

| CO Number | CO Statement | Knowledge Level |
|---|---|---|
| CO1 | Knowledge of various python tools and python program execution | K3 |
| CO2 | Solve Problems using control structures, functions, list, tuples and dictionaries | K4 |
| CO3 | Solve problems using OOPs concept, file handling and python libraries | K5 |

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