



**National Institute of Electronics & Information Technology,
Aurangabad**
(राष्ट्रीय इलेक्ट्रॉनिकी एवं सूचना प्रौद्योगिकी संस्थान, औरंगाबाद)
Ministry of Electronics & Information Technology
Government of India

COURSE PROSPECTUS

Name of the Group: IT

Name of the Course: Data Analysis with Python and Mysql

Course Code: NG-05-IT-01425-2023-V1-NIELIT

Starting Date: 15/07/2024 (Tentative)

Duration: 120 Hours

Course Coordinator: Ms. Manjiri Lavadkar, Project Engineer, Nielit Auarangabad.

Course Description:

The "Data Analysis with Python and SQL" course is designed to provide students with the essential skills and knowledge required to effectively analyze and interpret data using two powerful tools: Python and SQL. This comprehensive course will cover fundamental concepts, practical techniques, and real-world applications, enabling students to handle data from diverse sources, perform data cleaning, manipulation, and visualization, and derive actionable insights. The course is suitable for beginners with no prior experience in data analysis, as well as those looking to enhance their existing skills.

Course Objectives:

The course objectives for "Data Analysis with Python and SQL" are to provide students with a comprehensive understanding of data analysis, emphasizing its importance and process. Students will master Python basics and essential data analysis libraries, enabling them to perform data cleaning, manipulation, and transformation using Pandas. They will learn to create and customize effective data visualizations. The course also covers SQL fundamentals, teaching students to write queries for data retrieval, filtering, and sorting, and advances to more complex SQL functions and query optimization. Integrating Python and SQL, students will enhance their data analysis capabilities by combining both tools.

Course Outcome:

- ✓ Utilize Python and its libraries such as NumPy, Pandas, Matplotlib, and Seaborn to manipulate, analyze, and visualize data.
- ✓ Retrieve, filter, sort, and aggregate data using SQL queries, and employ advanced SQL techniques to perform complex data manipulations and calculations.
- ✓ Design and customize various types of plots to clearly communicate data insights using Matplotlib and Seaborn.
- ✓ Compile and present findings and insights through comprehensive reports and visualizations, effectively communicating the results of their analysis.

Expected Job Roles:

- Data Analyst
- Database Analyst
- Reporting Analyst
- Business Analyst

Course Structure:

Module	Topics	Hrs
Data Modelling Concepts	<ul style="list-style-type: none"> • PC1: Data modelling should adhere to principles of clarity, consistency, accuracy, completeness, and reusability. • PC2: Data modelling includes improved data quality, understanding, access, and decision-making. 	10
DBMS and RDBMS	<ul style="list-style-type: none"> • PC3: DBMS and RDBMS should effectively manage, organize, and retrieve data while ensuring data integrity and security. • PC4: DBMS and RDBMS should provide efficient data access, query processing, and transaction management capabilities. 	10
RDBMS Functionality	<ul style="list-style-type: none"> • PC5: RDBMS should effectively organize and store data in tables, optimize data retrieval and analysis, and maintain data integrity and consistency. • PC6: RDBMS should facilitate data segregation, joining, and aggregation to enhance query performance and minimize redundancy. 	10
NoSQL	<ul style="list-style-type: none"> • PC7: Efficiently store and retrieve data with high scalability and availability while providing flexibility in data modelling. • PC8: High availability, replication, and consistency to ensure data integrity and reliability for mission-critical applications. 	15
Introduction to Python	<ul style="list-style-type: none"> • PC9: Learners should gain a basic understanding of Python programming concepts, including environment setup, syntax, variables, data types, operators, data structures, control flow statements, and functions. • PC10: Learners should be able to write simple Python programs to solve basic programming problems. 	15

Functions	<ul style="list-style-type: none"> • PC11: Functions encompass designing efficient and reusable user-defined functions, utilizing inbuilt functions effectively, and understanding the role of lambda functions in concise and functional programming. • PC12: Python date and time handling include accurately managing and formatting dates and times, working with various time zones and date-related calculations. For modules and packages, it involves organizing and importing modules and packages efficiently, maintaining clear code structure, and managing dependencies. 	10
Classes And Objects	<ul style="list-style-type: none"> • PC13: Working with classes and objects in Python include a thorough understanding of the concepts, the ability to create and manipulate NumPy ndarrays, perform array creation and operations, iterate over arrays effectively, and utilize indexing and slicing techniques to access data efficiently. • PC14: NumPy functions involve proficiency in using various NumPy functions and methods for data manipulation. For Pandas, performance criteria include the ability to work with Series and DataFrames, perform descriptive statistics, read and write CSV files, and efficiently index and slice DataFrames. 	20
DataFrame Basic Functions	<ul style="list-style-type: none"> • PC15: DataFrame Join() and GroupBy() should effectively combine and manipulate data while preserving its integrity and structure. • PC16: DataFrame Join() should efficiently combine data from multiple DataFrames based on common attributes, while GroupBy() should effectively aggregate and analyze data based on specific criteria. 	15
Data Modelling Concepts	<ul style="list-style-type: none"> • PC17: Data modelling should adhere to principles of clarity, consistency, accuracy, completeness, and reusability. • PC18: Data modelling includes improved data quality, understanding, access, and decision-making. 	15



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Other Contents:

- I. Course Fees:** Course fee is Rs 5400+ GST (* Nil for SC/ST Candidates)
- II. Registration Fee:** An amount of Rs.1000/- (including all taxes as applicable) (non-refundable) should be paid at the time of registering for the course.
- III. Course Fee Instalment Structure:** - Can be paid in two instalments
- IV. Eligibility:**
- Pursuing^ Final Year B.Tech in any branch of Engineering* Or
 - Pursuing^ Final Year MCA Or
 - Pursuing^ Final Year B.Sc. in any branch of Sciences* Or
 - Pursuing^ Final Year B.Sc. in IT/CS/Electronics/allied subjects
- V. Number of Seats :30**
- VI. Selection of candidates:** The candidates passed in the qualifying examination will be based on their marks obtained, subject to eligibility and availability of seats.
- VII. Important Dates:**

Starting Date for Registration	01/07/2024
Last date to submit application form:	10/07/2024(Tentative)
Counselling/Admission	11/07/2024(Tentative)
Last Date for Payment of Fee	14/07/2024(Tentative)
Commencement of class work:	15/07/2024 (Tentative)

- VIII. Course Timings:** 3:00 Hrs. in week days (Mon-Fri).

- IX. Lab Facilities:** LIST OF EQUIPMENT (For a batch of 30 students)

Sr. NO.	Description	Qty
1	Classroom	2
2	Student Chair	30
3	Student Table	15
4	Smart Interactive Display	2
5	White Board	2
6	Desktop computer with Accessories: installed with: Python Mysql Jupyter notebook NumPy, Pandas, Matplotlib Seaborn	30