**1. Introduction to Databases and DB2 (2 lessons)**

**Lesson 1: Database Basics, History and Operation of DB2. Installing and configuring** DB2, creating and managing **databases.**

**Ma'ruza mavzulari:**

* **Database (Ma'lumotlar bazasi) tushunchasi**:
  + Ma'lumotlar bazasi — bu biror tashkilot yoki tizimdagi ma'lumotlarni tartibga solgan holda saqlash va boshqarish uchun ishlatiladigan tuzilma.
  + Ma'lumotlar bazasining turlari: Relatsion (RDBMS), NoSQL, Graph, Key-Value va boshqalar.
  + Relatsion ma'lumotlar bazasi — ma'lumotlar jadvallar (tables) ko‘rinishida saqlanadi va ular orasidagi bog'lanishlar SQL (Structured Query Language) orqali amalga oshiriladi.
* **DB2 haqida ma'lumot**:
  + DB2 — IBM tomonidan ishlab chiqilgan relatsion ma'lumotlar bazasini boshqarish tizimi (RDBMS).
  + Tarixi va rivojlanishi: 1980-yillarda IBM tomonidan chiqarilgan, hozirgi kunda katta hajmdagi korporativ tizimlar uchun ishlatiladi.
* **DB2 ni o'rnatish va konfiguratsiya qilish**:
  + **DB2 ning o‘rnatilishi**:
    - IBM ning rasmiy veb-saytidan DB2 ni yuklab olish va o‘rnatish jarayoni.
  + **DB2 serverini ishga tushirish**:

db2start

* + **Ma'lumotlar bazasini yaratish**:

CREATE DATABASE mydb;

Bu buyruq yangi ma'lumotlar bazasini yaratadi.

* + **DB2 konfiguratsiya qilish**:
    - DB2 ning konfiguratsiya fayllari va parametrlarini sozlash.

**Lesson 2: Basic data operations in DB2 (select, insert, update, delete).**

**Ma'ruza mavzulari:**

* **SQL asoslari**:
  + **SELECT**: Ma'lumotlarni tanlash.
  + **INSERT**: Ma'lumotlarni kiritish.
  + **UPDATE**: Ma'lumotlarni yangilash.
  + **DELETE**: Ma'lumotlarni o'chirish.

**Misollar:**

* **SELECT** (Ma'lumotlarni tanlash):

SELECT \* FROM employees;

Bu buyruq employees jadvalidan barcha ma'lumotlarni tanlaydi.

* **INSERT** (Ma'lumotlarni kiritish):

INSERT INTO employees (id, name, position) VALUES (1, 'Ali', 'Manager');

Bu buyruq employees jadvaliga yangi ma'lumot qo'shadi.

* **UPDATE** (Ma'lumotlarni yangilash):

UPDATE employees SET position = 'Senior Manager' WHERE id = 1;

Bu buyruq, id-si 1 bo'lgan xodimning lavozimini yangilaydi.

* **DELETE** (Ma'lumotlarni o'chirish):

DELETE FROM employees WHERE id = 1;

Bu buyruq, id-si 1 bo'lgan xodimni jadvaldan o'chiradi.

**Lesson 3: SQL Basics: SELECT, WHERE, JOIN queries. Grouping data, aggregate functions and subqueries.**

**Ma'ruza mavzulari:**

* **WHERE**: Malumotni aniqlash ishlatiladi.

SELECT \* FROM employees WHERE position = 'Manager';

* **JOIN**: Bir nechta jadvalni bog'lash.

SELECT employees.name, departments.department\_name   
FROM employees  
JOIN departments ON employees.department\_id = departments.id;

* **GROUP BY**: Ma'lumotlarni guruhlash.

SELECT department\_id, COUNT(\*) FROM employees GROUP BY department\_id;

* **Aggregate functions**:
  + **COUNT**, **SUM**, **AVG**, **MAX**, **MIN**.

SELECT department\_id, AVG(salary) FROM employees GROUP BY department\_id;

* **Subqueries**: Biror so'rovni boshqa so'rovda ishlatish.

SELECT name FROM employees WHERE salary > (SELECT AVG(salary) FROM employees);

**Lesson 4: Indexes, views and stored procedures in DB2.**

**Ma'ruza mavzulari:**

* **Indexes (Indekslar)**: Jadvalda ma'lumotlarni tezda qidirish uchun ishlatiladi.

CREATE INDEX idx\_employee\_name ON employees(name);

* **Views (Ko'rinishlar)**: Jadvaldan ko'rinish yaratish.

CREATE VIEW employee\_view AS  
SELECT name, position FROM employees WHERE salary > 50000;

* **Stored Procedures (Saqlangan protseduralar)**: Bir nechta SQL buyruqlarini bir joyda saqlash va bajarish.

CREATE PROCEDURE get\_high\_salary\_employees()  
BEGIN  
 SELECT \* FROM employees WHERE salary > 100000;  
END;

**3. Python and Databases (2 lessons)**

**Lesson 5: Introduction to Python, basic syntax. Working with databases in Python using the SQLAlchemy library.**

**Ma'ruza mavzulari:**

* **Python asoslari**: O'zgaruvchilar, operatorlar, funksiyalar.

x = 10  
print(x)

* **SQLAlchemy bilan ishlash**:
  + SQLAlchemy — Python uchun ORM (Object Relational Mapper) kutubxonasi, bu yordamida ma'lumotlar bazasi bilan ishlash osonlashadi.
  + **SQLAlchemy o‘rnatilishi**:

pip install sqlalchemy

* + **DB2 ga ulanish**:

from sqlalchemy import create\_engine  
  
engine = create\_engine('db2+ibm\_db://user:password@host:port/dbname')  
connection = engine.connect()

* + **Ma'lumotlar bazasi bilan ishlash**:

result = connection.execute("SELECT \* FROM employees")  
for row in result:  
 print(row)

**Lesson 6: Creating simple DB2 applications in Python.**

**Ma'ruza mavzulari:**

* **Ma'lumot kiritish, yangilash va o'chirish**:

connection.execute("INSERT INTO employees (name, position) VALUES ('Ali', 'Manager')")  
connection.execute("UPDATE employees SET position = 'Senior Manager' WHERE id = 1")  
connection.execute("DELETE FROM employees WHERE id = 1")

**4. Data Analysis with Python (3 lessons)**

**Lesson 7: Basics of data analysis with Pandas.**

**Ma'ruza mavzulari:**

* **Pandas kutubxonasi bilan ishlash**:

pip install pandas

* **DataFrame yaratish**:

import pandas as pd  
  
data = {'name': ['Ali', 'Vali', 'Sami'], 'age': [25, 30, 35]}  
df = pd.DataFrame(data)  
print(df)

* **Ma'lumotlarni o'qish va tahlil qilish**:

df = pd.read\_csv('employees.csv')  
print(df.head())

**Lesson 8: Data Visualization with Matplotlib and Seaborn.**

**Ma'ruza mavzulari:**

* **Matplotlib bilan grafiklar yaratish**:

# pip install matplotlib  
  
import matplotlib.pyplot as plt  
  
df = pd.DataFrame({'age': [25, 30, 35], 'salary': [50000, 60000, 70000]})  
plt.scatter(df['age'], df['salary'])  
plt.xlabel('Age')  
plt.ylabel('Salary')  
plt.show()

* **Seaborn bilan ilg'or grafiklar**:

# pip install seaborn  
  
import seaborn as sns  
  
sns.boxplot(x='age', y='salary', data=df)  
plt.show()

## **Introduction to Power BI**

### ****Lesson 10: Introduction to Power BI: Interface, Tools, and Data Sources****

Power BI interfeysi bilan tanishish, asosiy vositalar va ma’lumot manbalarini o‘rganish.

**Kod: Power BI interfeysi bilan ishlashda ko‘p funksiyalarga kirish uchun GUI ishlatiladi, ammo import qilinadigan kod quyidagicha:**

# Ma'lumotlarni CSV dan import qilish  
import pandas as pd  
data = pd.read\_csv("your\_data.csv")  
print(data.head())

### ****Lesson 11: Data Importing and Cleaning in Power BI. Data Modeling and Relationships in Power BI****

Ma’lumotlarni import qilish va tozalash, Power BI’da ma’lumot modellashtirish va o‘zaro bog‘lanishlar.

**Kod: Pandas yordamida tozalash:**

# NaN qiymatlarni olib tashlash  
data = data.dropna()  
  
# Unikal qiymatlar tekshirish  
unique\_vals = data["column\_name"].unique()  
print(unique\_vals)

### ****Lesson 12: Visualizations and Dashboards in Power BI****

Vizualizatsiyalar va boshqaruv panellarini yaratish.

**Kod: Matplotlib yordamida asosiy vizualizatsiya:**

import matplotlib.pyplot as plt  
  
# Histogram  
data['column\_name'].hist()  
plt.show()

### ****Lesson 13: Advanced Analytics and Calculated Fields in Power BI****

Kengaytirilgan tahlil va hisoblangan maydonlar.

**Kod: Hisoblangan maydon qo'shish:**

# Hisoblangan ustun qo'shish  
data['New\_Column'] = data['column1'] + data['column2']

### ****Lesson 14: Power BI Service: Sharing Reports and Collaboration****

Power BI Servis yordamida hisobotlarni almashish va hamkorlik.

## **Introduction to Big Data**

### ****Lesson 15: Big Data concepts, basic technologies and tools. Working with big data in Python (Dask, PySpark packages)****

Big Data tushunchalari va Python’da Dask, PySpark bilan ishlash.

**Kod: PySpark yordamida ishlash:**

from pyspark.sql import SparkSession  
  
spark = SparkSession.builder.appName("BigDataExample").getOrCreate()  
df = spark.read.csv("bigdata.csv", header=True, inferSchema=True)  
df.show()

### ****Lesson 16: Introduction to Hadoop and the Ecosystem****

Hadoop va uning ekotizimi bilan tanishish.

## **Processing and analysis of Big Data**

### ****Lesson 17: Distributed Data Processing with Apache Spark****

Apache Spark yordamida tarqatilgan ma’lumotlarni qayta ishlash.

**Kod: PySpark yordamida ma’lumotlarni tarqatish:**

df = df.repartition(4) # Ma'lumotni 4 qismga bo'lib ishlash

### ****Lesson 18: Data Analysis with Apache Spark SQL and DataFrames****

Apache Spark SQL va DataFrame'lar bilan ma’lumotlarni tahlil qilish.

**Kod: Spark SQL ishlatish:**

df.createOrReplaceTempView("data\_table")  
query\_result = spark.sql("SELECT column\_name, COUNT(\*) FROM data\_table GROUP BY column\_name")  
query\_result.show()

### ****Lesson 19: Visualization and interpretation of Big Data analysis results****

Big Data tahlil natijalarini vizualizatsiya qilish va talqin qilish.

## **Advanced topics in working with DB2**

### ****Lesson 20: Optimizing Queries and Performance in DB2****

DB2’da so‘rovlarni optimallashtirish va unumdorlikni oshirish.

**Kod: Indeks qo‘shish:**

CREATE INDEX idx\_column ON your\_table(column\_name);

### ****Lesson 21: Backup, recovery, and data security in DB2****

DB2’da zaxiralash, tiklash va ma’lumot xavfsizligi.

### ****Lesson 22: DB2 Advanced Features for Big Data and Analytics****

Big Data va tahlil uchun DB2 kengaytirilgan funksiyalari.

## **Advanced Data Analysis with Python**

### ****Lesson 23: Machine learning with Python: overview of algorithms and libraries****

Python’da mashinani o‘rganish: algoritmlar va kutubxonalar bilan ishlash.

**Kod: Scikit-learn yordamida model yaratish:**

from sklearn.linear\_model import LinearRegression  
model = LinearRegression()  
model.fit(X\_train, y\_train)

### ****Lesson 24: Working with text data and natural language (NLP) with Python. Introduction to Deep Learning with Python and TensorFlow/Keras****

Python’da NLP va TensorFlow/Keras yordamida chuqur o‘rganishga kirish.

**Kod: TensorFlow yordamida asosan NLP modeli:**

import tensorflow as tf  
from tensorflow.keras.preprocessing.text import Tokenizer  
  
tokenizer = Tokenizer(num\_words=1000)  
tokenizer.fit\_on\_texts(text\_data)  
sequences = tokenizer.texts\_to\_sequences(text\_data)

Ushbu darslar Power BI, Big Data, DB2 va Python bilan ishlash bo‘yicha zaruriy amaliy ko‘nikmalarni o‘z ichiga oladi.