Data Manipulation and Visualization

Class:	BBA
Instructor: Asad Sajid Awan	

Class details	
Class Timing and Room	08:30 – 09:45 | MCS4
Session Day(s)	Monday and Wednesday
Credit Hours:	***3***
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Contact #	0322-2719941

Course Description
Data Manipulation and Visualization is an applicative course aimed at building technical skills in business graduates. The skills developed in this course will cover a data pipeline allowing students to query data from SQL, fetch it in Excel, and visualize it in PowerBI. The course is designed to help students understand data pipelines and basic database queries along with dashboard creation to prepare them for leading similar projects in the corporate environment. It will also enable them to set realistic timelines and negotiate on the same when working with resources from other departments and teams such as the DBAs or the development teams.

BBA Program Learning Goals

1. Effective Communication Skills
Students will learn how to communicate results effectively through dashboards and visualizations

2. Knowledge of Core Business Disciplines
Students will be able to understand the integration of all business disciplines for problem solving

3. Critical Thinking Skills
Students will understand the linkages and limitations of different models and critically reflect on the use of theory to understand practices and processes. Additionally, students will be able to identify and analyze problems and apply appropriate problem-solving approaches

Course Objectives and Learning Outcomes

1) **Knowledge outcomes:**
    a. Understand different elements of a data pipeline
    b. Be able to efficiently work through different phases of the pipeline
    c. Apply the principles of good visualizations, tidy data, and efficient queries at different stages of a data pipeline

2) **Skills and abilities outcome:**
    a. Write intermediate level queries in SQL
    b. Work proficiently in Excel
    c. Set up intermediate level dashboards in PowerBI
    d. Connect SQL, Excel and PowerBI automatically and create a complete data pipeline

Teaching and Learning Methodology
The pedagogy used for the course will be a combination of: - Lectures - Assignments - Term project - Presentations - Exams - Self-Study - Case discussion - Guest Lecture sessions – If any

Module	S. No,	Topic	Assignment Due
1	1	Course introduction Installing SQL Accessing a database Accessing a table Load data into SQL	
1	2-3	Retrieving data from a table SELECT FROM WHERE commands with text, date, and numeric data Sorting results	SQL Assignment 1: Loading data from csv or txt to SQL
1	4	Aggregating data with GROUP BY commands Types of aggregations Filtering aggregation through HAVING commands	SQL Assignment 2: Write queries to answer given questions
1	5	Joining tables One-to-one, one-to-many, and many to-many joins INNER, LEFT, RIGHT, and FULL joins	SQL Assignment 3: Write queries to answer given questions
1	6-7	Subqueries in SELECT clause Subqueries in FROM clause Subqueries in WHERE clause	SQL Assignment 4: Write queries to answer given questions
1	8	Comprehensive SQL case	SQL Assignment 5: Write queries to answer given questions

2	9	MS Excel Basics Inputting basic formulas SUM, COUNT, MIN, MAX, AVERAGE Formatting	
2	10-11	MS Excel intermediate formulas VLOOKUP, HLOOKUP, XLOOKUP, INDEX, MATCH, SUMIF, COUNTIF, AVERAGEIF, IF, nested IF, AND, OR	MS Excel Assignment 1: Use Excel to answer given questions on datasets
2	12	Conditional formatting Pivot tables	MS Excel Assignment 2: Use Excel to answer given questions on datasets
2	13	Connecting to Microsoft SQL from Microsoft Excel	MS Excel Assignment 3: Use Excel to answer given questions on datasets
2	14	Data validation	MS Excel Assignment 4: Establish connection with SQL and fetch basic data to answer questions
2	15	Goal Seek and Scenario Builder	
2	16	Macros	
2	17-18	Comprehensive Excel case study	MS Excel Assignment 5: Comprehensive assignment
3	19	Import data into Power BI through SQL/Excel connection Set data types – differentiate between attributes and measures Define data structure and joins	
3	20	Principles of good data display Telling a story with dashboards	Power BI Assignment 1: Import data into Power BI
3	21	Choosing the right chart types Making a chart in Power BI	
3	22	Using tools and slicers	Power BI Assignment 2: Make basic charts in Power BI
3	23	Setting hierarchies	
3	24-26	Advanced formulas and calculations with Power BI	Power BI Assignment 3: Make a dashboard in Power BI
3	27-28	Group presentations	Final project

Textbook and Reading Material.
Recommended Text Excel 2016 for Dummies Learning SQL (O Reilly) by Alan Beaulieu's Microsoft Power BI Quick Start Guide **Secondary Texts** Handouts developed by teaching resource. Online courses on Coursera/EdX

Prerequisite Skills and Knowledge to take this Course
Principles of Marketing Introduction to Computer Applications Business Mathematics Be comfortable with using technology for learning

GRADING PLAN	
SQL Assignments	15
Excel Assignments	06
Power BI Assignments	06
Project	20
In-class Quiz Class Participation Mid Term Exam Final Exam	03 05 15 30
TOTAL	**100**

Comments and/or Suggestions
Students may see the faculty any time for the purpose of term project/assignment discussion. They may also contact the instructor in case of any problem or issue that needs attention.

Technology Requirements
Please bring your laptop to class when the instructor asks you.

Academic Conduct
No make-up mid-term test will be arranged. Synergy in team dynamics & equitable contribution by members are integral to all successful group projects. A 'peer evaluation' form submitted by all group members will therefore be used. Social loafing will not be encouraged in this course. If a student is found guilty, he/she will be given no marks for the project. Please ensure all assignment submissions are made on time. In fairness to the other groups, late submissions will be penalized a minimum 10%.
Attendance Policy
Attendance is **important** and will certainly be taken into account in the case of students on the borderline between two grades. This class follows IBA's policy.
Plagiarism Policy
Plagiarism in any form is strongly discouraged. In case, a student or a group is found guilty, he/she will be penalized as per the IBA procedures and laws.
Withdrawal Policy
This class follows IBA's policy