Institute of Business Administration
CSE 459: Business Intelligence
(Tentative Course Outline and Syllabus)

IBA SMCS

School of Mathematics and Computer Science

Spring 2025

CSE 459: Business Intelligence

"As you gain fresh insight from your data, it opens the door to new questions. As you have new questions, you need to update your instrumentation and analysis. Saying the process is "done" is saying you understand everything there is to know about your users, product, and channels."

~ Brian Balfour, Founder and CEO of Reforge, Former VP of Growth at Hubspot

Course Logistics

Instructor: Abeera Tariq

Course schedule: Monday, Wednesday BI-1 10.00am – 11:15am, BI-2 11:30 am- 12:45 pm
Credits: 3 (3 + 0)

Pre-requisites: CS341 Database Systems

Course Description:

The scope of this course is to teach and impart the skillset of data-driven decision making to students, particularly through BI techniques. The specific scope is to impart the skill of extracting actionable insights in a smart and informed way, from both small and large data sets (existing in databases – Relational/NoSQL) by understanding BI concepts and designing BI dashboards. All this will happen to solve a critical/particular business problem. Hence, the students are expected to conduct BI while developing problem-solving and analytical skills.

For this, the course will initially build on the foundations of data warehousing in detail, followed by BI-related theory and relevant hands-on activities. Some topics of interest include dimensional modeling (OLAP cubes), data cleaning/ETL, exploratory data analysis (EDA), understanding the impact of different BI charts, KPI measurement and design of interactive dashboards and stories to meet business goals.

Two BI tools are selected (PowerBI, Tableau) for hands-on to impart skills for data-driven decision making, preferably on representative business case studies (e.g., telecom, finance, healthcare, retail, ecommerce, agriculture etc.) The datasets would be downloaded from Kaggle or any other comparative repository.

Program Learning Outcomes:

- PLO-2: Knowledge for Solving Computing Problems
- PLO-5: Modern Tool Usage
- PLO-6: Individual and Teamwork

Course Learning Outcomes:

- CLO1: Gain practical and theoretical knowledge of BI and data warehousing, process of data wrangling and EDA, and apply BI methodology for solving business problems.
- CLO2: Use of modern BI tools.
- CLO3: Inculcate problem-solving and analytical skills through collaborative teamwork.

PLO/CLO mapping:

	PLO-2	PLO-5	PLO-6
CLO-1	✓		
CLO-2		✓	
CLO-3			✓

Format and Procedures:

The LMS site will be used to share the syllabus, give out assignments, and to share other course resources. The University's standard policies on attendance, inclusivity, office hours, and academic integrity apply in this course. These are described in later sections below.

Course Textbooks:

- Business Intelligence, Analytics, and Data Science: A Managerial Perspective on Analytics by Efraim Turban, Ramesh Sharda, DursunDelen 4th Edition, Pearson.
- Business Analytics - Taking Business Intelligence Beyond Reporting by Gert Laursen and Jesper Thorlund, 2nd Edition.

Required Tools:

List of Tools:

Data Wrangling: Python (Anaconda),
BI Tools: PowerBI, Tableau

Setup Links:

Students should setup the required BI tools by applying for academic licenses from the links shared below:

https://powerbi.microsoft.com/en-us/downloads/
https://www.tableau.com/community/academic

Grading Procedures: (tentative)

Midterm	30%
Final Exam	25%
Final Project	20%
Home Assignments/In-class graded activities/Quizzes	25%

- *Team Formation:* You may form teams of 2 members for all your assignments and class activities. Absence of any member during any activity will result in loss of marks for that member.

Attendance Policy

IBA attendance policy applies.

Academic Integrity

Each student in this course is expected to abide by the IBA Code of Conduct. Scholastic dishonesty shall be considered a serious violation of these rules and regulations and is subject to strict disciplinary action as prescribed by IBA regulations and policies. Scholastic dishonesty includes, but is not limited to, cheating on exams, plagiarism on assignments, and collusion. Kindly refer to https://examination.iba.edu.pk/CheatingPlagiarism.php for more details.

- PLAGIARISM: Plagiarism is the act of taking the work created by another person or entity and presenting it as ones own for the purpose of personal gain or of obtaining academic credit. Plagiarism includes the submission of or incorporation of the work of others without acknowledging its provenance or giving due credit according to established academic practices. This includes the submission of material that has been appropriated, bought, received as a gift, downloaded, or obtained by any other means. Students must not, unless they have been granted permission from all faculty members concerned, submit the same assignment or project for academic credit for different courses.
- CHEATING: The term cheating shall refer to the use of or obtaining of unauthorized information in order to obtain personal benefit or academic credit.
- COLLUSION: Collusion is the act of providing unauthorized assistance to one or more person or of not taking the appropriate precautions against doing so. Any student violating academic integrity a second time in this course will receive a failing grade for the course, and additional disciplinary sanctions may be administered.
- SHARING CREDENTIALS: It has been observed that some students share their credentials (log in id's and passwords) of LMS, portal, email, etc., with other students. These credentials are private and confidential and not to be shared with anyone. Any violation will be considered as aiding in plagiarism/collusion/cheating and appropriate action might be taken against such students.

Office hours

Monday, Wednesday 1 pm to 2 pm
If you need to speak to the instructor besides the designated office hours, you may book an appointment via email.

Late Submission Policy:

All assignments and graded class activities must be timely submitted via LMS. For any assignment, late submission up to one day late will be accepted with a 10% late penalty of the maximum score. Beyond that, no late submissions will be acceptable.

Missed assessments policy:

There will be no makeup for any missed assessments including assignments, project, quizzes and exams. In case of any medical emergency, proof must be submitted for any consideration.

Week	Topic
1	**Introduction to Data warehousing (DWH):** Fundamentals and historical development of data warehouses, OLTP vs OLAP systems Bill Inmon's foundational DWH concepts, Dimensional Modeling using Kimball methodology: Star schemas, snowflakes, and fact constellations, Understanding roll-up and drill-down operations, Concept of hierarchies (e.g., product and time), Practical star schema design examples, OLAP cube construction on dimensional models.
2	**Introduction to Business Intelligence (BI):** From DWH to BI: The Need for this Transition, BI Definition, Components of BI, Goals of BI, Types of BI, Historical development and evolution of BI, Decision Support Systems (DSS), The BI process/methodology: Steps to solve a business problem using BI, Industrial Applications and Industrial Surveys regarding BI (e.g., Gartner), Evolution of BI tools: A brief history and Important features of these tools
3	**OLAP Cube Theory and Power Pivot (hands-on)** Multi-dimensional analysis, OLAP Operations: drill-down, roll-up, slicing, dicing, pivot
4-6	**Data Wrangling and Exploratory Data Analysis (EDA) using Python(hands-on):** Data wrangling methodology, Data Cleaning Techniques: Analysis of dirty data and catering for missing values (e.g., MCAR, MAR, MNAR), Data Transformation strategy, Univariate and Multivariate analysis, Probability distributions, Box plots, Frequency distributions, Normality and Statistical Testing, Correlation analysis, Anomaly Detection / Outlier Analysis
7	**BI Methodology - Case Study (hands-on)** Following the BI execution strategy to solve a business problem.
8	Mid-term exams
9	Mid-Semester break
10	**Introduction to Power BI (hands-on)** Concepts of Data and Computer Visualization. Understanding the usage of the tool and impact of different charts and visualizations including *Pie/Doughnut, Bar, Stacked Bar, Area, Line, Tables, Gauge, KPI scorecards, Maps, Scatter, Bubble, Heat map / Tree map, Waterfall, Funnel, ribbon chart etc.*
11	**BI Report and Dashboard Design Practices (hands-on):** Dashboard design best practices and common pitfalls, Interactive dashboard development, Implementation of drill-down functionality, Data hierarchy creation and management, Data storytelling techniques with practical examples.
12	**Applied Case Study (hands-on)** Implementation of BI execution strategy with application of data wrangling and domain knowledge templates
13	**Tableau (hands-on)** Hands-on activities with Tableau.
14	**Applied BI Techniques and Advanced Topics** Real-world applications and case studies
15	**Project Presentations**