Innovative Teaching–Learning Practices

Program:	PGDM – SEM-II – 2023-2025 BATCH		
Course Name:	Power BI and AI Application for Business		
Course Credit:	2	Course Code:	DS110
Faculty Name:	Prof. Mitesh Jadav	Total No of Sessions:	20
	Mode of Sessions: Classroom / Lab		
	Lectures: 0	Tutorials: 0	Practical's: 20

1. Context of the Course and Alignment with COs, POs, PSOs

"Power BI and AI Application for Business (DS110)" is a 2-credit, lab-based course with 20–21 practical sessions that introduces students to data analytics and visualization for business decision-making using Microsoft Power BI. The course emphasizes hands-on engagement with business datasets to develop competencies in data preparation, modeling, analysis, and interactive reporting, thereby strengthening analytical and decision-support capabilities expected from PGDM graduates.

The course has four clearly defined Course Outcomes (COs): CO1 – Apply Power BI tools for data connectivity and preparation, including importing data from multiple sources, appending, and merging queries; CO2 – Apply advanced data modeling skills in developing interactive reports and dashboards through transformations, unpivoting/pivoting, grouping, and column operations; CO3 – Evaluate a variety of data using DAX in Power Pivot for data modeling, analysis, and visualization; CO4 – Create Power BI reports and dashboards including calendar tables using DAX, time intelligence, and sharing interactive dashboards. The innovative pedagogy described in this report is intentionally designed to address all four COs by engaging students with a comprehensive, real-life business dataset and requiring them to move from raw data to strategic insights for decision-makers.

The pedagogy is aligned with the CO–PO–PSO mapping specified for the course, which indicates substantial correlation (levels 2–3) with PO1 (management knowledge), PO2 (problem analysis), PO4 (investigation of complex problems), PO5 (modern tool usage), and PSO1 and PSO2 (Programme-specific competencies in analytics and decision support). By

placing students in a realistic, data-rich problem context and requiring them to design data models, compute advanced metrics, and communicate managerial recommendations, the pedagogy strengthens these mapped outcomes in a coherent and measurable way.

2. Description of the Innovative Pedagogy: "Adventure Works – Data-Driven Decision Lab"

The innovative teaching–learning activity for this course is conceptualized as a signature pedagogy titled "Adventure Works – Data-Driven Decision Lab." It revolves around a comprehensive business dataset, immersive problem framing, and end-to-end analytics tasks that culminate in managerial strategy formulation. This activity transforms the course from a purely tool-focused lab to an integrated decision-making laboratory grounded in real-world business scenarios.

The central resource is the "Adventure Works" dataset, which represents a bicycle manufacturing company engaged in B2B sales and provides multiple functional data tables such as HR, Sales, Orders, Products, Customers, and related entities. This dataset simulates an authentic business environment in which area managers require real-time insights into market performance, customer segments, product trends, and operational drivers to guide sales and marketing decisions. By working with this dataset, students experience complexity similar to that encountered in contemporary organizations.

The pedagogy is innovative when compared to traditional lab or lecture-based approaches because it follows the full analytics lifecycle: data import, cleaning, integration, star-schema data modeling, DAX-based computation, visualization, and managerial interpretation. Instead of treating Power BI as a set of isolated commands, the activity is framed around the question of how to design a robust analytical model and dashboard that directly supports decision-making for area managers. This shifts the focus from tool usage to decision-centric analytics, where the final outcome is a coherent marketing and sales strategy supported by evidence generated through the dashboard.

In addition, the activity emphasizes self-directed, problem-based, and project-based learning. Students are given an open-ended business problem and a rich dataset rather than a fixed,

step-wise lab manual, and they must plan, design, implement, test, and present their solutions over multiple sessions. This structure is aligned with the continuous evaluation and rubric-based assessment pattern of the course, thereby integrating innovative pedagogy with the formal evaluation framework.

3. Stepwise Pedagogical Design and Delivery

The teaching-learning design for the "Adventure Works – Data-Driven Decision Lab" is organized into five phases, each mapped to specific COs and implemented over multiple practical sessions. This phased approach ensures progressive learning from basic data handling to advanced strategy formulation.

Phase 1 – Data Connectivity and Preparation (CO1)

In Phase 1, students are introduced to the Adventure Works dataset and are required to import multiple tables into Power Query from relevant sources and formats such as spreadsheets, text files, or databases, depending on the deployment context. They perform foundational data operations including appending rows, merging queries, handling missing or inconsistent data, and performing basic data cleansing operations, thereby operationalizing CO1 through the implementation of performance indicators PI 1.1 and PI 1.2.

The teaching-learning process at this stage combines brief guided demonstrations by the instructor with substantial hands-on lab work, in which students execute the steps individually or in small groups. Micro-tasks are assigned to ensure that each learner can interpret schema, correctly import data, and validate preliminary outputs, laying a strong base for subsequent modeling and analysis.

Phase 2 – Advanced Data Modeling and Transformations (CO2)

Phase 2 focuses on advanced data preparation and data modeling using Power Query and Power Pivot. Students apply a variety of transformations including unpivoting and pivoting data, grouping records, creating calculated columns, and deriving additional fields required for analysis. These activities reinforce skills in structuring data into an analysis-ready format

and correspond directly to CO2, which emphasizes advanced data modeling skills for interactive reports and dashboards.

A key design element in this phase is the construction of a star schema data model. Students identify an appropriate fact table (such as a sales or orders fact) and then define and link relevant dimension tables including Products, Customers, Calendar, Geography, and HR, using primary–foreign key relationships. Through this process, students learn to evaluate the quality of their model, ensure referential integrity, and understand how model structure affects analytical flexibility and performance.

Phase 3 – DAX and Time Intelligence (CO3)

In Phase 3, the emphasis shifts to DAX and time intelligence for advanced analysis, addressing CO3, which focuses on evaluating data using DAX in Power Pivot. Students create calculated columns and measures to derive key performance indicators (KPIs) such as total sales, margins, average order value, period-wise growth, and region-wise performance, all computed on top of the star schema created in the previous phase.

Students then construct a Calendar table using DAX and apply time intelligence functions to perform analyses such as month-on-month or year-on-year comparisons, trend analysis, and seasonality checks. The learning outcome at this stage centers on the evaluation and interpretation of numerical results, requiring students to understand not only how to write DAX expressions but also how to interpret their outputs in a business context.

Phase 4 – Interactive Dashboard Design and Real-time Managerial Use Case (CO4)

Phase 4 operationalizes CO4 by guiding students to create interactive dashboards in Power BI Desktop and/or the Power BI Service. Using the measures and data model developed earlier, students design dashboards that incorporate slicers, filters, drill-down hierarchies, and segmented views tailored to the needs of area managers. The dashboards are expected to enable monitoring of region-wise sales, product category performance, key customer segments, and, where applicable, HR-related metrics that may affect sales outcomes.

The dashboards are positioned as real-time decision-support tools, where area managers can quickly identify underperforming regions or product lines and explore underlying drivers. Students are required to interpret their visualizations and submit a brief marketing or managerial recommendation note that synthesizes the key findings from the dashboard into an actionable strategy for the company. This requirement ensures that students do not stop at visual creation but complete the loop by drawing conclusions and suggesting interventions.

Phase 5 – Strategy Formulation and Communication Skills

In the final phase, students present their dashboards and defend the marketing and sales strategies derived from their analyses. Presentations may be conducted individually or in small groups and are evaluated on clarity of communication, rigor of analysis, and the coherence of proposed strategies. This phase reinforces communication, analytical thinking, and problem-solving abilities, directly supporting higher-level programme outcomes such as PO4 (investigation of complex problems) and PO5 (modern tool usage and communication in managerial contexts).

By requiring students to justify their strategies in front of faculty and peers, the pedagogy also develops confidence and professional readiness for industry roles that demand both technical and managerial competencies. The iterative feedback received during these presentations can be used to refine both the dashboards and the strategies, creating a continuous learning loop.

4. Mapping of Innovative Activity to COs, POs, PSOs and Bloom's Levels

The "Adventure Works – Data-Driven Decision Lab" contributes systematically to all four COs and, through them, to the mapped POs and PSOs. CO1 is addressed through data import, append/merge operations, and fundamental transformations on the Adventure Works dataset, building the ability to apply tools to real data. CO2 is achieved through the design of the star schema and advanced transformations, which require students to analyze structure and establish meaningful relationships between entities. CO3 is realized through DAX-based computations and time intelligence that demand analysis and evaluation of complex data patterns. CO4 is attained via the creation of interactive dashboards and the translation of analytical findings into business problem-solving and strategy.

Through these COs, the activity strengthens PO1 and PO2 by requiring application of management and analytical knowledge to real-world data, and PO4 and PO5 by involving investigation of complex problems and effective use of modern tools for communication and decision support. The use of a realistic dataset and a decision-centric scenario also enhances PSO1 and PSO2 by providing programme-specific exposure to business analytics and data-driven decision-making in a PGDM context. At the cognitive level, the phases progress along Bloom's taxonomy from "Apply" (in early data handling steps) to "Analyze", "Evaluate", and "Create" (in model design, KPI evaluation, dashboard composition, and strategy formulation).

Phase–Outcome–Skill Mapping Table

Phase / Activity	**Linked COs**	**PO/PSO Focus**	**Bloom's Level**
Data import & preparation (Adventure Works)	CO1	PO1, PO2, PSO1	Apply
Star schema modeling & transformations	CO2	PO1, PO2, PSO1, PSO2	Analyze
DAX measures & time intelligence	CO3	PO2, PO4, PSO1	Analyze, Evaluate
Interactive dashboards & strategy formulation	CO4	PO4, PO5, PSO1, PSO2	Evaluate, Create

This mapping is consistent with the CO–PO–PSO correlation levels specified for the course and demonstrates that the innovative pedagogy has been deliberately structured to achieve targeted competencies across multiple programme outcomes.

5. Assessment Design, Rubrics, and Evidence of Learning

The innovative pedagogy is fully embedded within the course's evaluation structure, which comprises both continuous evaluation (CE) and end-semester evaluation (FE). Continuous evaluation carries 50 marks and is entirely project-based, with milestones aligned to the

progression of the Adventure Works activity. This design ensures that assessment is authentic and directly connected to the teaching-learning process.

The CE is divided into three projects: Project 1 (15 marks) focuses on data connectivity and basic Power BI operations corresponding primarily to CO1; Project 2 (15 marks) emphasizes data modeling and transformation, linked to CO2: Project 3 (20 marks) evaluates DAX, dashboard development, and interpretation, thereby covering CO3 and CO4. Each project is assessed using rubrics that classify performance levels as Mastery, Proficiency, Developing, or Needs improvement, providing transparent criteria for student performance and facilitating feedback-driven improvement.

The end-semester evaluation (FE) carries 50 marks and is conducted as a lab-based examination. Students are given a new or modified business scenario that requires them to perform data import, modeling, DAX calculations, dashboard creation, and interpretation in a controlled setting. This ensures that their competencies are transferable beyond the specific Adventure Works dataset and that all COs are evaluated under examination conditions, strengthening the evidence base for outcome attainment.

The rubrics across CE and FE focus on dimensions such as accuracy and completeness of data import, quality and correctness of the data model (including relationships and transformations), effectiveness and usability of dashboards, and the ability to identify trends, patterns, and business problems from the visualizations. By aligning rubric criteria with COs, the course generates measurable evidence of learning, enabling the programme to track CO attainment over time and take remedial measures if required.

6. Student-Centric and Innovative Features

The "Adventure Works – Data-Driven Decision Lab" clearly fits within NBA's understanding of innovative and student-centric pedagogy due to its emphasis on experiential and problem-based learning. Students do not merely follow prescriptive lab instructions; instead, they engage with a realistic business dataset and are required to design and implement solutions autonomously within a structured framework. This project-based approach encourages exploration, experimentation, and reflection.

The pedagogy adopts a problem-based learning orientation around the central question: "How can an area manager monitor and improve sales performance using data?" Students must structure their data model, choose appropriate KPIs, design visualizations, and synthesize strategic recommendations in response to this managerial problem. In doing so, they integrate knowledge from multiple functional areas such as marketing, sales, operations, and HR, as represented in the Adventure Works dataset, thus reinforcing the multidisciplinary nature of management education.

The use of industry-relevant tools and concepts—including Microsoft Power BI, star schema modeling, and DAX—enhances the employability of students by familiarizing them with current business intelligence practices. The culminating requirement that students produce an evidence-backed marketing strategy, rather than merely submit a technical dashboard, ensures that decision-making and strategic thinking are at the core of the learning experience, aligning with the expectations of PGDM-level professional education.

7. Outcomes, Reflections, and Scope for Improvement

Initial implementation and feedback indicate that the "Adventure Works – Data-Driven Decision Lab" enhances student confidence in handling complex, multi-table business datasets and interpreting analytical results in a managerial context. Students report a clearer understanding of the end-to-end data analytics pipeline and its relevance for real-world decision-making, which is reflected in improved performance on COs related to analytical and problem-solving skills. Faculty observations suggest greater engagement and deeper conceptual understanding compared to more traditional lab exercises.

The activity also contributes to more robust CO attainment, particularly in CO2, CO3, and CO4, where students demonstrate the ability to design data models, compute advanced measures, and translate analytics into meaningful dashboards and strategies. These gains, combined with rubric-based assessment data, provide strong evidence for programme-level quality enhancement in the areas of business analytics and data-driven decision-making.

There is, however, scope for further improvement and extension of the pedagogy. Future iterations can incorporate AI and machine learning components, such as predictive modeling

or advanced forecasting, building on the "Time intelligence and predictive analytics" sessions already included in the course plan. Collaboration with industry experts—through guest evaluations of dashboards, joint critique sessions, or real client problem statements—can provide students with additional exposure to practitioner perspectives and further strengthen the relevance and impact of the pedagogy.