TECHNION Israel Institute of Technology | FACULTY OF DATA AND DECISION SCIENCES MAKING SENSE OF IT | THE WILLIAM DAVIDSON MBA

MBA – Focusing on Entrepreneurship, Innovation & Technology Management

Syllabus

Project in Big data and business intelligence (99100)

Mini Semester 8/2025
[Class location TBD]
[Thursday, 15:00-19:00]

Teaching Staff:

Instructor:	Dr. Ofir Yakobi	ofiry@technion.ac.il
Office Hours:	by appointment	
TA:	Hadar Shalev	hadarsh@technion.ac.il
Office Hours:	by appointment	

Prerequisites: Python, Machine Learning fundamentals (recommended)

Credits: 5 points

In-class study hours per week: 4

Course Goals and Description

This course provides hands-on experience in applying Data Science, and Business Intelligence techniques to real-world industry challenges. MBA students will collaborate with industry partners on a data-driven project, integrating concepts from data science and analytics. The course bridges the gap between business strategy and technical implementation, enabling students to extract insights from large datasets and translate them into actionable business recommendations, and create models that integrate with the business model.

Project Tracks

Students will work on one of two main types of projects in this course:

Data-Driven Decision Making – In this track, students will leverage Big Data, statistical analysis, and state-of-the-art machine learning (ML) models to extract insights from a client's dataset. The goal is to address core business questions and support strategic decision-making.

ML-Driven Capability Development – This track focuses on building a machine learning model to provide the client with a new operational capability. Examples include developing a computer vision model to enhance quality assurance in a manufacturing facility or creating an AI-driven recommendation system for customer engagement.

Project Sourcing and Approval

In the industry, data scientists and managers are often expected to proactively identify projects, uncover business challenges, and demonstrate their value through impactful work. Similarly, in this course, students are solely responsible for securing an industry partner and defining a project.

In rare cases where an industry partner cannot be secured despite all efforts, students may request approval to use a publicly available dataset. However, this option is discouraged. If granted, the team must design a "mock company" with a realistic business model to ensure their work remains practical, scalable, and business-driven rather than purely theoretical.

The course is oriented towards, but not limited to, tabular data. Other data structures may be considered.
All projects must be pre-approved by the course staff and will be evaluated based on feasibility, business value, and complexity.

Project groups should be 3-4 students per group.

Learning Outcomes

Students will gain practical experience with data processing, visualization, machine learning models, while developing essential problem-solving and communication skills. The course emphasizes statistical thinking, project management, teamwork, presentation and effective storytelling with data.

Course Content/Topics

Week	Key Topics	In-Class Activities	Submissions
1	**Course Introduction & Project Scoping** - Syllabus review - Project requirements - Success metrics/KPIs - Introduction to DS pipeline	- Review course structure, deliverables, and grading - Students pitch and finalize project ideas - Discuss data acquisition and client needs - Identify relevant data sources	**Draft Project Proposal** - Define project context - Define Objectives - Outline initial approach and success metrics (5%)
2	**Data Cleaning & EDA** - Data wrangling - Handling missing data - Data visualization - Exploratory Data Analysis techniques	- Exercise 1: Importing, merging, and cleaning real data - Exercises 2: Identifying outliers and missing data - Visualization best practices for quick insights	

3	**Feature Engineering & Selection** - Generating new features - Encoding categorical data - Feature importance techniques	- Tutorial: Feature transformation, polynomial features, and domain-based feature creation - Hands-on: Creating new features and using selection methods (e.g., correlation, information gain)	**Feature Transformation** - Experiment with various transformations on your dataset, compare outcomes, present logic and rationale (why do these features matter?) (5%)
4	**Model Tuning & Validation** - Cross-validation - Hyperparameter tuning - Overfitting & underfitting	- Strategies for robust model validation (e.g., k-fold CV) - Demonstration: Basic grid/random search - Compare metrics to guide improvements 1. Model Validation Exercise - Apply cross-validation to refine your project model	
5	**Mid-semester project presentation**	Group presentations	

6	**Model Selection & Practical Considerations** - Model interpretability basics - Handling imbalanced data - Intro to ensemble methods	- Tutorial: Using tools like SHAP or LIME for model interpretation - Discuss advanced algorithms: Random Forest, Gradient Boosted Trees - Class discussion: Balancing complexity vs. interpretability	
7	**Results Synthesis & Business Integration** - Business value mapping - Storytelling with data - Communicating results to stakeholders	- Case study: Successful DS project outcomes and pitfalls - Workshop: Building a persuasive data story - Peer feedback session: Present initial project findings and recommended actions	**Draft Presentation** - Prepare initial deck highlighting key insights and project outcomes
8	**Final Presentations & Course Wrap-Up** - Project presentations - Lessons learned - Future of data science in business	- Student teams present final projects - Q&A and class critique - Discussion of real-world DS challenges, ethics, and potential career paths	**Final Project Report & Deck** - Submit polished final documentation and presentation slides

Assignments and Grading Procedures
In-class participation (10%), Assignments (10%), Project Evaluation (80%)

Text book(s) and/or other materials

Book: UNDERSTANDING MACHINE LEARNING From Theory to Algorithms
Shai Shalev-Shwartz, The Hebrew University, Jerusalem
Shai Ben-David, University of Waterloo, Canada

Free online course: https://www.deeplearning.ai/courses/machine-learning-specialization/