Introduction to Data Analytics: From Theory to Practice with Excel

Course Syllabus

Course Description

This course bridges the gap between data analytics theory and practical application. Students will learn fundamental analytical concepts while mastering Microsoft Excel from basic operations to advanced analytical features. The course follows a "learn-by-doing" approach with weekly hands-on labs using real datasets across various industries.

Learning Outcomes

Upon completion, students will be able to:

1. Explain the data analytics lifecycle and its business applications
2. Clean, transform, and prepare raw data for analysis using Excel
3. Apply descriptive, diagnostic, and predictive analytical techniques
4. Create dynamic dashboards and compelling data visualizations
5. Use Excel's advanced functions (LOOKUP, PivotTables, Power Query, etc.)
6. Interpret analytical results and communicate data-driven insights
7. Perform basic statistical analysis without programming
8. Transition to more advanced tools (SQL, Python, Power BI)

Grading Policy

- Weekly Excel Labs & Assignments: 30%
- Midterm Project: 25%
- Final Capstone Project: 30%
- Quizzes & Participation: 15%
- **Grading Scale:** A: 90-100%, B: 80-89%, C: 70-79%, D: 60-69%, F: Below 60%

Course Schedule

Module 1: Foundations of Data Analytics (Weeks 1-2)

Week 1: Introduction to Data-Driven Decision Making

- **Theory:** What is data analytics? Historical evolution and modern importance
- **Types of Analytics:** Descriptive, Diagnostic, Predictive, Prescriptive
- **Industry Applications:** Healthcare, finance, marketing, operations
- **Practical:** Excel Basics: Interface, navigation, data entry, formatting
- **Lab 1:** Creating your first data table – Sales dataset formatting

Week 2: The Data Analytics Process (CRISP-DM)

- **Theory:** Business understanding, data understanding, data preparation
- **Theory:** Modeling, evaluation, deployment
- **Practical:** Excel Essentials: Sorting, filtering, basic formulas (SUM, AVERAGE, COUNT)
- **Practical:** Cell references (relative vs. absolute)
- **Lab 2:** Cleaning a messy customer dataset

Module 2: Data Preparation & Manipulation (Weeks 3-5)

Week 3: Data Cleaning in Excel

- **Theory:** Data quality dimensions, common data issues
- **Practical:** Text functions (LEFT, RIGHT, MID, TRIM, CONCATENATE)
- **Practical:** Data validation, removing duplicates, error checking
- **Lab 3:** Cleaning and standardizing an address database

Week 4: Advanced Excel Functions

- **Theory:** Logic in data transformation
- **Practical:** Logical functions (IF, AND, OR, nested IFs)
- **Practical:** Date & Time functions
- **Practical:** VLOOKUP and XLOOKUP (exact and approximate match)
- **Lab 4:** Building an employee dashboard with lookup functions

Week 5: Introduction to Power Query (Game Changer)

- **Theory:** ETL (Extract, Transform, Load) concepts
- **Practical:** Importing data from multiple sources
- **Practical:** Merging queries, unpivoting data, data type transformations
- **Lab 5:** Combining monthly sales reports from multiple Excel files

Module 3: Data Analysis & Exploration (Weeks 6-8)

Week 6: PivotTables Mastery

- **Theory:** Multidimensional data analysis concepts
- **Practical:** Creating PivotTables, field arrangement, value calculations
- **Practical:** Grouping data, timelines, slicers, PivotCharts
- **Practical:** GETPIVOTDATA function
- **Lab 6:** Analyzing year-long retail sales data with PivotTables

Week 7: Statistical Analysis in Excel

- **Theory:** Descriptive statistics (mean, median, mode, dispersion)
- **Practical:** Statistical functions (AVERAGEIFS, COUNTIFS, SUMIFS)
- **Practical:** Data Analysis ToolPak: Histograms, correlation, regression
- **Lab 7:** Customer segmentation analysis using statistical measures

Week 8: What-If Analysis & Scenario Modeling

- **Theory:** Business forecasting and scenario planning
- **Practical:** Goal Seek, Data Tables (one and two variables)
- **Practical:** Scenario Manager, Solver add-in basics
- **Midterm Project Assigned:** Sales performance analysis for a retail chain
- **Lab 8:** Creating a break-even analysis model

Module 4: Data Visualization & Dashboarding (Weeks 9-11)

Week 9: Effective Data Visualization Principles

- **Theory:** Cognitive principles of data visualization
- **Theory:** Chart types and when to use them
- **Practical:** Advanced charting: Combo charts, sparklines, waterfall charts

- **Practical:** Conditional formatting with formulas
- **Lab 9:** Creating an executive sales dashboard

Week 10: Dynamic Dashboards in Excel

- **Theory:** Dashboard design best practices
- **Practical:** Form controls (drop-downs, option buttons, sliders)
- **Practical:** INDEX-MATCH for advanced lookups
- **Practical:** Named ranges, OFFSET function for dynamic ranges
- **Lab 10:** Building an interactive financial performance dashboard

Week 11: Introduction to Power BI

- **Theory:** Business Intelligence vs. Data Analytics
- **Practical:** Power BI Desktop interface, importing data from Excel
- **Practical:** Creating basic visualizations and reports
- **Lab 11:** Transforming Excel data into a Power BI report

Module 5: Special Topics & Capstone (Weeks 12-14)

Week 12: Time Series Analysis

- **Theory:** Trend analysis, seasonality, forecasting methods
- **Practical:** Moving averages, trendlines, FORECAST functions
- **Lab 12:** Analyzing and forecasting website traffic data

Week 13: Data Storytelling & Reporting

- **Theory:** Communicating insights effectively
- **Practical:** Creating executive summaries in Excel
- **Practical:** Integrating Excel with Word and PowerPoint
- **Final Capstone Project Assigned:** End-to-end analysis of a real-world dataset
- **Lab 13:** Preparing a client presentation with data insights

Week 14: Ethics in Data Analytics & Course Review

- **Theory:** Data privacy (GDPR, CCPA), ethical considerations
- **Theory:** Bias in data and algorithms
- **Practical:** Anonymizing data in Excel

- **Course review and Q&A session**
- **Capstone project work session**

Week 15: Capstone Project Presentations

- Student presentations (10 minutes each)
- Peer feedback session
- Course wrap-up and next steps in analytics

Practical Lab Environment

- **Software:** Microsoft Excel 2016+ (Office 365 recommended)
- **Cloud Access:** OneDrive/SharePoint for collaborative projects
- **Datasets Provided:** 15+ real datasets across industries
- **Lab Manual:** Step-by-step guides with screenshots
- **Templates:** Pre-built Excel templates for common analyses

Projects & Assessments

Weekly Labs (45 minutes each)

- Hands-on exercises with immediate application
- Progressive difficulty building on previous weeks
- Real business scenarios (sales, marketing, operations, HR)

Midterm Project: Retail Analytics Dashboard

- Analyze 2 years of retail transaction data
- Create automated reports for management
- Present key insights and recommendations

Final Capstone Project (Choose One)

1. **Healthcare Analysis:** Patient satisfaction survey analysis with recommendations
2. **Marketing Analytics:** Campaign performance analysis with ROI calculation
3. **Financial Analysis:** Company financial statement analysis and forecasting
4. **Operations Analysis:** Supply chain or logistics optimization analysis

5. **Student's Choice:** With instructor approval on dataset

Excel Skills Progression

Beginner (Weeks 1-3): Basic formulas, formatting, sorting/filtering
Intermediate (Weeks 4-7): VLOOKUP, PivotTables, statistical functions
Advanced (Weeks 8-11): Power Query, dashboarding, dynamic formulas
Expert (Weeks 12-14): Forecasting, scenario analysis, integration

Career Pathways After This Course

- **Entry-Level Roles:** Data Analyst, Business Analyst, Reporting Analyst
- **Next Steps:** SQL for Data Analysis, Python for Data Analytics, Advanced Power BI
- **Certifications:** Microsoft Excel Expert, Microsoft Data Analyst Associate

Required Resources

- **Hardware:** Windows/Mac computer with Excel 2016+
- **Storage:** 5GB free space for datasets
- **Backup:** OneDrive/Google Drive for project backup
- **Optional:** Second monitor recommended for lab work

Support System

- **Weekly Office Hours:** In-person and virtual
- **Peer Mentoring:** Group study sessions encouraged
- **Online Forum:** Q&A board for technical questions
- **Excel Cheat Sheets:** Formula references and keyboard shortcuts
- **Troubleshooting Guide:** Common Excel errors and solutions

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Key Differentiators of This Course

1. **No Programming Required:** Accessible to all majors and backgrounds
2. **Industry-Relevant:** Real datasets from actual businesses
3. **Progressive Mastery:** Builds from basic to expert Excel skills
4. **Portfolio Development:** Capstone project for your resume
5. **Tool-Agnostic Foundation:** Skills transfer to other analytics tools