THOMAS ADEWUNMI UNIVERSITY, OKO, KWARA STATE
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RAIN SEMESTER LECTURE NOTE **2023/2024 Session**

COURSE INFO:

Course code:	**ECO 318**
Course title:	**Application of Computer in Social Science**
Credit unit:	**2**

LECTURER INFO:

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TOPIC 1: CHARTS AND GRAPHS IN EXCEL

Course Description:

This course note provides a comprehensive guide to creating and interpreting charts and graphs in Excel, a powerful tool for data visualization. It covers various types of charts, steps to create them, customization options, and best practices for effective data presentation.

Objectives:

- Understand the importance and purpose of charts and graphs in data analysis.
- Learn to create different types of charts and graphs in Excel.
- Customize charts and graphs for clarity and impact.
- Interpret and analyze data using visual tools in Excel.
- Apply best practices in data visualization for effective communication.

Course Outline:

1. Introduction to Charts and Graphs in Excel
    - Definition and Purpose
    - Importance of Data Visualization
2. Types of Charts and Graphs
    - Column and Bar Charts
    - Line Charts
    - Pie Charts
    - Scatter Plots
    - Area Charts
    - Histogram
    - Combo Charts
3. Creating Charts and Graphs
    - Data Preparation
    - Step-by-Step Guide to Creating Charts
    - Using the Chart Wizard
4. Customizing Charts and Graphs
    - Adding Titles, Labels, and Legends
    - Formatting Axes
    - Changing Chart Types and Styles
    - Using Colors and Patterns
    - Adding Data Labels and Annotations
5. Interpreting Charts and Graphs
    - Analyzing Trends and Patterns
    - Identifying Key Insights
    - Avoiding Misinterpretation
6. Best Practices for Data Visualization
    - Choosing the Right Chart Type

    - Ensuring Clarity and Readability
    - Avoiding Common Pitfalls
    - Using Visual Aids Effectively
7. Real-World Applications and Case Studies
    - Business Analytics
    - Financial Analysis
    - Scientific Research
    - Market Research

Detailed Course Notes:

1. Introduction to Charts and Graphs in Excel

Definition and Purpose:

- **Charts and Graphs**: Visual representations of data designed to make complex data more understandable and accessible.
    - **Purpose**: To present data in a clear, concise, and visually appealing manner, facilitating easier interpretation and analysis.

Importance of Data Visualization:

- Enhances understanding of data patterns and trends.
- Aids in decision-making processes.
- Communicates data insights effectively to a broader audience.

2. Types of Charts and Graphs

Column and Bar Charts:

- **Column Charts**: Used to compare values across categories using vertical bars.
- **Bar Charts**: Similar to column charts but use horizontal bars.

Line Charts:

- Display trends over time or continuous data points.
- Useful for showing changes in data at equal intervals.

Pie Charts:

- Represent proportions or percentages of a whole.
- Effective for comparing parts of a dataset.

Scatter Plots:

- Show relationships between two variables.
- Useful for identifying correlations and outliers.

Area Charts:

- Similar to line charts but with the area below the line filled in.
- Good for showing cumulative totals over time.

Histogram:

- Used for displaying the distribution of a dataset.
- Divides data into bins and shows frequency.

Combo Charts:

- Combine two or more chart types to highlight different aspects of data.
- Useful for comparing different data series with distinct ranges.

3. Creating Charts and Graphs

Data Preparation:

- Ensure data is clean and well-organized.
- Select the appropriate range of data for the chart.

Step-by-Step Guide to Creating Charts:

1. **Select Data**: Highlight the data range to be used for the chart.
2. **Insert Chart**: Go to the 'Insert' tab and choose the desired chart type.
3. **Chart Wizard**: Follow prompts to customize the chart.

4. Customizing Charts and Graphs

Adding Titles, Labels, and Legends:

- **Titles**: Provide a clear and descriptive title.
- **Labels**: Add axis labels to indicate what each axis represents.
- **Legends**: Include a legend to explain different data series.

Formatting Axes:

- Adjust scale, interval, and format of axes for better readability.

Changing Chart Types and Styles:

- Use the 'Change Chart Type' option to switch between different chart styles.

Using Colors and Patterns:

- Use contrasting colors and patterns to differentiate data series.

Adding Data Labels and Annotations:

- Display specific values on the chart.
- Use annotations to highlight key points or insights.

5. Interpreting Charts and Graphs

Analyzing Trends and Patterns:

- Look for upward or downward trends, cycles, or irregularities.

Identifying Key Insights:

- Focus on significant data points, outliers, and overall patterns.

Avoiding Misinterpretation:

- Be aware of scales, proportions, and visual distortions that can mislead interpretation.

6. Best Practices for Data Visualization

Choosing the Right Chart Type:

- Match the chart type to the nature of the data and the message to be conveyed.

Ensuring Clarity and Readability:

- Keep the design simple and uncluttered.
- Use clear labels and avoid overloading the chart with too much information.

Avoiding Common Pitfalls:

- Avoid misleading scales, cherry-picking data, and using inappropriate chart types.

Using Visual Aids Effectively:

- Employ gridlines, trendlines, and annotations to enhance understanding.

7. Real-World Applications and Case Studies

Business Analytics:

- Sales performance, market trends, and financial reporting.

Financial Analysis:

- Stock price movements, revenue growth, and expense tracking.

Scientific Research:

- Experimental results, survey data, and statistical analysis.

Market Research:

- Customer demographics, purchasing behavior, and market segmentation.

Recommended Readings:

- Walkenbach, J. (2015). *Excel 2016 Bible*. Wiley.
- Alexander, M., & Walkenbach, J. (2019). *Excel Charts*. Wiley.
- Few, S. (2012). *Show Me the Numbers: Designing Tables and Graphs to Enlighten*. Analytics Press.

TOPIC 2: INTRODUCTION TO DASHBOARD IN EXCEL

Course Description:

This course note provides an in-depth guide to creating and utilizing dashboards in Excel. It covers the purpose and benefits of dashboards, step-by-step instructions for building a dashboard, customization techniques, and best practices for effective data visualization and reporting.

Objectives:

- Understand the concept and purpose of dashboards in data analysis.
- Learn the key components of an effective dashboard.
- Gain proficiency in creating and customizing dashboards in Excel.
- Apply best practices to design clear and informative dashboards.
- Use Excel dashboards to monitor, analyze, and present data insights.

Course Outline:

1. Introduction to Dashboards
    - Definition and Purpose
    - Benefits of Using Dashboards
2. Key Components of a Dashboard
    - Data Sources
    - Visual Elements
    - Interactive Controls
3. Preparing Data for Dashboards
    - Data Cleaning and Organization
    - Using Tables and Named Ranges
4. Creating Dashboards in Excel
    - Step-by-Step Guide
    - Using Charts and Graphs
    - Incorporating PivotTables and PivotCharts
5. Customizing Dashboards
    - Adding Titles, Labels, and Legends

    - Formatting Visual Elements
    - Using Conditional Formatting
6. Interactive Dashboards
    - Adding Slicers and Filters
    - Using Form Controls
    - Creating Dynamic Charts
7. Best Practices for Dashboard Design
    - Ensuring Clarity and Simplicity
    - Choosing the Right Visualizations
    - Maintaining Consistency and Readability
8. Real-World Applications and Case Studies
    - Business Performance Monitoring
    - Financial Analysis
    - Project Management

Detailed Course Notes:

1. Introduction to Dashboards

Definition and Purpose:

- **Dashboard**: A visual display of key metrics and data points, designed to provide an overview of important information at a glance.
    - **Purpose**: To enable quick and informed decision-making by presenting complex data in an easily understandable format.

Benefits of Using Dashboards:

- Consolidates data from multiple sources.
- Provides real-time insights and updates.
- Enhances data visibility and accessibility.
- Facilitates data-driven decision-making.

2. Key Components of a Dashboard

Data Sources:

- Raw data that feeds into the dashboard, such as spreadsheets, databases, and external data connections.

Visual Elements:

- **Charts and Graphs**: Visual representations of data trends and patterns.
- **Tables**: Organized data in rows and columns for detailed analysis.
- **KPIs (Key Performance Indicators)**: Metrics that track the performance of specific objectives.

Interactive Controls:

- Tools that allow users to interact with the dashboard, such as slicers, filters, and form controls.

3. Preparing Data for Dashboards

Data Cleaning and Organization:

- Ensure data accuracy and consistency.
- Remove duplicates, handle missing values, and format data appropriately.

Using Tables and Named Ranges:

- Convert data ranges into Excel tables for easier management and analysis.
- Use named ranges to simplify formulas and references.

4. Creating Dashboards in Excel

Step-by-Step Guide:

1. **Plan the Dashboard**: Define objectives, identify key metrics, and sketch the layout.
2. **Gather Data**: Import or link data sources.
3. **Create Visual Elements**: Insert charts, tables, and KPIs.
4. **Arrange Elements**: Organize visual elements in a logical and aesthetically pleasing layout.

Using Charts and Graphs:

- Choose appropriate chart types based on the data and objectives (e.g., column, line, pie, scatter).
- Insert charts using the 'Insert' tab and customize as needed.

Incorporating PivotTables and PivotCharts:

- Use PivotTables to summarize and analyze data.

- Create PivotCharts to visualize PivotTable data.

5. Customizing Dashboards

Adding Titles, Labels, and Legends:

- Provide clear and descriptive titles.
- Add axis labels and legends to explain data.

Formatting Visual Elements:

- Adjust colors, fonts, and styles for better readability and aesthetics.
- Use consistent formatting throughout the dashboard.

Using Conditional Formatting:

- Apply conditional formatting to highlight important data points and trends.
- Use color scales, data bars, and icon sets for visual emphasis.

6. Interactive Dashboards

Adding Slicers and Filters:

- Insert slicers to filter data in PivotTables and PivotCharts.
- Use filters to allow users to select specific data subsets.

Using Form Controls:

- Add form controls like dropdowns, checkboxes, and option buttons for user interaction.

Creating Dynamic Charts:

- Use dynamic ranges and formulas to create charts that automatically update based on user inputs.

7. Best Practices for Dashboard Design

Ensuring Clarity and Simplicity:

- Avoid clutter and focus on key metrics.
- Use white space effectively to separate different sections.

Choosing the Right Visualizations:

- Match visualizations to the type of data and the message you want to convey.
- Avoid overloading the dashboard with too many visual elements.

Maintaining Consistency and Readability:

- Use a consistent color scheme and font style.

- Ensure text is readable and visual elements are appropriately sized.

8. Real-World Applications and Case Studies

Business Performance Monitoring:

- Track sales performance, customer metrics, and operational efficiency.
- Example: A sales dashboard displaying monthly revenue, sales by region, and top-performing products.

Financial Analysis:

- Monitor financial health, budget vs. actuals, and expense tracking.
- Example: A financial dashboard showing profit margins, cash flow, and expenditure breakdown.

Project Management:

- Oversee project timelines, resource allocation, and task completion.
- Example: A project management dashboard highlighting project status, milestones, and resource utilization.

Recommended Readings:

- Alexander, M., & Walkenbach, J. (2019). *Excel Dashboards and Reports*. Wiley.
- Jelen, B. (2016). *Excel 2016 in Depth*. Que Publishing.
- Few, S. (2006). *Information Dashboard Design: The Effective Visual Communication of Data*. O'Reilly Media.

TOPIC 3: INTRODUCTION TO POWERPOINT SLIDE

Course Description:

This course note provides an introductory guide to creating and using PowerPoint slides effectively. It covers the basics of PowerPoint, slide design principles, step-by-step instructions for creating presentations, and best practices for delivering impactful presentations.

Objectives:

- Understand the basics of PowerPoint and its interface.
- Learn key principles of slide design and layout.
- Gain proficiency in creating and customizing PowerPoint slides.
- Apply best practices for effective data presentation.
- Use PowerPoint to deliver engaging and professional presentations.

Course Outline:

1. Introduction to PowerPoint
    - Definition and Purpose
    - Overview of PowerPoint Interface
2. Key Principles of Slide Design
    - Simplicity and Clarity
    - Consistency and Alignment
3. Creating PowerPoint Slides
    - Step-by-Step Guide
    - Adding and Formatting Text
    - Incorporating Images, Charts, and Graphs
4. Customizing Slides
    - Using Themes and Templates
    - Applying Transitions and Animations
5. Enhancing Slides with Visual Elements
    - Using SmartArt and Icons
    - Adding Multimedia Elements
6. Best Practices for Effective Presentations

    - Structuring Your Presentation
    - Designing for Readability and Engagement
    - Practicing Delivery Techniques
7. Real-World Applications and Case Studies
    - Business Presentations
    - Educational Lectures
    - Project Proposals

Detailed Course Notes:

1. Introduction to PowerPoint

Definition and Purpose:

- **PowerPoint**: A presentation software developed by Microsoft, used to create slideshows composed of text, images, charts, videos, and other visual elements.
    - **Purpose**: To visually support and enhance oral presentations, making information more engaging and easier to understand.

Overview of PowerPoint Interface:

- **Home Tab**: Basic formatting tools for text, slides, and objects.
- **Insert Tab**: Tools for adding new elements such as tables, charts, images, and videos.
- **Design Tab**: Options for slide themes, colors, and background styles.
- **Transitions Tab**: Tools for adding transition effects between slides.
- **Animations Tab**: Tools for animating text and objects on slides.
- **Slide Show Tab**: Tools for setting up and starting slide shows.
- **Review Tab**: Tools for proofreading, comments, and language settings.
- **View Tab**: Tools for changing the presentation view and working with multiple windows.

2. Key Principles of Slide Design

Simplicity and Clarity:

- **Minimize Text**: Use bullet points and short sentences.
- **Highlight Key Points**: Use bold or different colors for emphasis.
- **Avoid Clutter**: Keep slides clean and focused on one main idea.

Consistency and Alignment:

- **Consistent Formatting**: Use the same fonts, colors, and styles throughout the presentation.
- **Alignment**: Ensure text and objects are aligned properly for a professional look.

3. Creating PowerPoint Slides

Step-by-Step Guide:

1. **Open PowerPoint**: Start a new presentation or open an existing one.
2. **Choose a Layout**: Select an appropriate slide layout for each slide.
3. **Add Text**: Click on text boxes to enter titles, subtitles, and bullet points.
4. **Format Text**: Use the Home tab to change font, size, color, and alignment.

Adding and Formatting Text:

- **Text Boxes**: Click to add text boxes and type your content.
- **Font Styles**: Use different fonts and sizes to differentiate headings and body text.
- **Text Color**: Choose colors that contrast well with the background for readability.

Incorporating Images, Charts, and Graphs:

- **Insert Images**: Use the Insert tab to add pictures from your computer or online sources.
- **Add Charts and Graphs**: Visualize data by inserting charts and graphs from Excel.

4. Customizing Slides

Using Themes and Templates:

- **Themes**: Apply pre-designed themes for a consistent look and feel.
- **Templates**: Use templates for specific presentation types (e.g., business reports, academic lectures).

Applying Transitions and Animations:

- **Slide Transitions**: Add effects to transition smoothly between slides.
- **Animations**: Animate text and objects to appear or move on slides.

5. Enhancing Slides with Visual Elements

Using SmartArt and Icons:

- **SmartArt**: Convert text into visually appealing diagrams.
- **Icons**: Insert icons to represent concepts and ideas visually.

Adding Multimedia Elements:

- **Videos**: Embed videos from your computer or online sources.
- **Audio**: Add background music or voice narrations to slides.

6. Best Practices for Effective Presentations

Structuring Your Presentation:

- **Introduction**: Start with a strong opening to grab attention.
- **Body**: Present key points logically and coherently.
- **Conclusion**: Summarize the main points and end with a strong closing.

Designing for Readability and Engagement:

- **Font Size**: Ensure text is large enough to be read from a distance.
- **Color Contrast**: Use high contrast colors for text and background.
- **Visual Balance**: Distribute text and images evenly on slides.

Practicing Delivery Techniques:

- **Rehearse**: Practice your presentation multiple times.
- **Engage the Audience**: Use eye contact, gestures, and questions to interact with the audience.
- **Time Management**: Keep track of time to ensure you cover all points within the allotted time.

7. Real-World Applications and Case Studies

Business Presentations:

- **Scenario**: Presenting quarterly sales data to stakeholders.
- **Approach**: Use charts and graphs to visualize data, highlight key achievements, and outline future strategies.

Educational Lectures:

- **Scenario**: Teaching a complex topic to students.
- **Approach**: Use visual aids like diagrams and videos to enhance understanding and retention.

Project Proposals:

- **Scenario**: Proposing a new project to potential investors.
- **Approach**: Outline project objectives, timeline, and expected outcomes using a clear and persuasive presentation.

Recommended Readings:

- Atkinson, C. (2018). *Beyond Bullet Points: Using Microsoft PowerPoint to Create Presentations That Inform, Motivate, and Inspire*. Microsoft Press.
- Duarte, N. (2008). *Slide:ology: The Art and Science of Creating Great Presentations*. O'Reilly Media.
- Reynolds, G. (2012). *Presentation Zen: Simple Ideas on Presentation Design and Delivery*. New Riders.

TOPIC 4: INTRODUCTION TO BASIC MATHEMATICAL PROGRAMMING IN EXCEL WORKSHEET

Course Description:

This course note introduces students to basic mathematical programming within Excel worksheets, leveraging Excel's built-in functions and tools to solve mathematical problems. It covers various mathematical concepts, including algebra, calculus, and optimization, using Excel's formulas, functions, and Solver add-in.

Objectives:

- Understand the basic mathematical functions available in Excel.
- Learn to apply these functions to solve algebraic and calculus problems.
- Use Excel's Solver add-in for optimization problems.
- Develop proficiency in using Excel for mathematical modeling and problem-solving.

Course Outline:

1. Overview of Mathematical Functions in Excel
    - Basic Arithmetic Functions
    - Algebraic Functions
    - Statistical Functions
2. Algebraic Calculations
    - Solving Equations
    - Working with Matrices
3. Calculus in Excel
    - Differentiation
    - Integration
4. Optimization Techniques
    - Introduction to Optimization
    - Using Solver Add-in for Optimization
5. Practical Applications and Case Studies
    - Financial Modeling
    - Operational Research
    - Engineering Calculations

Detailed Course Notes:

1. Overview of Mathematical Functions in Excel

Basic Arithmetic Functions:

- **Addition**: =SUM(A1:A10)
- **Subtraction**: =A1 - B1
- **Multiplication**: =A1 * B1
- **Division**: =A1 / B1

Algebraic Functions:

- **Power**: =POWER(A1, B1) or =A1^B1
- **Square Root**: =SQRT(A1)
- **Exponential**: =EXP(A1)
- **Logarithm**: =LN(A1) (natural logarithm) or =LOG10(A1) (base-10 logarithm)

Statistical Functions:

- **Mean**: =AVERAGE(A1:A10)
- **Median**: =MEDIAN(A1:A10)
- **Standard Deviation**: =STDEV.P(A1:A10) (population) or =STDEV.S(A1:A10) (sample)
- **Variance**: =VAR.P(A1:A10) (population) or =VAR.S(A1:A10) (sample)

2. Algebraic Calculations

Solving Equations:

- **Linear Equations**: Use =SOLVE.LINEAR(A1:B2) (requires Solver add-in)
- **Quadratic Equations**:
    - General form: ax^2 + bx + c = 0
    - Using formula: =(-B1 + SQRT(B1^2 - 4*A1*C1)) / (2*A1)

Working with Matrices:

- **Matrix Multiplication**: =MMULT(A1:B2, D1:E2)
- **Matrix Inversion**: =MINVERSE(A1:B2)
- **Determinant**: =MDETERM(A1:B2)

3. Calculus in Excel

Differentiation:

- **Finite Difference Approximation**:
    - For function f(x), approximate f'(x) as (f(x+h) - f(x)) / h
    - Example: =(F2 - F1) / (E2 - E1) where F is function value and E is x value.

Integration:

- **Trapezoidal Rule**:
    - For function values y1, y2, ..., yn at intervals x1, x2, ..., xn
    - Approximate integral: =SUM((y2 - y1) * (x2 - x1) / 2)
    - Implement using SUMPRODUCT for larger datasets.

4. Optimization Techniques

Introduction to Optimization:

- **Definition**: Optimization involves finding the maximum or minimum of a function subject to constraints.
    - **Applications**: Resource allocation, cost minimization, profit maximization.

Using Solver Add-in for Optimization:

- **Enabling Solver**: File > Options > Add-ins > Manage Excel Add-ins > Check Solver Add-in.
- **Setting Up Solver**:
    - Define Objective: Cell to maximize or minimize.
    - Variable Cells: Cells that Solver can change.
    - Constraints: Restrictions on variable cells.
- **Example**: Maximizing profit subject to budget constraints.
    - Set Objective: Total profit cell.
    - Variable Cells: Quantity of each product.
    - Constraints: Budget limit, production capacity.
- **Running Solver**: Data > Solver > Set Objective, By Changing Variable Cells, Add Constraints > Solve.

5. Practical Applications and Case Studies

Financial Modeling:

- **Net Present Value (NPV)**: =NPV(rate, value1, [value2], ...)
- **Internal Rate of Return (IRR)**: =IRR(values)

Operational Research:

- **Transportation Problem**: Using Solver to minimize shipping costs.
    - Set up cost matrix, supply, and demand constraints.
    - Use Solver to find the optimal shipping plan.

Engineering Calculations:

- **Stress-Strain Analysis**: Using Excel to calculate and plot stress-strain curves.
    - Input experimental data.
    - Use formulas to calculate stress and strain.
    - Create charts for visual analysis.

Recommended Readings:

- Walkenbach, J. (2018). *Excel 2019 Bible*. Wiley.
- Winston, W. L. (2019). *Microsoft Excel Data Analysis and Business Modeling*. Microsoft Press.
- Albright, S. C., Winston, W. L., & Zappe, C. J. (2010). *Data Analysis and Decision Making*. Cengage Learning.

TOPIC 5: INTRODUCTION TO DESCRIPTIVE AND INFERENTIAL ANALYSIS IN SPSS

Course Description:

This course note provides an introduction to performing both descriptive and inferential statistical analyses using SPSS (Statistical Package for the Social Sciences). It covers the basic concepts, tools, and techniques used in SPSS to summarize data, explore relationships, and make inferences about populations based on sample data.

Objectives:

- Understand the basics of SPSS interface and functionalities.
- Perform descriptive statistical analysis in SPSS.
- Conduct inferential statistical analysis in SPSS.
- Interpret and report the results of SPSS analyses.
- Apply SPSS techniques to real-world data scenarios.

Course Outline:

1. Introduction to SPSS
    - Overview of SPSS
    - SPSS Interface and Functionalities
    - Importing and Managing Data in SPSS
2. Descriptive Statistical Analysis in SPSS
    - Measures of Central Tendency
    - Measures of Dispersion
    - Frequency Distribution
    - Data Visualization
3. Inferential Statistical Analysis in SPSS
    - Hypothesis Testing
    - t-Tests
    - ANOVA
    - Chi-Square Tests
    - Correlation and Regression
4. Practical Applications and Case Studies

- Social Science Research
- Market Research
- Healthcare Studies

Detailed Course Notes:

1. Introduction to SPSS

Overview of SPSS:

- **SPSS (Statistical Package for the Social Sciences)**: A powerful software used for statistical analysis in social science, business, healthcare, and many other fields.

SPSS Interface and Functionalities:

- **Data View**: Displays the data set.
- **Variable View**: Displays metadata about the data set (e.g., variable names, types, labels).
- **Menus and Toolbars**: Access to various functions and analyses.
- **Output Viewer**: Displays results of analyses.

Importing and Managing Data in SPSS:

- **Importing Data**: File > Open > Data > Choose file format (e.g., Excel, CSV).
- **Data Management**: Using Data menu for sorting, merging, and transforming data.

2. Descriptive Statistical Analysis in SPSS

Measures of Central Tendency:

- **Mean**: Analyze > Descriptive Statistics > Descriptives.
- **Median**: Analyze > Descriptive Statistics > Frequencies.
- **Mode**: Analyze > Descriptive Statistics > Frequencies.

Measures of Dispersion:

- **Standard Deviation**: Analyze > Descriptive Statistics > Descriptives.
- **Variance**: Analyze > Descriptive Statistics > Descriptives.
- **Range**: Analyze > Descriptive Statistics > Frequencies.

Frequency Distribution:

- **Creating Frequency Tables**: Analyze > Descriptive Statistics > Frequencies.

Data Visualization:

- **Histograms**: Graphs > Chart Builder > Histogram.

- **Boxplots**: Graphs > Chart Builder > Boxplot.
- **Bar Charts**: Graphs > Chart Builder > Bar.

3. Inferential Statistical Analysis in SPSS

Hypothesis Testing:

- **Setting Up Hypotheses**: Null and alternative hypotheses.
- **p-Values and Significance Levels**: Interpreting p-values.

t-Tests:

- **Independent Samples t-Test**: Analyze > Compare Means > Independent-Samples T Test.
- **Paired Samples t-Test**: Analyze > Compare Means > Paired-Samples T Test.
- **One-Sample t-Test**: Analyze > Compare Means > One-Sample T Test.

ANOVA (Analysis of Variance):

- **One-Way ANOVA**: Analyze > Compare Means > One-Way ANOVA.
- **Two-Way ANOVA**: Analyze > General Linear Model > Univariate.

Chi-Square Tests:

- **Chi-Square Test for Independence**: Analyze > Descriptive Statistics > Crosstabs > Statistics > Chi-Square.
- **Goodness-of-Fit Test**: Analyze > Nonparametric Tests > Legacy Dialogs > Chi-Square.

Correlation and Regression:

- **Correlation Analysis**: Analyze > Correlate > Bivariate.
- **Simple Linear Regression**: Analyze > Regression > Linear.
- **Multiple Regression**: Analyze > Regression > Linear.

4. Practical Applications and Case Studies

Social Science Research:

- **Example**: Examining the relationship between education level and income.
- **Steps**: Import data, perform descriptive analysis, conduct correlation and regression analyses.

Market Research:

- **Example**: Analyzing customer satisfaction survey data.
- **Steps**: Import data, create frequency tables and charts, perform hypothesis tests.

Healthcare Studies:

- **Example**: Comparing patient outcomes across different treatment groups.
- **Steps**: Import data, perform descriptive statistics, conduct ANOVA and post hoc tests.

Recommended Readings:

- **Pallant, J. (2016).** *SPSS Survival Manual: A Step by Step Guide to Data Analysis Using IBM SPSS*. Open University Press.
- **Field, A. (2018).** *Discovering Statistics Using IBM SPSS Statistics*. Sage Publications.
- **Cronk, B. C. (2020).** *How to Use SPSS: A Step-by-Step Guide to Analysis and Interpretation*. Routledge.