

AI-Native analytics

Using julius.ai - Course Overview.

Introduction -

SECTION 1: Foundations of Analytical Thinking

- Why Statistics Matter.
- Analytical Typology
- Microtasks and Analytical Workflows

Lab: “Know Your Data” (Julius EDA Lab 1)

Integrated Topic: Types of Data + Visualization

- Objective: Explore the structure, types, and basic visual summaries using Julius.
- **Mapped to syllabus lines:**
 - *The Various Types of Data*
 - *Levels of Measurement*
 - *Categorical and Numerical Visualization*

SECTION 2: AI-Native Analysis with Julius

- Prompting 101
- Understanding Common Prompt Patterns
- Utilize Accurate Analytical Verbiage.
- Exploratory Data Analysis with Julius
- Building Prompt Chains for Deeper Insights

Lab: Prompting 101 – The AI Conversation Starter

- Teach prompt structures, types (exploratory, diagnostic, predictive), and how Julius parses data questions.
- *Could include your earlier 'Prompting 101' + mini challenge.*

SECTION 3: Descriptive Statistics (w/ Julius Integration)

- Types of Data & Levels of Measurement
- Categorical vs. Numerical Variables
- Frequency Tables, Histograms, Cross Tables, and Scatter Plots
- Measures of Central Tendency and Spread
- Skewness, Variance, Standard Deviation, Coefficient of Variation
- Correlation and Covariance (first intro here)

Lab: “Statistical Summary Sprint” (Julius EDA Lab 2)

Integrated Topic: Measures of Center and Spread

- Mapped to:
 - *Mean, Median, Mode*
 - *Skewness, Variance, Std Dev, Coefficient of Variation*

Suggestion: Add Prompt Chains

Include a section in the lab like:

“Now ask Julius to compare the mean vs. median of total purchases. What does this tell you about skewness?”

SECTION 4: Inferential Statistics

- Sampling & Estimators
- The Normal Distribution
- Central Limit Theorem
- Confidence Intervals (known and unknown variance)
- Student’s t-distribution


- Margin of Error
- Confidence Intervals for Two Means

Suggested Julius Lab: “Simulating Sampling”

Objective: Simulate random samples and ask Julius to summarize each—visually and statistically.

- Mapped to:
 - *Central Limit Theorem*
 - *Standard Error*
 - *Confidence Intervals*

Prompt example: “Create a histogram of means from 30 random samples of 50 observations.”

 Julius may not support full simulation—so consider providing pre-generated sample sets and letting students analyze them.

SECTION 5: Hypothesis Testing (Deep Dive)

- Null vs. Alternative Hypothesis
- Type I and Type II Errors
- One-Sample and Two-Sample Tests
- Dependent vs. Independent Samples

- P-values and Significance Levels
- Practical Hypothesis Testing Example

Lab: Practical Hypothesis Testing

Mapped to Syllabus Line: *Practical Example: Hypothesis Testing*

Refined Version:

Use Julius to test the hypothesis: "Are returning customers spending more than first-time buyers?"

- Have students define the null, set significance, ask Julius for the test, and interpret the p-value.

Bonus Prompt: "Explain the practical implication of this result to a non-technical stakeholder."

SECTION 6: Regression and Predictive Modelling

- Introduction to Regression
- Correlation vs. Causation
- Geometric and Algebraic View
- R-Squared and Adjusted R-Squared
- OLS and Multiple Regression
- F-Statistic and Model Interpretation
- Model Evaluation and Practical Considerations

Lab: Predictive Analytics with Julius

Mapped to Topics:

- *Regression Analysis and Predictive Modelling*
- *Model Evaluation*

Enhanced with:

- Julius prompt chains for single-variable and multiple-variable regression.
- Prompts like:
 - “Which variable is the most predictive of revenue?”
 - “What is the R^2 for the model predicting sales from ad spend?”

Section 7: Framing Analytical Questions.

- What makes a good analytical question?
- How to translate a business question into something Julius (or any tool) can analyze.
- Role-play different stakeholders (marketing, ops, product) and frame analytical tasks using prompt templates.

** Follow up with a more detailed workshop.

SECTION 8: Julius AI in Practice

- Prompting for Hypothesis Testing
- Prompting for Regression
- AI-Narrative Building and Insight Generation
- Real-Time Dashboards using Julius
- Final End-to-End Analysis Project

Section 9: Exploratory vs. Confirmatory Analysis

Often misunderstood—even by analysts.

- ◆ **Add: “*When Are We Exploring, and When Are We Testing?*”**

- Exploratory = "What patterns do I see?"
- Confirmatory = "Am I confident this is real?"
- Link it to hypothesis testing vs. EDA vs. regression.

Section 10: Projects

Project 1 -

Julius-Powered Data Storytelling Assignment

Use Julius to **generate insight**, then coach students to **structure that into a compelling story**.

- What's the “hook”?
- What's the evidence?
- What's the decision or action being informed?

Deliverable:

A 5-slide insight story powered entirely by Julius exploration.

Business Dashboards with AI Insight Generation

- Run this in a tool that supports dashboarding, but have Julius **generate the insights**.
- Learners can:
 - Prompt Julius for key metrics.
 - Translate Julius summaries into dashboard narratives.