LESSON PLAN 2: ADVANCED FINANCIAL MODELING WITH PYTHON

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SUBJECT: Computer Science (Chapter 2: Finance and Python)

GRADE LEVEL: 11–12

TEKS:

- **Competency 008:** The computer science teacher correctly and efficiently uses statements and control structures in the development of code.

- **Competency 009:** The computer science teacher knows how to construct, compare, and analyze various algorithms.

LEARNING OBJECTIVE(S):

Students will model advanced financial concepts using Python, including stochastic volatility and option pricing, and visualize results using Matplotlib.

ASSESSMENT:

Students will create a **Jupyter Notebook** that:

- Implements a multi-period binomial option pricing model.

- Visualizes stock price paths using Matplotlib.

- Includes a written analysis of their model's assumptions and limitations.

MATERIALS:

Python with NumPy, Matplotlib, Jupyter Notebook, financial datasets (sample CSV), projector.

ACTIVITIES:

1. Review of array operations and option payoffs.
2. Introduce binomial tree modeling for option pricing.
3. Implement stochastic volatility simulation.
4. Visualize results with Matplotlib.
5. Peer review and presentation of notebooks.

VOCABULARY:

Binomial model, stochastic volatility, Monte Carlo simulation, visualization, pricing model.

CLOSURE:

Discuss real-world applications: algorithmic trading, risk management, and quantitative finance careers.