**Portfolio Management Workshop**

1. Introduction to Portfolio Management and Statistical Analysis
   1. **1.1 Contents**
      1. Basics: return, risk, diversification.
      2. Introduction to Python and the essential libraries: NumPy, Pandas, Matplotlib.
      3. Descriptive statistics: mean, median, variance, standard deviation.
      4. Probability distributions and their use in finance.
   2. **1.2 Practice**
      1. Configuring the development environment in Python.
      2. Libraries: *pandas, numpy, matplotlib*
      3. Exercise: Import and manipulation of financial data with Pandas. Calculation of basic statistical measures. Creating Time-Series Histograms and Charts
2. Linear and Multiple Regression in Finance
   1. **2.1 Content**
      1. Fundamentals of linear and multiple regression.
      2. Applications in the prediction of asset returns.
      3. Diagnosis and evaluation of models: R^2, standard error, multicollinearity, heteroskedasticity and autocorrelation.
   2. **2.2 Practice**
      1. Libraries: *pandas, numpy, scikit-learn, matplotlib*
      2. Exercise: Implementation of linear and multiple regression models. Evaluation of the model using performance metrics.
3. Markowitz's Theory and the Efficient Frontier,
   1. **3.1 Content**
      1. Concepts of Markowitz's theory.
      2. Expected return and risk of a portfolio.
      3. Construction of the efficient border.
   2. **3.2 Practice**
      1. Libraries: *pandas, numpy, matplotlib*
      2. Exercise: Implementation of Markowitz's theory in Python. Efficient border visualization.
4. Mean-Variance and Sharpe Ratio Models
   1. **4.1 Content**
      1. Portfolio optimization using the mean-variance model.
      2. Sharpe ratio calculation.
      3. Selection of optimal portfolios.
   2. **4.2 Practice**
      1. Libraries: *pandas, numpy, scipy.optimize, matplotlib*
      2. Exercise: Optimizing a portfolio to maximize the Sharpe ratio. Analysis of the sensitivity of the model.
5. Time Series (ARIMA) and Volatility (GARCH) Models
   1. **5.1 Content**
      1. Introduction to ARIMA models: identification of AR, I, MA components.
      2. GARCH models: estimation of asset volatility.
   2. **5.2 Practice**
      1. Libraries: *pandas, statsmodels, arch, matplotlib*
      2. Exercise: Construction and adjustment of an ARIMA model for stock price prediction. Implementation of a GARCH model to analyze volatility.
6. Factor Models (CAPM, Fama-French)
   1. **6.1 Content**
      1. Introduction to factor models: CAPM, Fama-French.
      2. Portfolio performance assessment.
      3. Use of risk factors in asset selection.
   2. **6.2 Practice**
      1. Libraries: *pandas, numpy, statsmodels, matplotlib*
      2. Exercise: Implementation of the CAPM model. Portfolio evaluation using Fama-French's three-factor model.
7. Advanced Multifactorial Models (Carhart, APT)
   1. **7.1 Content**
      1. Advanced models such as Carhart and APT.
      2. Integration of multiple risk factors.
      3. Evaluation and comparison of multifactorial models.
   2. **7.2 Practice**
      1. Libraries: *pandas, numpy, statsmodels, matplotlib*
      2. Exercise: Application of the Carhart model in Python. Analysis of the performance of a portfolio.
8. Risk Measurement and Management
   1. **8.1 Content**
      1. Risk measurement methods: VaR, stress.
      2. Risk management strategies.
      3. Implementation of hedging techniques.
   2. **8.2 Practice**
      1. Libraries: *pandas, numpy, scipy.stats, matplotlib*
      2. Exercise: Calculation of the VaR and volatility of a portfolio. Implementation of hedging strategies.
9. Asset Allocation Strategies
   1. **9.1 Content**
      1. Differences between passive and active investment.
      2. Strategic and tactical asset allocation.
      3. Portfolio rebalancing techniques.
   2. **9.2 Practice**
      1. Libraries: *pandas, numpy, matplotlib*
      2. Exercise: Comparison of passive and active portfolios. Development of an asset allocation and rebalancing strategy.
10. Diversification, Correlation and Presentation of Results
    1. **10.1 Content**
       1. Concepts of diversification and correlation.
       2. Impact on portfolio management.
       3. Strategies to improve diversification.
       4. Interpretation of results and generation of reports.
       5. Presentation of analysis and conclusions.
    2. **10.2 Practice**
       1. Libraries: *pandas, numpy, matplotlib, seaborn*
       2. Exercise: Evaluation of the diversification of a portfolio. Calculation of correlations between assets. Generation of a final portfolio management report and presentation of results through visualizations and executive summaries.