

Semester 1

Programming and Data Analysis

Course # MEDS 5136

Pre-requisites and Co-requisites: None. The course assumes no prior programming experience.

Course Description

This course introduces Python programming with emphasis on data analysis. The NumPy open-source Python library is employed for numerical and scientific computing in this course. Pandas, an open-source Python library, is used for working with datasets (analyzing, cleaning, exploring, and manipulating data). Data visualization is implemented with the Matplotlib Python library. Students are guided through laboratory assignments designed to give them practical, real-world experience. Students are encouraged to design, implement, and evaluate small-scale projects in teams of up to three people.

Course Learning Outcomes

Upon the completion of the course, students will be able to:

1. **Implement Reproducible Workflows:** set up a professional local development environment using Jupyter Notebook to ensure code reproducibility.
2. **Execute Efficient Numerical Computations:** perform high-performance numerical operations and array manipulations using the NumPy library.
3. **Manage and Clean Complex Datasets:** load, clean, and manipulate real-world tabular data using Pandas, including handling missing values and merging disparate datasets.
4. **Construct Data Visualizations:** create diverse, high-quality static and interactive plots using Matplotlib to communicate insights from data.
5. **Analyze Real-World Economic Data:** apply data analysis techniques to real-world datasets to identify trends and perform statistical summaries.
6. **Optimize Performance for Large Data:** identify performance bottlenecks and apply strategies for handling larger datasets.
7. **Collaborate on Technical Projects:** design and implement small-scale data analysis projects in a team environment, demonstrating effective problem-solving and technical communication.

Course Assessments and Grading

The course follows the Grading System outlined in the UCA Academic Policies. Attendance is not assigned a grade.

Item	Description	Due date/ Timing	Weight, in %

Problem-solving sessions	14 problem-solving sessions	Tuesday, next week	35
Quizzes	14 quizzes	The end of tutorial	28
Midterm exam	One midterm exam	Midterm exam week	17
Final exam	One final exam	Final exam week	20
			Total: 100%

The midterm and final exams include two parts (quiz and practice) 50% each.