Course Program

**Day 1 (23/01/2023)**

1. Introduction to programing and data analysis (1h)
   1. Programing assignment 1 (0.5h)
   2. Fundamentals of data Analysis (0.5h)
2. IDE (Jupyter Notebooks, VS Code, Spyder) (1h)
   1. Benefits of each
   2. Anaconda Installation
   3. Environments
   4. Posit: embracing R and Python
   5. R-Markdown notebooks
   6. Google Colab
3. Python Basics (1.5h)
   1. Variables and Types
   2. Arithmetic operations
   3. List and Tuples
   4. Dictionaries
   5. Loops
   6. Conditionals and Operators
   7. NumPy package
4. Assignment 2 (0.5h)
   1. Presentations

**Day 2 (24/01/2023)**

1. Functions and Packages (1h)
   1. Functions
   2. Methods
   3. Packages
   4. Assignment 3
2. Data frames (1.5h)
   1. Introduction
   2. Pandas package
   3. Sorting and slicing
   4. Filtering
   5. Summary and cumulative statistics
   6. Group
   7. Missing data values
   8. Data Visualization
   9. Joining and Merging
3. Importing data in python (0.5h)
   1. Text files
   2. Flat files
   3. Excel files
   4. SAS/SATA files
4. Assignment 4(1h)
   1. Presentations

**Day 3 (25/01/2023)**

1. Data Visualization (0.5h)
   1. Plotting
   2. Matplotlib package
   3. Seaborn package
   4. Plotting Time series
2. Exploratory data analysis (1.5h)
   1. Graphical EDA
   2. Histograms
   3. Boxplots
   4. Quantitative Exploratory data analysis
   5. Assignment 5
3. Univariate statistics (1h)
   1. Distributions
   2. Checking normality
   3. Statistical packages
   4. Hypothesis testing
   5. ANOVA
   6. Non parametric tests
   7. Linear regression
4. Assignment 6 (1h)

**Day 4 (26/01/2023)**

1. Assignment 6 presentations(1h)
2. Multiprocessing and multithreading (0.5h)
   1. Multithreading
   2. Multiprocessing
3. Errors in python (0.5h)
   1. Pep 8
   2. Best practices
4. Image processing (1h)
   1. Scikit image
   2. NumPy for images
   3. Image de-noising
   4. Filtering
   5. Edge detection
   6. Transformations
   7. Measuring intensity and morphology
5. Assignment 7(1h)

**Day 5 (26/01/2023)**

1. ML models with python (2h)
   1. Classification
   2. K-nearest Neighbors
   3. Train/test split + fit
   4. Overfitting and under fitting
   5. Regression
   6. Fine-tuning your model
   7. Assignment 8

1. Exploring MRI Data(2h)
   1. Medical Images
   2. MRI data and Image registration
   3. Segmentation
   4. 2D U-Net and 3D U-NET
   5. Data argumentation for segmentation
   6. Assigment 9