SYLLABUS

IS407E_0108_26

Introduction to Programming Language

ACADEMIC AREA :	**OPERATIONS AND ANALYTICS**
PROGRAMME :	**MASTER DAIS / MASTER DMM / MASTER IBNG / MASTER IF / MASTER LSCP / MASTER**
PERIOD :	**FALL**
COORDINATOR :	**Mr. Amine LAHIANI**
INSTRUCTOR(S) :	**Dr. Nadjib BRAHIMI** **Mr. Anh Vu NGUYEN** **Mr. Paul SCHUHMACHER** **Mr. Timothée NEITTHOFFER**
CONTACT HOURS :	**24.0 hours**
STUDY TIME :	**null hours (Class preparation, homework and assessments)**
CREDITS :	**4.0 ECTS**
AOL :	**NO**

PRE-REQUISITE MODULES :

MODULE DESCRIPTION :

This foundational graduate module is designed to develop students' ability to write, debug, and apply Python code to explore, clean, and visualize data in professional and analytical contexts. Through the mobilization of core programming concepts and key data-science libraries — NumPy for data exploration, Pandas for structured data manipulation, and Matplotlib for visualization — students learn to translate raw data into usable, interpretable outputs to support fact-based decision-making. The module combines face-to-face instruction and hands-on practice with self-paced learning on the DataCamp platform, allowing students to consolidate coding skills at their own rhythm and earn a statement of accomplishment upon completion. This technical foundation supports students' broader professional project by developing the data literacy competencies expected across the programme.

CONTRIBUTION TO PROGRAMME LEARNING OBJECTIVES :

- Connect physical and digital spaces through advanced technological, AI and Data literacy to steer activites and processes #ConnectSpaces

MODULE INTENDED LEARNING OUTCOMES (ILOs) :

1. Apply Python syntax and programming logic (variables, control structures, functions) to write working, correct programs. 2. Apply NumPy operations to explore and prepare numerical data for analysis. 3. Use Pandas Series and DataFrames to structure, clean, and manipulate tabular data. 4. Produce data visualizations using Matplotlib to communicate patterns and insights from data.

TOPICS COVERED :

- Introduction to computers and Python: syntax, variables, data types - Control flow and functions: conditions, loops,

code reuse - Debugging fundamentals and responsible use of GenAI in coding - Data exploration and preparation with NumPy - Data manipulation with Pandas: Series and DataFrames - Data visualization with Matplotlib

RESEARCH-LED TEACHING :

CSR AND SUSTAINABLE DEVELOPMENT GOALS :

CSR NB HOURS :

SUSTAINABLE DEVELOPMENT GOALS COVERED :

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TEACHING METHODS :

Teaching combines Interactive and Guided Learning (short instructor-led sessions introducing key concepts, syntax, and logic) with Problem-Based Learning through in-class coding practice, where students apply concepts immediately to structured exercises under instructor guidance and feedback. This is reinforced by Flipped/Blended Learning via the DataCamp platform, where students complete self-paced practice, interactive exercises, and skill-building activities outside class, allowing in-class time to focus on application, debugging, and clarification of more complex problems. This progressive cycle (introduce practice apply debrief) supports the incremental development of coding competencies, from basic syntax to the manipulation and visualization of real datasets.

METHODS OF ASSESSMENT :

Continuous/Final	Group/Individual	Assessment	Weight	Duration	ILOs assessed
Continuous	Individual	Quiz	20%	1,5 Heure	All
Continuous	Individual	Participation or task completion	20%		All
Final	Individual Final Exam in class	Final	60%	1,5 Heure	All

Assessment 1 details:

Multiple choice questions : Moodle-based exam

Assessment 2 details:

Completion of DataCamp assignments and participation in class.

Assessment 3 details:

Assess individual coding skills in class

ACADEMIC INTEGRITY :

Academic integrity at Rennes SB is about sharing a set of values and practices promoting intellectual honesty, trust, fairness, respect and responsibility in all aspects of learning, studying and researching. Upholding academic integrity is key to maintaining the reputation of the student and the ultimate value of Rennes SB Degrees. Students are expected to demonstrate these values when submitting assessed work.

Academic misconduct is defined as gaining or attempting to gain an unfair academic advantage for yourself or for others during formal assessments. The following are examples of academic misconduct:

· Cheating
· Plagiarism
· Falsification
· Gaining an unfair advantage
· Assisting others in committing academic misconduct, such as by using generative AI
· Falsification of records or official documents
· Unauthorised access to restricted information or data
· Unauthorised or unethical use of generative AI

Academic misconduct is a serious offense and can result in consequences such as module failure, research project failure, or even exclusion from Rennes SB. To prevent unintentional academic misconduct, it is essential to read and comply with the Rennes SB Academic Integrity Policy for Assessments (available on RISE). Regarding use of AI in learning and assessment please consult your professor for specific instructions pertaining to this module.

BIBLIOGRAPHY :

DataCamp platform (access given by Rennes School of Business).

Additional Reading

Guttag, J. V. (2021). Introduction to Computation and Programming Using Python : with Application to Computational Modeling and Understanding Data. (3rd edn). MIT Press. [eBook https://bit.ly/45yvmVr]

MODULE PLAN SESSIONS :

Plan Session 01 :

Introduction to Computers, Python, and your first program:
- From machine to code: how a computer executes a Python program
- Setting up and writing code: Google Colab and other editors
- Core concepts: variables, data types, strings, numbers, basic arithmetic
- Data structures: lists and dictionaries
- Control flow basics: loops and conditions (introductory overview)
- Mini-lab: guided coding exercise — writing and running a first simple Python program (not assessed)
- DataCamp assignment

Plan Session 02 :

Data Structures & Debugging Fundamentals
- Warm-up quiz (no grades) — quick check of Session 1 concepts
- Deeper practice with data structures: lists and dictionaries (indexing, nesting, common operations)
- Introduction to debugging: reading error messages, common bugs, step-by-step troubleshooting
- Best practices for responsible use of GenAI tools when debugging code
- Mini-lab: guided exercise combining data structures with debugging practice
- DataCamp assignment

Plan Session 03 :

Control Flow — Conditions and Loops
Warm-up quiz (no grades) — quick check of Session 2 concepts
- Conditional structures: if / elif / else
- Loops: for and while, break/continue
- Combining loops with conditions to solve structured problems
- Mini lab: guided exercise applying control flow to small coding problems
- DataCamp assignment

Plan Session 04 :

Functions, Code Reuse, and Responsible Use of GenAI
- Warm-up quiz (no grades)— quick check of Session 3 concepts
- Defining and calling functions
- Parameters and return values
- Why code reuse matters: writing maintainable, modular code
- Debugging functions
- Responsible use of GenAI in coding: asking AI for help, evaluating output critically, ethical considerations
- Mini lab: guided exercise writing and reusing functions
- DataCamp assignment

Plan Session 05 :

Data Analysis with Pandas — Series and DataFrames
- Warm-up quiz (no grades)— quick check of Session 4 concepts
- Pandas Series and DataFrames: structure and purpose
- Loading CSV files, inspecting data (.head(), .info(), .describe())
- Selecting columns, filtering rows
- Mini lab: guided exercise loading and exploring a real dataset
- DataCamp assignment

Plan Session 06 :

Data Preparation with NumPy
- Warm-up quiz (no grades) — quick check of Session 5 concepts
- Introduction to NumPy arrays: creation, shape, indexing, slicing
- Vectorized operations and basic math on arrays
- Handling missing values and basic data cleaning with NumPy
- Combining NumPy with Pandas for numerical data preparation
- Mini lab: guided exercise cleaning and preparing a numerical dataset with NumPy
- DataCamp assignment

Plan Session 07 :

Data Visualization with Matplotlib
- Warm-up quiz (no grades)— quick check of Session 5 concepts
- Basic plot types: line, bar, scatter
- Customizing titles, labels, legends
- Plotting directly from DataFrames
- Mini lab: guided exercise creating and customizing visualizations from a dataset
- DataCamp assignment

Plan Session 08 :

Assessment:
Multiple choice questions (ILOs 1, 2, 3, 4): 1:30 hours
individual coding (ILOs 1, 2, 3, 4): 1:30 hours