COMILLAS
UNIVERSIDAD PONTIFICIA
ICAI ICADE CIHS

Syllabus
2025 - 2026

TECHNICAL SHEET OF THE SUBJECT

Data of the subject	
Subject name	Introducción a la Programación / Introduction to Programming
Subject code	E000012905
Mainprogram	Grado en Análisis de Negocios / Business Analytics por la Universidad Pontificia Comillas
Involved programs	Grado en Análisis de Negocios/Bachelor in Business Analytics y Grado en Relaciones Internacionales [First year] Grado en Análisis de Negocios/Bachelor in Business Analytics y Grado en Derecho [First year] Grado en Análisis de Negocios/Bachelor in Business Analytics [First year] Grado en Admin. y Dirección de Emp. y Grado en Análisis de Negocios/Bachelor in Business Analytics [First year]
Credits	6,0 ECTS
Type	Básico
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Coordinator	José Luis Gahete Díaz

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SPECIFIC DATA OF THE SUBJECT

Contextualization of the subject

Contribution to the professional profile of the degree

In the professional profile of graduates in a Bachelor's Degree in Business Analytics-E8, this Basic Training subject introduces students to

Programming as a tool for solving complex problems. For this purpose, students must acquire a method of logical reasoning in problem formulation and resolution, with subsequent application to a programming language. In this course, the programming language Python, which is easy to master and, at the same time, provides students with a powerful tool to use when working with data mining techniques, big data, and massive data manipulation, has been selected.

Prerequisites

None

Competencies - Objectives

Competences

Learning outcomes

HA10	Resultados del proceso de Formación y de Aprendizaje: HA10. Analiza, plantea y resuelve problemas en el mundo real, con algoritmos, herramientas, funciones de una hoja de cálculo y librerías científicas de programación aplicadas a los datos obtenidos de diversas fuentes.
CM11	Resultados del proceso de Formación y de Aprendizaje: CM11. Analiza e identifica problemas en un entorno de datos masivos, elaborando programas o soluciones automatizadas que permiten la gestión y explotación de los datos.
RA1	Introducción a la Programación/ Introduction to Programming (6 ECTS) RA1. Conocer y comprender los fundamentos de un lenguaje de programación, que permiten al alumno elaborar códigos orientados al tratamiento de la información.
RA2	Introducción a la Programación/ Introduction to Programming (6 ECTS). RA2. Utilizar los algoritmos, funciones y librerías idóneos para la adquisición y gestión de la información, y ser capaz de integrarla de una manera racional.
RA1	Tratamiento de Datos/ Data Processing. RA1 Ser capaz de automatizar extracciones programáticas de la información deseada, tanto de APIs como de páginas web, trabajando con los formatos de datos más utilizados en la actualidad (CSV, JSON, HTML, XML, XLSX...), procesándolos y visualizándolos./
RA2	Tratamiento de Datos/ Data Processing. RA2 Procesar y transformar información con el objetivo de poseer un dato de alta calidad: limpio, homogéneo y estandarizado.
RA1	Ciberseguridad / Cybersecurity RA1 Conocer los principios generales de la ciberseguridad, incluyendo gestión de riesgos, técnicas de cifrado y firma electrónica, sistemas de detección y protección, y conceptos de resiliencia y continuidad de negocio.
RA2	Ciberseguridad / Cybersecurity RA2 Conocer la normativa y legislación en el ámbito de la seguridad, y especialmente las relativas a protección de datos y privacidad
RA1	Introducción a la Estadística Computacional/Introduction to Statistical Computing. RA1 Conocer, comprender e interpretar las principales medidas estadísticas y gráficos básicos utilizados habitualmente en ingeniería para describir un conjunto de datos. Conocer también las principales distribuciones de probabilidad discretas y continuas, y aplicar las mismas en la resolución de problemas reales.
RA2	Introducción a la Estadística Computacional/Introduction to Statistical Computing. RA2 Conocer, comprender y manejar los conceptos básicos de probabilidad y los procedimientos y teoremas fundamentales para el cálculo de probabilidades

	de sucesos.
RA1	Estadística Computacional/Statistical Computing. RA1 Conocer y manejar software estadístico para calcular medidas estadísticas y generar gráficos descriptivos de interés a partir de un conjunto de datos.
RA2	Estadística Computacional/Statistical Computing. RA2 Estimar distribuciones de probabilidad a partir de un conjunto de datos utilizando software estadístico o lenguajes de programación.
RA1	Desarrollo de Aplicaciones Orientadas a Objetos/Object-Oriented Application Development. RA1 Realizar el análisis y el diseño detallado de las aplicaciones informáticas a partir de patrones de diseño orientados a objetos. Comprender los diferentes tipos de relaciones de los diagramas de clase UML. Conocer algunos de los patrones de diseño más importantes como MVC, DAO o Singleton. Diseñar aplicaciones separando claramente sus módulos entre diferentes capas que intervienen (presentación, lógica, comunicaciones, entrada/salida, etc.).
RA2	Desarrollo de Aplicaciones Orientadas a Objetos/Object-Oriented Application Development. RA2 Diseñar y codificar aplicaciones visuales utilizando componentes de especificaciones futuras. Realizar diseños usables y amigables de aplicaciones basadas en ventanas. Implementar aplicaciones visuales con componentes más complejos no explicados en el aula. Entender y aplicar los diferentes tipos existentes de materializar la gestión de eventos. Implementar soluciones web basadas en tecnología Java o similar del lado del cliente.

THEMATIC BLOCKS AND CONTENTS

Contents - Thematic Blocks

Chapter 1: Introduction to Programming

1.1 Programming Paradigms:

- Imperative Programming
- Procedural Programming
- Object-Oriented Programming
- Functional Programming

1.2 Most Used Programming Languages:

- Machine Language
- Assembly Language
- High-level Languages: C, Java, Python, Scala, etc.

1.3 Programming Methodology:

- Introduction to algorithm and program design techniques
- Modular and structured programming

Chapter 2: ANACONDA Installation

2.1 Anaconda Installation

2.2 Introduction to Development Environment. Differences between markdown and code cells

2.3 Importing libraries

2.4 Saving and downloading notebooks

2.3 Shell Mode and IDE

Chapter 3: Basic Concepts of Python

3.1 Data Types: integers, real numbers, strings, etc.

3.2 Data Input: input

3.3 Data Output: basic print

Chapter 4: Operators and Expressions

4.1 Operators: assignment, arithmetic, logical and relational, compound assignment operators (+=, etc.)

4.2 Other operators

Chapter 5: Input/Output Functions

5.1 input() Function

5.2 print() Function

5.3 String manipulation methods: format()

Chapter 6: Control Statements-I

6.1 if Statement

6.2 if-else Statement

6.3 if-elif Statement

Chapter 7: Control Statements-II

7.1 for Loops (iterable, range)

7.2 while Loops

7.3 Nested Loops

Chapter 8: Strings

8.1 Definition and creation of strings

8.2 Escape sequences

8.3 Accessing elements of a string. Index operator, slicing, *, +, in, not in

8.4 String functions and methods: len(), int(), lower(), etc.

Chapter 9: Lists

9.1 Definition, creation, and updating of lists

9.2 Accessing elements of a list. Index operator, slicing, *, +, in, not in

9.3 Creating lists using List Comprehensions

9.4 Functions and methods applied to strings: len(), sum(), append(), etc.

9.5 From strings to lists and vice versa (split vs join)

9.6 Lists of lists

Chapter 10: Tuples and Dictionaries

10.1 Definition and creation of tuples

10.2 Accessing elements of a tuple

10.3 Operators and functions in tuples

10.4 Definition, creation, and updating of dictionaries

10.5 Accessing elements of a dictionary

10.6 Functions and methods applied to dictionaries: items(), values(), keys(), etc.

Chapter 11: Functions in Python

11.1 Function definition

11.2 Types of functions:

- built-in-functions (abs, pow, etc),
- module-built-in, must be imported (import math, math.sin),
- user-defined

11.3 Structure of a function: header (parameters), body, and return

11.4 Function call and return values (return)

11.5 Scope of variables

Chapter 12: Massive Data Manipulation: Files

12.1 File definition. Types of files

12.2 Text files:

- Opening. Opening modes (w, r, a, w+, r+, a+). with-as clause
- Creating text files: file.write(), file.writelines().
- Reading text files: file.read(), file.readline(), file.readlines(),
- Using split() and splitlines()

12.3 Binary files.

- Pickle library: dump and load
- Opening. Opening modes
- try: ... except:

Chapter 13: Handling and Analyzing Data Structures. Pandas Library

- Brief introduction to Pandas.

Chapter 14: Multimedia Data Processing

14.1 Practical example of image and/or audio processing.

LAB PRACTICES

In all topics, students will carry out practical sessions in which they will have to solve the problems posed with creativity, critical thinking, and deciding on the best and most efficient solution in each case. Planning and organization of the algorithm to be programmed.

TEACHING METHODOLOGY

General methodological aspects of the subject

SUMMARY STUDENT WORKING HOURS

CLASSROOM HOURS
NON-PRESENTIAL HOURS
ECTS CREDITS: 6,0 (0 hours)

EVALUATION AND CRITERIA

The use of AI to produce full assignments or substantial parts thereof, without proper citation of the source or tool used, or without explicit permission in the assignment instructions, will be considered plagiarism and therefore subject to the University's General Regulations.

Ratings

Ordinary Call

- Final Exam (60% of total): The minimum grade for the final Theory exam is 5. If the grade is lower than 5, it will be the final grade for the subject.
- Performance evaluation (30% of total): In-class tests and individual and group assignments.
- Attendance and active participation in class (10% of total)

Extraordinary Call

- Exam (80% of total): The minimum grade for the extraordinary Theory exam is 5. If the grade is lower than 5, it will be the final grade for the subject.
- Performance evaluation (20%): Average evaluation grade obtained throughout the course.

The use of AI is permitted for documentation, study, presentation of topics chosen by students, and laboratory work, within the scope provided in levels 2 and 3 of the guide https://aiassessmentscale.com/:

Level 2: "AI may be used for pre-task activities such as brainstorming, outlining, and initial research. This level focuses on planning, synthesis, and idea generation, but assessments should emphasize the ability to develop and refine these ideas independently."

Level 3: "AI may be used to help complete the task, including idea generation, drafting, feedback, and evaluation. Students must critically assess and modify AI-suggested outputs, demonstrating their understanding."

In all cases, the use of AI must be cited, and sources independently verified by the student.

The use of AI is not permitted in examinations or performance assessment tests.

"The use of AI to create complete works or substantial parts, without citing the source or tool, or without being expressly authorized in the assignment description, will be considered plagiarism and regulated in accordance with the University's General Regulations."

BIBLIOGRAPHY AND RESOURCES

Basic Bibliography

Fundamentos de Programación con Python

D. José Luis Gahete Díaz/D. Carlos Miguel Vallez Fernández/D. Atilano Fernández-Pacheco Sánchez-Migallón

ISBN: 9788448645274

Ed. McGRAW-HILL

Complementary Bibliography

- Alberto Cuevas Álvarez, "Python 3. Curso Práctico" Editorial RAMA
- Andrés Marzal Varó, Isabel Garcías, Pedro García, "Introducción a la programación con Python 3" Edita: Publicacions de la Universitat Jaume I.