



POLITÉCNICA

INTERNATIONAL  
CAMPUS OF  
EXCELLENCE

COORDINATION PROCESS OF  
LEARNING ACTIVITIES  
PR/CL/001



E.T.S. de Ingenieros  
Informáticos

# ANX-PR/CL/001-01

## LEARNING GUIDE

### SUBJECT

103000905 - Programming For Data Processing

### DEGREE PROGRAMME

10BA - Master Universitario En Ciencia De Datos

### ACADEMIC YEAR & SEMESTER

2021/22 - Semester 2

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## 1. Description

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### 1.1. Subject details

<b>Name of the subject</b>	103000905 - Programming For Data Processing
<b>No of credits</b>	4.5 ECTS
<b>Type</b>	Optional
<b>Academic year of the programme</b>	First year
<b>Semester of tuition</b>	Semester 2
<b>Tuition period</b>	February-June
<b>Tuition languages</b>	English
<b>Degree programme</b>	10BA - Master Universitario en Ciencia de Datos
<b>Centre</b>	10 - Escuela Tecnica Superior De Ingenieros Informaticos
<b>Academic year</b>	2021-22

## 2. Faculty

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### 2.1. Faculty members with subject teaching role

<b>Name and surname</b>	<b>Office/Room</b>	<b>Email</b>	<b>Tutoring hours *</b>
Guillermo Antonio Viguera Gonzalez (Subject coordinator)	D4310	guillermo.viguera@upm.es	Tu - 10:00 - 13:00 Th - 10:00 - 13:00
Raul Gutierrez Gil	D4310	r.gutierrez@upm.es	Tu - 15:00 - 18:00 W - 10:00 - 13:00

\* The tutoring schedule is indicative and subject to possible changes. Please check tutoring times with the faculty member in charge.

## 3. Skills and learning outcomes \*

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### 3.1. Skills to be learned

CECD01 - Conocer los procesos de captura, extracción, manipulación y conversión de datos en diferentes entornos.

CECD02 - Conocer los principales sistemas de almacenamiento de la información estructurada y no estructurada de fuentes heterogéneas.

CG11 - Conocimiento y comprensión de la informática para crear modelos, así como sistemas y procesos de información complejos

### 3.2. Learning outcomes

RA23 - Destreza en el uso de distintos tipos de herramientas (software o metodológicas y conceptuales) necesarias para el correcto y eficaz desarrollo de software, incluyendo entornos y librerías en el contexto de ciencia de datos.

RA24 - Conocimiento y aplicación de algoritmos y estructuras de datos básico, así como las técnicas y métodos generales para su diseño.

RA20 - Ser capaz de procesar datos masivos

RA22 - Poseer destrezas fundamentales de la programación que permitan la implementación de algoritmos y el uso de estructuras de datos típicos en ciencia de datos. e distintos tipos de herramientas (software o metodológicas y conceptuales) necesarias para el correcto y eficaz desarrollo de software, incluyendo entornos y librerías en el contexto de ciencia de datos.

\* The Learning Guides should reflect the Skills and Learning Outcomes in the same way as indicated in the Degree Verification Memory. For this reason, they have not been translated into English and appear in Spanish.

## 4. Brief description of the subject and syllabus

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### 4.1. Brief description of the subject

This course is related with data manipulation and programming using the Python language. The main goal is to introduce main characteristics and programming style using this language of wide adoption for data analysis purposes. Once introduced the language, the course presents to students how to efficiently use the different constructs, control statements and data structures in Python. Based on this, the course describes the main characteristics of a Python framework for data storage and manipulation. All programming concepts presented in the course are accompanied with exercises in order to guarantee correct comprehension and practical knowledge.

### 4.2. Syllabus

1. Python programming.
  - 1.1. Introduction to Python programming.
  - 1.2. Common Python data structures.
  - 1.3. Programming in Python adopting an imperative paradigm.
  - 1.4. Programming in Python adopting a functional paradigm.
2. Data representation and manipulation.
  - 2.1. Python framework for data representation.
  - 2.2. Revision of data manipulation techniques.
3. Data visualization.

## 5. Schedule

### 5.1. Subject schedule\*

Week	Face-to-face classroom activities	Face-to-face laboratory activities	Distant / On-line	Assessment activities
1	<b>Python programming</b> Duration: 02:00			
2	<b>Python programming</b> Duration: 02:00	<b>Python programming</b> Duration: 02:00		
3	<b>Python programming</b> Duration: 02:00	<b>Python programming</b> Duration: 02:00		
4	<b>Python programming</b> Duration: 02:00	<b>Python programming</b> Duration: 01:00		
5	<b>Data Manipulation</b> Duration: 02:00	<b>Data Manipulation</b> Duration: 02:00		
6	<b>Data Manipulation</b> Duration: 02:00	<b>Data Manipulation</b> Duration: 02:00		
7	<b>Data Manipulation</b> Duration: 02:00	<b>Data Manipulation</b> Duration: 02:00		
8	<b>Parallel Constructs</b> Duration: 02:00	<b>Parallel Constructs</b> Duration: 01:00		<b>Programming Exercise</b>  Continuous assessment Presential Duration: 01:00  <b>Programming Exercise</b>  Final examination Presential Duration: 01:00
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Depending on the programme study plan, total values will be calculated according to the ECTS credit unit as 26/27 hours of student face-to-face contact and independent study time.

\* The schedule is based on an a priori planning of the subject; it might be modified during the academic year, especially considering the COVID19 evolution.

## 6. Activities and assessment criteria

### 6.1. Assessment activities

#### 6.1.1. Continuous assessment

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
8	Programming Exercise		Face-to-face	01:00	100%	5 / 10	CECD02 CG11 CECD01

#### 6.1.2. Final examination

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
8	Programming Exercise		Face-to-face	01:00	100%	5 / 10	CECD01 CECD02 CG11

#### 6.1.3. Referred (re-sit) examination

Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
Programming Exercise		Face-to-face	01:00	100%	5 / 10	CECD01 CECD02 CG11



## 6.2. Assessment criteria

### Sistema general de evaluación continua

Evaluation system during the course will consist of developing one practical exercise performed during the course. The weight in the final grade of the exercise is 100% and a minimum of 5 points out of 10 is required in order to pass the course. In case you don't want to follow the continuous evaluation process and you want to opt for the final evaluation in June's session, you have to notify the course coordinator in advance within the first 15 days of the course by email.

### Sistema de Evaluación mediante Sólo Prueba Final

Evaluation system at the end of the course will consist of taking one practical exam performed in the day scheduled for the course evaluation. The weight in the final grade of the exam is 100% and a minimum of 5 points out of 10 is required in order to pass the course.

## 7. Teaching resources

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### 7.1. Teaching resources for the subject

Name	Type	Notes
Moodle	Web resource	Main communication channel with students.   Repository: slides, scripts, data sets and other resources 
Data Science from Scratch: First Principles with Python	Bibliography	Joel Grus
Programming in Python 3: A Complete Introduction to the Python Language	Bibliography	Mark Summerfield

## 8. Other information

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### 8.1. Other information about the subject

#### Teaching and COVID-19 measures:

The health situation caused by the COVID-19 pandemic is expected to have improved enough to allow the full capacity of the classrooms to be used. For this reason, the teaching of this semester in face-to-face mode has been planned.

If the sanitary conditions do not allow to use the full capacity of the classrooms, it will be transferred to a modality of mixed presence in shifts, as the one proposed in first semester subjects, without the need to modify this guide.