



POLITÉCNICA

INTERNATIONAL
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COORDINATION PROCESS OF
LEARNING ACTIVITIES
PR/CL/001



E.T.S. de Ingenieros
Informáticos

ANX-PR/CL/001-01

LEARNING GUIDE

SUBJECT

103000888 - Programming For Data Science

DEGREE PROGRAMME

10AZ - Master Universitario en Innovación Digital

ACADEMIC YEAR & SEMESTER

2020/21 - Semester 2

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1. Description

1.1. Subject details

Name of the subject	103000888 - Programming For Data Science
No of credits	5 ECTS
Type	Optional
Academic year of the programme	First year
Semester of tuition	Semester 2
Tuition period	February-June
Tuition languages	English
Degree programme	10AZ - Master Universitario en Innovación Digital
Centre	10 - Escuela Tecnica Superior de Ingenieros Informaticos
Academic year	2020-21

2. Faculty

2.1. Faculty members with subject teaching role

Name and surname	Office/Room	Email	Tutoring hours *
Angel Herranz Nieva	D-2309	angel.herranz@upm.es	M - 09:00 - 13:00 M - 15:00 - 17:00
Guillermo Antonio Viguera Gonzalez (Subject coordinator)	D4310	guillermo.viguera@upm.es	Tu - 10:00 - 13:00 Th - 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 *

3.1. Skills to be learned

CB06 - Poseer y comprender conocimientos que aporten una base u oportunidad de ser originales en el desarrollo y/o aplicación de ideas, a menudo en un contexto de investigación

CB07 - Que los estudiantes sepan aplicar los conocimientos adquiridos y su capacidad de resolución de problemas en entornos nuevos o poco conocidos dentro de contextos más amplios (o multidisciplinares) relacionados con su área de estudio

CE-CD05 - Capacidad para usar herramientas de procesamiento de big data tanto en online como en modo batch

CE-CD06 - Capacidad para extraer, integrar y consultar datos heterogéneos en diferentes escenarios

3.2. Learning outcomes

RA55 - Conocimiento y aplicación de algoritmos y estructuras de datos básico, así como las técnicas y métodos generales para su diseño.

RA54 - 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.

RA53 - 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.

* 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

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. Basic parallel constructs for data manipulation.

5. Schedule

5.1. Subject schedule*

Week	Face-to-face classroom activities	Face-to-face laboratory activities	Distant / On-line	Assessment activities
1	Python programming Duration: 02:00			
2	Python programming Duration: 02:00	Python programming Duration: 02:00		
3	Python programming Duration: 02:00	Python programming Duration: 02:00		
4	Python programming Duration: 02:00	Python programming Duration: 01:00		Programming Exercise Continuous assessment Presential Duration: 01:00
5	Data Manipulation Duration: 02:00	Data Manipulation Duration: 02:00		
6	Data Manipulation Duration: 02:00	Data Manipulation Duration: 02:00		
7	Data Manipulation Duration: 02:00	Data Manipulation Duration: 02:00		
8	Parallel Constructs Duration: 02:00	Parallel Constructs Duration: 01:00		Programming Exercise Continuous assessment Presential Duration: 01:00 Programming Exercise Final examination Presential Duration: 01:00
9				
10				
11				
12				
13				
14				

15				
16				
17				

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
4	Programming Exercise		Face-to-face	01:00	50%	5 / 10	CB06 CB07 CE-CD05 CE-CD06
8	Programming Exercise		Face-to-face	01:00	50%	5 / 10	CB06 CB07 CE-CD05 CE-CD06

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	CB06 CB07 CE-CD05 CE-CD06

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	CB06 CB07 CE-CD05 CE-CD06

6.2. Assessment criteria

Sistema general de evaluación continua

Evaluation system during the course will consist of taking two practical exercises performed during lecture hours. The weight in the final grade of each exercise is 50% and a minimum of 5 points out of 10 is required in order to pass each exercise. At least the minimum grade (5/10) must be obtained in both exercises 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 exam in June's session, you have to warn the course coordinator in advance during 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 written 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

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