

DATA ANALYSIS PROGRAMMING FUNDAMENTALS

Course Description

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School of Engineering
Universidad Distrital Francisco José de Caldas

2026-I



Outline

- 1 You don't know who I am
- 2 Course Overview
- 3 Grading & Rules
- 4 Bibliography



Outline

1 You don't know who I am

2 Course Overview

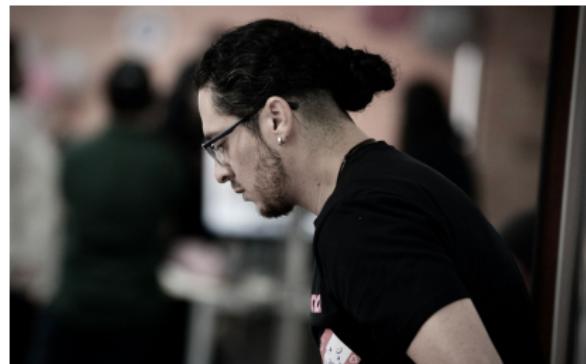
3 Grading & Rules

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Academic Experience

- **Computer Engineer**, M.Sc. in Computer Engineering, and *researcher* for **16 years**.
- 8 years as **full-time associate professor** at colleges, in **Computer Engineering programs**.
- 3 years as **lecturer professor** for both colleges and **government STEM programs**.
- Speaker at **IEEE** events and colleges in Colombia, Brazil, and Bolivia.



Non-academic Experience



- PyCon Colombia and Python Bogotá **co-organizer**.
- 3 years as **software engineer** for several **tech companies** in Colombia.
- 3 years as **Technical Leader** of Machine Learning and Data Science at a USA startup.
- 1.5 years as **MLOps Engineer** for a **Fintech** company in LATAM.
- Currently, **Senior Engineering Manager** of Data Engineering and Machine Learning at Blend 360.



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Overview

This course is designed to **introduce undergraduate students** to **data analysis programming** as part of the foundation for becoming an experienced *data scientist* capable of developing *data-driven solutions*.

The course starts with a **comprehensive introduction** to **Python programming** and **data manipulation fundamentals**. Then, it transitions into **exploratory data analysis** and **statistical computing techniques**. Finally, we will focus on **data visualization**, **machine learning basics**, and **practical applications** for both **descriptive** and **predictive analytics**.

Classes will consist of **lectures**, **hands-on coding sessions**, and **real-world data projects**. Also, you must complete some readings from *data science fundamentals* and *Python programming*. In addition, there will be a **course-long project**, **one final course test**, and **four workshops**.



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Goals

The **main goal** of this course is to **provide students with fundamental concepts and practical tools for data analysis programming** using Python as the primary language for solving **real-world data problems**.

At the end of this course you should be able to **perform comprehensive data analysis** using Python libraries, expressing **insights** through statistical methods and visualizations. Also, you should be able to **develop complete data analysis workflows** that transform raw data into **actionable insights** using industry-standard tools and techniques.



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Prerequisites

This is an advanced course, so you must have some knowledge in:

- **Programming** in Python, C++, Java, or Golang.
- Programming basics (variables, loops, functions, etc.).
- Mathematics fundamentals (calculus, algebra, statistics).
- Git basic usage and GitHub fundamentals.
- Use of IDEs such as VS Code, Eclipse, or PyCharm.
- Linux OS, Jupyter Notebooks, Databases.



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Syllabus

Period	Topic	Time
Period I	Programming Languages for Data Analysis	2 sessions
	Data Manipulation with Pandas and Polars	4 sessions
	OpenData and ETLs	4 sessions
	Descriptive Analysis	4 sessions
	Visualization Fundamentals	4 sessions
	Course Project Catch-Up	2 sessions
Period II	Natural Processing Languages	4 sessions
	Exploratory Data Analysis	3 sessions
	Models Evaluation and MLOps	3 sessions
	Final Test	1 session
Period III	Project Dissertation	2 sessions



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Grades Percentages

Period	Item	Percentage
Period I	Workshops	20%
	Project Catch-Up	10%
Period II	Workshops	15%
	Course Test	20%
Period III	Paper + Poster	5%
	Report + Implementation	20%
	Presentation	5%



Don't hate the player, hate the game

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- Class attendance is **not mandatory**. If you miss classes, you must study *independently*.
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Code of Conduct

- Always be **respectful** to your **classmates** and to me. You must be **kind** to everyone inside (*and outside*) the classroom.
- There is **no best programming language, tool, or technology**. There are only **better** or **worse** solutions.
- You must be **honest** with your work. If you don't know something, just **ask** me. I will be **glad** to help you.
- You must be **responsible** with your work. If you don't submit **on time**, please **don't complain**.
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Bibliography

Recommended bibliography:

- **Data Science for Business**, by Foster Provost and Tom Fawcett.
- **Python for Data Analysis**, by Wes McKinney.
- **Data Science from Scratch**, by Joel Grus.
- **Python Data Science Handbook**, by Jake VanderPlas.
- **Introduction to Machine Learning with Python**, by Andreas C. Müller and Sarah Guido.
- **Machine Learning Yearning**, by Andrew Ng.
- **Effective Pandas 2** by Matt Harrison.
- **Natural Language Processing with Python**, by Steven Bird, Ewan Klein, & Edward Loper.
- **Rust for Rustaceans**, by Jon Gjengset.



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Thanks!

Questions?



My Profile: www.linkedin.com/in/casierrav

