# Computer Science I

## Syllabus

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Computer Engineering Program
School of Engineering
Universidad Distrital Francisco José de Caldas

2026-I

# Outline

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

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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.

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## 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 **algorithmic problem-solving** as part of the foundation for becoming an experienced *software engineer* capable of developing *efficient solutions*.

The course starts with a comprehensive analysis of **problem context** and **constraints identification**. Then, it transitions into **algorithmic design** and alternative solution approaches. Finally, we will focus on **complexity analysis**, **data structures**, and **optimization techniques** for both memory and time resources.

Google

Meta

!

→ Programming Contest

Classes will consist of lectures, **problem-solving sessions**, and practical implementations. Also, you must complete some readings from *algorithm analysis* and *data structures*. In addition, there will be a **semester-long project**, one **final course test**, and four **workshops**.

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# Goals

The main goal of this course is to present students with theoretical concepts and **practical applications** for **algorithm analysis** and computational problem-solving.

At the end of this course you should be able to **perform** computational complexity analysis of algorithms, expressing the **resource usage** in terms of mathematical functions. Also, you should be able to **determine** the optimal data structure that minimizes algorithmic complexity for **specific problems**, optimizing both algorithms and **information management** in software solutions.

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# Pre-Requisites

This is a basic course, so you must have some knowledge of:

- **Programming** in Java, Python, or C++.
- Basic **object-oriented programming** concepts.

Additionally, it is desirable that you have some knowledge of:

- Basic usage of **Git** and **GitHub**.
- Use of **IDEs** such as VS Code, Eclipse, or PyCharm.

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# Syllabus I

| Period | Topic | Time |
|---|---|---|
| Period I | Introduction to Algorithms | 3 sessions |
| | Algorithms Design | 3 sessions |
| | Algorithms Types and Paradigms | 6 sessions |
| | Workshop: Ad-Hoc Problem Solving Contest | 1 session |
| | Search Algorithms | 3 sessions |
| | Sorting Algorithms | 6 sessions |
| | Complexity Analysis I | 4 sessions |
| | Workshop on Sorting Algorithms | 1 session |
| | Course Project Catch-Up | 2 sessions |

Table: Schedule for Period I

# Syllabus II

| Period | Topic | Time |
|---|---|---|
| Period II | Complexity Analysis II | 5 sessions |
| | Linear Data Structures | 9 sessions |
| | Workshop on Linear Data Structures | 1 session |
| | Tree Data Structures | 9 sessions |
| | Workshop on Tree Data Structures | 1 session |
| | Final Test | 1 session |
| Period III | Project Dissertation | 2 session |

Table: Schedule for Period II & III

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# Grades Percentages

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

40%

15%

45%

# Don't hate the player, hate the game

- All assignments must be submitted handwritten, **on time**, and in **English**. Grammar and spelling will **not** be evaluated.
- Copying and pasting from the Internet are **forbidden**. Please **develop** your own ideas and solutions.
- Class attendance is **not mandatory**. If you **miss** classes, you must study *independently*.
- No cell phones, smartwatches, WhatsApp, Tinder, or smart devices. **Just you and your brain**. Pay attention in class.
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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: MIT

- **Introduction to Algorithms**, by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, & Clifford Stein.
- **The Algorithm Design Manual**, by Steven S. Skiena.
- **Data Structures and Algorithms in Java**, by Michael T. Goodrich, Roberto Tamassia, & Michael H. Goldwasser.
- **Algorithms**, by Robert Sedgewick & Kevin Wayne.
- **Data Structures and Algorithm Analysis in C++**, by Mark Allen Weiss.
- **Grokking Algorithms: An Illustrated Guide for Programmers and Other Curious People**, by Aditya Bhargava.

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# Thanks!

# Questions?

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