Systems Analysis & Design

Course Description

Author: Eng. Carlos Andrés Sierra, M.Sc.
cavirguezs@udistrital.edu.co

Full-time Adjunct Professor
Computer Engineering Program
School of Engineering
Universidad Distrital Francisco José de Caldas

2025-III

UNIVERSIDAD DISTRITAL
FRANCISCO JOSÉ DE CALDAS

Outline

UNIVERSIDAD DISTRITAL
FRANCISCO JOSÉ DE CALDAS

Outline

UNIVERSIDAD DISTRITAL
FRANCISCO JOSÉ DE CALDAS

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.

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.

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.

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, **Technical Leader** of Data Engineering and Machine Learning at Blend 360.

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, **Technical Leader** of Data Engineering and Machine Learning at Blend 360.

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, **Technical Leader** of Data Engineering and Machine Learning at `Blend 360`.

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, **Technical Leader** of Data Engineering and Machine Learning at Blend 360.

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, **Technical Leader** of Data Engineering and Machine Learning at `Blend 360`.

UNIVERSIDAD DISTRITAL
FRANCISCO JOSÉ DE CALDAS

Outline

UNIVERSIDAD DISTRITAL
FRANCISCO JOSÉ DE CALDAS

Overview

This course is designed to introduce undergraduate students to foundations of **systems analysis and design** and a lot of multiple computer science paradigms. This is a course focused on thinking and **problem solving**.

Classes will consist of lectures, **discussions**, and practical examples. Also, you must take some readings from *theory of systems*. In addition, there will be a **semester-long project**, as well as one **final course test**, four **workshops**, and six additional **assignments**.

Overview

This course is designed to introduce undergraduate students to foundations of **systems analysis and design** and a lot of multiple computer science paradigms. This is a course focused on thinking and **problem solving**.

Classes will consist of lectures, **discussions**, and practical examples. Also, you must take some readings from *theory of systems*. In addition, there will be a **semester-long project**, as well as one **final course test**, four **workshops**, and six additional **assignments**.

Goals

The main goal of this course is to provide undergraduate students with different **models concepts**, and **tools** for understanding and solving problems using **analysis systems and design** based on projects requirements.

At the end of this course you should be able to **create** a full **systems engineering solution** with a good level of **quality** metrics. Also, you should be able to **design** solutions in an **agnostic** way.

UNIVERSIDAD DISTRITAL
FRANCISCO JOSÉ DE CALDAS

Goals

The main goal of this course is to provide undergraduate students with different **models concepts**, and **tools** for understanding and solving problems using **analysis systems and design** based on projects requirements.

At the end of this course you should be able to **create** a full **systems engineering solution** with a good level of **quality** metrics. Also, you should be able to **design** solutions in an **agnostic** way.

Prerequisites

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

- **Programming** in Python or Java.
- **Draw diagrams** to represent anything.
- Use of **IDEs** like VS Code, Eclipse, or PyCharm.

Also, it is recommended to have some knowledge in:

- **Data Structures** and **Algorithms**.
- **Git** basic usage, and **GitHub** basic usage.

UNIVERSIDAD DISTRITAL
FRANCISCO JOSÉ DE CALDAS

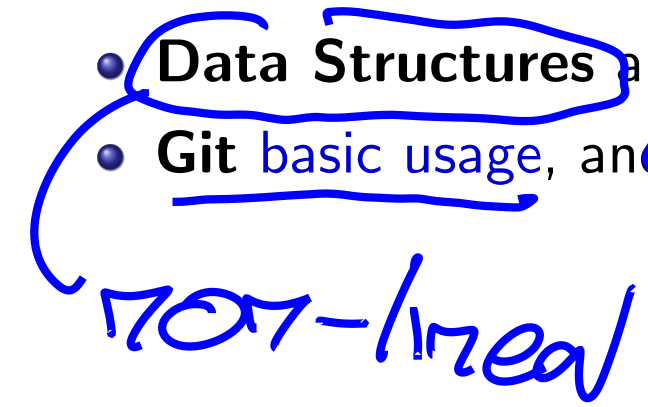
Prerequisites

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

- **Programming** in Python or Java.
- **Draw diagrams** to represent anything.
- Use of **IDEs** like VS Code, Eclipse, or PyCharm.

Also, it is recommended to have some knowledge in:

- **Data Structures** and **Algorithms**.
- **Git** basic usage, and **GitHub** basic usage.



UNIVERSIDAD DISTRITAL
FRANCISCO JOSÉ DE CALDAS

Outline

UNIVERSIDAD DISTRITAL
FRANCISCO JOSÉ DE CALDAS

Syllabus I

Period	Topic	Time
Period I	Systems Thinking	2 sessions
	Systems Engineering	3 sessions
	Systems Analysis	4 sessions
	Systems Design	4 sessions
	Robust System Design	3 sessions
	Projects Catch-Up	2 sessions

Table: Schedule for Period I

Syllabus II

Period	Topic	Time
Period II	General Systems Theory Paradigms	3 sessions
	Systems Projects Management	3 sessions
	Systems Simulation	5 sessions
	Final Test	1 session
Period III	Project Dissertations	2 sessions

Table: Schedule for Period II & III

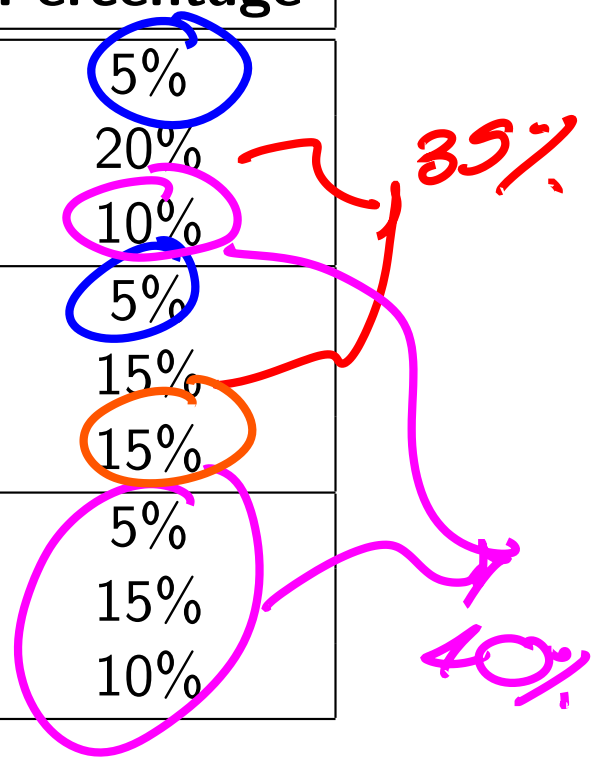
Outline

UNIVERSIDAD DISTRITAL
FRANCISCO JOSÉ DE CALDAS

Grades Percentages

Period	Item	Percentage
Period I	Assignments	5%
	Workshops	20%
	Project CatchUp	10%
Period II	Assignments	5%
	Workshops	15%
	Final Test	15%
Period III	Paper + Poster	5%
	Report + Implementation	15%
	Presentation	10%

Table: Systems Analysis & Design — Grades Distribution



UNIVERSIDAD DISTRITAL
FRANCISCO JOSÉ DE CALDAS

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, no smartwatches, no WhatsApp, no Tinder, no smart-anything. **Just you and your brain**. Pay attention in class.
- Communication with me must be via **email** or **Slack**. I will **not** answer any questions via *WhatsApp*.

UNIVERSIDAD DISTRITAL
FRANCISCO JOSÉ DE CALDAS

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, no smartwatches, no WhatsApp, no Tinder, no smart-anything. **Just you and your brain**. Pay attention in class.
- Communication with me must be via **email** or **Slack**. I will **not** answer any questions via *WhatsApp*.

UNIVERSIDAD DISTRITAL
FRANCISCO JOSÉ DE CALDAS

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, no smartwatches, no WhatsApp, no Tinder, no smart-anything. **Just you and your brain**. Pay attention in class.
- Communication with me must be via **email** or **Slack**. I will **not** answer any questions via *WhatsApp*.

UNIVERSIDAD DISTRITAL
FRANCISCO JOSÉ DE CALDAS

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, no smartwatches, no WhatsApp, no Tinder, no smart-anything. **Just you and your brain**. Pay attention in class.
- Communication with me must be via **email** or **Slack**. I will **not** answer any questions via *WhatsApp*.

UNIVERSIDAD DISTRITAL
FRANCISCO JOSÉ DE CALDAS

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, no smartwatches, no WhatsApp, no Tinder, no smart-anything. **Just you and your brain**. Pay attention in class.
- Communication with me must be via **email** or **Slack**. I will **not** answer any questions via *WhatsApp*.

UNIVERSIDAD DISTRITAL
FRANCISCO JOSÉ DE CALDAS

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.
- You must not be **disruptive** or **negatively affect** the **classroom environment**. If you do, I will ask you to **leave** the classroom.

UNIVERSIDAD DISTRITAL
FRANCISCO JOSÉ DE CALDAS

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.
- You must not be **disruptive** or **negatively affect** the **classroom environment**. If you do, I will ask you to **leave** the classroom.

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.
- You must not be **disruptive** or **negatively affect** the **classroom environment**. If you do, I will ask you to **leave** the classroom.

UNIVERSIDAD DISTRITAL
FRANCISCO JOSÉ DE CALDAS

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.
- You must not be **disruptive** or **negatively affect** the **classroom environment**. If you do, I will ask you to **leave** the classroom.

UNIVERSIDAD DISTRITAL
FRANCISCO JOSÉ DE CALDAS

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.
- You must not be **disruptive** or **negatively affect** the **classroom environment**. If you do, I will ask you to **leave** the classroom.

UNIVERSIDAD DISTRITAL
FRANCISCO JOSÉ DE CALDAS

Outline

UNIVERSIDAD DISTRITAL
FRANCISCO JOSÉ DE CALDAS

Bibliography

Recommended bibliography:

- **Systems Analysis and Design**, by Alan Dennis, Barbara Haley Wixom, and Roberta M. Roth.
- **Systems Analysis and Design**, by Kenneth E. Kendall and Julie E. Kendall.
- **Systems Analysis and Design**, by Scott Tilley and Harry J. Rosenblatt.
- **Systems Analysis and Design**, by Gary B. Shelly, Harry J. Rosenblatt, and Thomas J. Cashman.

Outline

UNIVERSIDAD DISTRITAL
FRANCISCO JOSÉ DE CALDAS

Thanks!

Questions?

URL: `www.linkedin.com/in/casierrav`

UNIVERSIDAD DISTRITAL
FRANCISCO JOSÉ DE CALDAS