IIBM BootCamp 2026

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Pontificia Universidad Católica de Chile – Institute for Biological and Medical Engineering (IIBM)
GitHub: IIBM BootCamp 2026

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0.1 Course Description

This Bootcamp, both theoretical and practical, aims to equip students with essential programming skills and mathematical methods to address challenges in medicine and biology.

The primary goal is to prepare students for postgraduate programs at the **Institute for Biological and Medical Engineering (IIBM)** by providing the necessary tools for success across the curriculum.

Participants will learn: - Fundamentals of **Python**, widely used in scientific computing
- Basic concepts in **calculus** and **linear algebra**
- An introduction to **image processing**

Faculty and graduate students from IIBM will guide participants through interdisciplinary problem-solving, emphasizing the importance of computational tools.

0.2 Learning Objectives

- Acquire basic programming skills
- Apply programming tools to scientific problems
- Design basic scripts
- Explain chosen methods and results to an interdisciplinary audience
- Critically and respectfully contrast results with others

0.3 Schedule Overview

Dates: January 19–23
Time: 09:00–17:00

0.3.1 Daily Scheme (Most Days)

Time	Activity
09:00 – 10:10	Introduction and hands-on coding
10:10 – 10:30	Break
10:30 – 12:30	Hands-on coding
12:30 – 13:30	Guest professor
13:30 – 14:30	Lunch
14:30 – 16:30	Group project (pairs)
16:30 – 17:00	Presentations and discussion

First day logistics:
- Meet at **08:45 AM**
- Location: **Institute for Biological and Medical Engineering**, 7th floor, *Ciencia y Tecnología* Building, **Campus San Joaquín UC**
- Requirements: Laptop with internet access.

0.4 Bootcamp Topics

0.4.1 1. Introduction

- Course overview
- Objectives
- State of the art in coding
- IIBM project examples

0.4.2 2. Setting Up Tools

- Google Colab
- GitHub

0.4.3 3. Programming Fundamentals

- Basic data types: strings, lists, integers, floats, booleans

0.4.4 4. Control Flow

- Loops: `for`, `while`

- Conditional statements: `if`
- Control statements: `break`, `continue`, `pass`

0.4.5 5. Arithmetic and Conventions

- Arithmetic operators: `/`, `//`, `%`, `**`, `+`, `-`
- Naming conventions for variables and functions

0.4.6 6. Functions and Scripts

0.4.7 7. Data Reading

- Text files (`.txt`, `.csv`)
- Image files
- Common data-reading libraries

0.4.8 8. Numerical and Plotting Libraries

- **NumPy:** vector and matrix operations
- **Matplotlib:** plots and parameters

0.4.9 9. Debugging

- Python

0.5 Calculus and Algebra

0.5.1 10. Calculus

- Derivatives
- Integrals

0.5.2 11. Algebra

- Matrix operations
- Vector operations

0.6 Image Processing

0.6.1 12. Basic Operations

- Filtering
- Fourier transform

0.7 Week Schedule

Location: Classroom C403, Civil Construction.

Time	Monday	Tuesday	Wednesday	Thursday	Friday
09:00–10:10	Google Colab & Python	Arithmetics (Python)	Matrix & Plots	Derivatives (Part 1)	Linear Systems
10:10–10:30	Break	Break	Break	Break	Break
10:30–11:30	Google Colab & Python	Arithmetics (Python)	Matrix & Plots	Derivatives (Part 1)	Linear Systems
11:30–12:30	Speaker: Tomás Egaña	Discussion & Content Check	Discussion & Content Check	Discussion & Content Check	Speaker: René Botnar
12:30–13:30	Discussion & Content Check	Speaker: Flavia Zacconi	Speaker: María Rodríguez	Lunch*	Discussion & Content Check
13:30–14:30	Lunch	Lunch	Lunch	Speaker: Pablo Irarrázabal*	Lunch
14:30–16:30	Control Flow	Group Project	Group Project	Group Project	Group Project
16:30–17:00	Discussion & Content Check	Project Presentation	Project Presentation	Project Presentation	Final Thoughts

- *Thursday's lunch from 13:00 to 14:00, speaker session from 14:00 - 15:00.