IIBM BootCamp 2022

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IIBM Bootcamp

This theoretical and hands-on course will provide general programming tools and mathematical methods for solving problems in medicine and biology. The main objective of this bootcamp is to equip future students of the postgraduate programs of the Institute for Biological and Medical Engineering (IIBM) with tools that will be necessary to succeed in the different courses of the programs.

The student will be introduced to the basics of programming in the Python language for scientific computing and general concepts from calculus and linear algebra. Professors and graduate students from the IIBM will teach with particular attention to the interdisciplinar background of the students.

Learning objectives:

- Adcquire basic programming skills
- Apply programming tools
- Design basic scripts
- Explain chosen methods and obtained results to an interdisciplinary and diverse audience
- Contrast the results critically and respectfully with different people

Day scheme:

The Bootcamp will be held from **January 17 to 21 from 09:00am to 17:00pm**. The scheme for each day is:

- **09:00 - 09:30** Lecture discussion
- **09:30 - 10:30** Hands-on Coding
- **10:30 - 11:00** Guest professor
- **11:00 - 11:30** Break
- **11:30 - 12:30** Hands-on Coding
- **12:30 - 13:00** Discussion
- **13:00 - 14:00** Lunch
- **14:00 - 16:30** Group project (pairs)
- **16:30 - 17:00** Results discussion

A laptop with internet connection will be required for the Bootcamp.

On the first day, we will meet at **08:45 am** at the Institute for Biological and Medical Engineering located on the 7th floor of the Ciencia y Tecnologia's Building of Campus San Joaquin UC.

Bootcamp Topics:

Introduction

1. Overview of the course
   - Course description and objectives
   - State of the art in coding and IIBM project examples
2. Setting up Tools
   - Google Colab
   - Github

Python

3. Basic data types: Strings, lists, numbers (int and float) and booleans
4. Control process:
   - Loops: for and while
   - Conditions and if statements
   - Control statements: break, continue and pass
5. Arithmetic operators and naming conventions
   - Arithmetics operators (/, //, %, **, + and -)
   - Naming conventions for variables and functions
6. Functions and scripts
7. Data reading
   - Reading from files (.txt and .csv)
   - Reading images
   - Common libraries for data reading
8. Introduction to Numpy and Matplotlib libraries
   - Numpy: Operating with Matrix and vectors
   - Matplotlib: Plots and parameters
9. Debugging

Calculus and Algebra

10. Calculus
    - Derivatives
    - Integrals
11. Algebra
    - Matrix operations
    - Vector operations

Week schedule:

Monday	Tuesday	Wednesday	Thursday	Friday
Sala Crisosto	**Sala Magíster**	**Sala Magíster**	**Sala Crisosto**	**Sala Magíster**
09:00 - 09:30	**09:00 - 09:30**	**09:00 - 09:30**	**09:00 - 09:30**	**09:00 - 09:30**
Welcome to the Bootcamp	Discussion and content check	Discussion and content check	Discussion and content check	Discussion and content check
09:30 - 10:30	**09:30 - 10:30**	**09:30 - 10:30**	**09:30 - 10:00**	**09:30 - 10:30**
Working with Google Colab	Python arithmetics - Hands-on coding	Matrix and Vectors - Hands-on coding	Speaker - **María Rodríguez**	Linear equations - Hands-on coding
10:30 - 11:00	**10:30 - 11:00**	**10:30 - 11:00**	**10:00 - 11:00**	**10:30- 11:00**
Speaker - **Francisco Sahli**	Speaker - **César Ramírez**	Speaker - **Tobias Wenzel**	Derivatives - Hands-on coding	Break
11:00 - 11:30	**11:00 - 11:30**	**11:00 - 11:30**	**11:00 - 11:30**	**11:00 - 12:00**
University Tour	Break	Break	Break	Hands-on coding
11:30 - 12:30	**11:30 - 12:30**	**11:30 - 12:30**	**11:30 - 12:30**	**12:00 - 12:30**
Intro to variable types - Hands-on coding	Python functions - Hands-on coding	Plots - Hands-on coding	Integrals - Hands-on coding	Discussion and content check
12:30 - 13:00	**12:30 - 13:00**	**12:30 - 13:00**	**12:30 - 13:00**	**12:30 - 13:00**
Discussion and content check	Discussion and content check	Discussion and content check	Discussion and content check	Speaker - **Pablo Irarrázaval**
13:00 - 14:00	**13:00 - 14:00**	**13:00 - 14:00**	**13:00 - 14:00**	**13:00 - 14:00**
Lunch	Lunch	Lunch	Lunch	Lunch
14:00 - 16:30	**14:00 - 16:30**	**14:00 - 16:30**	**14:00 - 16:30**	**14:00 - 16:30**
Control flow - Hands-on coding	Group project	Group project	Group project	Group project
16:30 - 17:00	**16:30 - 17:00**	**16:30 - 17:00**	**16:30 - 17:00**	**16:30 - 17:00**
Discussion and content check	Group project presentation	Group project presentation	Group project presentation	Final - Group project presentation