International Doctoral Program in Integrative Neuroscience

ADVANCED COURSES
2026/2027

1ST SEMESTER

TOOLS IN NEUROSCIENCE

Sensors, Electronics and Hardware

9-13 November, 2026

Coordinators:

Hugo Marques, Champalimaud Foundation

Cristina Márquez, CNC-UC/CIBB, University of Coimbra

Location:

UC-Biotech - Biocant Park, Parque Tecnológico de Cantanhede, Cantanhede

Aim:

This course introduces students to the hardware and software tools used in neuroscience research, focusing on how to integrate and synchronize devices for behavioral and neural experiments with sub-millisecond precision. The main goals will be to understand the principles of physical and electrical measurements, learn to acquire, process, and synchronize signals from multiple hardware sources and to develop skills in real-time and non-real-time system integration using Arduino, HARP, and Bonsai.

Monday, Nov 9, 2026

9:30-10:30	**Introduction to technical drawing** *(Lecture)*
10:30-12:30	**Exercises in technical drawing** *(Hands-on session)*
12:30-13:30	**Lunch Break**
13:30-14:30	**Introduction to electrical measurements** *(Lecture)*
14:30-18:00	**Exercises in electrical measurements** *(Hands-on session)*

Tuesday, Nov 10, 2026

9:30-10:30	**Real-time systems using Arduino** *(Lecture)*
10:30-12:30	**Exercises in real-time systems using Arduino** *(Hands-on session)*
12:30-13:30	**Lunch Break**
13:30-14:30	**Introduction to Reactive programming using Bonsai** *(Lecture)*
14:30-18:00	**Exercises in Reactive programming using Bonsai** *(Hands-on session)*

Funded by the European Union

CiBB is an FCT-funded R&D Unit (UID/04539/2025) and an Associate Laboratory (LA/P/0058/2020)

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Wednesday, Nov 11, 2026

9:30-10:30	**Computer vision and signal processing using Bonsai** *(Lecture)*
10:30-12:30	**Exercises in computer vision and signal processing using Bonsai** *(Hands-on session)*
12:30-13:30	**Lunch Break**
13:30-14:30	**Micro-second real-time systems using HARP** *(Lecture)*
14:30-18:00	**Exercises in micro-second real-time systems using HARP** *(Hands-on session)*

Thursday, Nov 12, 2026

9:30-10:30	**High-order Reactive operators and Bonsai utils** *(Lecture)*
10:30-12:30	**Exercises in high-order Reactive operators** *(Hands-on session)*
12:30-13:30	**Lunch Break**
13:30-18:00	**Project Development** *(Hands-on session)*

Friday, Nov 13, 2026

9:30-11:30	**Project Development** *(Hands-on session)*
11:30-12:30	**Project Presentations** *(Students presentations)*

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