



University of Minho  
School of Medicine

## ADVANCED METHODS FOR IMAGING AND MANIPULATION OF NEURONAL CIRCUITS IN VIVO

April 26<sup>th</sup> to May 13<sup>th</sup>, 2022

### Module 1: Fiber Photometry calcium signals in freely-moving animals

Day	Start	End	Theme	Teaching Staff
26/04/2022	09:30	10:00	Course introduction	Carina Soares-Cunha / Andreia Teixeira-Castro
	10:15	12:30	Principles of intracranial injection and fiber implantation	Carina Soares-Cunha
	14:00	15:30	Stereotaxic surgery; intracranial viral injection; fiberoptic implant	Carina Cunha / Bárbara Coimbra
	15:45	18:00	Stereotaxic surgery; intracranial viral injection; fiberoptic implant	Carina Cunha / Bárbara Coimbra
27/04/2022	09:30	10:45	Fiber photometry: an overview on principles of the technique	Thomas Akam
	11:00	12:30	Fiber photometry: an overview on calcium indicators	Thomas Akam
	14:00	16:00	Recording of calcium signals in freely-moving mice using fiber photometry (GROUP I)	Thomas Akam / Carina Soares-Cunha
	16:00	18:00	Recording of calcium signals in freely-moving mice using fiber photometry (GROUP II)	Thomas Akam / Carina Soares-Cunha

### Module 2: Fiber Photometry neuromodulator signals in freely-moving animals

Day	Start	End	Theme	Teaching Staff
28/04/2022	10:00	12:30	Fluorescence protein-based sensors for neuromodulators	Lin Tian
	14:00	16:30	Assessing dopamine dynamics in freely-moving mice using fiber photometry (GROUP II)	Carina Soares-Cunha
	16:30	19:00	Assessing dopamine dynamics in freely-moving mice using fiber photometry (GROUP I)	Carina Soares-Cunha
29/04/2022	10:00	12:00	General overview on fiber photometry data analysis	Lin Tian
	14:00	17:00	Introduction to fiber photometry data analysis	Rodrigo Oliveira

### Module 3: One-photon calcium imaging

Day	Start	End	Theme	Teaching Staff
02/05/2022	10:00	12:00	Principles of calcium imaging in <i>C.elegans</i>	Andreia Teixeira-Castro
	13:30	16:00	Calcium imaging in awake worms using microfluidic chambers and brief data analysis (GROUP I)	Andreia Teixeira-Castro / Joana Sousa
	16:00	18:30	Calcium imaging in awake worms using microfluidic chambers and brief data analysis (GROUP II)	Andreia Teixeira-Castro / Joana Sousa
03/05/2022	09:30	10:30	Principles of miniscope	Carina Soares-Cunha / Gabriela Martins / Jonathan Zapata
	10:45	12:30	Principles of miniscope & GRIN lens system to perform calcium imaging	Carina Soares-Cunha / Gabriela Martins / Jonathan Zapata
	14:00	18:00	GRIN lenses implantation (DEMO - ALL)	Gabriela Martins
04/05/2022	09:30	12:30	Calcium imaging data acquisition in freely-moving mice using miniscopes (GROUP II)	Carina Soares-Cunha / Gabriela Martins
	14:00	17:00	Calcium imaging data acquisition in freely-moving mice using miniscopes (GROUP I)	Carina Soares-Cunha / Gabriela Martins
05/05/2022	09:30	12:30	Principles of calcium imaging data analysis	Jonathan Zapata
	14:00	18:00	One-photon calcium imaging data analysis	Jonathan Zapata

### Module 4: Multi-photon calcium imaging

Day	Start	End	Theme	Teaching Staff
06/05/2022	09:30	10:30	Principles of multi-photon calcium imaging (PART I)	Andreia Teixeira-Castro / Olympus
	11:00	12:00	Principles of multi-photon calcium imaging (PART II)	Andreia Teixeira-Castro / Olympus
	14:00	18:00	Multi-photon calcium imaging in <i>C. elegans</i> and mice	A. Teixeira-Castro / C. Soares-Cunha

### Module 5: Optogenetics and calcium imaging

Day	Start	End	Theme	Teaching Staff
09/05/2022	09:30	10:30	Principles of optogenetics	Ana João Rodrigues
	11:00	12:30	Considerations for simultaneous application with imaging	Ana João Rodrigues
	14:00	17:00	Simultaneous optogenetic stimulation and calcium imaging recordings	A.J. Rodrigues / C. Soares-Cunha

### Wrap-up and evaluation

Day	Start	End	Theme	Teaching Staff
10/05/2022	09:30	12:30	Consolidation of learned techniques / Tutorial support	C. Soares-Cunha/A. Teixeira-Castro
	14:00	17:00	Practice on request / Tutorial support	C. Soares-Cunha/A. Teixeira-Castro
11/05/2022	09:30	12:30	Consolidation of learned techniques / Tutorial support	C. Soares-Cunha/A. Teixeira-Castro
	14:00	17:00	Practice on request	C. Soares-Cunha/A. Teixeira-Castro
12/05/2022	09:00	17:00	Self-study / Tutorial support	
13/05/2022	14:00	16:00	Final Evaluation	C. Soares-Cunha/A. Teixeira-Castro