

Training program in *Computational Biophysics*

TFG offer

## ***Atrial fibrillation disease. Subcellular analysis of calcium malfunction***

Atrial fibrillation is a heart condition that produces irregular and abnormal fast rates in the heart because the proper electrical conductivity in the atria fails and it starts beating in a chaotic manner out-of-sync with the ventricles. The reason behind the structural changes in the atria that lead to this electric failure are the focus of intense research since more than 37 M have the disease worldwide. One of the most promising research lines opened with the discovery of strong abnormalities in intracellular calcium dynamics which, normally, transform

electrical activity into contraction in a healthy cell. These abnormalities seem to trigger beats spontaneously in different parts of the atria. **The goal of this project is to analyze and implement the effects of Reactive Oxygen Species (ROS) in changes of the key proteins that regulate the subcellular calcium dynamics, first as an independent cell process and then integrating its effects in a calcium subcellular model developed with the University of Leeds.**

### **TFG proposal**

The proposal for 2022/2023 consists on (1) Understand and implement a dynamical system that reproduces the cAMP/PKA oxidative process in cells in MATLAB/Python/C; (2) Analyze the resulting level of ROS and its link with phosphorylation levels as a function of signaling parameters related with healthy vs disease cells; (3) Introduce this dynamical system in a detailed subcellular platform that simulates calcium dynamics already in operation in the group, testing the effects of the disease in an in-silico cell.

**Director/a TFG:** Enric Alvarez and Blas Echebarria.

**Candidate profile:** Last course in Data Science and Engineering, Engineering Physics o Biomedical Engineering in the Universitat Politècnica de Catalunya.

**Center:** Escola d'Edificació de Barcelona EPSEB (Barcelona).

**Applications:** Send CV (including grades) and a motivation letter to the head of the program **before the 30th of setembre** (Clara Prats, [clara.prats@upc.edu](mailto:clara.prats@upc.edu))

**Financing:** Research group BIOCOS-SC will offer an INIREC contract to the three best candidates that want to carry out any of the TFG associated with this training program in *Computational Biophysics* in the course 2022-2023.

