# MASTER IN PHOTONICS – "PHOTONICS BCN"
# ERASMUS+ "EUROPHOTONICS"

## MASTER THESIS PROPOSAL

### Dates: April - September 2019

**Laboratory:** Centre for Sensors, Instruments and Systems Development (CD6)
**Institution:** Universitat Politècnica de Catalunya (UPC)
**City, Country:** Terrassa, Spain

**Title of the master thesis:** *Multispectral imaging and machine learning for automated ocular diagnosis*

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**Keywords:** multispectral imaging, machine learning, retinography.

**Summary of the subject (maximum 1 page):**

In conventional fundus photography, a broadband white light source and a camera are used to acquire color images from the retina. In the last years, multispectral imaging has shown to be a powerful tool for the spectral analysis of tissue and, in particular, for a better understanding and aiding the diagnosis of ocular diseases. In this regards, a full custom-made multispectral system based on Light Emitting Diodes (LEDs) for fundus imaging with extended spectral range (from 400 nm to 1300 nm) has been recently developed. The illumination of the system consists of LEDs, which allow robust, fast and versatile multiplexed illumination of the retina through the entire spectral range. Optimal viewing of retinal structures can be achieved with the system: superficial layers are visible through short wavelengths, while images in the infrared range, especially those beyond 950 nm, allow obtaining information from deeper layers.

In this study, we look for a motivated and enthusiastic student with good team working skills to:
1. Process and analyse the multispectral images acquired among several patients with different ocular conditions.
2. Apply machine learning tools to look for specific patterns.
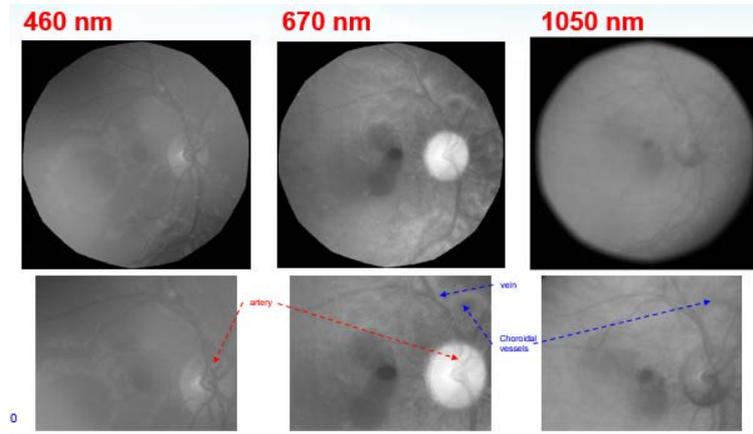
To this end, the following prior knowledge/skills will be very welcome:

1. Knowledge of machine learning
2. Skills in Matlab programming