

# SEMS: RESEARCH PROJECT DESCRIPTION

## 1. Project Background and Description

***Dynamic three-dimensional (3D) model of the human vitreous to predict diffusion of intraocular drugs into the back of the eye***

*The project aims to develop a dynamic three-dimensional (3D) model of the human vitreous to study in vitro the diffusion and distribution of intraocular drugs*

## 2. Project Scope

*There is a need to develop reliable in vitro models to perform systematic studies and obtain predictive data on drug distribution in the vitreous before in vivo testing. The specific objectives of this project are:*

- Apply a hydrogel technology developed in the lab of the primary supervisor as surrogate of the vitreous.*
- Fabricate a 3D case, using the printing technologies available in the lab of the secondary supervisor, to hold the hydrogel and allow the simulation of eye motions and the visualization of labelled drugs in the hydrogel.*
- Study the diffusive properties of ocular drugs in the vitreous model and identify the mechanism governing their diffusion.*
- Create patient-specific vitreous models that can be used to improve drug safety and efficacy.*

## 3. Desired Skills from the Student

*Background in (bio)engineering (biomedical engineering, materials engineering, mechanical engineering).  
Knowledge in polymer chemistry/processing, manufacturing, mass transport and characterization techniques (rheology, microscopy).*

## 4. Supervisory Team

*Primary: Dr Helena Azevedo; Reader in in Biomedical Engineering & Biomaterials, School of Engineering & Materials Science, [h.azevedo@qmul.ac.uk](mailto:h.azevedo@qmul.ac.uk)*

*Secondary: Dr J.R. Castrejon-Pita), Senior Lecturer in Applied Sciences, School of Engineering & Materials Science, [r.castrejonpita@qmul.ac.uk](mailto:r.castrejonpita@qmul.ac.uk)*

*Additional: TBC*