



**POLITÉCNICA**



E.T.S. DE INGENIERÍA AGRONÓMICA,  
ALIMENTARIA Y DE BIOSISTEMAS

### **Título de las prácticas (Title of the internship):**

Holographic optical tweezers for controlling active matter

### **Descripción de las funciones del alumno (Description of the student's tasks)**

The applicant's activity will focus on using an holographic optical tweezing device capable of inducing local forces (down to pN) on biological active matter like red blood cells and nucleolus of eukaryotic cells. Optical tweezers are made of highly focused laser beams and use electromagnetic radiation to trap and move tiny objects, like living cells or protein molecules, providing direct access to the micro and nano scale world. The optical set-up available in our laboratory consists of a laser beam impinging on a spatial light modulator, which is a digitally controlled screen able to control the phase of the reflected light, hence it can generate a hologram pattern in the sample plane. The digital trap is the output of an object detection and cell-contour recognition MATLAB-based software, which analyses the images provided by a high-speed camera coupled to the microscope.

**Requisitos (Prerequisites):** *(indicar titulación y curso) (give Grade and academic year); otros requisitos adicionales (idiomas, informática, otros conocimientos, etc) (other additional prerequisites (languages, informatics, other knowledge, etc))*

Student in the Grade of Biology/ Informatics /Engineering. Orientation: computational biophysics. Proficiency in MATLAB usage and programming.

### **Proyecto formativo (Training Project)**

Module EXTERNAL PRACTICES. The fundamental goal of the external practices is to guide the student in applying his previously acquired knowledge to real tasks in a group work environment the realistically represents the work conditions the students will encounter in their future roles. In this way, the student will be able to get familiar with a working environment (work schedule, responsibility, attitude, organization, etc) and with the adequate working methodology in professional reality, contrasting and applying the acquired academic knowledge.

### **Actividades a desarrollar en la práctica académica (Activities that will be performed in the academic internship):**

The applicant's activity will be developing and preparing biological samples, programming the spatial light modulator to induce desired optical trap configurations and analysing the high-speed camera video output.



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<b>Nº de plazas:</b> (Nr. of places)	<b>1</b>
<b>¿El alumno tendrá trato habitual con menores?</b> (Has the student dealings with underage persons?)	<b>No</b>
<b>Fecha de inicio:</b> (Starting date)	<b>10/01/2022</b>
<b>Fecha de fin:</b> (End date)	<b>31/05/2022</b>
<b>Horas semanales:</b> (Weekly hours)	<b>25</b>
<b>Horario jornada laboral:</b> (Working hours)	<b>5</b>
<b>Importe Ayuda/Bolsa de estudio:</b> (Amount of fellowship / remuneration)	<b>0 €/mes</b>
<b>Tutor académico:</b> (Academic tutor (UPM))	FRANCISCO MONROY MUÑOZ / NICCOLO CASELLI <a href="mailto:monroy@quim.ucm.es">monroy@quim.ucm.es</a> / <a href="mailto:ncaselli@ucm.es">ncaselli@ucm.es</a>



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Email:	
<b>Departamento tutor académico:</b> (Dept. of academic tutor)	UCM - DEPARTAMENTO DE QUIMICA FISICA
<b>Tutor empresa:</b> (External tutor)	
<b>Email tutor empresa:</b> (Email external tutor)	
<b>Departamento tutor empresa:</b> (Dept. of external tutor)	
<b>Ubicación de la estancia de las practicas</b> (Location of the internship)	
<b>ENTIDAD COLABORADORA:</b> (Collaborating Entity)	
<b>A cumplimentar por Oficina Prácticas ETSIAAB:</b> <b>Créditos a reconocer (Nº ECTS):</b>	

Enviar por email a: **OFICINA DE PRÁCTICAS ACADEMICAS EXTERNAS – ETSIAAB**  
secretaria.pei.etsiaab@upm.es – Secretarias: Visitación Pérez / Susana Pardo - Tfno: 913363686)