



POLITÉCNICA



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

### Título de las prácticas/*Practice Title:*

Microbiomes prediction with Deep and Transfer Learning

### Descripción de las funciones del alumno/*Description of student functions*

Microbial communities are everywhere, inside (gut, oral, lung, etc) and around us (food, soil, ocean, etc.). Microbiomes influence their environment by modifying the availability of compounds such as nutrients. Knowing the microbial composition of a site is therefore relevant to improving human, animal and plant health. However, sequencing facilities are not always available, or may be prohibitively expensive in some cases. Thus, it would be desirable to computationally predict the microbial composition from more accessible, easily-measured features.

The main goal of the project will be to develop a microbiome predictor from phenotypic/environmental features of a particular habitat, such as the most studied human gut, using Artificial Intelligence approaches, such as the powerful Deep and Transfer Learning. A latent space will be defined, using Autoencoder architectures, together with interpretability methods to explain the predictions. For additional details, [check our research lines into microbiomes](#).

### *Requisitos: (indicar titulación y curso); otros requisitos adicionales (idiomas, informática, otros conocimientos, etc)/Required formation and skills of the student*

- Computational Biology Master student
- Programming knowledge in python and R

### Proyecto formativo/*Student Formation Program*

**EXTERNAL PRACTICE module.** The fundamental objective of the External Practices is to teach the student to apply in the real world the knowledge that have been previously acquired in a group work environment that reproduces in a realistic way the things that can be found in his future place of work. The student can become familiar with the working world (schedules, responsibility, attitude, organization, etc.), and with the work methodology appropriate to the professional reality, contrasting and applying the academic knowledge acquired.

**MASTER THESIS module.**

### *Actividades a desarrollar en la práctica académica/Activities to carry out during the academic practices*

- Become familiar with microbiome and Deep Learning (Keras/Tensor Flow) software



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- Find a microbiome dataset of the student preference/interest
- Run experiments to build the Deep and Transfer Learning models
- Develop new explainable approaches of the latent space
- Document the developed software in github, and provide a reproducible docker container
- Write master thesis and preparing oral presentation

<b>Nº de plazas/Nº of positions</b>	<b>1</b>
<b>¿El alumno tendrá trato habitual con menores?/Will student work with under 18 years old children?</b>	<b>No</b>
<b>Fecha de inicio/Starting date:</b>	<b>To be defined</b>
<b>Fecha de fin/End date:</b>	<b>No later end of May 2021 (until satisfying required ECTS)</b>
<b>Horas semanales/Hours per week:</b>	<b>25</b>
<b>Horario jornada laboral/Workday:</b>	<b>Flexible</b>
<b>Importe Ayuda/Bolsa de estudio/Fellow* (€):</b>  <i>*(It is not mandatory)</i>	<b>0 €/mes</b>
<b>Tutor académico/Academic Supervisor:</b>  Email:	<b>Mark D. Wilkinson</b> <b>mark.wilkinson@upm.es</b>
<b>Departamento tutor</b>	<b>Biotechnology and Bioinformatics</b>



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<b>académico/Academic Supervisor</b>  <b>Department:</b>	
<b>Tutor empresa/Enterprise Supervisor:</b>	<b>Beatriz García Jiménez</b>
<b>Email tutor empresa/Email Enterprise Supervisor</b>	<b>beatriz.garcia@upm.es</b>
<b>Departamento tutor empresa/Department of Enterprise Supervisor:</b>	<b>Biotechnology and Bioinformatics</b>
<b>Ubicación de la estancia de las practicas/Location for Practices</b>	<b>Virtual / Centre for Plant Biotechnology and Genomics UPM</b>
<b>ENTIDAD COLABORADORA/COLLABORATOR ENTITY:</b>	
<b>A cumplimentar por Oficina Prácticas ETSIAAB/To be fulfilled by the ETSIAAB Practice Office : Créditos a reconocer (Nº ECTS)/ECTs to be recognised:</b>	

**DATOS DE LA OFICINA DE PRÁCTICAS ACADEMICAS EXTERNAS – ETSIAAB**

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