Título de las prácticas/*Practice Title*:

Microbiome dynamics simulations under interventions

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 change over time, due to multiple external factors (modifications in the medium composition, prebiotics, probiotics, nutrients, etc.). Thus, modulate the microbiome with individualized interventions (such as diet in human gut) begin to be proposed as microbiome-based theraphy to improve health. However, the microbiome dynamics knowledge is limited, and its analysis complex and costly. So, a computational simulation of the evolution of microbial communities over time, could contribute to engineer the microbiome with personalized interventions. Models and technologies based on combining genome-scale metabolic modeling will be used. 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, R and shell script

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*

- Read scientific literature about microbiome and modelling microbial communities
- Become familiar with Genome-scale metabolic models (GEM), COBRApy and related software
- Select and curate GEMs of different microbes belonging to a microbial community of interest

- Generate synthetic data of microbial community dynamics under interventions (such as human gut under different diets), using tools such as MMODES
- Identify microbiome states based on metabolites, microbial compositions and/or interactions
- Apply MDPbiome system over the simulated data to obtain personalized recommendations
- Document the developed software in github, and provide a reproducible docker container
- Write master thesis and preparing oral presentation

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

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

DATOS DE LA OFICINA DE PRÁCTICAS ACADEMICAS EXTERNAS – ETSIAAB

secretaria.pei.etsiaab@upm.es **–** Secretarias: Visitación Pérez / Susana Pardo - Tfno: 913363686)