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

Título de las prácticas (Title of the internship):

Data analysis for Genomic Assisted Breeding

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

The student will join the Rocinante-Lab -in cooperation with other groups- where he/she will be working on the application of statistical methodologies in genomic assisted breeding. The specific tasks will depend on the moment of incorporation and the interests of the student.

Currently, we are working on the following projects:

- Bayesian linear regression models to predict the adaptability and stability of bread wheat lines considering the environmental interaction between 14 field trials across Europe. The student will apply the concepts of “Envirotyping” to perform the correlation between environments and achieve better accuracy of genomic predictions.
- Use of nonlinear regression models to predict disease growth patterns in wheat varieties. Here, the student will be focusing on the development of different nonlinear models, such as, logistic regression, gompertz regression, etc to evaluate model prediction in empirical data.
- Optimization of the Training set optimization (TRS) applied to in silico datasets. Here, the student will be focusing on the application of specific algorithms for the optimization of the TRS in breeding programs.
- Data mining for genotyping sequencing in wheat and Septoria. Here, the student will work on data cleaning, visualization, classification, and clustering of genomic information provided from next-generation sequencing. There will data from fungi (100 samples of *Septoria tritici*) and wheat varieties (200 samples).

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))*

Master student with background on:



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- R Programming and computational biology tools. This is essential.
- Statistical skills.
- English is mandatory.

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.

References:

Check website for more references: <https://therocinante-lab.github.io>

- Rio S, Akdemir D, Carvalho T, Isidro y Sánchez, J. "Assessment of genomic prediction reliability and optimization of experimental designs in multi-environment trials". Theoretical and applied Genetics. <https://doi.org/10.1007/s00122-021-03972-2>. IF: 4.439. Q1.
- Isidro y Sánchez, J and Deniz Akdemir. "Training set optimization for sparse phenotyping in genomic selection" Frontier in Plant Science. 12:715910. doi: 10.3389/fpls.2021.715910. IF: 4.402. Q1.
- Simon Rio, Luis Gallego-Sánchez, Gracia Montilla-Bascón, Francisco J. Canales, Isidro y Sánchez, J and Elena Prats. "Genomic prediction and training set optimization in a structured Mediterranean oat population". Theoretical and applied Genetics, 134, 3595–3609. <https://doi.org/10.1007/s00122-021-03916-w>. IF: 4.439. Q1.
- Hilmarsson, H.S, Rio, S, Isidro y Sánchez, J. "Genotype by Environment Interaction Analysis of Agronomic Spring Barley Traits in Iceland Using AMMI, Factorial Regression Model and Linear Mixed Model". Agronomy 2021, 11, 499. IF: 1.689. Q3.
- Akdemir D, Rio. S and Isidro y Sánchez Julio. "TrainSel: an R package for selection of training populations". Frontiers in Genetics, section Statistical Genetics and Methodology. 12, p.607. IF: 3.226. Q2.

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

We offer a great research environment and cutting-edge facilities where the student will have the opportunity to develop skills in research skills, bioinformatics and statistics. The activities and functions are already summarizing in the student tasks descriptions.

- Read literature (papers, book) about the subject
- Prepare hypothesis of the study.
- Filtering and prepare the dataset (phenotypic and genotypic)
- Prediction models
- Evaluate the results
- Write the thesis report.



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Nº de plazas: (Nr. of places)	1 or 2 depending on students background.
¿El alumno tendrá trato habitual con menores? (Has the student dealings with underage persons?)	No
Fecha de inicio: (Starting date)	The sooner the better but will depend on student availability.
Fecha de fin: (End date)	31-05-2023
Horas semanales: (Weekly hours)	25
Horario jornada laboral: (Working hours)	To be determined by the student
Importe Ayuda/Bolsa de estudio: (Amount of fellowship / remuneration)	€/mes Optional UPM scholarship
Tutor académico: (Academic tutor (UPM))	Julio Isidro Sánchez



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Email:	j.isidro@upm.es
Departamento tutor académico: (Dept. of academic tutor)	Biotecnología - Biología Vegetal
Tutor empresa: (External tutor)	Humberto Fanelli/Achille Nyouma/Julián Garcia- Abadillo/Javier Fernández
Email tutor empresa: (Email external tutor)	h.fanelli@upm.es/achille.nyouma@upm.es/ j.gvelasco@upm.es/ javfer98@gmail.com
Departamento tutor empresa: (Dept. of external tutor)	Biotecnología-Biología Vegetal
Ubicación de la estancia de las prácticas (Location of the internship)	CENTRO DE BIOTECNOLOGÍA Y GENOMICA DE PLANTAS (CBGP)
ENTIDAD COLABORADORA: (Collaborating Entity)	CENTRO DE BIOTECNOLOGÍA Y GENOMICA DE PLANTAS (CBGP)
A cumplimentar por Oficina Prácticas ETSIAAB: Créditos a reconocer (Nº ECTS):	

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