

Two bioinformatics post-doc positions – Biological networks design – Machine learning with cell-free systems

We are seeking candidates for two positions in bioinformatics. The successful candidates will take part of a 4-year European project funded by H2020 (position 1) and a pre-competitive project (position 2) funded by the French government at the MICALIS Institute (Jouy-en-Josas, near Paris, France).

MICALIS (INRA & AgroParisTech) is a research unit of more than 350 researchers developing multidisciplinary approaches and promoting microbial systems biology towards the development of synthetic biology applications for health and biotechnology. Within MICALIS, the recruiting research team (<http://www.jfaulon.com>) specializes in developing whole-cell and cell-free synthetic biology for pathway and biosensor engineering to produce biologically active molecules and monitor disease biomarkers.

Position 1

The person recruited will be responsible for (i) designing and ranking metabolic pathways, (ii) plug top-ranked pathways into constraint-based models to perform strain engineering, and (iii) determine lists of genes to be up- or down-regulated to optimize pathway productivity in strains of interest (bacteria and yeast). These tasks will be performed using scientific workflows already developed by the team [1]. The person recruited will also interact with other project partners in France, Finland, and the Netherland.

Position 2

The person recruited is expected to develop: (i) state-of-the-art supervised machine learning tools to predict activities of engineered metabolic pathways, (ii) generative models to design nucleotide sequences for optimization of specific enzymatic activities, and (iii) a reinforcement/ active learning pipeline to propose novel pathway sequences for synthesis and experimental characterization. These tasks will be performed using training sets built from experimental data obtained by the host laboratory. The person recruited will also benefit from several years of experience the research team has in developing machine learning for systems & synthetic biology [2].

Both positions will necessitate interactions with molecular biologists. The persons recruited will closely collaborate with a IT research engineer, a postdoctoral appointee working on workflow developments, and wet laboratory research scientists already accustomed to work together.

Applicants' profiles:

- Applicants should have a master or Ph.D. degree in either: systems & synthetic biology, molecular biology, computational biology, or computer science with working knowledge of biology.
- Ability to write high-quality research manuscripts, strong collaborative skills, and excellent communication skills in English are required.
- For Position 1, essential qualifications include past experience in modeling biological (metabolic) network. Knowledge of experimental protocols and analytical techniques used in molecular biology are desirable.
- For Position 2, experience with machine learning open source tools is anticipated

Positions are opened for 12 months (then renewable for an additional year) from October 1st, 2018. The appointees will be hired through fixed-term contracts in accordance with the French legislation. Salary will be commensurate with qualifications and experience.

To Apply: Applicants should send a detailed curriculum vitae, a letter of intent explaining their motivations for the chosen position, and contact details of two references. Send your applications to: jean-loup.faulon@inra.fr.

[1] Delépine B, et al. RetroPath2.0: A retrosynthesis workflow for metabolic engineers. *Metabolic Engineering*, 45: 158-170, 2018, see also: <http://www.jfaulon.com/bioretrosynth/>

[2] Mellor J, et al. Semi-supervised Gaussian Process for automated enzyme search. *ACS Synthetic Biology*, 5(6): 518-528, 2016, see also: <http://www.jfaulon.com/machine-learning-methods-for-biotechnology-applications/>