

# INTERNSHIP OFFER

**IFP Energies Nouvelles**  
**Direction Expérimentation Procédés**  
**BP3 - Rond-point de l'échangeur de Solaize**  
**69360 SOLAIZE, FRANCE**

## Internship Topic

Exploring Transfer Learning techniques with Generative AI for the prediction of chemical processes performances

## Project Context

IFPEN is an important player in the triple energy, ecological, and digital transition by offering differentiating technological solutions in response to societal and industrial challenges of energy and climate. The implementation of new methodological approaches combining "data science and experimentation" is among the studied solutions that allow for faster progress and reduced R&I costs.

The prediction of the output impurities content, such as sulphur or nitrogen, is a key factor when developing new catalysts or new processes. Data scarcity and poor generalization to new experimental conditions often limit the quality of the kinetic models or even and standard machine learning techniques.

One of the solutions for improving models is reusing knowledge from previous datasets. Transfer Learning is a promising approach to model new catalysts or processes. Previous studies conducted at IFPEN led to important improvements using a Bayesian approach. Other techniques, that use Generative Adversarial Networks (GANs), along with feature augmentation, allow model's deep understanding of the dataset's feature distribution, thus improving model training and robustness.

## Internship objectif :

- Conduct an in-depth literature review of transfer learning with generative techniques (e.g. GANs), with a focus on their applications in chemical processes.
- Adapt and implement selected approaches.
- Test and evaluate the proposed methods using simulated datasets.

## Profile

We are seeking a candidate with an engineering degree or pursuing a Master's (M2) in Applied Mathematics, Artificial Intelligence or Data Science. Chemical engineering students with AI background are also encouraged to apply.

- **Technical Skills:** Strong foundation in deep learning and machine learning, with proficiency in Python and experience with deep learning frameworks.
- **Knowledge Areas:** Familiarity with Transfer Learning, generative models (e.g., GANs), and data augmentation techniques is highly desirable.
- **Soft Skills:** Analytical mindset, problem-solving abilities, a willingness to learn and adapt to new aspects, interests in AI.

## Internship manager

Fanny CASTERAN, Victor COSTA, Youba ABED, Rayane AMMAR KHODJA

**Period:** 5 to 6 months starting from March 2025

**Location:** IFPEN – LYON (a personal mean of transportation is recommended but the site can be reached by public transportation).

**Compensation:** Remunerated internship.

## Application Process:

Interested candidates are invited to send their CVs and motivation letters to:

- **Youba Abed:** [yuba.abed@ifpen.fr](mailto:yuba.abed@ifpen.fr)
- **Rayane Ammar Khodja:** [rayane.ammar-khodja@ifpen.fr](mailto:rayane.ammar-khodja@ifpen.fr)