

# INTERNSHIP IN DATA SCIENCE APPLICATION TO RESERVOIR ENGINEERING

## Summary

- **Duration:** 4 to 6 months
- **Location:** 232 Avenue Napoléon Bonaparte, Rueil Malmaison, 92500, France
- **Reference:** RP-2025-02
- **Starting Date:** March-December 2025

## Title

Consolidation of Python-based application(s) developed for Reservoir Engineering problems

## Intern profile

Final year student enrolled in a master's degree program with geosciences and reservoir engineering skills along with a strong taste for Python programming. Fast learner and eagerness to understand and solve technical challenges. A good understanding and intuition to represent physical phenomena is needed.

## Objectives

To ease routine analysis tasks related to its reservoir engineering studies for petroleum systems, Beicip-Franlab has developed several applications in Python or R programming languages, each dedicated to separate tasks (specific visualizations, analytical computations ...).

One of these applications implements the 'Capacitance Resistance Model' (CRM) approach, which corresponds to an analytical model aiming at predicting the fluid production rates of a well to the injection rates of neighbouring injectors. Such model therefore captures 'mathematically' the relationship between wells which can subsequently be supported (or contradicted) by the understanding of the geological setting of the studied reservoir.

The first objective of this internship is to consolidate the existing work by:

- Reviewing the existing code for this CRM tool/application (Python and R languages);
- Complexifying the code by adding Machine Learning 'bricks', for example to model statistically the residuals of the first-order (simple) model
- Evaluating the performance of the model on a real case study corresponding to an oil reservoir previously studied by Beicip-Franlab where water has been injected using several geometrical patterns (1 injector for 8 producers or 1 injector for 4 producers).

As a secondary objective, the candidate will identify other analytical tools existing in Beicip-Franlab technical servers and evaluate their usefulness to address common reservoir engineering challenges. Depending on the overall progress of the internship, the most relevant tools identified could be re-coded in Python, in order to obtain a more robust version of the tool and facilitate its sharing to the rest of the reservoir engineering team.

## Main tasks undertaken during the internship

- Finalization of a Capacitance-Resistance Model in Python, including Machine Learning steps
- Critical review of several existing analytical tools used for reservoir engineering apps (Excel) and translation of some codes from Excel to Python language
- Redaction of relevant supportive material (report, slides) to document the consolidated tools
- Application of analytical tools to real data to support on-going client studies
- Participation to other (shorter) Data Science tasks, if any and if deemed relevant

The internship will be supervised by a senior reservoir engineer.

## Software used

- Python (compulsory), in particular with the following libraries: plotly, pandas
- Excel