

Research Internship Opportunity (10 ECTS)

Topic: Dimensionality Reduction of High-Frequency Photobioreactor Data to Identify Key Parameters for Microalgae Growth Optimization.

Start Date: August 2025

Deadline: 1st August 2025

Background

Microalgae are a powerful tool in the mission for a decarbonized future, capable of producing sustainable products from biofuels to biopharmaceuticals. To unlock their full potential, we must move from laborious manual processes to smart, automated systems.

A critical first step towards creating these "smart" systems is to understand the complex web of data they produce. Pilot-scale photobioreactors generate vast amounts of data, but not all of it is equally important. This project focuses on cutting through the noise to identify the few variables that would be crucial for bioprocess optimization. This will lay the groundwork for building future predictive models and integrated bioprocess controls.

Aim of the Internship

We are looking for a student in the master programs to participate in this project, which aims to:

1. Apply dimensionality reduction techniques, such as Principal Component Analysis (PCA), to process datasets to identify key patterns and sources of variation.
2. Develop correlation matrices to uncover hidden relationships between process parameters, environmental conditions, and biomass productivity.
3. Identify the most influential parameters that affect microalgae growth to establish a basis for bioprocess optimization through automation and integrated process controls.

Requirements

- Solid background in data analysis and programming (R or Python are essential).
- Experience with data science libraries (e.g., Pandas, NumPy, Scikit-learn, Matplotlib)
- A methodical and detail-oriented approach to data exploration and analysis.
- Ability to work independently and communicate complex findings.
- An enthusiastic and curious attitude towards solving real-world sustainability problems.

Application Process

Please send your application documents, including a CV and cover letter, to **Eric Kariuki MSc. (gathirwa.kariuki@tum.de)**. Feel free to reach out to him with any questions regarding this position.

We highly encourage you to apply if you are ready to use your data skills to help address real-world sustainability challenges!

Privacy policy

As part of your application for a position at the Technical University of Munich (TUM), you submit personal data. Please note our privacy policy pursuant to Art. 13 General Data Protection Regulation (GDPR) for the collection and processing of personal data in the context of your application <http://go.tum.de/554159>. By submitting your application, you confirm that you have taken note of TUM's privacy policy. In the case of a written application, we ask you to only submit copies to us, as we are unfortunately unable to return your application documents after the procedure has been completed.