Professorship for Bioprocess Engineering
TUM Campus Straubing
Technical University of Munich

Master Thesis Opportunity

Topic: Integrating Online Sensor and Weather Data for the Predictive Modeling and Optimization of a Continuous Microalgae Cultivation Process.

Start Date: August 2025
Deadline: 1st August 2025

Background

Microalgae hold immense potential as a powerful tool in the mission for a decarbonized future, capable of producing sustainable products from biofuels to biopharmaceuticals. To unlock their full potential in continuous bioprocesses, we must transition from laborious manual processes to smart, automated, integrated systems. This project focuses on integrating real-time sensor data from photobioreactors with environmental and weather data to model, predict, and optimize biomass productivity. This will pave the way for fully automated, continuous bioprocessing that can adapt to fluctuating conditions, dramatically increasing efficiency and scale. This requires multidisciplinary expertise to bridge the gap between bioprocess engineering and data analysis.

Aim of the Master Thesis

The objectives of the thesis will be:

1. Use real-time data from pilot-scale photobioreactors to model and optimize microalgae growth.
2. Validate the accuracy of your models against real-world, manually collected process data.
3. Establish the link between weather patterns and process efficiency to create an adaptable bioprocess.

Requirements

- Solid background in data analysis and programming (preferably with R or Python languages)
- Good organizational skills
- Proactive and detail-oriented work approach
- Team player with an open learning attitude

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.

If you are ready to apply your data skills to a tangible sustainability challenge, we strongly encourage you to apply.