**MARMARA UNIVERSITY**

**FACULTY OF ENGINEERING**

**ENVIRONMENTAL ENGINEERING DEPARTMENT**

**ENVE 4197/4198 ENGINEERING PROJECT**

**PROPOSAL FORM**

**FALL 2025-2026**

|  |
| --- |
| **Instructor:** Adile Evren TUĞTAŞ**Project Title:** IMPROVING pH PREDICTION IN ANAEROBIC DIGESTION MODELS**Proposal No.:** #1**Number of Students:** (Max 2 students)**Requirements (from students):** 2209-A - Üniversite Öğrencileri Araştırma Projeleri Destekleme Programı Başvurusu (Kasım 2025) Oğuzhan Çelik ve Sena Öztetik |
| **Scope of the Project:**This project will focus on improving pH prediction in anaerobic digestion (AD) models, which are used to simulate biogas production from organic waste. The study will analyze how operational parameters—such as pH, temperature, ammonia and VFAs concentration—affect pH and methane generation. A simplified computational model based on ADM1 will be developed using Matlab or Python. The model will integrate basic thermodynamic corrections to account for non-ideal conditions. The goal is to improve the accuracy of pH predictions and provide insights into controlling and optimizing AD systems. |
| **Hardware/Software/Lab/Equipment Requirements:*** Matlab or Python for modelling and simulations.
* Access to AD process datasets from literature or laboratory experiments.
* No laboratory equipment required unless optional small-scale validation is conducted.
 |
| **Development Plan:*** Review AD process fundamentals and literature on pH effects and ammonia inhibition.
* Implement a simplified ADM1 model in Matlab or Python.
* Incorporate thermodynamic corrections to improve pH estimation.
* Simulate different operational scenarios and analyse the effects on methane production and process stability.
* Validate the model using literature data or lab-scale experimental datasets.
 |