



**MARMARA UNIVERSITY
FACULTY OF ENGINEERING
ENVIRONMENTAL ENGINEERING DEPARTMENT**

**ENVE 4197/4198 ENGINEERING PROJECT
PROPOSAL FORM
2023-2024**

Instructor: Barış ÇALLI

Project Title: Fate of ammonium and phosphate in anaerobic digestate

Proposal No.: BarisCalli-1

Number of Students : Max 3 students

Requirements (from students): Students should have basic computer application skills and be interested in data analysis.

Scope of the Project :

Mineralization of organic matter during anaerobic digestion processes results in the production of inorganic carbonate, ammonium, sulfide, and phosphate species, which are involved in a complex network of chemical and biological reactions through interaction with available macro and micro nutrients as well as microbial processes with profound effects on the efficiency and stability of the anaerobic digester performance. The interactions of different ions attract attention in research carried out for the recovery of phosphorus and, on the other hand, the removal of ammonium nitrogen from the system, which negatively affects the anaerobic digester performance. In this project, the fate of ammonium and phosphate in anaerobic digestate will be investigated under scenario based differing conditions (pH, addition of ions, etc) by using freeware chemical equilibrium modelling tools.

Hardware/Software/Lab/Equipment Requirements :

Computer/Visual MINTEQ

Development Plan:

Operational parameters such as pH and concentrations of different ions (volatile fatty acids, sulfide, iron, sodium, calcium, potassium, bicarbonate, magnesium, etc.) and presence of organics may affect the chemical equilibrium of ammonium and phosphate in anaerobic digesters and digestate. Students are required to use a modeling tool to determine the fate of ammonium and phosphate under different conditions.

- Modelling tool (Visual MINTEQ) will be studied by the students.
- Scenario based data simulating an anaerobic digester will be assessed and modeling parameters will be selected.
- The system will be modeled under different operational conditions to determine the fate of ammonium and phosphate.
- Operating parameters and ammonium and phosphate speciations will be correlated.