**MARMARA UNIVERSITY**

**FACULTY OF ENGINEERING**

**ENVIRONMENTAL ENGINEERING DEPARTMENT**

**ENVE 4197/4198 ENGINEERING PROJECT**

**PROPOSAL FORM**

**FALL 2021-2022**

|  |
| --- |
| **Instructor: Prof. Dr. Barış ÇALLI, Özlem KAPLAN (PhD Student)**  **Project Title:** ENHANCED BIOMETHANE RECOVERY FROM WASTE ACTIVATED SLUDGE  **Proposal No.:** *BarişÇalli-1*  **Number of Students:** Max 3 students  **Requirements (from students):** Workingmin. 2 hrs/day and 3 days/week in laboratory (in Göztepe Campus) |
| **Scope of the Project:** The aim of this project is to develop a mild temperature (40-65 oC) vacuum assisted sludge treatment process to increase the amount of biomethane produced from waste activated sludge by anaerobic digestion. The mild-temperature vacuum process will be applied in a chamber on the internal recycling line of anaerobic sludge digester (AD) to remove the dissolved CO2 and NH3 gases from the digestate. After vacuum application, the digestate free of dissolved gases will be recycled back to AD and there it will re-absorb CO2 and NH3 from the headspace. In this way, a biogas with a higher methane content will be produced. In addition to methane enrichment, it is supposed that vacuum application will to some extent disintegrate the WAS and thus will increase the methane yield and daily biomethane production. In this project, different vacuum-assisted digestate treatment parameters such as temperature, pH, hydraulic retention time will be tested to find the optimum conditions for gas separation and bacterial cell disintegration. |
| **Hardware/Software/Lab/Equipment Requirements:** Spectrometer, Magnetic stirrer, Incubator, pH meter, Vacuum Pump, Manometer, HPLC (UV detector), GC-FID, GC-TCD. |
| **Development Plan:**   1. Operation of ADs by feeding with WAS to obtain digestate (effluent) 2. Optimization of vacuum-assisted digestate treatment parameters 3. Evaluation of the effectiveness of disintegration with BMP tests |