**MARMARA UNIVERSITY**

**FACULTY OF ENGINEERING**

**ENVIRONMENTAL ENGINEERING DEPARTMENT**

**ENVE 4197/4198 ENGINEERING PROJECT**

**PROPOSAL FORM**

**FALL 2025-2026**

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| **Instructor :** Zehra Semra Can  **Project Title :** Machine Learning–Based Analysis and Prediction of Adsorption Processes  **Proposal No. :** *ZehraSCan-1*  **Number of Students :** Max 2 students  **Requirements (from students) :**  Meet with the project advisor for two hours every week, and plan your weekly schedules to ensure consistent progress and timely feedback. |
| **Scope of the Project :**  This study integrates environmental engineering with data-driven approaches by applying machine learning to adsorption processes. Instead of relying solely on extensive lab work, students will use algorithms to predict adsorption performance under varying conditions. The project will compare model accuracy and robustness, highlighting machine learning’s potential as a decision-support tool for pollutant removal and adsorbent optimization. |
| **Hardware/Software/Lab/Equipment Requirements :**   * + Computer systems with Python   + Open-source machine learning libraries |
| **Development Plan :**   * + Conduct a comprehensive literature review on adsorption processes, including equilibrium isotherms and kinetic models.   + Collect adsorption datasets from peer-reviewed articles, open-access repositories, or laboratory experiments, with emphasis on parameters such as pH, temperature, adsorbent dosage, contact time, and initial solute concentration.   + Perform data preprocessing, including normalization, feature selection, and train/test validation.   + Develop and compare machine learning models to predict adsorption efficiency and isotherm/kinetic parameters.   + Provide a critical discussion on model interpretability and applicability to environmental engineering practice.   + Prepare and submit a joint thesis and deliver a poster presentation to the department faculty. |