**MARMARA UNIVERSITY**

**FACULTY OF ENGINEERING**

**ENVIRONMENTAL ENGINEERING DEPARTMENT**

**ENVE 4197/4198 ENGINEERING PROJECT**

**PROPOSAL FORM**

**FALL 2025-2026**

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| **Instructor :** Assoc.Prof. Esra ERKEN  **Project Title :** On-Site Oxidant Generation by Electrooxidation: Methyl Orange Removal as a Surrogate for Water Treatment  **Proposal No. :** 1  **Number of Students :** (Max 2 students)  **Requirements (from students) :** |
| **Scope of the Project :**  This project investigates the production of oxidants through electrooxidation and their effectiveness in degrading methyl orange (MO), a synthetic azo dye often used as a model pollutant. MO will serve as a safe chemical surrogate to evaluate disinfection/oxidation efficiency. The study will monitor color removal and concentration decrease of MO under different electrochemical conditions. Results will provide insights into oxidant production efficiency, energy consumption, and potential application in water treatment processes. |
| **Hardware/Software/Lab/Equipment Requirements :**  **Electrooxidation setup**  DC power supply (0–30 V, 0–5 A)  Electrochemical reactor  Magnetic stirrer with stir bars  Electrolytes: NaCl or Na2SO4 solutions  **Analytical tools**  UV-Vis spectrophotometer (for absorbance at ~465 nm for MO)  pH and conductivity meters  Glassware (volumetric flasks, beakers, cuvettes, pipettes, etc.)  **Chemicals**  Methyl orange dye (analytical grade)  Electrolyte salts (NaCl, Na2SO4)  Distilled or deionized water  **Software**  Excel |
| **Development Plan :**   * Literature Review   Review electrooxidation and its application to dye degradation.   * Identify parameters influencing efficiency (current density, pH, electrolyte type).   Calibration & Baseline  Prepare MO standard solutions (1–20 mg/L).  Record absorbance spectrum to confirm λmax ≈ 465 nm.  Generate calibration curve (Abs vs. concentration).   * System Setup   Assemble the electrooxidation cell.  Perform blank runs (no current, no dye) to confirm baseline stability.   * Experimental Runs   Vary operational parameters:  Current density (e.g., 5, 15, 30 mA/cm²)  Electrolyte type (NaCl vs. Na2SO4)  pH (acidic, neutral, alkaline)  Collect samples at intervals (0, 5, 10, 20, 30, 60 min).  Measure absorbance decrease at λmax.   * Data Analysis   Calculate % decolorization  Estimate energy consumption (kWh per mg MO removed).   * Comparative Evaluation   Identify most efficient operating conditions.  Discuss influence of electrolyte, current density, and pH.   * Thesis Writing & Presentation |