Lesson Plan
Civil Engineering – CE2840: Introduction to Environmental Engineering
Lab 6: Oxygen demand and nutrients in water/wastewater samples

Lesson: Oxygen demand and nutrients in water/wastewater samples

Timeframe: 2 lab sessions of 1 week each

Materials needed:

For pre-class:

Computer with Microsoft Excel, access to Internet, and headsets or speakers.
Copy of Lab 6 Handout.

For in-class:

Printed paper copy of Lab 6 Handout
Lab notebook
Simple calculator

Objectives:

Basic:

B1. To define the following terms: dissolved oxygen, biological oxygen demand, nitrate and phosphate nutrients, primary and secondary wastewater treatment process, and removal efficiency.
B2. To master dilution and conversion calculations.
B3. To perform the laboratory work required by each subsection of the handout in a safe manner.
B4. To properly record the results and share them in their respective group.
B5. To take note of what they observe and do in their lab handbook.
B6. To calculate the average and standard deviation for each data point.

Advanced:

A1. To calculate removal efficiency for each parameters.
A2. To interpret the results in a meaningful way by explaining the relationship between values of the different samples. For instance, why BOD decreases between primary and secondary effluent samples.
A3. To explain why the parameters studied in Lab 6 are crucial to understanding the performance of a wastewater treatment plant.
A4. To determine in what other environmental engineering context the same studies of these particular would be helpful.
A5. To write a succinct but complete report on their work while articulating 2., 3., 4.

Background:

The students have already performed basic water chemistry tasks such as finding the correct glassware, performed dilutions, and they have also used all the instruments in this lab but in a different context. The students have been exposed to water sampling instructions in Lab 1 and have already sampled surface and tap water are home.

Introduction to Lesson:

Pre-class

Steps	Purpose	Estimated time	Learning objective
1. Watch the video on wastewater treatment parameters	To expose the students to typical wastewater treatment parameters.	5 min 8 s	B1
2. Perform necessary calculations to perform the dilutions	To maximize lab time for experiments	15 min	B2,
3. Preliminary bibliographical research (books or online) on subject of Lab 6	To prepare for the lab report.	15 min	B1,

In-class group space activities and resources

Steps	Purpose	Estimated time	Learning objective
1. As a group, perform the tasks in each sub-part of the report.	To promote collaboration and to make sure students will be able to know how to measure the parameters.	90 min	B3,
2. Take notes of performed tasks and observations.	To encourage clear and organized note-taking.	20 min	B4
3. Share notes and observations.	To discuss the results and	10 min	B4, B5, A2

Post-class

Steps	Purpose	Estimated time	Learning objective
1. Use Excel and calculator to perform data analysis.	Prepare the necessary calculations for the report.	15 min	A1
2. Write the report.	Present the data in a concise way.	60 min	A2, A3, A4, A5