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Course description:
The purpose of this course is to provide students with hands-on opportunities to learn basic laboratory methods for characterizing wastewater. The course format will include both lecture and lab: students will learn fundamental laboratory skills, including solids analysis, chemical oxygen demand, and other methods as appropriate to the characteristics of the wastewater. Students will also have the opportunity to participate in a wastewater treatment design competition to be held at University of Nevada, Reno at the end of April.

Course objective
To build fundamental knowledge in the characterization of wastewater and to apply critical thinking skills in designing treatment processes.

Learning Objectives
By the end of EV 441 students will understand the fundamentals of wastewater characterization and will be able to formulate and implement appropriate treatment design strategies.

Prerequisites:
CE 438, CE 440 or EV 438

Textbook and Course Materials
Students are required to purchase an appropriate laboratory notebook for data recording.


Supplemental materials will be distributed in class.

Safety and Appropriate Lab Procedure:
Students should follow all safety instructions carefully. Appropriate attire is required for work in the lab: no shorts or cut-offs, no open toed shoes. Many of the chemicals we will be working with are dangerous: goggles and gloves must be worn at all times when working in the lab!
Grading:

**Lab Reports and Protocols (50%)**: Each week following lab, students will be required to summarize their procedures and results in the form of a 1-2 page Appendix (double spaced) to be included in the final lab report. Only one write up will be required per group. Before each lab, students also will be required to read the laboratory methods provided to them and write a summary protocol to be followed in lab.

**Final Report (25%)**: One final report will be required per group. The report should include an introduction and problem statement, materials and methods, design approach, results and discussion and references. The appendices should be included at the end and may be referred to for detailed information.

**Quizzes (20%)**: Several short quizzes will be given during the semester. These quizzes will focus on laboratory exercises and lecture material. Example problems are provided for practice. They need not be turned in.

**Participation and Good Lab Citizenship (5%)**: Considering the spirit of this course, active participation will be critical to success. As you will be working in groups and sharing the lab with others, good citizenship will also be essential. Be sure to keep your workspace clean and clean up any glassware and put away any items that are used as appropriate.

Course Rules:

- Only those students who participate in laboratory exercises may submit a laboratory report. If you are not present, you will receive a grade of “0”.
- There are no scheduled times to “make-up” a missed laboratory assignment. If you are unable to attend class due to illness, you must provide documentation. At that point, we will discuss next steps.
- Because laboratory reports and the final report are group projects, it is important that each member of the group participate fully and fairly. Therefore, team members should immediately report any issues with members of your laboratory group. All members must participate in the preparation of laboratory reports.
- Protocols are required at the beginning of each laboratory and must be completed by every member of the group individually before class begins. Lack of a protocol will result in a reduction in your score. In addition, the protocol must be completed before any member of your laboratory group begins work on the week’s lab.
- Students are not required to participate in the design competition at the University of Nevada Reno.
- Some of the laboratory assignments will be “special projects” such as the preparation of a summary of a unit operation or process or the development of a method to measure a wastewater characteristic. These special projects will depend on the wastewater composition and will be assigned as a laboratory.