CE 479
Environmental Microbiology Laboratory

Course Description:
One-credit introductory microbiology laboratory course; application of diagnostic microbiological techniques to the characterization of environmental enrichment cultures and pure cultures. Concurrent requisite: CE 497A, seventh-semester standing.

Course Objectives:
- Provide students hands-on experience with traditional culture-based techniques for microbial analysis
- Provide students hands-on experience with modern nucleic acid-based techniques for microbial analysis
- Advance proficiency in determining proper experimental controls
- Advance proficiency in critical analysis of experimental data

CEE Program Outcome Mapped to this Course:
(7) An ability to conduct laboratory experiments and to critically analyze and interpret data in more than one of the major Civil Engineering areas

Instructor:
Dr. John M. Regan
231C Sackett Building
Phone: 865-9436
Email: jregan@engr.psu.edu
Office hours: Mon 9:00-10:00 am, Thurs 2:00-3:00 pm, or by appointment.

Teaching Assistant:
Sok-Hee Jung

Meeting Times:
Monday 2:30-5:30 pm, 124 Sackett Building

Text:
Handouts of laboratory assignments.


Lab Safety
The following safety practices should be followed, in addition to the instructions provided during the first class:
- Wear lab coat, safety glasses, and closed-toe footwear at all times to protect yourself and your clothes from contamination and harm caused by microbial agents, stains, and chemicals
• Wash lab bench with disinfectant at both the beginning and end of the laboratory period
• Do not eat or drink in the laboratory
• Report accidents and spills promptly
• Discard biologically contaminated waste in the biohazard containers
• Label containers with contents, your name, and date

Exam Policy:
Exam dates are noted in the schedule. There will be two in-class quizzes. These exams are closed book, closed notes.

Final Presentation:
There will be final group presentations during the last scheduled laboratory period. Each group will spend the last third of the semester focusing on the application of the laboratory techniques to an assigned specific functional group of bacteria (e.g., ammonia oxidizers or polyphosphate-accumulating organisms) or environmental microbial system (e.g., activated sludge, anaerobic digester, microbial fuel cell). In consultation with the instructor, groups will develop a one-page plan describing the system they will study and the experiments that will be performed. This outline should be completed by October 11th. The results of each group’s project should be presented in a PowerPoint presentation that provides some background on the microbial group or system that was studied, the question that was addressed, the methods, results, and discussion. Each group will be given approximately 10 minutes to present their project to the class.

Grading Policy:
The final grade will be calculated as follows:

Quizzes (2) 24% each
Brief lab writeups (total) 20%
Outline of group experiments 5%
Final Project Presentation 24%
Professional Evaluation 3%

The grading schedule is shown below:

A 93-100%  C+ 77-80%
A- 90-93%  C 70-77%
B+ 87-90%  D 60-70%
B 83-87%  F < 60%
B- 80-83%

Academic Integrity: The University's statement on academic integrity, from which the following statement is drawn, is available at http://www.psu.edu/dept/oue/aappm/G-9.html. Academic integrity is the pursuit of scholarly activity in an open, honest and responsible manner. Academic integrity is a basic guiding principle for all academic activity at The Pennsylvania State University, and all members of the University community are expected to act in accordance with this principle. Consistent with this expectation, the University's Code of Conduct states that all students should act with personal integrity, respect other students' dignity, rights and property,
and help create and maintain an environment in which all can succeed through the fruits of their efforts. All students are expected to act with civility, personal integrity; respect other students' dignity, rights and property; and help create and maintain an environment in which all can succeed through the fruits of their own efforts. An environment of academic integrity is requisite to respect for self and others and a civil community. Academic integrity includes a commitment to not engage in or tolerate acts of falsification, misrepresentation or deception. Such acts of dishonesty include cheating or copying, plagiarizing, submitting another persons' work as one's own, using Internet sources without citation, fabricating field data or citations, "ghosting" (taking or having another student take an exam), stealing examinations, tampering with the academic work of another student, facilitating other students' acts of academic dishonesty, etc.

Students charged with a breach of academic integrity will receive due process and, if the charge is found valid, academic sanctions may range, depending on the severity of the offense, from F for the assignment to F for the course.

**Syllabus:**

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<td>Lab safety, Microscopy</td>
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<td>Sterilization of media and apparatus, Aseptic technique, Enrichment</td>
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<td>cultures, Microbial enumeration, Standard microbial analyses for</td>
<td>22 (1-2), Ch. 27 (1-3)</td>
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<td>Microbial enumeration (cont.), Microbial isolation</td>
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<td>Characterization of isolates, Microbial</td>
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<td>9/27</td>
<td><strong>Quiz 1</strong></td>
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<td>Microbial identification – overview of molecular approaches, Nucleic</td>
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<td>Nucleic acid sequence analysis and design of primers/probes, Polymerase</td>
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<td>Restriction digestions, Cloning and sequencing</td>
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