MURRAY STATE UNIVERSITY

DEPARTMENT OF INDUSTRIAL AND ENGINEERING TECHNOLOGY

COURSE NUMBER: CET 585/685 CREDIT HOURS: 3.0

I. TITLE: Remediation Technology

II. CATALOG DESCRIPTION:
Study includes process design and operations for biological and physical/chemical systems used to remove organic and inorganic contaminants from soil and groundwater.

III. PURPOSE:
Biological waste treatment is fundamental to environmental engineering technology. A strong background in applied microbiology and process design of biological systems is needed to enhance employment opportunities and performance. The purpose of this course is to provide such a background. Additionally, the course introduces design and operations of common physical and chemical groundwater treatment processes.

IV. COURSE OBJECTIVES:
The objectives of this class are to provide students with the background in applied microbiology and biological process design necessary to function as a practicing environmental professional, understand the microbial growth kinetics and biochemical pathways for degradation of various organic compounds (including the efficiency of degradation and the formation of intermediate compounds), understand the conditions under which in-situ biological treatment might be effective, and learn how to prepare a treatment system conceptual design. Upon completion of this course, successful students will understand applied microbial ecology, recognize typical degradation pathways for organic compounds, and be able to conceptually design a bioremediation system and common physical and chemical groundwater treatment systems.

V. CONTENT OUTLINE:

A. Contaminant Characteristics and Partitioning
B. Soil Vapor Extraction
C. Air Sparging
D. Microorganism structure
E. Nutrient and Oxygen Requirements
F. Metabolic classifications and pathways
G. Chemical Molecular Structure and Biodegradability
H. Quantitative description of microorganism growth
I. Bioremediation System Design
J. Air Stripping
K. Carbon Adsorption
L. Ion Exchange
M. Membrane Processes

VI. INSTRUCTIONAL ACTIVITIES:
Classroom lectures, library research, and a small group design project will be included.

VII. FIELD, CLINICAL, AND/OR LABORATORY EXPERIENCES:
Case studies of actual in-situ remediation systems will be included in the course.

VIII. RESOURCES:
Students will be required to use personal computers for data analyses, graphics, and report presentation.

IX. GRADING PROCEDURES:

Quizzes	20%
Homework	20%
Reports	20%
Project	40%

Letter grades of A, B, C, D or E will be assigned based on student performance.

X. GRADUATE LEVEL REQUIREMENTS:
Graduate students will be required to provide an additional in-depth case study or process development report. Students must be admitted to graduate status prior to scheduling this course to receive graduate credit.

XI. ATTENDANCE POLICY:
This course will adhere to the policy published in the MSU Undergraduate Bulletin.

XII. ACADEMIC HONESTY POLICY:
This course will adhere to the policy published in the MSU Undergraduate Bulletin. Cheating, plagiarism (submitting another person's material as one's own), or doing work for another person which will receive academic credit are all impermissible. This includes the use of unauthorized books, notebooks or other sources in order to secure or give help during an examination; the unauthorized copying of examinations, assignments, reports or term papers; or the presentation of unacknowledged material as if it were the student's own work. Disciplinary action may be taken beyond the academic discipline administered by the faculty member who teaches the course in which the cheating took place.

XIII. TEXT AND REFERENCES:
TBA.

XIV. PREREQUISITES: None.

XV. STATEMENT OF AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY:

Murray State University endorses the intent of all federal and state laws created to prohibit discrimination. Murray State University does not discriminate on the basis of race, color, national origin, gender, sexual orientation, religion, age, veteran status, or disability in employment, admissions, or other provision of services and provides, upon request, reasonable accommodation including auxiliary aids and services necessary to afford individuals with disabilities equal access to participate in all programs and activities.