

(NR 722)

ADVANCED ENVIRONMENTAL MICROBIOLOGY

SECOND SEMESTER 2005/2006

SYLLABUS

Instructor: Dr. Ragheb Tahhan
Department: Natural Resources and the Environment/College of Agriculture
Lecture Time: 11:15 - 12:05 STT
Lecture Place: M2006
Office Hours: 1:15 - 2:15 pm STT (and by appointment).

COURSE OBJECTIVES

- ◆ To have an understanding of modern pollution problems from a biological point of view.
- ◆ To examine the chemical, biochemical, and molecular aspects of biodegradation of hazardous and toxic compounds.
- ◆ To understand how knowledge applied from these areas has led to the development of bioremediation technology.

WHAT YOU ARE EXPECTED TO LEARN FROM THIS COURSE

- ◆ Environmental pollution types, extents, and implications.
- ◆ Interactions between natural biological systems, particularly microbial systems, and modern pollutants.
- ◆ Biochemical degradation pathways of the most prominent pollutants.
- ◆ Molecular aspects of biodegradation.
- ◆ Applications of such basic knowledge preventing, mitigating, and treating environmental pollution.

COURSE OUTLINE

Introduction; Biodegradation and bioremediation-an overview

Biodegradation microflora

Assessing biodegradation

Types and origins of environmental pollutants

Persistence and biomagnification

Environmental factors affecting biodegradation

Biochemical aspects of biodegradation

Biodegradation kinetics

Subsurface microbiology

Detoxification of inorganic pollutants

Waste and wastewater microbiology

In situ bioremediation

Future perspective and required research

References: The following is a list of useful references. You will not be asked to get your own references. Instead, you will be given selected handouts from this list and elsewhere as a study material. Add to that your notes from lectures.

- 1) Atlas, R. M., and R. Bartha. 1993. *Microbial Ecology, Fundamentals and Applications*. Third Edition. Benjamin-Cummings (Pub.). Redwood City, CA. USA.
- 2) Hurst, C. J., G. R. Knudsen, M. J. McInerney, L. D. Stetzenbach, and M. V. Walter (eds.). 1997. *Manual of Environmental Microbiology*. ASM Press. Washington DC. USA.
- 3) Paul, E. A., and F. E. Clark. 1989. *Soil Microbiology and Biochemistry*. First Edition. Associated Press (Pub.). San Diego, CA. USA.
- 4) Weaver, R. W. (ed.). 1994. *Methods of Soil Analysis. Part 2. Microbiological and Biochemical Properties*. SSSA Inc. (Pub.). Madison, WI. USA.
- 5) Bitton, G. 1994. *Wastewater Microbiology*. Wiley-Liss Inc. New York, NY. USA.

Note: You can use other references, textbooks or even the Internet to get through the course. Nonetheless, you will be responsible for the material in these cases. This is not saying that you should be afraid of using other resources. On the opposite, you are encouraged to do so; you only need to learn to verify your resources.

Grading policy:

We will stick to the rules and regulations stated in the student guide. The final course grade will be calculated out of 100 points. As of now, you all have 100 points. It is now up to you to keep it or to lose some of it! The grade will be distributed as follows:

1 st Hour Exam	150 points
2 nd Hour Exam	150 points
10 paper summaries and reviews	100 points**
4 Presentations	100 points
<u>Final Exam</u>	<u>500 points*</u>
Total	1000 points

* The written final exam will be graded for 400 points. The rest of the points (100) are assigned to the term paper.

** Paper summaries will be handed in the time schedule given and in the following style:

Title: Bold, capital initials, Centered, 12 points Times New Roman font, single space. Authors are listed under the title as in the original paper.

Body text: One or two paragraphs consisting of an introductory statement, materials and methods statement(s), main results, and a concluding statement. Face is 12 points Times New Roman font, double space.

Reference: Soil Science Society of America style. Face is 12 points Times New Roman font, single space.

Have a happy and productive semester. Good luck