A. INTRODUCTION
1. Outline and Questionnaire

2. Grading:  
   Points  
   1st exam (Feb. 20) 100  
   2nd exam (Apr. 3) 100  
   Final (week of May 6) 150  
   Lesson Development 150  
   TOTAL 500

3. Materials on reserve
4. Course objectives
5. Reasons for interest

1. Habitat vs. niche  
2. Distribution patterns  
3. Microsite-organism interactions  
4. Organismal adaptation

1. Methods of sterilization, "partial sterilization", and fumigation of soils  
2. Microbial survival and recolonization  
3. Gross biochemical changes

1. Potential vs. water content  
2. Water activity and other units of measure  
3. Raoult’s Law of Mole Fractions

1. Soil quality--uniform standards for all?  
2. Sampling techniques  
3. Cultured and uncultured organisms  
4. Biomass  
5. Metabolic activity measurement

1. Substrate utilization patterns (Biolog)  
2. Species identification through 16S rRNA  
3. Polymeric Chain Reaction (PCR)
4. Lipid composition
5. Factors influencing diversity

1. Risk assessment of genetic transfer
2. Conjugation, transduction, and transformation
3. Terrestrial environments
4. Identification and confirmation of recombinants

H. CARBON AS A SUBSTRATE
1. Why carbon and not some other element?
2. Substrate control of microbial growth
4. Gibbs free-energy relationships

1. What is a heavy metal?
2. Sewage wastes
3. Ecological impact
4. Safety guidelines

1. The microbial habitat
2. Organismal abundance
3. Degradation in the substratum

1. The ‘magic six’ and acclimation
2. Organic acids and fuel from wastes (methane)
3. Petroleum hydrocarbons and soil reclamation
4. PCBs

1. What is SOM?
3. Carbon-14 dating
4. Characterization by chemical and physical means
5. Nature of complexing groups and reactions with metal ions and clays
1. Causes of C loss
2. Mechanisms of C sequestration
3. Monitoring C tie-up
4. Desertified lands

O. MICROBIOLOGY OF SOIL STRUCTURE  (Sutherland, 2001. Biofilm Exopolysaccharides: A Strong and Sticky Framework, Microbiology 147:3-9)
1. Soil carbohydrates
2. Microbial polymers
3. Filamentous structures
4. Microorganisms and aggregate formation

1. Background and origin
2. Extraction from soil
3. Persistence in soil
4. Kinetics
5. Enzyme diversity
6. Urease

1. Soil and aerobic/anaerobic metabolism
2. Measurement of reducing conditions (redox potential)
3. Wetland soils
4. Biochemistry and energy relationships

R. COURSE SUMMARY AND REVIEW

Articles are on reserve in the Parks Library. Articles indicated as "quick reading" should be read for less detail than those articles not marked. It is a good idea to have read the articles before class discussion.

HOPE THAT YOU ENJOY THE COURSE