II. COURSE OUTCOMES AND OBJECTIVES

1. Know safety procedures for handling pathogenic microorganisms.
2. Be able to prepare media which includes use of balances, a variety of glassware, and use of the autoclave.
3. Be able to demonstrate proficiency in using streak-late, spread-plate, and pour-plate.
4. Be able to demonstrate an understanding for the uses of differential, selective, and all-purpose media.
5. Recognize different colony types on the variety of media used in lab.
6. Be able to properly handle viruses and understand the concept of a bacteriophage.
7. Understand bacterial conjugation and transformation.
8. Be able to identify the gram stain reaction of a microorganism with the aid of a microscope.

The following College Competencies covered in this class would include: writing, reading, computer literacy, professional competency and problem solving.

III. METHOD OF INSTRUCTION

The format of this class will be lecture with most of the time spent doing hands-on laboratory exercises.

Students will be graded on homework reading assignments, papers (2), quiz, and a cumulative final exam.

IV. COURSE OUTLINE

1. Introduction to Course
   - Laboratory Safety
   - Lecture on Bacteria
   - Environmental Culturing

2. Preparing Culture Media
   - Prepare broths, slants, and plates of media for use in the subsequent laboratories.
   - Describe two uses for each form of culture media; solid, semisolid, and liquid.
   - List five functional categories of media; describe the purpose of each and give
an example of each.
- Distinguish between a chemically defined medium and a chemically complex one.
- List the basic nutritional requirements of all bacteria.
- Summarize attributes of agar that make it an adequate solidifying agent for the microbiology laboratory.
- Wash glassware correctly for culture media preparation.
- Discuss the advantages of utilizing a hot plate stirrer for preparing culture media.
- Explain why Petri plates of media are poured at a holding temperature of about 50°C instead of 100°C.
- Demonstrate knowledge of proper media storage techniques.

3. Streak-plate, Spread-Plate, Pour-Plate and Differential and Selective Media
- With the streak-plate technique, students separate bacterial cells and grow them into isolated colonies.
- Prepare bacterial spread plates that completely cover the medium with even, confluent growth.
- Student’s will learn a basic technique called a pour-plate which is used in the culturing of and/or isolation of bacteria in which a melted, yet sufficiently cooled, medium is inoculated with a bacterial culture, introduced into a sterile Petri dish, and allowed to harden; the individual bacteria trapped within the medium grow and eventually form colonies.

4. Bacterial Culture Characteristics
- Distinguish basic features of bacterial colonies, broth cultures, and agar slant growths.
- Recognize the advantages and limitations of culture characteristics in the identification of bacterial species.
- Determine the influence of temperature of pigment production.

5. Viruses and Plaque Assay
- Use and manipulate pipettes and pipettors to safely transfer liquids and/or bacterial cultures.
- Calculate and perform dilutions.
- Use metric unites of measurement for liquids.
- Perform the standard plate count technique.
- Determine the number of viable bacteria/millimeter (mL) by means of a spread-plate technique.
- Define virus structure, lytic and lysogenic life cycles, and bacteriophage.
- Discuss medically important viruses.
- Perform plaque assay to detect areas where viruses have replicated and destroyed host cells.

6. Bacterial Transformation and Conjugation
- Discuss general theory of bacterial conjugation and transformation.
- Discuss the importance of plasmids and their role in antibiotic resistance.
- Review the work of Frederick Griffith and show how this relates to bacterial transformation.

7. Gram Stain Reactions
- Students will view several slides to determine gram stain reaction and morphology.