I. Course Description and Credit Hours:  
Theory and practice of common biological laboratory methods: solution  
preparation, spectrophotometry, electrophoresis, DNA manipulations, and  
biological, chemical, and radiological safety. One one-hour lecture and two two-hour labs. 3 credits.

II. Prerequisites:  
BI200, CH186, MA134.

III. Purposes or Objectives of Course:  
A. To give students experience in dimensional analysis used in microbiology and  
cellular and molecular biology.  
B. To familiarize the students with the theory and practice of preparing solutions  
from various starting materials.  
C. To introduce the students to means of preparing sterile media and solutions.  
D. To allow students to practice quantifying bacteria and viruses, and to measure  
growth rates of bacterial populations.  
E. To allow students to quantify proteins, nucleic acids and other chemicals in  
solution.  
F. To introduce students to commonly used devices including, but not limited to:  
microliter pipetters, centrifuges, spectrophotometers, pH meters, etc.  
G. To introduce the students to the use of enzymes for end-point determination  
and to measure enzyme activity.  
H. To give students experience in the techniques for manipulation and  
electrophoretic separation of proteins and DNA.  
I. To provide information regarding biological, chemical, radiation, and other  
aspects of lab safety. Students will receive four hours of radiation safety  
training in order to achieve certification by the institutional Radiation Safety  
Officer for radiation work.

IV. Expectation of Students:  
Students are expected to attend classes, complete laboratory exercises, allied  
assignments, and maintain a research notebook. Grades will be based on four  
unannounced inspections of research notebooks, completion of five on-line  
calculation assignments in a controlled computer facility, five homework problem  
sets, and a final exam.
V. Course Content and Outline:
Lecture Content (15 hours)
Dimensional analysis; SI units in Biology (1 hour)
Dimensional analysis; Derived and interchangeable units of concentration (1 hour)
Buffers (1 hour)
Sterile techniques (1 hour)
Dilution factors (1 hour)
Growth curve and kinetics (1 hour)
Literature searches (1 hour)
Statistics and interpolation (1 hour)
Absorbance spectra (1 hour)
Nucleic acid hybridization techniques (1 hour)
Radiotracer methods (1 hour)
Polymerase Chain Reaction (1 hour)
Chemical Safety (1 hour)
Biological Safety (1 hour)
Radiation Safety (1 hour)

Lab Content (58-60 Hours)
Propipettors, Microfuges (2 hour)
Preparing solutions (4 hours)
Weak acid titrations (2 hours)
Behavior of weak acids (2 hours)
Preparing Media (2-4 hours)
Viable cell count, Direct cell count, and Membrane filtration (4 hours)
Spectrophotometric growth curve (4 hours)
Plaque assay (2 hours)
Microscopy (4 hours)
Bradford protein assay (2 hours)
Glucose determination (2 hours)
Lactate dehydrogenase activity (2 hours)
SDS PAGE (4 hours)
Plasmid and chromosomal extractions (4 hours)
Spectrophotometric DNA determination (2 hours)
Absorbance spectra of pigments (4 hours)
Agarose electrophoresis and photography (4 hours)
Chemical Safety (2 hours)
Biological Safety (2 hours)
Radiation Safety (4 hours)

VI. Textbook:
VII. Basis for Student Evaluation:
20% Lab Notebook
30% On-Line Examinations – Competency Based Instruction
30% Homework Problem Sets – Competency Based Instruction
20% Final Exam

Five computer U-tests taken outside of class time.