COURSE DESCRIPTION:

Prerequisites: Completion of General Education Core, including, (Take one): BIO-111, CHM-131, or CHM 151; Permission to register for this capstone is required. Contact Ms. Kara Battle, 919-536-7223, ext. 8002.

Corequisites: None

This course provides experience in selected laboratory procedures. Topics include proper laboratory techniques in biology and chemistry and their uses in the modern biotechnology lab setting. Upon completion, students should be able to perform laboratory techniques and use instrumentation common to basic biotechnology. As a capstone course, students should recognize the interdisciplinary aspects of scientific investigation processes, and be able to apply these scientific skills in their laboratory activities. This course has been approved to satisfy the Comprehensive Articulation Agreement for transferability as a pre-major and/or elective course requirement. Course Hours Per Week: Class, 2. Lab, 3. Semester Hours Credit, 3.

LEARNING OUTCOMES:

The purpose of this course is to provide a context for the assessment of Associate in Arts and Associate in Science Program Learning Outcomes. During the course, students will:

a) Articulate discipline-specific concepts and vocabulary and demonstrate empirical and conceptual knowledge foundational to all program disciplines.
b) Demonstrate college-level critical thinking, argumentation, and analysis skills.
c) Construct purposeful and effective written essays and oral presentations that demonstrate an understanding of rhetorical strategies and use experiential evidence and appropriately documented academic research.
d) Demonstrate an awareness and understanding of cultural and social diversity and gain the skills necessary to interact appropriately within diverse environments.
e) Demonstrate an understanding of the scientific method and its application, including interpreting and analyzing scientific data, forming hypotheses, and evaluating experiments.
f) Create a mathematical model of a practical problem and use the model to logically interpret and analyze the problem and make predictions.
g) Demonstrate competent and relevant technology skills.

In addition to assessing Learning Outcomes associated with the General Education Core, upon completion of this course, the student will be able to do the following:

a) perform basic and analytical laboratory techniques
b) perform general bacteriology and microbial techniques including making media and culturing bacteria
c) perform DNA manipulation techniques including transformation, DNA restriction analysis, DNA fingerprinting and gel electrophoresis
d) analyze and present data from scientific literature in peer-reviewed journals
e) relate the laboratory techniques performed to modern biotechnological developments or science issues facing society.

OUTLINE OF INSTRUCTION:

I. General Introduction
   A. Working in a scientific laboratory setting
   B. Using different types of scientific glassware and basic lab equipment
   C. Understanding the need for accuracy and precision in measurements

II. Scientific Reporting
   A. Writing and following protocols
   B. Properly keeping lab notebooks
   C. The need for documentation

III. Media Preparation
   A. Performing dilutions
   B. Preparing solutions
   C. Sterilization techniques

IV. Microbiological Techniques
   A. Aseptic techniques
   B. Bacterial culturing
   C. Microscopy

V. Tissue Culture Techniques
   A. Aseptic processes
   B. Plant tissue culture

VI. Bacterial Transformation
   A. Culture requirements
   B. Performing transformation

VII. Spectrophotometry
   A. Using spectrophotometers
   B. Producing standard curve data
   C. Performing different graphing techniques

VIII. Chemical Laboratory Techniques
   A. Performing redox titration
   B. Doing different chromatography techniques
   C. Performing acid/base extraction
IX. DNA Techniques
   A. Performing DNA extraction
   B. Performing DNA fingerprinting
   C. Performing Restriction digests
   D. Performing gel electrophoresis
   E. Performing PCR

X. Scientific Journals
   A. Reading peer-reviewed literature
   B. Analyzing scientific journal articles
   C. Presenting data and discussing scientific articles

REQUIRED TEXTBOOKS AND MATERIALS:

Students will be given online readings and supplementary materials in the laboratory.

SUGGESTED REFERENCES, PERIODICALS, AND VISUAL AIDS:

Numerous supplementary texts, programmed materials, and audiovisual packages are available in the Educational Resources Center. These materials may be utilized to reinforce the lecture and lab material or to provide material for independent study by the student.

STATEMENT OF STUDENTS WITH DISABILITIES:

Students who require academic accommodations due to any physical, psychological, or learning disability are encouraged to request assistance from a disability services counselor within the first two weeks of class. Likewise, students who potentially require emergency medical attention due to any chronic health condition are encouraged to disclose this information to a disability services counselor within the first two weeks of class. Counselors can be contacted by calling 919-536-7207, ext. 1413 or by visiting the Student Development Office in the Phail Wynn Jr. Student Services Center, room 1209.