COCONINO COMMUNITY COLLEGE
COURSE OUTLINE

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A. Identification:
   1. Course Subject: Biology (BIO)
   2. Course Number: 132
   3. Course Title: Bioscience Practicum II
   4. Credit Hours: 4
   5. Course Description:

      Preparation of students to become lab technicians by introduction of fundamental skills, knowledge, and attitudes essential to any lab professional. Includes lab safety, documentation, quality control, lab math, validation and verification of results. Also includes understanding government regulations, biological solution preparation, assays, biological separations, and growing cells. The course aims at implementing a community based scientific problem and varying teams of students create a workable scientific solution using the methods taught in the Bio 131 and further development in this course. Exposure to varying scientific internships and work environments are also explored. At the successful completion of this course the student will have the opportunity to take the Bio-Assistant Credentialing Exam (BACE).
   6.
   7. Prerequisite: BIO 131. Three lecture. One lab.

B. Course Goals: To examine, analyze, evaluate and assess how infectious diseases spread in various ways and are caused by different pathogens. This includes using laboratory epidemiological techniques to study principles of disease transmission, treatment and pathogen identification. This continuation course will include real-world health problem based around our community.

Course Outcomes Upon completion of this course, student will:
1. Practice proper laboratory safety.
2. Practice common laboratory procedures.
3. Demonstrate the ability to keep a legal scientific notebook compatible with industry standards.
4. Employ the correct mathematical rules of operation, and be able to apply these to the preparation of reagents and biological solutions.
5. Demonstrate techniques common to the bioscience laboratory.
6. Understand and demonstrate ability to perform biological separations.
7. Demonstrate ability to grow, transfer, and enumerate bacterial cells.
8. Research current topics and/or careers in bioscience.
9. Create a scientific solution to a community based problem.

C. Course Outcomes Assessment will include:
   1. Initial models (pre-assessment)
   2. Lab notebook and class portfolio including all student work (formative assessments)
   3. Final evidence-based explanation (summative assessment)
   4. Scientific poster creation and presentation

D. Course Content will include:
   1. Lab safety and GLPs, along with a national certification.
   2. Epidemiology, epidemiological triangles and epidemiological principles
   3. Community-Problem-Based learning around an emerging/reemerging community health problem.
   4. Microbial Techniques:
      a. gram staining to determine Gram reaction of bacteria

b. determining cell shape and size
c. staining onion and cheek cells using three different stains
d. determining size of cells using the field of view or stage micrometer observed under the microscope
e. demonstrating correct use of an incubator
f. determining antimicrobial properties of three chemicals
g. performing tenfold serial dilution of bacterial cultures
h. quantifying concentration of bacteria in a culture
i. streaking an agar plate for single colonies (perform an isolation streak) and for growth.
j. transforming *E. coli* HB101 bacteria with the pGLO plasmid
k. determining role of fomites in the chain of infection
l. disinfecting microorganisms present on various fomites
m. determining antimicrobial properties of three household chemicals and antibiotics

5. Cell Biology
    a. performing a disk diffusion assay using three chemicals/antibiotics and one negative control
    b. using NEB cutter predicting where restriction enzymes will cut the bacteriophage lambda DNA sequence
    c. producing a virtual gel image of lambda DNA cut with specific restriction enzymes
    d. preparing agarose gels by calculating the amount of agarose powder needed to make 1% agarose, preparing gel trays, preparing and casting 1% agarose TAE gel, and removing gel combs
    e. loading and running dyes on an agarose gel
    f. determining the charge of each electrophoresed dye
    g. performing a restriction digest assay
    h. generating a standard curve using a DNA size standard, and determining DNA fragment sizes
    i. performing a restriction digest assay
    j. understanding how drug resistant mutations quickly become prevalent in a bacterial population
6. Scientific Explanation
    a. using models to represent ideas and explanations
    b. deciphering patterns and causal relationships from data (evidence)
    c. communicating clearly and persuasively the ideas and methods they generate as the result of scientific investigations
    d. obtaining, evaluating and communicating information in written form, using academic language
    e. engaging in argumentation from scientific evidence
    f. using a disease caused by a bacterial pathogen of students choice and applying the skills and knowledge gained through the course to construct a causal explanation on the disease