I. DIVISION: Science, Mathematics, and Engineering DIV./DEPT. NO: 51/8000

PREFIX/NO.: MICRO 101 COURSE TITLE: Microbiology

 Formerly listed as: ___________________________ Date Changed: ____________

II. ALSO OFFERED AS:

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III. COURSE INFORMATION:

Units: 4 or Variable Units: [ ] X=1/2 unit [ ] A=1 unit [ ] B=2 units [ ] C=3 units [ ] D=4 units

Total Hours: Lecture: 52.50 Lab: 52.50 Other: ______

Transfer Credit: [ ] CSU – [ ] UC – [ ] CAN – BIOL 14

General Ed: [ ] Approved AA/AS Area: Natural Sciences CSU GE Area: B.2 IGETC Area: 5B

Offered Only: Fall – [ ] Spring – [ ] Summer – [ ] Eve – [ ] Not offered every semester – [ ]

IV. PREREQUISITE(S)/COREQUISITE(S)/RECOMMENDED FOR SUCCESS:

(Please check all that apply and list below. Also attach appropriate documentation forms)

Prerequisite (P) – [ ] Corequisite (C) – [ ] Recommended for Success (R) – [ ] Limitation on Enrollment (L) – [ ]

BIO 111 or BIO 101 and CHEM 143

NOTE: An AP Biology score of 4 or 5 may be accepted as equivalent to the Biology prerequisite. An AP Chemistry score of 4 or 5 may be accepted as equivalent to the Chemistry prerequisite. Articulated equivalents from other colleges may also be accepted. Visit the Records Office (Morris 107) to fill out a Prerequisite Challenge Form.

V. CATALOG DESCRIPTION:

Includes the study of microbial metabolism, genetics, and varieties; immunity, infections, and antimicrobials. Intended mainly for student entering the health professions.

VI. FIELD TRIPS REQUIRED? [ ] Yes [ ] No [ ] Maybe

VII. GRADING: [ ] A-F Only [ ] CR/NC Only [ ] CR/NC Option [ ] Non-Graded

VIII. REPEAT PROCEDURES:

Credit: [ ] No [ ] *Yes [ ] Maximum Completions: ______ Maximum Units: ______

Non-Credit: [ ] No [ ] Yes [ ] Maximum Completions: ______

*(If course is repeatable, attach a memo with the appropriate justification)

IX. EXPLAIN FEE REQUIRED: ____________________________________________

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X. **PREREQUISITE SKILLS**
Before entering the course, the student will be able to:

**FROM CHEM 143**

A. apply the principles of dimensional analysis to unit conversions.
B. differentiate between physical and chemical properties and changes.
C. define subatomic particles, cations, anions and isotopes.
D. identify atomic number and mass of an element on the periodic table.
E. apply Avogadro’s number to mole and mass measurements.
F. calculate molar mass.
G. write balanced chemical equations and identify types of equations.
H. use molar ratios to calculate moles (or mass) of chemicals consumed or produced as well as percent yield taking into account limiting reagents.
I. differentiate between ionic, covalent and polar convalent bonds.
J. describe and identify intermolecular bonding.
K. predict the effect of changing pressure, volume, temperature or number of moles on a gaseous system holding one or more of these variables constant.
L. calculate an unknown variable in a gas law.
M. define vapor pressure, surface tension and boiling point of surfaces.
N. calculate mass percent, mass/volume percent and volume percent of a solution.
O. differentiate between strong and weak acids; strong and weak bases.
P. calculate pH and \( \text{H}^+ \).
Q. identify oxidized and reduced elements in a single replacement reaction.
R. identify families of organic compounds.
S. distinguish functional groups of organic compounds.

**FROM BIOLOGY 111 or BIO 101**

A. explain the fundamental principles and generalizations of biology.
B. use the scientific method in problem solving.
C. describe chemical and physical reactions as they relate to biology.
D. use binocular dissecting and compound microscopes.
E. make a scientific drawing and correctly label the drawing including the appropriate scale of the object drawn.
F. explain the hierarchical structure and function of organisms and communities from the atom to the biosphere.
G. diagram various common types of inheritance.
H. use the laboratory to work together with other students in problem solving situations.
I. relate cell structures to their cell functions.
J. identify and locate the ten organ systems of the human body.
K. define the overall function of each organ system.
XI. OBJECTIVES (Expected outcomes for students)
Upon successful completion of the course, the student will be able to:

A. demonstrate skills using aseptic techniques.
B. use laboratory procedures and equipment for the isolation, culture and identification of microorganisms including an unknown bacterium.
C. identify sources of contamination in the laboratory and the environment, and utilize appropriate disinfection methods.
D. utilize the scientific method to answer a microbiological question.
E. insert foreign DNA into bacteria in the laboratory.
F. analyze the interaction of discoveries that led to the germ theory of disease.
G. compare and contrast the characteristics of microorganisms.
H. compare and contrast procaryotic and eucaryotic cells, and indicate how their differences may be used in treating infections.
I. outline the processes involved when microorganisms utilize energy sources to produce ATP, both in the absence and presence of oxygen.
J. list physical and chemical factors needed for microbial growth, then explain how such factors relate to the control of microorganisms.
K. explain the principles of sterilization, the use of disinfectants and antibiotics, and other methods used in the control of microorganisms from both clinical and public health standpoints.
L. discuss examples of human dependence on microorganisms, in several human cultures.*
M. analyze host microorganism’s interactions in symbiotic relationships.
N. distinguish between pathogenic and beneficial microorganisms.
O. access the public health measures employed in our society, and contrast these with public health practices in other countries.*
P. outline the basic processes involved in genetic engineering of microorganisms, and give examples of how genetic engineering impacts our lives.
Q. correlate specific microorganisms with treatment and prophylactic measures.
R. determine a probable cause of an infection when presented with a case study or vignette.
S. analyze the interactions between cells of the immune system and relate these interactions to vaccination.
T. explain how derangement of one’s immune processes may result in autoimmune disease or cancer.
U. describe the etiologic agent, pathogenesis, treatment, and prevention of important infectious diseases of human body systems.
V. compare and contrast the processing of drinking water and sewage, and indicate their importance in public health.
W. identify microorganisms and biochemical processes used in food production and related industries.

XII. CONTENT

A. The Chemistry of Life
   1. Inorganic Basics
   2. Organic Basis of Life

B. Basic Concepts in Microbiology
   1. History of Microbiology
   2. Scope of Microbiology

* = Multi-cultural objective or content item
C. Visualizing Microorganisms
   1. Microscopy
   2. Staining Techniques

D. Anatomy of Bacteria
   1. Procaryotic Cells
   2. Eucaryotic Cells

E. Bacterial Metabolism
   1. Enzymes
   2. Anaerobic Metabolism
   3. Aerobic Metabolism
   4. Anabolism

F. Bacterial Growth
   1. Growth and the Factors Affecting Growth
   2. Culturing and Counting Bacteria

G. Bacterial Genetics
   1. DNA Structure and Replication
   2. Protein Synthesis
   3. Regulating Metabolism
   4. Mutations and Their Repair; Ames Test

H. Gene Transfer and Manipulation
   1. Transformation, Transduction, and Conjugation
   2. Plasmids and Transposons
   3. Genetic Engineering

I. The Varieties of Microorganisms
   1. Classification Systems
      a. Taxonomy
      b. The 5 Kingdom System
      c. The 3 Domain System
   2. Virus Classification
   3. Bacterial Taxonomy and Nomenclature

J. Viruses, Viroids, Prions
   1. Characteristics and Classification
   2. Viral Replication
   3. Viruses and Cancer

K. Eucaryotic Parasites
   1. Protista
   2. Fungi
   3. Helminths
   4. Arthropods

L. Killing/Inhibiting Microorganisms
   1. Chemical Antimicrobial Agents
   2. Physical Antimicrobial Agents

M. Antimicrobials
   1. General Properties
   2. Culture and Sensitivity of Bacteria
   3. Antimicrobial Agents and their Actions
N. The Normal Microbiota and Pathogenicity
   1. Symbiotic Relationships
   2. Koch's Postulates
   3. Types of Diseases
   4. The Disease Process

O. Epidemiology/Nosocomial Diseases

P. Nonspecific Host Defenses
   1. Physical Barriers to Infection
   2. Cellular Defenses
   3. Inflammation, Fever, Interferon, and Complement

Q. Immune System
   1. Types of Immunity
   2. Antibodies and Antigens
   3. Humoral Immunity
   4. Cellular Immunity
   5. Immunizations

R. Immune Mistakes and Tests
   1. Types of Hypersensitivity
      a. Immediate
      b. Cytotoxic
      c. Immune Complex
      d. Cell-Mediated
   2. Autoimmune Disorders
   3. Immune Deficiencies
   4. Immunological Tests

S. Skin and Eye Infections
   1. Anatomical Defenses
   2. Skin Infections
   3. Eye Infections
   4. Bite and Wound Infections

T. Respiratory System Infections
   1. Respiratory System Components
   2. Upper Respiratory Tract Infections
   3. Lower Respiratory Tract Infections

U. Digestive System Infections
   1. Digestive System Components
   2. Oral Cavity Infections
   3. Lower Digestive System Infections

V. Cardiovascular/Lymphatic Infections
   1. Cardiovascular System Components
   2. Cardiovascular System Infections
   3. Systemic Infections

W. Nervous System Infections
   1. Nervous System Components
   2. Nervous System Infections

X. Urogenital Infections
   1. Urogenital System Components
   2. Non-sexually Transmitted Urogenital Infections
   3. Sexually Transmitted Urogenital Infections

* = Multi-cultural objective or content item
Y. Environmental Microbiology
   1. Water and Mineral Cycles

XIII. TEACHING METHODS

A. Methods to achieve course objectives:
   1. Subject material will be presented through class lecture and reaffirmed in laboratory experiences.
   2. Photographic slides, microscope slides, films, living and preserved specimens as well as handouts will be used to supplement lecture material.
   3. Case studies and collaborative learning experiences.
   4. Field trip to a medical laboratory.
   5. Computer projection and other technological presentations.

B. Typical assignments used in achieving learner independence and critical thinking:
   1. Write up and evaluate standard laboratory experiments.
   2. Analyze and derive conclusions from provided experimental data.
   3. Design, execute, and analyze an independent experiment.
   4. Identify an unknown bacterium.
   5. Analyze case studies.

XIV. TEXTBOOKS AND OTHER READINGS (Typical)

A. Required texts:

B. Other readings:

XV. SPECIAL STUDENT MATERIALS (i.e., protective eyewear, aprons, etc.)

Protective eyewear will be available for use during experiments.

XVI. METHODS OF EVALUATING STUDENT PROGRESS

A. Lecture examinations
B. Execution and write up of laboratory exercises
C. Laboratory final exam
D. Comprehensive final exam
E. Case studies
F. Identifying an unknown bacterium

* = Multi-cultural objective or content item
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