

# El Paso Community College

## Syllabus

### Part II

## Official Course Description

<b>SUBJECT AREA</b>	<u>Biology</u>
<b>COURSE RUBRIC AND NUMBER</b>	<u>BIOL 2421</u>
<b>COURSE TITLE</b>	<u>Microbiology for Science Majors (Lecture + Lab) (F)</u>
<b>COURSE CREDIT HOURS</b>	<u>4                      3                      :</u> <b>Credits                      Lec                      Lab</b>

### I. Catalog Description

Principles of microbiology, including metabolism, structure, function, genetics, and phylogeny of microbes. The course will also examine the interactions of microbes with each other, hosts, and the environment. Requires unscheduled observation visits to the laboratory. **Prerequisites: BIOL 1306 and 1106 with a “C” or better or Biology CLEP exam; and CHEM 1311 and 1111 with a “C” or better or Chemistry CLEP exam. (3:3). Lab fee.**

### II. Course Objectives

#### LECTURE AND LABORATORY

Upon satisfactory completion of this course, the student will be able to:

- A. Understand and comply with the laboratory safety rules, procedures, and universal precautions in a microbiology lab.
- B. Discuss the history of microbiology and identify the importance of microbiology in a variety of fields including modern genetics and molecular biology, industry, agriculture, medicine, public health, and environmental sciences.
- C. Describe and apply in the laboratory the principles of microscopy, bacterial staining techniques, culture methods, criteria for classification, and the collection, handling, and processing of cultures.
- D. Discuss the key steps of microbial metabolism emphasizing energy-yielding pathways and apply these concepts to the identification of microorganisms in the laboratory.
- E. Discuss and apply in the laboratory the basic concepts of microbial genetics, molecular biology, and the applications of recombinant DNA technology.
- F. Describe the characteristics of microbial growth and the applications to the control of microbial populations using physical and chemical agents and their mechanisms of action.
- G. Describe the techniques used in taxonomy and identify the taxa that include bacteria, fungi, protozoa and algae using selected laboratory techniques.
- H. Identify the unique characteristics of viruses, viroids and prions, describe virus structure and replication as well as laboratory techniques used in the cultivation of viruses.

- I. Discuss the mechanisms of microbial pathogenicity, the principles of epidemiology, and the defense mechanisms of the host against infectious disease.
- J. Describe the importance of microorganisms in the environment including the concepts of soil microbiology, nitrogen fixation, bioremediation, use of microorganisms in plant genetic engineering, and water and wastewater treatment processes.
- K. Apply the principles of microbial metabolism, growth, and genetics to the development of industrial applications.

### **III. THECB Learning Outcomes (ACGM)**

Upon successful completion of this course, students will:

- 1. Provide examples of the impact of microorganisms on agriculture, environment, ecosystem, energy, and human health, including biofilms.
- 2. Identify unique structures, capabilities, and genetic information flow of microorganisms.
- 3. Compare the life cycles and structures of different types of viruses.
- 4. Discuss how microscopy has revealed the structure and function of microorganisms.
- 5. Give examples of the range of metabolic diversity exhibited by microorganisms, impact of metabolic characteristics on growth, and control of growth.
- 6. Describe evidence for the evolution of cells, organelles, and major metabolic pathways from early prokaryotes and how phylogenetic trees reflect evolutionary relationships.
- 7. Describe the causes and consequences of mutations on microbial evolution and the generation of diversity as well as human impacts on adaptation.
- 8. Classify interactions of microorganisms on human and non-human hosts as neutral, detrimental, or beneficial.

#### **Learning Outcomes (Lab)**

- 1. Apply scientific reasoning to investigate questions and utilize scientific tools such as microscopes and laboratory equipment to collect and analyze data.
- 2. Use critical thinking and scientific problem-solving to make informed decisions in the lab.
- 3. Communicate effectively the results of scientific investigations.
- 4. Provide examples of the impact of microorganisms on agriculture, environment, ecosystem, energy, and human health, including biofilms.
- 5. Identify unique structures, capabilities, and genetic information flow of microorganisms.
- 6. Compare the life cycles and structures of different types of viruses.
- 7. Discuss how microscopy has revealed the structure and function of microorganisms.
- 8. Give examples of the range of metabolic diversity exhibited by microorganisms, impact of metabolic characteristics on growth, and control of growth.
- 9. Describe evidence for the evolution of cells, organelles, and major metabolic pathways from early prokaryotes and how phylogenetic trees reflect evolutionary relationships.
- 10. Describe the causes and consequences of mutations on microbial evolution and the generation of diversity as well as human impacts on adaptation.
- 11. Classify interactions of microorganisms on human and non-human hosts as neutral, detrimental, or beneficial.

### **IV. Evaluation**

- A. The type and number of exams will be determined by the instructor. A minimum of four lecture written exams, two laboratory exams and practical exams are recommended. The lecture/lab ratio for grading will be 75% for lecture (3 credit hours) and 25% for laboratory (1 credit hour)

Grading scale:

90-100 = A

80- 89	=	B
70- 79	=	C
60- 69	=	D
Below 60	=	F

**V. Disability Statement (Americans with/Disabilities Act [ADA])**

EPCC offers a variety of services to persons with documented sensory, mental, physical, or temporary disabling conditions to promote success in classes. If you have a disability and believe you may need services, you are encouraged to contact the Center for Students with Disabilities to discuss your needs with a counselor. All discussions and documentation are kept confidential. Offices located: VV Rm C-112 (831-2426); TM Rm 1400 (831-5808); RG Rm B-201 (831-4198); NWC Rm M-54 (831-8815); and MDP Rm A-125 (831-7024)

**VI. 6 Drop Rule**

Students who began attending Texas public institutions of higher education for the first time during the Fall 2007 semester or later are subject to a 6-Drop limit for all undergraduate classes. Developmental, ESL, Dual Credit and Early College High School classes are exempt from this rule. All students should consult with their instructor before dropping a class. Academic assistance is available. Students are encouraged to see Counseling Services if dropping because exemptions may apply. Refer to the EPCC catalog and website for additional information.

**VII. Title IX and Sex Discrimination**

Title 9 (20 U.S.C. 1681 & 34 C.F.R. Part 106) states the following "No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any educational program or activity receiving Federal financial assistance." The Violence Against Women Act (VAWA) prohibits stalking, date violence, sexual violence, and domestic violence for all students, employees and visitors (male and female). If you have any concerns related to discrimination, harassment, or assault (of any type) you can contact the Assistant to the Vice President for Student and Enrollment Services at 915-831-2655. Employees can call the Manager of Employee Relations at 915-831-6458. Reports of sexual assault/violence may also be reported to EPCC Police at 915-831-2200.