I. INTRODUCTION

A. Study of the morphology, physiology, and taxonomy of representative groups of pathogenic and nonpathogenic microorganisms. Pure cultures of microorganisms grown on selected media are used in learning laboratory techniques. Includes a brief preview of food microbes, public health, and immunology.

B. This course satisfies the Biology requirement in most curricula. Please check your degree plan to determine the status of this course in your program of study.

C. This course is occupationally related and serves as preparation for a career in nursing.

D. None

II. LEARNING OUTCOMES

Upon successfully completing this course, students will:

A. Describe distinctive characteristics and diverse growth requirements of prokaryotic organisms compared to eukaryotic organisms.

B. Provide examples of the impact of microorganisms on agriculture, environment, ecosystem, energy, and human health, including biofilms.

C. Distinguish between mechanisms of physical and chemical agents to control microbial populations.

D. Explain the unique characteristics of bacterial metabolism and bacterial genetics.

E. Describe evidence for the evolution of cells, organelles, and major metabolic pathways from early prokaryotes and how phylogenetic trees reflect evolutionary relationships.
F. Compare characteristics and replication of acellular infectious agents (viruses and prions) with characteristics and reproduction of cellular infectious agents (prokaryotes and eukaryotes).

G. Describe functions of host defenses and the immune system in combating infectious diseases and explain how immunizations protect against specific diseases.

H. Explain transmission and virulence mechanisms of cellular and acellular infectious agents.

I. Use and comply with laboratory safety rules, procedures, and universal precautions.

J. Demonstrate proficient use of a compound light microscope.

K. Describe and prepare widely used stains and wet mounts, and discuss their significance in identification of microorganisms.

L. Perform basic microbiology procedures using aseptic techniques for transfer, isolation and observation of commonly encountered, clinically significant bacteria.

M. Use different types of bacterial culture media to grow, isolate, and identify microorganisms.

N. Perform basic bacterial identification procedures using biochemical tests.

O. Estimate the number of microorganisms in a sample using methods such as direct counts, viable plate counts, or spectrophotometric measurements.

P. Demonstrate basic identification protocols based on microscopic morphology of some common fungi and parasites.

III. INSTRUCTIONAL MATERIALS

A. The instructional materials identified for this course are viewable through www.ctcd.edu/books

IV. COURSE REQUIREMENTS

A. **Reading Assignments:**
   You will be given a lecture schedule which details the reading requirements. Reading should always be done before the corresponding lecture to ensure that you have the appropriate background to understand the lecture material. Lecture tests may include any materials listed in the course outline and any additional lecture materials.

B. **Class Performance:**
   Students are expected to attend lecture and lab during their scheduled time. It is the responsibility of the student to sign-in during lecture and lab. Signing-in after class time will not be allowed. The maximum number of absences that a student that a student my accumulate is equivalent to 12.5% of the semester at which time this will be regarded as insufficient attendance which may result in
an administrative withdrawal with a grade of F as stated in the college catalog. Excessive absences are usually reflected in the final grade and should be avoided.

V. EXAMINATIONS:

There will be four unit exams during the scheduled lecture time. These exams may consist of multiple choice, matching, true/false, short answer, labeling, definitions, and essay questions. There will be no exam review given during lecture time. If a student misses an exam then the comprehensive final lecture exam will count in place of the one missed exam. Other missed exams will result in a zero being recorded in the gradebook. The final examination will be comprehensive and will be given on the date as listed in the schedule bulletin.

VI. SEMESTER GRADE COMPUTATIONS

Microbiology 2420 course grade is based on a total of 1000 points.

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>LECTURE EXAMS- Four @ 100 points</td>
<td>400</td>
</tr>
<tr>
<td>FINAL EXAM- One @ 150 points</td>
<td>150</td>
</tr>
<tr>
<td>LAB UNKNOWN</td>
<td>070</td>
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<tr>
<td>LABS EXAMS TWO @ 100 points</td>
<td>200</td>
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<tr>
<td>PRESENTATIONS - ONE @ 100 points</td>
<td>100</td>
</tr>
<tr>
<td>QUIZZES/EXERCISES</td>
<td>080</td>
</tr>
<tr>
<td>COURSE TOTAL:</td>
<td>1000</td>
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COURSE GRADE:

- A- 900-1000 points
- B- 800-899
- C- 700-799
- D- 600-699
- F- 0-599

VII. NOTES AND ADDITIONAL INSTRUCTIONS FROM THE INSTRUCTOR

A. **Course Withdrawal:** It is the student’s responsibility to officially drop a class if circumstances prevent attendance. An instructor cannot initiate a withdrawal based on the student’s request. GoArmyEd students should contact their ACES counselor before withdrawing and withdraw through the GoArmyEd portal. All other students who desire to or must officially withdraw from a course on or after the first scheduled class meeting must file an Application for Withdrawal with the local CTC representative by the last date to withdraw. Students enrolled in distance learning courses and who do not have access to a local CTC representative should submit a withdrawal form to EaglesOnCall@ctcd.edu or the CTC Records Office in Killeen, Texas.

*Applications for Withdrawal will be accepted at any time before the completion of the 12th week of classes for 16-week courses, the sixth week of classes for eight-week courses, or the fourth week of classes for six-week courses.*
*For non-GoArmyEd active military students, the effective date of withdrawal is the filing date with the Education Center. For all other students, the effective date of withdrawal is the date that the withdrawal application is received by the Central Texas College representative.

*Students who used financial aid, military tuition assistance, VA benefits, or other non-personal funds may be required to repay tuition and fees to the funding agency. For specific repayment requirements, contact the Office of Student Financial Aid or Veterans Services Office before withdrawing. Military tuition assistance students should visit their military Education Center or Navy College Office.

*Students may not withdraw from a class for which the instructor has previously issued a grade of “F,” “FI,” “FN,” “IP,” or “XN.”

B. **Administrative Withdrawal:** A student may be administratively withdrawn by a designated member of the administrative staff of the College under the following conditions:

- The student has been placed on Academic Suspension or Disciplinary Suspension;
- The student has an outstanding financial obligation owed to the college; or
- The student registered for a course without the required prerequisite or departmental permission.

The college is under no obligation to refund tuition and fees, or other costs associated with a student who is administratively withdrawn.

C. **Incomplete Grade:** Incomplete, Course in Progress (for non-developmental courses): An “IP” grade may be assigned by an instructor if a student has made satisfactory progress in a course with the exception of a major quiz, final exam, or other project. The “IP” grade may also be assigned for extenuating circumstances beyond a student’s control such as personal illness, death in the immediate family, military orders, or in the case of distance learning courses, institutional technology failures and mail delays. Notice of absences with supporting documentation may be required by the instructor. The instructor makes the final decision concerning the granting of the incomplete grade. The instructor may set a deadline for completing the remaining course requirements. In no case will the deadline exceed 110 days after the scheduled end of the course. An “IP” grade cannot be replaced by the grade of “W.” If a student elects to repeat the course, the student must register, pay full tuition and fees and repeat the entire course.

At the end of the 110 calendar days if the student has not completed the remaining coursework as required by the instructor, the “IP” will be converted to an “FI” and appear as an “F” on the student’s official transcript. A student who merely fails to show for the final examination will receive a zero for the final and a “F” for the course.

D. **Cellular Phones:** Cellular phones will be turned off while the student is in the classroom or laboratory. Use of a cell phone during an exam will result in a
zero for that exam. If a student in any way makes a copy of exam questions then that student will be dropped from the course with an “F”. The number for your family members to call in an emergency is 254-526-1200. Appropriate personnel will immediately communicate the message to you.

E. **Americans With Disabilities Act (ADA):** Disability Support Services provide services to students who have appropriate documentation of a disability. Students requiring accommodations for class are responsible for contacting the Office of Disability Support Services (DSS) located on the central campus. This service is available to all students, regardless of location. Explore the website at www.ctcd.edu/disability-support for further information. Reasonable accommodations will be given in accordance with the federal and state laws through the DSS office.

F. **Instructor Discretion:** The instructor reserves the right of final decision in course requirements.

G. **Civility:** Individuals are expected to be cognizant of what a constructive educational experience is and respectful of those participating in a learning environment. Failure to do so can result in disciplinary action up to and including expulsion.

H. Absolutely no food or drinks in the lecture classroom or the laboratory room.

I. Courtesy dictates that you discuss any problem with your instructor first. If the issue cannot be resolved, then contact the Chair of the Science and Agricultural Department.
VIII. COURSE OUTLINE

A. Chemical Principles of Biology

1. Identify the building blocks of carbohydrates.
2. Differentiate between simple lipids, complex lipids, and steroids.
3. Identify the building blocks and structure of proteins.
4. Identify the building blocks of nucleic acids.
5. Describe the role of ATP in cellular activities.

B. Observation and Anatomy of Prokaryotes and Eukaryotes

1. Identify the three basic shapes of bacteria.
2. Describe the structure and function of the glycocalyx, flagella, axial filaments, fimbriae, and pili.
3. Compare and contrast the cell walls of gram-positive bacteria, gram-negative bacteria.

C. Microbial Growth and Metabolism

1. Explain the overall function of biochemical pathways.
2. Compare and contrast oxidative phosphorylation and photophosphorylation.
3. Categorize the various nutritional patterns among organisms.

D. Microbial Genetics and Practical Applications

1. Describe how DNA serves as genetic information.
2. Describe the process of DNA replication.
3. Compare the mechanisms of genetic recombination in bacteria.
4. Differentiate between horizontal and vertical gene transfer.
5. List four properties of vectors.
6. Describe the use of plasmid and viral vectors.

E. Survey of the Microbial World – Prokaryotes, Eukaryotes, Viruses

1. List the outstanding characteristics of the five phyla of algae discussed in this chapter.
2. Differentiate between pathogenic, nonpathogenic, and opportunistic microbes.
3. List the defining characteristics of algae.
4. List the defining characteristics of protozoa.
5. List the defining characteristics of fungi.
6. List the defining characteristics of bacteria.

F. Innate and Adaptive Immunity

1. Differentiate between innate and adaptive immunity.
2. Differentiate between humoral and cellular immunity.
3. Classify phagocytic cells, and describe the roles of granulocytes and monocytes.
4. Distinguish a primary from a secondary immune response.
5. List the components of the complement system.