

BIOL 2421 — Microbiology for Science Majors

Frank Phillips College

General Course Information

Credit Hours: 4

General Education Core Curriculum Course

Prerequisite

CHEM 1311 General Chemistry I (lecture) and CHEM 1111 General Chemistry I Laboratory or CHEM 1411

Plus one of the following biology sequences for majors:

BIOL 1306 Biology for Science Majors I (lecture) and BIOL 1106 Biology for Science Majors I Laboratory; and BIOL 1307 Biology for Science Majors II and BIOL 1107 Biology for Science Majors II Lab.; or BIOL 1406 and BIOL 1407

or

BIOL 1311 General Botany (lecture) and BIOL 1111 General Botany Laboratory; and BIOL 1313 General Zoology and BIOL 1113 General Zoology Laboratory; or BIOL 1411 and BIOL 1413

Course 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. Must be taken concurrently with a laboratory section.

THECB Approval Number26.0503.51 03

Statement of Purpose

Through the Texas Core Curriculum, students will gain a foundation of knowledge of human cultures and the physical and natural world, develop principles of personal and social responsibility for living in a diverse world, and advance intellectual and practical skills that are essential for all learning.

Core Objectives Required for Life and Physical Sciences Courses

Courses in this category focus on describing, explaining, and predicting natural phenomena using the scientific method.

Courses involve the understanding of interactions among natural phenomena and the implications of scientific principles on the physical world and on human experiences.

- **Critical Thinking Skills** – to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information
- **Communication Skills** – to include effective development, interpretation and expression of ideas through written, oral and visual communication

- **Empirical and Quantitative Skills** – to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions
- **Teamwork** – to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal

Required Core Objective	Activity Related to Core Objective
Communication – to include effective development, interpretation, and expression of ideas through written, oral, and visual communication.	Article Review – Student will read a primary scientific article supplied by instructor and complete a summary and critical review of the publication that demonstrates effective development, interpretation, and expression of ideas..
Communication – to include effective development, interpretation, and expression of ideas through written, oral, and visual communication	Laboratory Procedure Presentation – Student will explain and demonstrate the lab procedure required for successful completion of that week’s lab.
Communication – to include effective development, interpretation, and expression of ideas through written, oral, and visual communication	Research Design – Students will write a proposal to include a background literature search, experimental setup, data collection and analytical methodology.
Critical Thinking Skills – to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information	Research Presentation – Students will present research they design & complete during the course.
Critical Thinking Skills – to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information	Research Design – Students will write a proposal to include a background literature search, experimental setup, data collection and analytical methodology.
Empirical and Quantitative Skills – To include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions	Article Review – Student will read a primary scientific article supplied by instructor and complete a critical review of the publication.
Empirical and Quantitative Skills – To include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions	Research Presentation – Students will present their own original research completed during the course.
Empirical and Quantitative Skills – To include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions	Research Design – Student will write a proposal for research that includes a background literature search, with justification for the proposed research based on previous reported observations/results, to include data collection and analysis.
Teamwork – To include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal	Poster Presentation – Students will give a presentation over concepts related to a phenomenon discussed in during the semester.
Teamwork – To include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal	Students will work in groups to complete laboratory exercises to be reported in a lab manual.

Required Core Objective	Activity Related to Core Objective
Teamwork – To include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal	Teamwork Questionnaire Each student will complete a post-presentation reflection on the contribution of each student in the overall project.

Learning Outcomes:

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 of 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.
9. Apply scientific reasoning to investigate questions and utilize scientific tools such as microscopes and laboratory equipment to collect and analyze data.
10. Use critical thinking and scientific problem-solving to make informed decisions in the laboratory.
11. Communicate effectively the results of scientific investigations.

Methods of Evaluation

1. 40% of grade is averaged daily grades. Test average and lab average are worth 35% and 25% of final grade, respectively.
2. Test average includes a cumulative final exam for twice the value of a single test. Makeup test format is instructor determined. Grade earned is posted as is; no adjustment to class average.
3. Daily grades derived primarily from assignments, attendance & participation and a project. Project includes presentation, & meets grading requirements which could include: references (works-cited pg.), copies of sources, summary writing, and meeting presentation criteria. In addition students do active listening & participate during presentations by others (pose questions & participate in assessment).
4. Laboratory grades are based on Lab exercises (writings/drawings indicate successful identification of cells, tissues, & organs of systems studied), lab quizzes/practicals including demonstrated ability to use microscope & dissect specimens, homework (demonstrations; completion of labs shown by correct, completed lab reports). Exercises assigned chosen to support classroom material.

5. A “test only” based grade available upon request after consultation with instructor during first week. Lab will be required & valued at 25% while tests count an additional 75% of the grade. Recommended only for course repeats.
6. Final grade reported as: 90 -100= A, 80 - 89= B, 70 - 79= C, 60 - 69= D, <60= F.

Academic Honesty and Integrity

Students attending Frank Phillips College are expected to maintain high standards of personal and scholarly conduct. Academic dishonesty including, but not limited to, cheating, collusion (working with anyone else to produce work for which you take credit without the professor’s permission), utilizing resources such as books and notes for a test without the professor’s permission, and plagiarism is considered a serious offense and may result in disciplinary actions including:

- A grade of 0 for the test or assignment
- A semester grade of F for the course
- Administrative withdrawal from the course
- Academic suspension
- Notation of the student’s transcript of “Academic Dishonesty.”
- ***Faculty members have the right to assign a failing grade to a student who is guilty of academic dishonesty at any point during a semester. Faculty members may prohibit a student from dropping a course when academic dishonesty is discovered. However, if a student has dropped the course in accordance with the rules and dates applied to dropping a course and prior to the discovery of academic dishonesty, the grade of W will stand. Students currently enrolled in a course and students who have completed a course (A, B, C, D, CT, and I) may have a grade changed to an F if academic dishonesty is discovered. The faculty member must notify the student of the change to the final grade within one week of facilitating the change. The student will have the opportunity to appeal the final grade change according to the college policy stated in the catalog.

Class Attendance

Regular attendance is necessary for satisfactory achievement. Therefore, it is the responsibility of the student to attend class in accordance with requirements of the course as established by the instructor.

Students will be excused from class without penalty when either representing the college in an approved activity or having an approved reason for not attending. Reasons for absences must be approved by the instructor of the course. These exceptions do not relieve the student of the responsibility of making up the missed work as designated by the instructor concerned.

Students who enroll in one or more college-preparatory course(s) because of TSI deficiency will be administratively withdrawn from all classes if the course in which they are excessively absent is their only preparatory course. For a student enrolled in more than one preparatory course, the student may be dropped from only the course affected by absences.

Any student who is absent from classes for the observance of a religious holy day shall be allowed to take an examination or complete an assignment scheduled for that day, provided that proper notification of the absence is given to the instructor of the course

missed. The student should notify the instructor within the first fifteen (15) days of the semester that he or she intends to be absent on the specified holy day.

Cell Phones and Other Electronic Devices Procedure:

Cell phones and electronic devices in the classroom create a distraction for both students and faculty. Cell phones are also considered suspicious during test taking. Therefore, Frank Phillips College outlines the procedure for handling cell phone usage in a classroom as follows:

1. First Offense: the student will be warned verbally by the instructor to turn off the cell phone or electronic device or by appropriate administrative personnel at distance sites. The instructor will make a notation of the infraction.
2. Second Offense: the student will be asked to leave the class period for the day and will receive zeroes for any work done in class on that day; a student receiving instruction through remote connection at an off-campus site will be required to attend the class face to face in Borger from this class date forward.
3. Third Offense: the student will be administratively withdrawn from the class in which the infraction occurred and will receive no refund for the class.

Students should leave the college's main number with an appropriate contact in case of an emergency.

Borger: (806) 457-4200, ext. 0 or 886-5047 after hours

Dalhart: (806) 244-7669

Perryton: (806) 648-1450

Grievance Policy

If you have a dispute concerning your grade or policies in this class, it is your responsibility to FIRST contact the instructor, either by e-mail or in person, to discuss the matter. Should things remain unresolved after this initial contact, please follow the procedures described in the Academic Policies section of the Frank Phillips College Catalog. In the vast majority of cases, the matter can be resolved at the instructor/student level, and learning to communicate your concerns in a civilized manner is part of the college experience.

Important Information

Frank Phillips College is a Microsoft Office Campus. You must submit your electronic assignments in Microsoft Office programs only. If you do not have Microsoft Office, you may use one of the computer lab sites on campus for your class work.

Scans/Or Core Competencies That Will Be Addressed in the Class

Resources:

Allocates Time

Allocates Money

Allocates Material & Facility Resources

Information:

Acquires & Evaluates Information

Organizes & Maintains Information

Uses Computers to Process Information

Interpersonal:

Participates as a Member of a Team
Teaches Others
Serves Clients/Customers
Exercises Leadership
Negotiates to Arrive at a Decision
Works with Cultural Diversity

Technology:

Selects Technology
Applies Technology
Maintains & Troubleshoots Technology

Basic Skills:

Reading
Writing Arithmetic Mathematics
Listening & Speaking

Thinking Skills:

Creative Thinking
Decision Making
Problem Solving
Seeing Things in the Mind's Eye
Knowing How to Learn
Reasoning

Systems:

Understands Systems
Monitors & Corrects Performance
Improves & Designs Systems

Personal Qualities:

Responsibility
Self-Esteem
Sociability
Self-Management Integrity/Honesty