BIO 309 Microbiology Course Policies

**Course Description:** Morphology, physiology, genetics and classification of microorganisms, with relationships to man.

**Number of Credit Hours:** 4

**Pre-requisites:** BIO 130, 131, 133, CHE 133  **Co-requisite:** BIO 309L

**Course Objectives:**
- Differentiate viruses, bacteria, fungi, algae and protozoans in terms of structure, physiology, genetics, replication and reproduction, ecological niches, and interactions with man and the environment.
- Differentiate the eubacteria and archeobacteria into significant taxa based on genetics, physiology and morphology with special attention to those known to have the greatest impact on man.
- Understand the implications of the presence and functions of microorganisms in terms of economics, industry, the environment, history, health care and research.
- Understand how microorganisms grow, their unique nutritional requirements, how their growth can be controlled and the cellular mechanisms and structures target by antibiotics.
- Understand the mechanisms of prokaryotic DNA replication, nucleic acid transcription and translation, mutations and mobile genetic elements.
- Understand the techniques used to observe, identify, measure, manipulate, study and genetically modify microorganisms.

**Student Learning Outcomes (Course Competencies):**

**Knowledge and Understanding**

The student’s understanding will be evaluated with comprehensive exams with both objective and subjective components covering each topic in detail. Students who successfully complete Microbiology will demonstrate:
- The ability to identify the role of microorganisms in human history and health.
- An understanding of the importance and roles of microorganisms within the biosphere.
- An understanding of prokaryotic cell morphology and function.
- An understanding of nutritional and environmental influences on cell growth and control of cell growth.
- An understanding of energy flow and basic metabolic processes within the cell.
- An understanding of both molecular and microbial genetics and mobile genetic elements.
- A basic understanding of recombinant DNA technology.
- An understanding of the binomial classification system used in microbiology and the ability to identify significant species.
- An understanding of the taxonomic descriptions and distinctions of eukaryotic microorganisms.
- A basic understanding of the distinctions and peculiarities of the viruses.

**Program Learning Outcomes:**

Each of the student learning outcomes listed above address the Biology Department Program Learning Outcome #1: Demonstrate a good knowledge base in biological concepts and be able to integrate knowledge with critical thinking skills to become problem solvers. Knowledge base will include: levels of complexity (molecular/cellular through population/communities/ecosystems); biological principles and processes.

**Required Textbook:**
Course Assessment

LECTURE ASSIGNMENTS: Review questions that emphasize critical thinking and real-world problems will be assigned periodically throughout the semester. Written reports of these questions will be collected and graded. The instructor will provide further details of these reports as they are assigned. These will be worth 5% of the final grade.

LECTURE EXAMS: There will be three lecture exams each worth 17% and a lecture final exam worth 18% of the final grade. These exams will be primarily of an objective nature (multiple choice and matching) but with some short answer essay-style questions. Most (about 85%) of these exam questions will come from material covered in class with the remainder from reading requirements in the text. About 65% of the lecture material will originate from the text and about 35% from other sources. Therefore, don't miss class or you will miss about 1/3 of the material that will be covered on an exam. The lecture exams will be given according to the attached schedule. Part of the final will be comprehensive in nature.

LABORATORY: All the exercises and exams in the lab account for 26% of the total course grade. The specifics will be covered in the first lab period. Specific requirements for attendance will be outlined by the laboratory instructor.

Course Content

Lecture Topical Outline (based on 75 minute class periods):

1. Introduction and historical developments (one lecture)
2. Microscopic methods (two lectures)
   a. Light microscopy and variations
   b. Electron microscopy
3. Prokaryotic cell structure and functions (two lectures)
   a. Gram negative and Gram positive cell walls
   b. Intracellular/extracellular organization and components
4. Microbial nutrition (two lectures)
   a. Autotrophic, heterotrophic
   b. Chemotrophic, photrophic
   c. Lithotrophic, organotrophic
5. Growth and control of growth (two lectures)
   a. Sterilization and disinfection
   b. Antibiotics and antibiotic resistance mechanisms
6. Metabolism: anabolic and catabolic pathways (two lectures)
7. Microbial genetics (two lectures)
8. Gene expression (two lectures)
   a. Control of replication and transcription
   b. Constitutive, inducible and repressible genes
9. Biotechnology (two lectures)
10. Viruses (two lectures)
11. Bacterial taxonomy and noteworthy species (four lectures)
12. Fungi and related organisms (one lecture)
13. Algae (one lecture)
14. Protozoans and parasites detected by microscopy (two lectures)
BIO 309, Section 001, Spring 2011
General Microbiology Syllabus

Instructor: Dr. Stephen Wagner
Department: Biology
Email: swagner@sfasu.edu
Phone: 936-468-2135
Office: 223 Miller
Office Hours: MF 10-11; TTh 2-3; MW 2 – 5

Objectives: Welcome to BIOLOGY 309. The course is designed to be introductory in nature and will cover broad concepts in microbiology including bacteria, protozoans, parasites, viruses, and fungi. Because prerequisites include BIO 130, 131 and 133 as well as one semester of chemistry, basic concepts in these fields will be only briefly covered while passing on to other areas of concentration. There will of necessity be some memorization (just remember: Taxonomy is Fun and Exciting!) but only enough to allow you to apply facts to building concepts and a fuller understanding of this rapidly advancing field of science. My goal is to have you leave this course with a burning desire to continue on to more advanced studies in microbiology using your newly acquired basic skills and capabilities.

Instructor’s Background: My name is Dr. Stephen Wagner. I have a B.S. in Environmental Biology from Heidelberg College, an MS in Microbiology from North Carolina State University, and a Ph.D. in Agronomy (Soil Microbiology) from Clemson University. I spent two years as a postdoctoral research associate with the USDA, working on herbicide biodegradation. This is my 15th year at SFA. My major research interest is microbial ecology, emphasizing bioremediation, plant-microbe interactions, and effects of management practices on soil ecology. Besides this course my courses include Prenursing Microbiology, Cell and Molecular Biology, Microbial Ecology, Industrial Microbiology, Planetary and Space Biology, and SFA 101. I also lead the department’s program for EC-8 pre-service teachers and direct projects funded by NASA and the Department of Education to develop this program and a similar program for in-service teachers.

Outside of work I enjoy gardening, walking our dogs Charlie and Gracie, hiking, home improvement, cheering on my school and Cleveland, Ohio teams, attending church, and doing volunteer work. This December my wife Lynn and I will celebrate our 26th anniversary! We have two children, Michael (age 23) and Melissa (age 21) and a daughter-in-law named Katie (age 23). Melissa is a senior in the nursing program here at SFA.


Lab Manual: To Be Announced in Lab

Attendance Policy: You are expected to attend all lectures and exams. Because this course is a science activities course that usually will involve group activities, your attendance and participation in the class is very important. Absences are only excused as outlined in the university handbook:

“Regular and punctual attendance is expected at all classes, laboratories, and other activities for which a student is registered. For those classes where attendance is a factor in the course grade, the instructor shall make his/her class policy known in writing at the beginning of each term and shall maintain an accurate record of attendance. Regardless of attendance, every student is responsible for course content and assignments. It is University policy to excuse students from attendance for certain reasons. Among these are absences related to health, family emergencies, and student participation in certain University-sponsored events. Students are
responsible for providing documentation satisfactory to the instructor for each class missed. Students with acceptable excuses will be permitted to make up work for absences to a maximum of three weeks of a semester or one week of a six-week summer term when the nature of the work missed permits.”

In the case of absences caused by participation in University-sponsored events, announcement of such absences by the Vice President for Academic Affairs will constitute an official excuse. Faculty members should submit a written explanation of the absence, including the date, time and an alphabetical listing of all students attending to the office of the Vice President for Academic Affairs for publication.

You must make prior arrangements if you have to miss an exam or presentation. Please contact me before the exam if there is any problem. I will use a different format for makeup exams than the format used for the exams given to the rest of the class. All makeup exams will be given during the last week of the semester (May 2 - 6) to students who provide documented proof for a legitimate excuse as described by university policy. Students who are late for an exam will not be permitted to take the exam and will only be allowed to take a makeup exam if there is a legitimate excuse (as described by university policy) for being late.

Office Hours: Your success in this course as well as here at SFA is very important. Should you have questions or need additional help I maintain an open door policy and encourage every student to talk freely about any issue that concerns them. My office hours for the summer are listed above. If I am not in my office, I will leave a note as to my whereabouts. Also check rooms 101 (BIO Dept. office), or 207 and 208 (labs).

Academic Integrity (A-9.1): Academic integrity is a responsibility of all university faculty and students. Faculty members promote academic integrity in multiple ways including instruction on the components of academic honesty, as well as abiding by university policy on penalties for cheating and plagiarism. I expect everyone to do her own, original work. This includes all exams, quizzes, and assignments. We will take appropriate disciplinary action, as described in the University Student Handbook, against anyone that does not comply with this policy.

Definition of Academic Dishonesty
As stated in the university handbook:
"Academic dishonesty includes both cheating and plagiarism. Cheating includes but is not limited to (1) using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class; (2) the falsification or invention of any information, including citations, on an assigned exercise; and/or (3) helping or attempting to help another in an act of cheating or plagiarism. Plagiarism is presenting the words or ideas of another person as if they were your own. Examples of plagiarism are (1) submitting an assignment as if it were one's own work when, in fact, it is at least partly the work of another; (2) submitting a work that has been purchased or otherwise obtained from an Internet source or another source; and (3) incorporating the words or ideas of an author into one's paper without giving the author due credit."

Acceptable Student Behavior: Classroom behavior should not interfere with the instructor’s ability to conduct the class or the ability of other students to learn from the instructional program (see the Student Conduct Code, policy D-34.1). Unacceptable or disruptive behavior will not be tolerated. Students who disrupt the learning environment may be asked to leave class and may be subject to judicial, academic or other penalties. This prohibition applies to all instructional forums, including electronic, classroom, labs, discussion groups, field trips, etc. The instructor shall have full discretion over what behavior is appropriate/inappropriate in the classroom. Students who do not attend class regularly or who perform poorly on class projects/exams may be referred to the Early Alert Program. This program provides students with recommendations for resources or other assistance that is available to help SFA students succeed.

STUDENTS WITH SPECIAL NEEDS: Students who require special accommodations for this course will be provided such accommodations within established university guidelines. Students who are requesting support services from SFA are required to submit documentation through the Office of Disability Services to verify eligibility for reasonable accommodations; the institution must review and evaluate that documentation. To obtain disability related accommodations and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, Room 325, 468-3004/ 468-1004 (TDD) as early as possible in the semester. Once verified,
ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided.

Please note that the only way you can get extra time to finish exams and/or work for the course is to be verified by ODS that you are eligible to receive this accommodation.

**Use of Electronic Devises:** Use of computers and/or other wireless devises is not permitted in class. You may, however, audio record the lectures. Listening to a biology lecture repeatedly may not be “easy listening” but it can help you learn the material. **Use of calculators will not be permitted for any exams.** Ringing, playing, or singing cell phones or someone responding to one are a huge interruption during lectures; if you own or use one, please turn it off for lectures or do not bring it into the lecture hall. Additionally it is now university policy that repeated disruptions is grounds for dismissal from a course taught at SFASU.

**Extra Credit, Bonus Points:** Opportunities for extra credit or bonus points will not be given to individual students but rather to all students as a whole. **Students with excessive unexcused absences and/or tardiness will not receive any additional points.** Additionally, students must score at least 57% on an exam order to receive any bonus points assigned to the particular exam.

**Course Evaluation:** All students are required to complete a course evaluation at the end of the semester for both the lecture and lab sections. Failure to complete this evaluation will result in a 1% deduction in your final grade.

**Acceptable Student Behavior:** Classroom behavior should not interfere with the instructor’s ability to conduct the class or the ability of other students to learn from the instructional program (see the Student Conduct Code, policy D-34.1). Unacceptable or disruptive behavior will not be tolerated. Students who disrupt the learning environment may be asked to leave class and may be subject to judicial, academic or other penalties. This prohibition applies to all instructional forums, including electronic, classroom, labs, discussion groups, field trips, etc. The instructor shall have full discretion over what behavior is appropriate/inappropriate in the classroom. Students who do not attend class regularly or who perform poorly on class projects/exams may be referred to the Early Alert Program. This program provides students with recommendations for resources or other assistance that is available to help SFA students succeed.

**REQUIREMENTS**

**LECTURE ASSIGNMENTS:** Review questions that emphasize critical thinking and real-world problems will be assigned periodically throughout the semester. Written reports of these questions will be collected and graded. The instructor will provide further details of these reports as they are assigned. These will be worth 5% of the final grade.

**LECTURE EXAMS:** There will be three lecture exams each worth 17% and a lecture final exam worth 18% of the final grade. These exams will be primarily of an objective nature (multiple choice and matching) but with some short answer essay-style questions. Most (about 85%) of these exam questions will come from material covered in class with the remainder from reading requirements in the text. About 65% of the lecture material will originate from the text and about 35% from other sources. Therefore, don’t miss class or you will miss about 1/3 of the material that will be covered on an exam. The lecture exams will be given according to the attached schedule. Part of the final will be comprehensive in nature.

**LABORATORY:** All the exercises and exams in the lab account for 26% of the total course grade. The specifics will be covered in the first lab period. Specific requirements for attendance will be outlined by the laboratory instructor.
GRADING CRITERIA

The final grade will be calculated by the following:

- Lecture Assignments: 1 @ 4% = 4%
- Lecture Exams: 3 @ 17% = 51%
- Final Lecture Exam: 1 @ 20% = 20%
- Laboratory Grade: 1 @ 25% = 25%

TOTAL = 100%

Scale: 100-90% = A; 89-80% = B; 79-70% = C; 69-60% = D; Below 60% = F.

USE OF ELECTRONIC DEVICES: Use of computers to take lecture notes and/or tape recorders is permitted during lectures. Listening to a biology lecture repeatedly may not be “easy listening” but it can help you learn the material. **Use of calculators will not be permitted for any exams.** Ringing, vibrating, or singing cell phones are a huge interruption during lectures; if you own or use one, please turn it off for lectures or do not bring it into the lecture hall.

Be On Time! You are disrupting the class if you come in late, leave early or walk out of the class during lecture time. Keep in mind that all your classmates paid the same amount of money that you did to take the course and deserve the best course we can possibly give them! Also, if you need an extra hour of sleep don’t use this course to catch up. At times emergencies or extenuating circumstances may be a factor; I will be considerate of these situations. Please let me know if you have to come in late or leave the lecture early. **If you make a habit of disrupting the class I will subtract points from your final grade.**

No Food or Beverages in Lecture Hall! The housekeepers who take care of the lecture halls work very hard to maintain a relatively clean lecture hall and do not make a lot of money doing this. Please help them by not consuming beverages (other than water) or food while you attend class.
<table>
<thead>
<tr>
<th>Week</th>
<th>Monday</th>
<th>Wednesday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>January 19</td>
<td>21</td>
<td>Foundations (1)</td>
</tr>
<tr>
<td></td>
<td>Introduction</td>
<td>26</td>
<td>Microscopy (2)</td>
</tr>
<tr>
<td>2</td>
<td>24</td>
<td>28</td>
<td>Microscopy (2)</td>
</tr>
<tr>
<td></td>
<td>Foundations (1)</td>
<td>26</td>
<td>Cell Structure/Function (3, 4)</td>
</tr>
<tr>
<td></td>
<td>31</td>
<td>28</td>
<td>Cell Structure/Function (3, 4)</td>
</tr>
<tr>
<td></td>
<td>Cell Structure/Function (3, 4)</td>
<td>4</td>
<td>Cell Structure/Function (3, 4)</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
<td>9</td>
<td>Viruses (5)</td>
</tr>
<tr>
<td></td>
<td>Review and Catch-up</td>
<td>EXAM 1 (Ch. 1-4)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>14</td>
<td>16</td>
<td>Growth (7)</td>
</tr>
<tr>
<td></td>
<td>Nutrition (6)</td>
<td>Nutrition (6)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>21</td>
<td>23</td>
<td>Antibiotics (34)</td>
</tr>
<tr>
<td></td>
<td>Physical/Chem. Control (8)</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>9</td>
<td>EXAM 2 (Ch. 5-8)</td>
</tr>
<tr>
<td></td>
<td>Antibiotics (34)</td>
<td>Antibiotics (34)</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Spring Break! March 14-18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>21</td>
<td>23</td>
<td>Microbial Genetics (12)</td>
</tr>
<tr>
<td></td>
<td>Metabolism (9, 10)</td>
<td>Metabolism (9, 10)</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>28</td>
<td>30</td>
<td>April 1</td>
</tr>
<tr>
<td></td>
<td>Gene Regulation (13)</td>
<td>Gene: Regulation (13)</td>
<td>EXAM 3 (Ch. 34, 9-13)</td>
</tr>
<tr>
<td>11</td>
<td>4</td>
<td>6</td>
<td>Microbial Taxonomy (17)</td>
</tr>
<tr>
<td></td>
<td>Biotechnology (14)</td>
<td>Biotechnology (14)</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>9</td>
<td>13</td>
<td>The Archaea (18)</td>
</tr>
<tr>
<td></td>
<td>Microbial Taxonomy (17)</td>
<td>The Archaea (18)</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>16</td>
<td>20</td>
<td>The Archaea (18)</td>
</tr>
<tr>
<td></td>
<td>Bacteria: The Deinococci …</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>23</td>
<td>25</td>
<td>No Class Easter Break</td>
</tr>
<tr>
<td></td>
<td>Gram Pos. Bacteria (21, 22)</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>2</td>
<td>4</td>
<td>Microbial Ecology (27)</td>
</tr>
<tr>
<td></td>
<td>Microbial Ecology (27)</td>
<td>TBD</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td></td>
<td>6</td>
<td>Review</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Final Exam</td>
<td></td>
</tr>
</tbody>
</table>