MICROBIOLOGY BIOL 2421
Department of Life Sciences
Fall 2016 v2

A. COURSE INFORMATION

Course number/section: BIOL 2421.001  
Class meeting time: MWF 12:00-12:50  
Class location: Lecture: EN 106 (changed from BH 104); labs in CS 233  
Course Website: https://bb9.tamucc.edu

B. INSTRUCTOR INFORMATION

Instructor: Gregory W. Buck, Ph.D., Associate Professor  
Office location: Center for the Sciences 251  
Office hours: MW 10:00-11:15; TR 1:00-2:15  
Telephone: (361) 825-3717  
e-mail: Gregory.Buck@tamucc.edu  
Appointments: Preferred method is by e-mail

C. COURSE DESCRIPTION

Catalog Course Description
“An introduction to microorganisms including the bacteria, fungi, and viruses. Laboratory involves microbiological techniques and development of basic laboratory skills, or permission of instructor...Safety training given during a laboratory meeting early in the semester is required for continued participation in this course.”

Extended Course Description
This course is designed for those students majoring and minoring in Biology, Biomedical Sciences, Environmental Sciences, Biochemistry, and Chemistry, and for post-baccalaureate students seeking to fulfill pre-professional requirements. While medical, dental, and veterinary schools do not require Microbiology, you will take it in those professional programs and the course content may be found on the MCAT and DAT. For Optometry, Pharmacy, and Physician Assistant programs, the course is required for many programs.

This course will cover a detailed history of microbiology and its contributors; the structure, function, growth and metabolism of prokaryotes in general; physical, chemical and antibiotic methods of controlling microbes; basic genetics and Central Dogma of microbes; taxonomy and characterization of eight phyla within Domain Bacteria; ecology of microbes, including their role in biogeochemical cycling; basic structure of viruses; structure and revised taxonomy of fungi; aspects of algae and protozoans. We may also briefly discuss how microbes are recognized as non-self by hosts.

The laboratory involves hands-on manipulation of microbes; please see the separate lab syllabus and schedule. In the first four labs, most organisms are Biological Safety Level
(BSL)-1 (less likely to cause disease) until you perfect basic techniques (aseptic technique, isolation streak of bacteria on plates, transfer bacteria from plate to broth to slant, etc.). In the second part involving biochemical characterization and rapid multi-tests, you are working with BSL-2 that can cause disease, and you are isolating organisms from soil that may cause problems. If you are allergic to molds or fungi, you may be exempted from the soil lab. Please let me and your lab TA know if you are allergic to molds or specific antibiotics, have a history of seizures, have diabetes, are pregnant or immunocompromised in any way.

Microbiology is very relevant to the science curriculum, regardless of your major; not only for medical concerns, but also safety of drinking and recreational water, food, bioremediation, and daily occurrences. Knowledge of microbiology can get you employed, by federal and state agencies (TDSHS, FDA, CDC), local municipalities (health departments, sanitation inspections, water and waste-water treatment), clinical laboratory science in hospitals, and industry (agricultural, breweries, biotechnology).

D. PREREQUISITES AND COREQUISITES

Prerequisites
Prerequisites: BIOL 1406 with a grade of ‘C’ or above, BIOL 1407, CHEM 1311 [1411], CHEM 1312 [1412]

Corequisites
SMTE 0092—will be taken on-line. See lab schedule for details.
You cannot do any other Lab Safety course as a substitute!!

While there are no other official co-requisites, most students are concurrently enrolled in Organic Chemistry. Students should also be able to perform basic calculations (add, subtract, multiply and divide using exponents and scientific notation), understand logarithms, and basic mathematical concepts. Casual observations reveal that students with weak mathematical skills (mediocrity in College Algebra or Pre-Calculus) struggle in the course, but there is no mathematical co-requisite.

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

A textbook is required! You may choose among these recommended options:


Slonczewski and Foster Microbiology: an evolving science, 3rd ed. 2014
Figures may be taken from Nester et al. 3rd through the 8th editions, or I may take them from Brock Biology of Microorganisms, 13th or 14th eds. (Madigan et al.); Microbiology: an evolving science, 2nd or 3rd ed., (Slonczewski and Foster); or Prescott Microbiology, 7th ed. (Willey et al).

Citation format: Please use Council of Science Editors format. A useful link on this format is available at this URL:  http://writing.wisc.edu/Handbook/DocCSE.html
For example, the citation format for the text:


Please note that I will obtain photographs, graphs, tables and other figures from primary journal articles and place in handouts and Power Points in order to remain current—Microbiology changes very rapidly!!

Required Laboratory Manual (in proper CSE citation format)
Note: the 6th, 7th or 8th editions of Harley will suffice for the lab.

Optional Textbook(s) or Other References (Web sites)
Text websites: http://highered.mcgraw-hill.com/sites/0073375314/information_center_view0/ (accessed 07/21/16). The Online Learning Center for Nester is very good; it is not mandatory, and I do NOT use ARIST™ as an assessment system.


CDC: www.cdc.gov (accessed 07/21/16)

Supplies
Lab coats, lab notebooks, and safety goggles.

F. STUDENT LEARNING OUTCOMES AND ASSESSMENT
Assessment is a process used by instructors to help improve learning. Assessment is essential for effective learning because it provides feedback to both students and instructors. A critical step in this process is making clear the course’s student learning outcomes that describe what students are expected to learn to be successful in the course. The student learning outcomes for this course are listed below. By collecting data and sharing it with students on how well they are accomplishing these learning outcomes students can more efficiently and effectively focus their learning efforts. This information can also help instructors identify challenging areas for students and adjust their teaching approach to facilitate learning.
By the end of this course, students should be able to achieve all outcomes at a level of ≥70%:

**SLO 1:** List or identify persons involved in the history of microbiology from antiquity to the present;

**SLO 2:** Discuss the roles and significance of microorganisms within biology, including bacteria, viruses, fungi, algae and protozoa;

**SLO 3:** Describe the basic elements of microbiology, including structure, metabolism, and genetics of microorganisms;

**SLO 4:** Perform (in the laboratory component of the course) basic laboratory skills and basic microbiological techniques, including the isolation, culture, and biochemical identification of microorganisms;

**SLO 5:** Sort the major categories of physical methods and of antimicrobials used in control of microorganisms

**SLO 6:** Calculate (laboratory and lecture) serial dilutions, and volumes of media from dehydrated stock;

**SLO 7:** Categorize levels of diversity within the microbial world including bacteria, viruses, fungi, algae and protozoa;

**SLO 8:** Examine the role of the scientific method in obtaining, critiquing, and confirming microbiological data.

**G. INSTRUCTIONAL METHODS AND ACTIVITIES**

My instrumental methods include lecturing but also active learning strategies (Socratic Method, “flipping,” problem-based learning, peer instruction, cooperative learning), and to question you, including sending you to the board, but you have plenty of “lifelines”!

**H. MAJOR COURSE REQUIREMENTS AND GRADING**

Assessments include lecture exams, questioning strategies, pop quizzes.

Lecture makes up 66.7% of total grade: 500 pts
- Three class exams of 50 questions each (100 pts each exam)=300 pts; 40% of total grade
- Cumulative final exam=200 pts; 26.7% of total grade
- Extra credit: minimum of 30 pts at instructor’s prerogative

Lab makes up 33.3% of total grade
- Lab reports (8 total)—20% total grade
- Lab Practical Exam—5% total grade
- Lab Quizzes (minimum of 5)—3% of total grade
- Laboratory TA evaluation and extra credit—5.3% of total grade

Please note that Instructor may modify assignments, number of assignments and point values depending on number of students in class. Also note that “any mid-term grades posted on S.A.I.L. and Blackboard are not official University grades, not a guarantee of final grades and are never updated; once they are posted they cannot be changed even if your grade in the class does change.”
I. COURSE CONTENT/SCHEDULE

Page/Chapter assignments from Nester et al. 7th or 8th ed. I am placing the handout (HO) and Power Point (PP) on History of Microbiology (Chapt. 1) and on Fungi (Chapt. 12) directly on Blackboard. You are still responsible for History for the first and second tests, and for fungi, on the third test. Both sections will be on the final!

<table>
<thead>
<tr>
<th>DATE (BY DAY OR WEEK)</th>
<th>TOPIC</th>
<th>CHAPTER(S)</th>
<th>ASSIGNMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>W Aug 24</td>
<td>Microbial Structure I</td>
<td>3, 16.4</td>
<td>HO A (History); B (Koch Postul)</td>
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<tr>
<td>F Aug 26</td>
<td>Microbial Structure II</td>
<td>3</td>
<td></td>
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<tr>
<td>M Aug 29</td>
<td>Microbial Structure III</td>
<td>3</td>
<td></td>
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<tr>
<td>W Aug 31</td>
<td>Microbial Structure IV</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>F Sep 2</td>
<td>Microbial Structure V</td>
<td>3</td>
<td></td>
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<tr>
<td>M Sep 5</td>
<td>Labor Day Holiday–no class</td>
<td></td>
<td></td>
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<tr>
<td>W Sep 7</td>
<td>Metabolism I</td>
<td>2, 6</td>
<td>HO C (Metabolism)</td>
</tr>
<tr>
<td>F Sep 9</td>
<td>Metabolism II</td>
<td>2, 6</td>
<td></td>
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<tr>
<td>M Sep 12</td>
<td>Metabolism III</td>
<td>2, 6</td>
<td></td>
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<tr>
<td>W Sep 14</td>
<td>Metabolism IV</td>
<td>2, 6</td>
<td></td>
</tr>
<tr>
<td>F Sep 16</td>
<td>Exam I</td>
<td>1, 2, 3, 6 + History</td>
<td>HO D (Cell counts/dilutions)</td>
</tr>
<tr>
<td>M Sep 19</td>
<td>Growth of Microbes I</td>
<td>4</td>
<td>HO D (Counts/dilutions)</td>
</tr>
<tr>
<td>W Sep 21</td>
<td>Growth of Microbes II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>F Sep 23</td>
<td>Growth of Microbes III</td>
<td>4</td>
<td>HO G (Media)</td>
</tr>
<tr>
<td>M Sep 26</td>
<td>Growth of Microbes IV</td>
<td>4</td>
<td></td>
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<tr>
<td>W Sep 28</td>
<td>Growth of Microbes V</td>
<td>4</td>
<td></td>
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<tr>
<td>F Sep 30</td>
<td>Control of Microbes I</td>
<td>5</td>
<td>HO E (Chem)</td>
</tr>
<tr>
<td>DATE (BY DAY OR WEEK)</td>
<td>TOPIC</td>
<td>CHAPTER(S)</td>
<td>ASSIGNMENTS</td>
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<tr>
<td>M Oct 3</td>
<td>Control of Microbes II</td>
<td>5</td>
<td>HO RR Rad-res bact.</td>
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<tr>
<td>W Oct 5</td>
<td>Control of Microbes III</td>
<td>5</td>
<td>HO N Hist Mol Biol</td>
</tr>
<tr>
<td>F Oct 7</td>
<td>Genetics I: Central Dogma</td>
<td>7</td>
<td>HO M Cent. Dogma</td>
</tr>
<tr>
<td>M Oct 10</td>
<td>Genetics II: Central Dogma</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>W Oct 12</td>
<td>Genetics III: Central Dogma</td>
<td>7</td>
<td>HO N Hist Mol Biol</td>
</tr>
<tr>
<td>W Oct 19</td>
<td>Genetics VI: Methods</td>
<td>8, 9</td>
<td></td>
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<tr>
<td>F Oct 21</td>
<td>Exam II</td>
<td>4, 5, 7, 8, 9</td>
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<tr>
<td>M Oct 24</td>
<td>Antibiotics I</td>
<td>21</td>
<td>HO 2F antibiotics</td>
</tr>
<tr>
<td>M Oct 26</td>
<td>Antibiotics II</td>
<td>21</td>
<td>HO 2F</td>
</tr>
<tr>
<td>W Oct 28</td>
<td>Antibiotics III</td>
<td>21</td>
<td>HO 2F</td>
</tr>
<tr>
<td>M Oct 31</td>
<td>Prokaryotic Diversity I</td>
<td>10, 11</td>
<td>HO P</td>
</tr>
<tr>
<td>W Nov 2</td>
<td>Prokaryotic Diversity II</td>
<td>10, 11</td>
<td>HO P</td>
</tr>
<tr>
<td>F Nov 4</td>
<td>Prokaryotic Diversity III</td>
<td>10, 11</td>
<td>HO P</td>
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<tr>
<td>M Nov 7</td>
<td>Prokaryotic Diversity IV</td>
<td>10, 11</td>
<td>HO P</td>
</tr>
<tr>
<td>W Nov 9</td>
<td>Microbial Ecology I</td>
<td>28</td>
<td></td>
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<tr>
<td>F Nov 11</td>
<td>Microbial Ecology II</td>
<td>28</td>
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<tr>
<td>M Nov 14</td>
<td>Microbial Ecology III</td>
<td>28</td>
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<tr>
<td>W Nov 16</td>
<td>Microbial Ecology IV</td>
<td>28</td>
<td></td>
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<tr>
<td>F Nov 18</td>
<td>Exam III</td>
<td>10, 11, 21, 28</td>
<td></td>
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<tr>
<td>M Nov 21</td>
<td>Fungi, Algae; Viruses I</td>
<td>12, 13</td>
<td>HO T—Fungi, Algae</td>
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<tr>
<td>W Nov 23</td>
<td>Reading Day—no class</td>
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<tr>
<td>F Nov 25</td>
<td>Thanksgiving Holiday—no class</td>
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<tr>
<td>M Nov 28</td>
<td>Viruses II; Immune system I</td>
<td>13, 14, 15</td>
<td></td>
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<tr>
<td>W Nov 30</td>
<td>Immune system II</td>
<td>14, 15</td>
<td></td>
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<tr>
<td>F Dec 2</td>
<td>Immune system III; HIV/AIDS</td>
<td>17.3, 21.6, 27.6</td>
<td></td>
</tr>
<tr>
<td>M Dec 5</td>
<td>HIV/AIDS</td>
<td>17.3, 21.6, 27.6</td>
<td></td>
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<tr>
<td>M Dec 12</td>
<td>Final Exam</td>
<td>All comprehensive</td>
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</tbody>
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**NOTE** DIFFERENT TIME

11:00-am -1:30 pm
Class Handouts:

1. HO A v4 History of Microbiology
2. HO B v2 Koch Postulates
3. HO C v16 Metabolism
4. HO D6 Dilutions and Cell Counts
5. HO E Antimicrobial Chemicals
6. HO 2F v16 Antibacterial Drugs
7. HO G v7 Bacteriological Media
8. HO J4 v8 Molecular Techniques
9. HO M5 Central Dogma
10. HO N v4 History of Molecular Biology
11. HO P v9 Prokaryotic Diversity SP14
12. HO RR1 Radiation Tolerant Bacteria
13. HO T v2 Fungi_Algae FA14

Note: Changes in this course schedule may be necessary and will be announced to the class by the Instructor. The assignments and exams shown are directly related to the Student Learning Outcomes described in Section F.

Important Dates:
- F Sep 16—Exam I
- F Oct 21—Exam II
- F Nov 18—Exam III
- F Nov 11—Last day to drop course
- M Dec 5—Last day to withdraw from University
- Final Exam—M Dec 12 11:00 am-1:30 pm

J. COURSE POLICIES

Attendance/Tardiness
Students are expected to attend every scheduled class and laboratory meeting. It is the responsibility of the student to obtain any material missed during an absence from his/her classmates. Power Points are not placed in the library, and only Power Points from certain sections (e.g., Intro to Microbiology) will be placed on Blackboard™ 9, or on a website. The US Department of Education requires that faculty take roll, but even if taking attendance is not required, with Socratic Method, I will know if you are in class or not. For labs, the instructor (TA) should be notified PRIOR to lab if the student will be absent (except in emergency situations). Students must attend the laboratory section for which they originally registered. “Make-up” by attending other lab sections is NOT permitted except in emergencies, only with a signed green permission slip from either Dr. Buck, Dr. Turner, or Dr. Doyungan & depending upon space in the laboratory section. Tardiness for lab is not allowed due to safety reasons. Quiz make-up in lab is not allowed.

Late Work and Make-up Exams
Late work is not accepted for either lecture work or lab reports.

Extra Credit
A minimum of 30 pt extra credit is assured as pre- and post-test assessments. No make-ups are given for pre- and post-tests. Other extra credit assignments may be given at instructor or lab TA’s prerogative. Instructor or TA is not obligated to give make-up assignments for extra credit opportunities, whether excused or unexcused. The ONLY possible exception is for students with a university-approved scheduled absence. The make-up (if given) may not be the exact same assignment given to the class. I do not have to give the same number of extra credit opportunities each semester.
Cell Phone Use
DO NOT USE CAMERA PHONES IN LECTURE OR LAB. DO NOT SEND TEXT MESSAGES DURING CLASS. Please turn off all cell phones, beepers, Bluetooth devices, Palm Pilots, Black Berrys, etc., before entering the classroom, or at least place them on silent mode. Cell phones may not be used in the laboratory; we prefer that you not bring them into CS 233. Please place these in the lockers outside CS 233 (locks not provided by university). I would prefer that earpieces not be worn in lecture or laboratory. DO NOT TAKE PHOTOS of Power Point slides or videos with your cell phone camera unless otherwise instructed. Recording of lectures with recorders can only be done with permission of instructor—please see me privately.

Laptop Use
I have no problems with any student using a laptop in class, as long as they are not looking at pornography, anime, videos, etc.

Food in Class
I prefer that you not eat or drink in class, but I will not throw you out or ask you to leave. NO EATING OR DRINKING is allowed in lab.

Missed Exam
Excused only per TAMU-CC guidelines; such exams are given only under EXTREME circumstances, and will be total essay.

Participation
I expect that all members in the class will participate in the questioning, discussions, and interactions within the lecture and lab. While I do not tabulate every time you answer in class, I have a good idea.

Disruption of Exams
If an exam is ever disrupted by situations such as weather, power outages, fire drills, or any event requiring evacuation in the middle of an exam, those persons who have finished their exam before the disruption will not be allowed to do a make-up exam. Those persons who did not finish their exam will have to take an exam the first day of class that faculty, staff and students are allowed to return to the building. The format of this exam may use Type K, short answer, essay, fill-in-the–blank, multiple matching, or all of the above. Students taking their exam with Disability Services do not have this option unless their exam is interrupted in the building where they took their exam.

Others
Laboratory Safety: You must take SMTE 0092 before you are admitted to lab—no exceptions!

K. COLLEGE AND UNIVERSITY POLICIES

• Academic Integrity (University)
  It is expected that university students will demonstrate a high level of maturity, self-
direction, and ability to manage their own affairs. Students are viewed as individuals who possess the qualities of worth, dignity, and the capacity for self-direction in personal behavior. See Full University Policy at http://catalog.tamucc.edu/content.php?catoid=10&navoid=313#Academic_Integrity

- **Classroom/Professional Behavior**
  “Texas A&M University-Corpus Christi, as an academic community, requires that each individual respect the needs of others to study and learn in a peaceful atmosphere. Under Article III of the Student Code of Conduct, classroom behavior that interferes with either (a) the instructor’s ability to conduct the class or (b) the ability of other students to profit from the instructional program may be considered a breach of the peace and is subject to disciplinary sanction outlined in article VII of the Student Code of Conduct. Students engaging in unacceptable behavior (including excessive text messaging) may be instructed to leave the classroom. This prohibition applies to all instructional forums, including classrooms, electronic classrooms, labs, discussion groups, field trips, etc.”

- **Deadline for Dropping a Course with a Grade of W (University)**
  The grade of W will be assigned to any student officially dropping a course by Friday, November 11, 2016. No student is eligible to receive a W without completing the official drop process by this deadline. Visit the Office of the University Registrar for the Course Drop Form that must be submitted. After that date, a student will not be allowed to drop a course.

- **Grade Appeals (College of Science and Engineering)**
  As stated in University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules website at http://www.tamucc.edu/provost/university_rules/index.html, and the College of Science and Engineering Grade Appeals webpage at http://sci.tamucc.edu/students/GradeAppeal.html. For assistance and/or guidance in the grade appeal process, students may contact the chair or director of the appropriate department or school, the Office of the College of Science and Engineering Dean, or the Office of the Provost.

- **Disability Services**
  - The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute (ADA of 1990, including the ADA Amendments from 2008 (PL 110-325), that
provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please call (361) 825-5816 or visit Disability Services in Corpus Christi Hall 116.

- This act also includes returning veterans who may be experiencing cognitive and/or physical access issues in the classroom or on campus. If you are a returning veteran and are experiencing cognitive and/or physical access issues in the classroom or on campus, please contact the Disability Services office for assistance at (361) 825-5816. [http://disabilityservices.tamucc.edu/](http://disabilityservices.tamucc.edu/)

- If you need disability accommodations in this class, please contact the instructor as soon as possible. If you have mobility problems, are pregnant, or you may have a history of seizures, please notify the instructor PRIVATELY so that assistance can be given in case of fire drills or emergencies. Please have your Faculty Notification Letter from the Disabilities Service Office when you talk with Dr. Buck.

- **Other information: List serve**
  All students are on the Blackboard list serve for the course, and to a second opportunities-list serve. To subscribe, send a separate e-mail to opportunities-list-request@listserv.tamucc.edu. Make sure that your e-mail appears in the “From” heading. In the subject heading, type “subscribe,” then send the e-mail. Next, you will receive a second message with a long set of letters and numbers in the subject line. You must also reply to that message in order to be subscribed to the list-serve.

  After the initial message to subscribe, to send items on the list-serve, just type opportunities-list@listserv.tamucc.edu (do NOT add –request after list). You may not receive the messages from the list-serve if your Internet service provider (Yahoo, Hotmail, Excite, Roadrunner, Grande, etc.) keep these messages from being placed in junk-mail. **The University administration prefers that you use the islander.tamucc.edu accounts.**

  At the end of the course, send an e-mail that contains your e-mail address in the “From” heading to opportunities-list@listserv.tamucc.edu. In the subject heading, type the word “unsubscribe,” then send the e-mail. I hope that students will continue to subscribe to opportunities-list@listserv.tamucc.edu!

L. **OTHER INFORMATION**

How to successfully complete BIOL 2421:
1. Read the book before class
2. In class, listen and take notes not on every word on every slide, but what are the
main points being discussed

3. Go back after lecture and fill in gaps of what was not understood with your text
4. Don’t just highlight your text! Make an outline of the lecture and see if you can describe, define, compare/contrast, analyze, evaluate or justify. Do not just memorize—make connections!

GENERAL DISCLAIMER

I reserve the right to modify the information, schedule, assignments, deadlines, and course policies in this syllabus if and when necessary. I will announce such changes in a timely manner during regularly scheduled lecture periods.