MICROBIOLOGY BIOL-2421
Department of Life Sciences
Spring 2020

A. COURSE INFORMATION

Course number/section: BIOL-2421.002
Class meeting time: TR 03:30–04:45PM
Class location: RFEB-107
Course Website: https://bb9.tamucc.edu

B. INSTRUCTOR INFORMATION

Instructor: Dr. Emad Tahtamouni
Office location: Tidal Hall 132
Office hours: MWF 10:00-11:45, or by appointment
Telephone: 361-825-5819
E-mail: m-emad.tahtamouni@tamucc.edu

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. The Biomedical Laboratory Safety Seminar SMTE0092 is a co-requisite for this course. Documented completion of this safety training is required early in the semester for continued participation in this course. 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, 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
BIOL1406 – General Biology I, BIOL1407 – General Biology II, CHEM1411 – General Chemistry I, and CHEM1412 – General Chemistry II are pre-requisites for this course.

Corequisite
The Biomedical Laboratory Safety Seminar (SMTE0092) is a co-requisite for this course. Although it is not a co-requisite, 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

Required Textbook

Microbiology: A Human Perspective by Anderson et al. is the required textbook. The 6th, 7th or 8th edition will suffice. Laboratory Exercises in Microbiology by Harley is the required laboratory textbook. Please see citations below.


Lectures will be supplemented with material from Brock Biology of Microorganisms by Madigan et al. 14th edition. Lectures and any additional reading material (such as handouts)
will be made available on Blackboard https://bb9.tamucc.edu prior to class.

Supplies
Lab coats, lab notebooks, and safety goggles are needed for the lab.

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.

At the end of the semester, the student will be able to:

1. List or identify persons involved in the history of microbiology from antiquity to the present.
2. Discuss the roles and significance of microorganisms within biology, including bacteria, viruses, fungi, algae and protozoa.
3. Describe the basic elements of microbiology, including structure, metabolism, and genetics of microorganisms.
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.
5. Sort the major categories of physical methods and of antimicrobials used in control of microorganisms.
6. Calculate (laboratory and lecture) serial dilutions, and volumes of media from dehydrated stock.
7. Categorize levels of diversity within the microbial world including bacteria, viruses, fungi, algae and protozoa.
8. Examine the role of the scientific method in obtaining, critiquing, and confirming microbiological data.

G. **INSTRUCTIONAL METHODS AND ACTIVITIES**

Lecture will be the primary form of instruction. However, I will make use of “active learning” strategies such as flipping the classroom, challenge-based instruction, peer instruction and cooperative learning. Occasionally, classroom exercises will require student participation. This allows you to be an owner or co-producers of your education. For instance, you may be asked to collaborate with classmates to solve a problem and then share the answer with the class.
H. MAJOR COURSE REQUIREMENTS AND GRADING

Major Course Requirements

Grading will include classroom-based (65%) and laboratory-based (35%) assessments.

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Points</th>
<th>Percentage of Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam 1</td>
<td>100</td>
<td>10%</td>
</tr>
<tr>
<td>Exam 2</td>
<td>100</td>
<td>10%</td>
</tr>
<tr>
<td>Exam 3</td>
<td>100</td>
<td>10%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>200</td>
<td>20%</td>
</tr>
<tr>
<td>Quizzes</td>
<td>100</td>
<td>10%</td>
</tr>
<tr>
<td>Laboratory</td>
<td>350</td>
<td>35%</td>
</tr>
<tr>
<td>Attendance</td>
<td>50</td>
<td>5%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,000</strong></td>
<td><strong>100%</strong></td>
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Attendance is mandatory. You are allowed no more than 2 unexcused absences. Students with more than 2 unexcused absences will not receive the 50 points.

Grades will be based on the following:

- A. 90.0% – 100.0% Excellent
- B. 80.0% – 89.9% Good
- C. 70.0% – 79.9% Satisfactory
- D. 60.0% – 69.9% Passing
- E. 0.0% – 59.9% Failing

How to pass this course

1. Read the textbook and any supplemental reading assignments before class.
2. Listen carefully in class and take good notes. It is not necessary to record every word, but take note of the main points. To help you out, PowerPoint slides will be made available on Blackboard prior to each class.
3. After class, review your lecture notes and use those notes as a guide to make connections between the lecture and your textbook.
4. Do not just memorize – make connections.
5. Attend the Supplemental Instruction (SI) session. Your SI leader made an A in this course, and is here to help you learn.
6. Lab is important – 35% of your grade – read all lab exercises before class and pay close attention to your Teaching Assistant.
## I. COURSE CONTENT/SCHEDULE

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Chapter(s)</th>
</tr>
</thead>
</table>
| 1    | Course Introduction  
The Microbial World | 1          |
| 2    | Microbial Structure I  
Microbial Structure II | 3, 3       |
| 3    | Molecules of Life  
Dynamics of Growth | 2, 4       |
| 4    | Control of Growth I  
Control of Growth II | 5, 5       |
| 5    | Exam 1  
Metabolism I | 1, 2, 3, 4, 5 |
| 6    | Metabolism II  
Photosynthesis | 6, 6       |
| 7    | Central Dogma I  
Central Dogma II | 7, 8       |
| 8    | Spring break |            |
| 9    | Bacterial Genetics I  
Bacterial Genetics II | 8, 20      |
| 10   | Antibiotics I  
Antibiotics II | 20, 20     |
| 11   | Exam 2  
BSL-3 | 6, 7, 8, 20 |
| 12   | Taxonomy  
Prokaryotic Diversity | 10, 11     |
| 13   | Eukaryotic Diversity  
Microbial Ecology | 12, 28     |
| 14   | PCR | 9          |
| 15   | Exam 3  
Course Review | 9, 10, 11, 12, 28 |
| 16   | Final Exam | Comprehensive |
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.

J. COURSE POLICIES

Deadline for Dropping a Course with a Grade of W (University)
I hope that you never find it necessary to drop this or any other class. However, events can sometimes occur that make dropping a course necessary or wise. Please consult with your academic advisor, the Financial Aid Office, and me, before you decide to drop this course. Should dropping the course be the best course of action, you must initiate the process to drop the course by going to the Student Services Center and filling out a course drop form. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. Please consult the Academic Calendar (http://www.tamucc.edu/academics/calendar/) for the last day to drop a course.

Attendance/Tardiness
Attendance in the classroom is mandatory. Attendance will be recorded using a sign-in sheet prior to every class. Exceptions will be granted in the event of illness, death in the family, university sponsored event and military deployment. Other conflicts such as attendance of professional symposia or the need to conduct field research will be considered on a case-by-case basis. In the event of an absence, it is the student’s responsibility to find out what you missed, get notes, learn about changes in the syllabus, etc. An unexcused absence will result in a score of ‘0’ for that day. Students with a university approved scheduled absence (athletics, military duty, etc.) or other conflict must contact the instructor well in advance of the anticipated absence.

Attendance in the laboratory is mandatory. The lab 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. Emad 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
In the event of an absence, it is the student’s responsibility to find out what you missed, get notes, learn about changes in the syllabus, etc. An unexcused absence will result in a 0 for that assignment. No late lab worksheets or lab reports are accepted.

Missed Exam
A special make-up exam is given to students with excused absence (excused per TAMUCC guidelines). The format of any make-up exams will be identical to the regular exams.
Extra Credit
Opportunities to earn bonus points are provided for the ENTIRE CLASS.

Cell Phone Use
Students are required to put their cell phones to silent mode during class. Taking pictures and sending text messages during class are not allowed.

Laptop Use
Laptops, iPads or similar tablet usage is limited to class-related activities such as taking notes, looking at the PowerPoint lectures and study guides.

Food
Please eat your meals before or after class. However, I will not take food away from you. In the laboratory, eating and drinking is prohibited.

Participation
Participation in class is voluntary, but encouraged. Extra credit points will be available for participation.

Laboratory Safety
You must take SMTE0092 before you are admitted to lab – no exceptions.

Supplemental Instruction
SI is an academic support model developed by Dr. Deanna Martin at UMKC in 1973. It uses peer-assisted study sessions to improve student retention and success within targeted, historically difficult courses. SI sessions are regularly scheduled, informal review sessions that are held at least three times per week. In these sessions, students compare notes, discuss readings, develop organizational tools, and predict test items. Students learn how to integrate course content and study skills while working together. The sessions are facilitated by “SI Leaders”, students who have previously done well in the course (received an A) and who attend all class lectures, take notes, complete assignments, and act as model students.

K. COLLEGE AND UNIVERSITY POLICIES

• Academic Integrity (University)
University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) In this class, academic misconduct or complicity in an act of academic
misconduct on an assignment or test will result in a failing grade.

- **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 may be instructed to leave the classroom. This prohibition applies to all instructional forums, including classrooms, electronic classrooms, labs, discussion groups, field trips, etc.

- **Statement of Civility**
  Texas A&M University-Corpus Christi has a diverse student population that represents the population of the state. Our goal is to provide you with a high quality educational experience that is free from repression. You are responsible for following the rules of the University, city, state and federal government. We expect that you will behave in a manner that is dignified, respectful and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation or disability. Behaviors that infringe on the rights of another individual will not be tolerated.

- **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. Please consult with the instructor before you decide to drop to be sure it is the best thing to do. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. Should dropping the course be the best course of action, visit the Office of the University Registrar for the Course Drop Form that must submitted. No student is eligible to receive a W without completing the official drop process by this deadline. Last day to drop the class is APRIL 10.

- **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](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](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 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.

  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/)

- **Statement of Academic Continuity**
  In the event of an unforeseen adverse event, such as a major hurricane and classes could not be held on the campus of Texas A&M University–Corpus Christi; this course would continue through the use of Blackboard and/or email. In addition, the syllabus and class activities may be modified to allow continuation of the course. Ideally, University facilities (i.e., emails, web sites, and Blackboard) will be operational within two days of the closing of the physical campus. However, students need to make certain that the course instructor has a primary and a secondary means of contacting each student.

L. OTHER INFORMATION

- **Academic Advising**
  The College of Science & Engineering requires that students meet with an Academic Advisor as soon as they are ready to declare a major. The Academic Advisor will set up a degree plan, which must be signed by the student, a faculty mentor, and the department chair. Meetings are by appointment only; advisors do not take walk-ins. Please call or stop by the Advising Center to check availability and schedule an appointment. The College’s Academic Advising Center is located in Center for Instruction 350 or can be reached at (361) 825-3928.

**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.