Biology 3444-002
General Microbiology Spring 2016

General information:
Instructor: Dr. Thomas Chrzanowski
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Faculty profile: http://www.uta.edu/profiles/thomas-chrzanowski
Office Hours: T, Th: 2:00 – 3:30 pm
Textbook: Brock Biology of Microorganisms 13th ed., by Madigan et al. 2012
Other reading: You are responsible for reading assigned from sources other than your textbook.
Meeting times: The class meets in UC185 T, Th 9:30 - 10:50

Student Learning Outcomes: The objective of this course is to introduce you to the life of the prokaryote. From the perspective of both age and biology, this fabulously diverse group of organisms is unlike any other form of life on the planet. While widely known for their medical importance, these organisms also play important roles in maintaining our environment, supplying food and medicines, and as vehicles by which we may understand the expression of genetic information. The material that we will cover is broad and voluminous; fortunately, it is also interesting. Upon completion of the course of study you should understand the major differences between the types of cellular life on the planet, you should understand how prokaryote metabolism differs from the metabolism of cells with a nucleus, you should understand how antibiotics function, and you should be able to understand some fundamental aspects of how your body responds to infections.

Prerequisites: Biology 1441 (General Biology) or equivalent

Attendance Policy: The University does not require monitoring your attendance; each faculty member is free to establish course-specific policies on attendance. With the exceptions of exam dates, you are not required to attend lectures; however, you are responsible for all material covered in lecture including changes to the syllabus.

Evaluation: The lecture section will follow a traditional format of lecture with subsequent evaluation of your mastery of the topic material. While the lecture material will broadly follow the material in the book, there will often be supplemental material. Your performance in this course will be assessed through four examinations. Each exam will contribute 20% to your final grade. The grade you receive for the laboratory section of the course will be 20% of your final grade. Exams will be announced at least one week prior to the exam date. The schedule of exams will depend upon our progress through the material. The following grading scale will be used to determine your grade for the course; A - 90 to 100%, B - 80 to <90%, C - 70 to <80%, D - 60 to <70%, F - <60%. Exams may be 'curved' but in no circumstance will curves be more than 10% of the exam value and the value of any exam will not exceed 100%. No other curves or points will be credited to your score. You are required to bring to each exam a NO. 2 lead pencil and a SCANTRON 882-ES electronic grading form. You may not have any other personal belongings at your desk during an exam (phone, drinks, tissues...nothing). You will not be allowed to take an exam if you do not comply. The form of examinations may be multiple choice, short essay, long essay, or whatever is best suited to the material and is solely the discretion of the instructor. You are expected to keep track of your performance throughout the semester and seek guidance from available sources (including the instructor) if your performance drops below satisfactory levels.

Late to or Absence from exams: You are required to be present for all examinations. You will be considered absent from an exam if you enter the room after one person has completed the exam and turned it in. Absences will be excused only with written request by a physician, other responsible professional, or with proof of jury duty. If you miss an exam, you will be given an exam score of zero. Exams missed due to excused absence must be taken within one day of your return to class. No other make-up exams will be given.

Lab Safety Training: ***You must complete all required lab safety training prior to entering the lab and beginning work*.** Once completed, Lab Safety Training is valid for the remainder of the same academic year (i.e., through the following August) and must be completed anew in subsequent years. There are no exceptions to this University policy.

Failure to complete the required training will preclude participation in any lab activities, including those for which a grade is assigned.

Final Review Week: A period of five class days prior to the first day of final examinations in the long sessions is designated as Final Review Week. The purpose of this week is to allow you sufficient time to prepare for final exams. During this week, there shall be no scheduled activities such as required field trips or performances; and no themes, research problems or exercises of similar scope that have a completion date during or following this week shall be assigned *unless specified in the class syllabus*. During Final Review Week, no examinations constituting 10% or more of the final grade will be given, except makeup tests and laboratory examinations. In addition, no portion of the final examination will be given during Final Review Week. During this week, classes are held as scheduled and new concepts will be introduced as appropriate.

Drop Policy: You may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, you must see an academic advisor to drop a class or withdraw. If you have not declared a major, you must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is your responsibility to officially withdraw if you do not plan to attend after registering. **You will not be automatically dropped for non-attendance**. Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (http://wweb.uta.edu/ses/fao).

Expectations for Out-of-Class Study: Beyond the time required to attend each class meeting, you should expect to spend at least an additional 9 hours per week in course-related activities, including reading required materials, completing assignments, preparing for exams, etc.

Academic Integrity: You are expected to adhere to the UT Arlington Honor Code:

I pledge, on my honor, to uphold UT Arlington's tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.

I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.

"Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts."

Per UT System *Regents' Rule* 50101, §2.2, suspected violations of university's standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in suspension or expulsion from the University.

Possession of any exams used in prior sessions of this course will be considered as academic dishonesty. Those in possession of such exams will be assigned a grade of zero for that exam. Other violations will be disciplined in accordance with University policy, which may result in suspension or expulsion from the University.

Americans with Disabilities: The University of Texas Arlington is committed to both the spirit and letter of federal equal opportunity legislation (Public Law 93112--The Rehabilitation "Act of 1973 as amended; Americans with Disabilities Act - (ADA)). It is your responsibility to inform me of your disability at the beginning of the semester and to provide authorized documentation through designated administrative channels. If you require and accommodation based on disability, I would like to meet with you in my office the first week of class to discuss your special needs. If you believe your academic performance suffers due to a disability please contact: The Office for Students with Disabilities, (OSD) www.uta.edu/disability (817-272-3364) or Counseling and Psychological Services, (CAPS)

www.uta.edu/caps/ (817-272-3671).

Title IX: The University of Texas Arlington does not discriminate on the basis of race, color, national origin, religion, age, gender, sexual orientation, disabilities, genetic information, and/or veteran status in its educational programs or activities it operates. For more information, visit uta.edu/eos. For information regarding Title IX, visit www.uta.edu/titleIX.

Bomb Threats: If you are tempted to call in a bomb threat, be aware that UTA will attempt to trace the phone call and prosecute all responsible parties. Every effort will be made to avoid cancellation of presentations/Tests caused by bomb threats. Unannounced alternate classrooms or sites will be available in the event that your classroom is not available.

Recording Devices: The use of electronic devices to record lectures if forbidden without exception.

Smoking, food and drink: University regulations prohibit smoking, eating, and drinking in lecture halls.

Cell Phones: ***Ringers must be turned off during class. If your phone rings during class, pick up your belongings and quietly leave the room. Do not return until the next class. THIS INCLUDES CLASSES DURING WHICH EXAMS ARE ADMINISTERED. IF YOUR PHONE DISTURBS EVERYONE IN THE CLASS AND YOU ARE ASKED TO LEAVE, SUBMIT WHAT YOU HAVE COMPLETED AND LEAVE. YOU WILL BE GRADED AS IF YOU SUBMITTED THE EXAM AS COMPLETE.***

Electronic Communication Policy: The University of Texas Arlington has adopted the University "MavMail" address as the sole official means of communication. All students are assigned a MavMail account. ***You are responsible for checking your MavMail regularly.*** Information about activating and using MavMail is available at http://www.uta.edu/oit/cs/email/mavmail.php. There is no additional charge for using this account, and it remains active even after graduation.

Student Support Services: The University provides a variety of resources and programs designed to help you develop academic skills, deal with personal situations, and better understand concepts and information related to your courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, you may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at http://www.uta.edu/universitycollege/resources/index.php

Student Feedback Survey: At the end of each term, you should complete a Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to you through MavMail approximately 10 days before the end of the term. Your feedback enters the SFS database anonymously and is aggregated with that of others enrolled in the course. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback is required by state law; you are strongly urged to participate. For more information, visit http://www.uta.edu/sfs.

After Hours Safety Escort: The Sam Mav Escort service provides a service to assist students, faculty, staff and campus visitors to reach their destinations after regular business hours. The hours of service are 7:00 p.m. to 1:00 a.m., Sunday through Saturday. 817-272-3381.

Emergency Phone Numbers: In case of an on-campus emergency, call the UT Arlington Police Department at 817-272-3003 (non-campus phone), 2-3003 (campus phone). You may also dial 911. Non-emergency number 817-272-3381

Emergency Exit Procedures: Should we experience an emergency that requires us to vacate the building, you should exit the room and move toward the nearest exits, which are located immediately across the hall, at the right end of the

hall or at the left end of the hall. When exiting the building during an emergency, never take an elevator…use the stairwells. I will assist you in selecting the safest route for evacuation and will arrange to assist handicapped individuals.

Changes to the syllabus: The following serves only as an outline. Our progress in covering material may warrant changes in this outline. I reserve the right to adjust this schedule in any way necessary to meet the course objectives.

Sequence of Lecture Discussions:

Part I: The foundations (Covering sections of chapter 1, 2, and 3)
- Discussion topics:
  - Introduction and some history
  - Cell structure and function
  - **Exam I**

Part II: Foundations (continued) and Diversity of life (Covering sections of chapter 4, 5, 17-21, and 9)
- Discussion topics:
  - Nutrition
  - Growth
  - Metabolism
  - Diversity of microbial life
  - **Exam II**

Part III: Molecular aspects (Covering sections of chapter 6, 10, 15, and 26)
- Discussion topics:
  - Molecular biology
  - Genetics
  - Genetic engineering
  - Industrial Microbiology
  - Control
  - **Exam III**

Part IV: Applied aspects (Covering sections of chapter 27-30, 32, and 33)
- Discussion topics:
  - Host-parasite relationships
  - Immunology
  - Epidemiology
  - Diseases
  - **Exam IV (5 May 2016)**

Detailed summary of course topics

Introduction
- History of the universe
- What are microbes?
- Development of Microbiology as a science
- Germ theory of disease
- Some mind numbing numbers

Macromolecules
- Chemical bonds
- Major classes of biologically important macromolecules
- Carbohydrates
- Lipids and Fatty Acids
- Amino Acids and Proteins
- Nucleotides and Nucleic Acids

Cell Structure and Function
- Overview
- General comparison of prokaryotes and eukaryotes

- Shapes
- Surface structures
- Walls
- Cell Membranes and transport
- Outer membranes
- Porins and LPS
- Motility
- Inclusions
- Endospores

Nutrition and Metabolism

- Nutrients and media
- Growth of cells
- Factors affecting growth
- Physiological diversity
- Carbon sources
- Concepts of Energy and Electron Donors
- Glycolytic pathways
- Fermentations
- Ticarboxylic acid cycle
- Electron Transport systems

Diversity

- The tree of life
- Bacteria
    - Phototrophs and Lithotrophs
- Archaea
    - Unique attributes
    - Halophiles
    - Methanogens
    - Hyperthermophiles
- Eukarya
    - Diplomonads
    - Parabasalids
    - Kenetoplastids
    - Euglenids
    - Ciliates
    - Dinoflagellates
    - Apicomplexans
    - Diatoms
    - Oomycetes
    - Golden Algae
    - Cercozoans
    - Radiolarians
    - Amoebozoa
    - Slime molds
    - Fungi

Viruses

- Defined
- Structure
- Reproduction
    - Virulent and Temperate

- Animal Viruses

Molecular Biology
- Foundations
- Replication in Bacteria
- RNA synthesis and processing
- Translation

Genetics
- Mutation and recombination
- Transformation
- Transduction
- Conjugation
- Insertion Elements and Transposons

Industrial Applications
- Defined
- Exploiting microbes
- Products commonly produced by microbes
- Water and sewage treatment

Control and Sterilization
- Definitions
- About Death
- D-values
- Killing agents
- Filtration
- Gas killing
- Radiation
- Chemotherapeutic agents

Human-Microbe interactions
- The concept of the Normal Flora
- Opportunistic pathogens
- Infection processes
- Passive defenses
- Invasive properties of bacteria
- Toxins

Immunology
- Non-specific active immunity
- Specific Active immunity
- T-cells
- B-cells
- Immunoglobulins
- Vaccinations
- Hypersensitivities

Epidemiology and diseases
- The work of the epidemiologist
- Emerging diseases
- Streptococcal Diseases
- Staphylococcal Diseases
- Respiratory Diseases
- Sexually transmitted diseases
- Viral Diseases