BIOLOGY 2120

INTRO TO MICROBIOLOGY LAB

Instructor/Professor: Dr. Stephanie Daugherty
Office: BEP 104  Office phone: 903-566-7013
Office Hours: MW 8-9, TTh by email appointment
Email: sdaugherty@uttyler.edu

Scheduled meeting times: Mondays & Wednesdays, or Tuesday & Thursdays 1 hr and 20 minutes each (check schedule for each section time).

Course Description:
This course will introduce non-Biology-major, health professions focused students to the principles of Microbiology lab work.  Pre-requisites: Completion of or concurrent enrollment in Intro to Chemistry is recommended, but not required.

Course Objectives:
1. Students will learn basic laboratory techniques and techniques specific to the clinical microbiology laboratory, including microscopy, sterile inoculations, and chemical tests.
2. Students will learn how enzymes function in the cell, and how enzymes control metabolism and other traits in microbes that can be tested for in the laboratory.
3. Students will learn the cellular characteristics of prokaryotes and eukaryotes, and will study viral infections, bacterial infections, fungal infections, and parasitic infections.  Students will learn to identify each type in a microscope.
4. Students will learn how antibiotics work to target specifically prokaryotes, and also how enzymes in bacteria can confer resistance to antibiotics.  Students will learn how to test antibiotic resistance in the laboratory from simulated patient samples.
5. Students will learn basics of the immune system, including the functions of fever, antibodies, memory cells, and cytotoxic cells. Students will learn how antibodies can be used as tools in a diagnostic microbiology lab.
6. Students will develop critical thinking skills, writing skills and discussion skills as they work in lab groups to complete lab data reports.
7. Students will receive 2 unknown bacterial samples that they must utilize all the skills they have learned in the lab to isolate and identify.

Course Lab book:

Required: Introduction to Microbiology Lab manual, by Stephanie Daugherty, will be available on the first day of class for $30.00.  it is pre-printed by the department and sold just for printing cost to students.

Other Resources: online resources and links to research papers will be distributed via Canvas and other online tools.
Expectations

Students are expected to participate in the course, including keeping track of and completing assignments on time (online quizzes and lab book readings included). Students are expected to attend all lab sessions. Multiple absences require documentation through the Student Accessibility Resource office. Students are expected to behave in accordance with University Policy and with safety regulations dictated by the laboratory setting. Tobacco and e-cigarettes pose a distraction and potential medical risk to other students, and will not be used in class or in lab. Students are expected to behave professionally and not create a disruptive learning environment for fellow students.

If a student misses a class or exam due to a documented emergency, a make up assignment or exam will be determined by consultation with the professor. If a student misses a class or exam without contacting the professor, no make up assignment or exam need be offered.

The student is expected to keep track of assignment due dates and times. All assignments open for all students at the same time. Emails claiming that “it did not open for me” if it opened for everyone else, will be ignored (this is a technical impossibility). Furthermore, as students have a week to complete online assignments (at the least), if student notices an assignment is due soon but not open, that should be discovered and communicated well before the due date, so claims after the due date that something was unopened for that particular student will be similarly ignored.

Points may or may not be awarded for make up lab for an unexcused absence at the professor’s discretion. Policy for entire semester is, if student misses an assignment and wants the opportunity to make it up, student must create a semester planner with all due dates entered for the semester, and show it to the professor (it may be electronic or on paper). Once professor verifies planner, assignment will be reopened. This offer is only valid for one assignment. Medical absences or hardship absences extending over more than 3 classes are subject to the same policy unless they are documented through the university Student Accessibility Resources office. Lab credit for experiments will not be awarded if a student is absent during either the inoculation day or the results day.

If a student misses more than four labs without documentation, the professor may fail the student due to lack of participation in labs. Make up lab days are not offered.

Examinations & Coursework:

Four exams will be given, focusing on lab book material and data sheets, each worth 14% of the final grade

Quizzes will be given online, for a total of 10% of the final grade
Homework will be given online over assigned Juno lab manual readings for 8% of the grade.

Lab Data Sheets & Reports will be turned in for credit for each lab experiment, for a total of 8% of the final grade.

A "portfolio" of images of your lab experiment results labeled appropriately will be turned in (either in hard copy or electronically) for 8% of the final grade.

Clinical Practice exercises will be turned in for 10% of the final grade.

If a student misses a class or exam due to a documented emergency, a make up assignment or exam will be determined by consultation with the professor, to occur no more than 1 week after student returns to class. If a student misses a class or exam without contacting the professor, no make up assignment or exam need be offered. Medical absences or hardship absences affecting an exam are subject to the same policy unless they are documented through the university Student Accessibility Resources office.

Rules for exams: exams are given online, but in lab (you must attend lab to take the exam), on either a laptop or a tablet. The device on which you take the exam is the only device that may be in the student’s possession (please put phones or other devices in your bag). Smartwatches & headphones are not allowed during exams. Hats and hoods will be removed during exams. If these rules are not followed, student will be given a zero for the exam.

**Canvas, Dropbox, and other online tools:**
Digital information exchanges for this course will take place on the university Canvas system and other online tools. This includes class announcements, lecture outline slides, study materials, links, and emails. Information on how to access the tools will be given on the first day of class.

**Grading:**
Grading will be performed consistent with UT Tyler policy.

<table>
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<tr>
<th>Percentage of total possible points</th>
<th>Letter grade</th>
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<tbody>
<tr>
<td>90-100%</td>
<td>A</td>
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<tr>
<td>80-89.4%</td>
<td>B</td>
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<tr>
<td>70-79.4%</td>
<td>C</td>
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<tr>
<td>60-69.4%</td>
<td>D</td>
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<tr>
<td>00-59.4%</td>
<td>F</td>
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Final grades are rounded up (69.5% is rounded up to a 70%).

**Lab Safety:**
All students will sign a safety contract, which will be kept on file in the professor's office. All students MUST follow all safety rules and recommendations. This is a microbiology laboratory, and there are microorganisms present. Some microorganisms used in this course will be BSL-2 (present a moderate environmental or health hazard).

**ABSOLUTELY NO FOOD OR DRINKS ARE ALLOWED IN THE LABORATORY.**

If you choose to act irresponsibly in the laboratory, including horseplay or other behavior that may put others at risk, you may forfeit your right to finish the course. All appropriate department heads will be notified of the problem. Tobacco and e-cigarettes are not permitted in the laboratory. Anything that goes into the mouth (cough drops, candy, etc) is not permitted in the laboratory. Tobacco and nicotine products are not allowed in lecture or lab.

**Make Ups, Withdrawals & Incompletes**

No make-up exams will be given for unexcused absences. If you must be absent for an exam, please email the professor AHEAD OF TIME. The time-stamp on the email MUST BE BEFORE THE EXAM BEGINS. If you have a medical emergency, a note from a doctor is required to schedule a make up exam. Only one make-up exam will be scheduled; if you miss the make-up, or miss another exam later, no new make-up exam will be scheduled. The make-up exam may be a version of the original exam, or may be an essay version of the exam, at the professor's discretion.

Make up material will be provided at the professor's discretion, dependent upon attendance in lecture, completed assignments, and the amount of time elapsed since material was missed. Please email the professor to obtain make up material, after checking on Canvas and with colleagues to determine what is needed. Please follow up the email with personal contact if an answer has not been received within 1 week.

It is the student's responsibility to consult with the lecturer, Canvas, and peers/colleagues in a timely manner to obtain missed material. Materials may not be provided after 3 weeks, or after an exam is given, depending upon whether materials are pertinent to next exam.

The last day to withdraw from the course and receive a “W” on your transcript is October 27th. Please contact the registrar’s office for paperwork to formally withdraw. An professor's signature is required. If you fail to get a withdrawal form submitted on time, you will receive an “F” in the course. You are NOT automatically withdrawn, even if you stop attending classes. You must file the form.

**Extra Credit**
NO, NO, NO, I repeat, NO Extra Credit will be offered at the end of the course. Extra credit assignments MAY be offered to the entire class as a bonus assignment during the course, at the professor’s discretion. They will not be offered at the end of the course to adjust your grade, and they will NOT be offered on an individual basis.

Best Practices and Hints

Read lab book assignments before the due date and complete the conceptualization questions for credit. These are due at the beginning of your lab session on the date indicated on the calendar. You will not be permitted to finish these after the due date and time.

Look back at your lab portfolio and the lab manual when you are answering questions on the lab data sheets, and when you are studying for the exams. An exam review will be posted for each exam. Study the exam review, the data sheets, the quizzes, and the lab manual reading.

Lab slides will be posted after the lab, to help with answering questions.

Take photos of your lab results for each experiment, and compile them into a lab portfolio to be used when doing your clinical practice and unknown. The professor will show you an example.

Your professor is a neuroscientist and specifically studied learning and memory. Three key points to remember:

1. Reading is not enough. **PRACTICE TESTING IS CRITICAL.** Find a study group, or use flashcards to self-test. Only then will you know whether you have true command of the material.
2. Sleep is when memory is consolidated from short term to long term memory. Study right before sleeping, if possible. For exams, STUDY and then SLEEP....
3. I am a firm believer in “whole brain” recall, rather than memorization. I will give cues to multiple brain lobes (pictures, root words, reading material, memory cues, and reasoning). I want you to be able to reason through a problem, not memorize an answer. Use group discussion activities as a guide both in what to study, and how to think about problems.

Other Resources:

I highly recommend two websites: scientificamerican.com and sciencedaily.com, which are brilliant for keeping up with science happenings on a daily basis.

There are several online microbiology resources that will help you if you need extra information.
Online Textbook of Bacteriology: http://www.textbookofbacteriology.net/index.html
Medical Microbiology online: http://www.ncbi.nlm.nih.gov/books/NBK7627/
Microbiology & Immunology online: http://pathmicro.med.sc.edu/book/welcome.htm
Flashcards: for a $19.95 fee, you may view and use flashcards created by other students. For our textbook, search tags: microbiology, then Black, then MCBC 2010 at the flashcard exchange website: http://www.flashcardexchange.com/membership

If you have a disability or accommodation, please see the professor during the first week of class, and follow up with an email, so that we may arrange appropriate accommodations.
<table>
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<tr>
<th>Lab Objective</th>
<th>Student Learning Goals</th>
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<tr>
<td>3 factors of molecular interaction</td>
<td>Molecules interact, and their interactions are governed by their charge, hydrophobicity/hydrophilicity, and 3 dimensional shape. Students work as directed with magnets, hydrophobic and hydrophilic powders in water, and puzzle pieces and legos to explore this topic, and learn how to fill in lab data sheets appropriately.</td>
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<td>Streak for Isolation, Inoculations</td>
<td>Students learn what it means to get an “isolated colony”, and learn to streak for isolation from a plate and a “mystery mix” broth. They learn to inoculate broths and keep tools sterile using Bunsen burner.</td>
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<td>Ubiquity</td>
<td>Students culture from common lab locations as well as personal equipment, learn the importance of taking care in a BSL II lab, of not eating or drinking in lab, and also of the dose difference between 1 or 2 bacteria on their pencil, and 1 or 2 million of the same bacteria on a culture plate. Students learn how to dispose of lab materials properly.</td>
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<td>Colony Morphology</td>
<td>Students learn vocabulary and how to classify isolated colonies based upon their morphology and culture conditions.</td>
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<td>Microscopy</td>
<td>Students familiarize themselves with the microscopes and learn how to use them appropriately, how to use immersion oil, and why we use immersion oil.</td>
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<td>Smears &amp; Stains</td>
<td>Students learn to prepare a wet smear and then heat-fix it, and apply a simple stain, and differentiate between bacterial morphologies of their simple stains on the microscope.</td>
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<td>Gram Stains</td>
<td>Students learn to prepare a wet smear and then heat-fix it, and do Gram Staining. They must be able to explain what bacterial characteristics determine the result of the Gram Stain, and do several repeatable Gram Stains. They also learn about, but do not do: capsule stains, negative stains, acid-fast stains, and endospore stains.</td>
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<td>Gram Positive Tests: MSA</td>
<td>Students learn that once a bacterium is Gram Stained, the Gram Staining characteristic can help determine what further tests should be done. They explore the MSA plate as a differential and selective plate, Blood Agar Plate hemolysis, and bacitracin resistance to help determine identify of an unknown</td>
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<tr>
<td>Gram Positive bacteria.</td>
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<td>Gram Negative Tests:</td>
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<td>EMB</td>
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<td>HE</td>
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<td>MAC</td>
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<td>Students learn that once a bacterium is Gram Stained, the Gram Staining characteristic can help determine what further tests should be done. They explore the EMB, HE, and MAC plates as differential and selective plates, and are given “hypothetical” situations to decide which plates to use for food poisoning, sewage leaks, etc.</td>
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<th>Catalase, Coagulase, and Oxidase Tests</th>
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<td>Students are introduced to direct enzyme tests, in which a substrate is provided and an end product looked for to determine directly whether a specific enzyme is present. Students perform catalase tests and coagulase tests, and are expected to be able to explain the value of both to a patient.</td>
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| Other Metabolic Tests: Ph         |
| Phenol Red                        |
| Citrate                            |
| Oxidation/Fermentation MRVP       |
| Students are now familiar with the idea of differentiation tests, and different metabolic processes. These example tests explore the different possibilities to detect enzymatic and metabolic differences between bacterial species. |

| Koch’s Postulates                |
| Correlating with the lecture on this subject, in this lab activity students are given epidemiological information and must hypothesize causative pathogen and describe scientific method to test using Koch’s postulates. |

| Epidemiology                     |
| Students play a video game and answer questions about a disease outbreak, with the objective that they could explain to a patient why understanding patient behaviors, risk factors, geographical location, and exposure opportunities are important. |

| Antibodies & Blood Typing        |
| Students are introduced to the idea of using antibodies as tools in the laboratory. Students read about using antibody tests to diagnose virus exposure, bacterial exposure, and virus titer. Blood typing labs are used as an example of using antibodies as tools in the laboratory. |

| Lysis Tests                      |
| Bile Esculin Hydrolysis and Urea Lysis are utilized here to exemplify hydrolysis tests for bacterial identification. The Bile Esculin test is important for streptococcus/enterococcus identification, and the urea lysis test is important for determining the causative pathogen of prospective UTIs. |

| SIM & Motility                   |
| These two tests utilize semi-solid media to determine bacterial motility, and the SIM test also is differential. Students learn how to inoculate these specific tubes and read the results. |

| Clinical Practices:             |
UTI

Students are given 3 simulated “urine” samples and must first determine (utilizing a common dipstick test looking for nitrate reduction to nitrite) likelihood of UTI. In addition, they will learn that not all pathogens of UTI are able to reduce nitrate to nitrite. Then, they will have to determine the likely pathogen causing the UTI using the lab tests they have learned this semester.

Throat culture

Students are given 3 simulated “throat” samples and must first determine likelihood of strep infection using the tests they have learned this semester. Then they must determine the most probable species of strep causing the infection.

Food poisoning

Students are given a mixed unknown from which they must first isolate the two bacteria. Then they must use tests they have learned to determine the identity of the potential food poisoning pathogens.

Wound infection

Students are given three samples from potential wounds and must use tests they have learned to determine the identity of the potential wound pathogens.

UT Tyler Policies:

Academic Honesty

UT Tyler maintains strict standards of academic integrity. All forms of subtle or overt dishonesty, including (but not limited to) copying another student’s work, plagiarism of published literature (including internet content), and using notes during an exam will not be tolerated. All instances will result in the student FAILING THE ENTIRE COURSE and will be reported to the College of Arts and Sciences, the student’s major department, and the Dean.

Students Rights and Responsibilities

To know and understand the policies that affect your rights and responsibilities as a student at UT Tyler, please follow this link:
http://www.uttyler.edu/wellness/StudentRightsandResponsibilities.html

Grade Replacement/Forgiveness

Students repeating a course for grade forgiveness (grade replacement) must file a Grade Replacement Contract with the Enrollment Services Center (ADM 230) on or before the Census Date of the semester in which the course will be repeated. Grade Replacement Contracts are available in the Enrollment Services Center or at http://www.uttyler.edu/registrar. Each semester’s Census Date can be found on the Contract itself, on the Academic Calendar, or in the information pamphlets published each semester by the Office of the Registrar.
Failure to file a Grade Replacement Contract will result in both the original and repeated grade being used to calculate your overall grade point average. Undergraduates are eligible to exercise grade replacement for only three course repeats during their career at UT Tyler; graduates are eligible for two grade replacements. Full policy details are printed on each Grade Replacement Contract.

The Census Date is the deadline for many forms and enrollment actions that students need to be aware of. These include:

- Submitting Grade Replacement Contracts, Transient Forms, requests to withhold directory information, approvals for taking courses as Audit, Pass/Fail or Credit/No Credit.
- Receiving 100% refunds for partial withdrawals. (There is no refund for these after the Census Date)
- Schedule adjustments (section changes, adding a new class, dropping without a “W” grade)
- Being reinstated or re-enrolled in classes after being dropped for non-payment
- Completing the process for tuition exemptions or waivers through Financial Aid

State Mandated Course Drop Policy
Texas law prohibits a student who began college for the first time in Fall 2007 or thereafter from dropping more than six courses during their entire undergraduate career. This includes courses dropped at another 2 year or 4 year Texas public college or university. For purposes of this rule, a dropped course is any course that is dropped after the 12th day of class (See Schedule of Classes for the specific date). Exceptions to the 6 drop rule may be found in the catalog. Petitions for exemptions must be submitted to the Registrar’s Office and must be accompanied by documentation of the extenuating circumstance. Please contact the Registrar’s Office if you have any questions.

Disability Services

**Disability/Accessibility Services:** In accordance with Section 504 of the Rehabilitation Act, Americans with Disabilities Act (ADA) and the ADA Amendments Act (ADAAA) the University of Texas at Tyler offers accommodations to students with learning, physical and/or psychological disabilities. If you have a disability, including non-visible diagnosis such as a learning disorder, chronic illness, TBI, PTSD, ADHD, or you have a history of modifications or accommodations in a previous educational environment, you are encouraged to visit [https://hood.accessiblelearning.com/UTTyler](https://hood.accessiblelearning.com/UTTyler) and fill out the New Student application. The **Student Accessibility and Resources** (SAR) office will contact you when your application has been submitted and an appointment with Cynthia Lowery, Assistant Director Student Services/ADA Coordinator. For more information, including filling out an application for services, please visit the SAR webpage at [http://www.uttyler.edu/disabilityservices](http://www.uttyler.edu/disabilityservices), the SAR office located in the University Center, #3150 or call 903.566.7079.

**UT Tyler is a Tobacco-Free University**

All forms of tobacco will not be permitted on the UT Tyler main campus, branch campuses, and any property owned by UT Tyler. This applies to all members of the University community, including students, faculty, staff, University affiliates, contractors, and visitors. Forms of tobacco not permitted include cigarettes, cigars, pipes, water pipes (hookah), bidis, kreteks, electronic cigarettes, smokeless tobacco, snuff, chewing tobacco, and all other tobacco products. There are several cessation programs available to students looking to quit smoking, including counseling, quitlines, and group support. For more information on cessation programs please visit
Student Absence due to Religious Observance

Students who anticipate being absent from class due to a religious observance are requested to inform the professor of such absences by the second class meeting of the semester.

Student Absence for University-Sponsored Events and Activities

If you intend to be absent for a university-sponsored event or activity, you (or the event sponsor) must notify the professor at least two weeks prior to the date of the planned absence. At that time the professor will set a date and time when make-up assignments will be completed.

Social Security and FERPA Statement:

It is the policy of The University of Texas at Tyler to protect the confidential nature of social security numbers. The University has changed its computer programming so that all students have an identification number. The electronic transmission of grades (e.g., via e-mail) risks violation of the Family Educational Rights and Privacy Act; grades will not be transmitted electronically.

Emergency Exits and Evacuation:
Everyone is required to exit the building when a fire alarm goes off. Follow your professor’s directions regarding the appropriate exit. If you require assistance during an evacuation, inform your professor in the first week of class. Do not re-enter the building unless given permission by University Police, Fire department, or Fire Prevention Services.