

Biology 2120

Spring 2024



Lab: Introduction to Microbiology

Professor: Dr. Stephanie Daugherty

sdaugherty@uttyler.edu BEP107

Office Hours: MW 12:50–2:20 pm & as arranged by email

TAs: Dillon Flowers & Trent Furr

Dflowers4@patriots.uttyler.edu Tfurr3@patriots.uttyler.edu

Scheduled meeting times: M and W (times vary by section)

Office Hrs for TAs will be announced first day of lab.

This course will introduce non-Biology-major, health-professions focused students to the principles of microbiology lab work. **Co-registration in BIOL 2320**

Last day to withdraw:
March 25, 2024

Materials: Lab Manual printed by department,
cost: \$35.00 first day of class
(cash or check)
1 pack colored pencils (not expensive, should
include pink and purple)

*This is an in person lab course; attendance in
lab is required each lab day.*

*Note that intro to micro labs meet Mondays
and Wednesdays.*

*Many course materials are required to be
completed online ahead of lab.*

Grades are earned by students based on student mastery of learning objectives, via assignments, experiments, participation, and assessments.

Objectives:

1. Students will learn basic micro lab techniques including sterile technique, inoculations, microscopy, and staining. Lab safety and PPE will be a priority.
2. Students will learn about aerobic respiration, anaerobic respiration, and fermentation, learn how to detect each in test media in the laboratory, and be able to explain the results
3. Students will learn how enzymes control metabolism and traits in a cell, be able to test for traits in the laboratory with specialized selective & differential media, and be able to explain the results.
4. Students will learn how antibiotics work to target prokaryotes specifically, and how enzymes can confer resistance to antibiotics. Students will conduct an antibiotic sensitivity test and be able to explain the results.
5. Students will learn how antibodies can be used as tools in a diagnostic microbiology lab, and will be able to conduct an antigen detection test and be able to explain the results.
6. Students will learn how pathogen genetic testing is done.
7. Students will develop critical thinking skills, teamwork & communication skills as they complete group work & lab work
8. Students will build a dichotomous key/testing plan for G+ and G- bacteria using lab tests they learn in lab.
9. Students will perform in person or virtual bacterial identifications on simulated clinical samples and produce a clinical report and paragraph defending their identification using their lab test results.

Class Policies in short:

Follow all safety rules

Respect your colleagues &
instructors

Zero-Tolerance for Cheating & Plagiarism

Attendance is expected; if
instructor is notified at least 2
hours before online flexibility
can be granted for one lab*

Late work policy for uploaded
documents: -10% each day for
maximum 3 days

Late work policy for quizzes,
videos, readings that close at
certain time: email to ask for
reopening; first one submit
planner; rest penalized:

Max score 75% – 2nd

Max score 60% – 3rd ... rest 0%

Expectations of Students:

Students are expected to follow all safety rules & wear PPE as determined by the instructor. Students are expected to participate; keep track of, and complete assignments by due date, attend required labs, and complete required online labs. (send documentation of excused absences ahead of lab). Students are expected to follow University Policy and Academic Conduct requirements, including doing students' own work, not cheating, not plagiarizing, and citing sources appropriately. If you have an accommodation, email me during the first week of class to check in.

Materials:

Required: *Introduction to Microbiology Lab Manual*, by S Fischer, will be available in lab on the first day for \$35.00 (cash or check). It is pre-printed by the department and sold just for printing costs to students. Colored pencil set (cheap) that includes pink, purple, yellow, etc.

Online systems: Canvas (provided through University); Jupiter (provided through instructor as a free system we can use as a clicker/ etc); Instant feedback program (provided through instructor for activities)

Coursework: (grade weights may be adjusted during semester if unforeseen circumstances require)

Full list of assignments available on course calendar.

Data Sheets: where experimental or virtual results are recorded and questions about experiment are answered. Then uploaded to online system to be graded. (8% of final grade). There are multiple days to ask questions about these; turning in with habitual (>3 DSheets) blank answers may cause DS to be graded at maximum 50%.

Lab Readings: done online ahead of lab, and answer questions to receive credit (same text is provided in hard copy if needed). (9% of final grade)

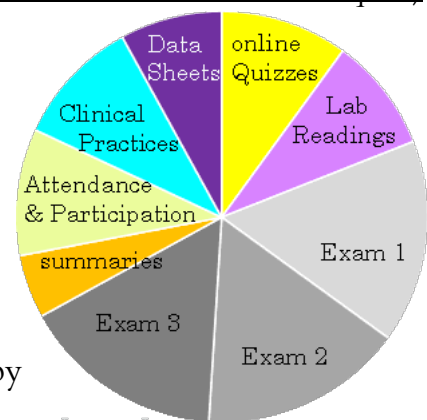
Online lab quizzes: over lab readings & videos, open book, open slides, open notes, open for 1 week prior to due date. Completed on online system (10% of final grade).

Exams (3 of them): given in class (or online if safety requires), over lab readings, videos/slides, & data sheets. Reviews will be posted online. Exams will be given on online system, whether in person or not. (16% each for total of 48% of grade)

Summaries & reviews: exam reviews will include summaries that will be completed by the student and turned in, and the start of review flashcards to be completed by students, and dichotomous keys to be completed by students (5% of final grade)

Clinical Practices: at end of semester, multiple simulated patient samples will be given, and students will use learned lab tests to identify them, fill out data sheets, fill out a report page, and write a summary paragraph which will then be uploaded. (10% of final grade)

Attendance & Participation: required attendance in lab (10% of final grade).



UT Tyler grading policy (rounding 0.50 to next percent):

00-59.49% = F 59.5-69.49% = D 69.5-79.49% = C 79.5-89.49% = B 89.5-100% = A

Academic Integrity Policy: Student dishonesty in this class includes, but is not limited to: plagiarism or failure to cite sources, using another's words/ideas and claiming as one's own; use of automated programs to write or reword copied-and-pasted text to "avoid plagiarism"; turning in another person's work as one's own, no matter where it was obtained; signing in another student to attendance records; using or possessing, in lap or hand, an unauthorized (not-in-lockdown) device during an exam; otherwise cheating on an assignment or exam.

Any occurrence of academic dishonesty can result in a score of zero on an assignment, nullification of all extra credit done by the student, failure of the course, and reporting to the Office of Judicial Affairs.

Comportment: Students are expected to behave in accordance with University Policy and with safety regulations dictated by the instructor; and behave professionally to not create a disruptive learning environment for fellow students. Tobacco and nicotine products, including e-cigarettes, pose a distraction and potential medical risk to other students, and will not be used in lecture or in lab.

Absence Policies:

Students are expected to attend all labs in person. These are posted on the calendar students receive at the beginning of the semester, and students are expected to make arrangements to attend every lab class.

In the case of an excused absence, students must submit documentation and let the instructor know as soon as possible prior to the scheduled class.

Multiple absences require documentation through the Student Accessibility Resource office at saroffice@uttyler.edu (903-566-7079) for a plan to accommodate absences and prepare alternative work.

Missed Exams: students who notify the professor with an excused absence ahead of an exam day, complete with required documentation, may be accommodated ONCE with a make-up exam within one week of the absence, which may or may not be in the same format as the scheduled exam (at the instructor's discretion). If a student misses a class or exam without contacting the instructor ahead of the start of the class or exam, no make up exam or assignment need be offered.

Late Work & Make-Up Work: A single missed online or virtual assignment may be made up by any student for full credit by submitting a full semester planner that includes both due dates & planned times for working on assignments to the instructor by email (see example in lab book). A second missed assignment may be made up for a maximum of 75% by contacting the instructor within 5 days. A third missed assignment may be made up for a maximum of 60% within 5 days. For uploaded documents or projects, late penalty is -10% every 24 hours for a maximum of 3 days, after which a score of zero will be given. **There are no make-up lab sessions for in person labs.**

NO EXTRA CREDIT will be offered at the end of semester as a grade adjustment, or to individual students. Extra credit assignments may be given to entire class during the semester, or may be offered for following safety protocols or clean up protocols.

Withdrawals & Incompletes: Make up assignments are provided at the instructor's discretion, dependent upon the type of assignment, attendance, previous completed assignments, the student's diligence about contacting the instructor quickly & ahead of the scheduled lab session, and the amount of time elapsed since material was missed. Missing assignment credit may not be provided after 3 weeks or after an exam is given, depending upon whether materials are pertinent to the next exam. Please email the instructor as soon as possible regarding missed assignments, missed classes, or required quarantines. Please follow up the email if an answer has not been received within 1 week.

If circumstances force a withdrawal from the class, please contact the registrar's office to formally withdraw from the course by the required date and email your instructor to let them know. If you fail to submit the form on time, you will receive an F in the course. You are not automatically withdrawn if you stop attending classes; you must file the form.

Best Practices & Hints:

- Keep up with **online Lab Readings**, answer questions as you watch them & at the end to receive credit. These are done ahead of lab for needed instructions and safety information; you may not be allowed to do the lab if they are not complete.
- **Online Lab Quizzes** are open for at least one week; open them early and review the questions, then use class slides, notes, videos & class readings to answer (answers are based on class materials, not outside sources).
- **Attend required Labs** to complete experiments which will be crucial for exams as well as counting for credit. In case of forced absence, notification of the professor ahead of the lab by email is required, with accompanying documentation, for the opening of a virtual lab activity.
- **Lab Slides** will be presented by the professor, and copies will be posted in the Materials section of Jupiter for students to review and use to answer questions.
- **Lab Data Sheets** are to be completed by the student from lab experiment results and answering questions from lab reading and lab slides. Students should do their own work to complete the Lab Data Sheets. **Photos of student results** are required to be submitted with Data Sheets, and grading includes result consistency with photos.
- **Clinical Practices** will be introduced, explained, and completed at the end of the semester, using all students have learned to identify pathogens in prepared "patient samples"

READING IS NOT ENOUGH. PRACTICE TESTING IS CRITICAL. Our Review Materials are specifically designed to make self-testing or study-groups extremely easy.

INTERESTED IN MORE?

Medical Microbiology text online: <http://www.ncbi.nlm.nih.gov/books/NBK7627/>

Blog & Book: *Puswhisperer: a year in the life of an infectious disease doctor*. Mark Crislip, MD. (Books on amazon, blog on Medscape:

<http://boards.medscape.com/29f3af03/>)

The Great Influenza, by John M Barry.

Lab Objective	Student Learning Goals
3 factors of molecular interaction	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 lego to explore this topic, and learn how to fill in lab data sheets appropriately.
Micro Tools & Labeling	Students learn names of microbiology tools & how to label materials properly
Streak for Isolation, Inoculations	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.
Ubiquity	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 safely.
Metabolism & Fermentation	Students will observe signs of metabolic processes and waste products produced, in preparation for differential media tests used later in the semester.
Colony Morphology	Students learn vocabulary and how to classify isolated colonies based upon their morphology and culture conditions.
Microscopy	Students familiarize themselves with the microscopes and learn how to use them appropriately, how to use immersion oil, and why we use immersion oil.
Smears & Stains	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.
Gram Stains	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.
Catalase, Coagulase Tests	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.
Gram Positive Tests: MSA BE, Hemolysis Bacitracin Resistance	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, Bile Esculin, hemolysis, and bacitracin resistance to help determine identify of an unknown Gram Positive bacteria.

Gram Negative Tests: EMB HE	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 plates as differential and selective plates, and are given “hypothetical” situations to decide which plates to use for food poisoning, sewage leaks, etc.
Other Metabolic Tests: Phenol Red Citrate Oxidation/Fermentation	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.
Lysis Tests	Urea Lysis are utilized here to exemplify hydrolysis tests for bacterial identification. The urea lysis test is important for determining the causative pathogen of prospective UTIs.
Semi-Solid Tests	SIM and Motility tests are utilized here to show how bacterial motility can be assessed, along with indole production and sulfur reduction in the SIM test.
Antibodies as Tools	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. Rapid Antigen Tests are used to demonstrate the use of Antibodies as Tools in the lab
Genetic Tools	Students are introduced to the idea of using genetic methods as tools in the laboratory. Students read about using genetic tests to identify pathogens such as viruses, bacteria, and parasites. A PCR test is used to demonstrate the use of Genetic tools in the lab.
Clinical Practices:	
UTI	Students are given 2 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. Students will record results on data sheets, then summarize results in a report form and write a summary paragraph.
Throat culture	Students are given 2 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. Students will record results on data sheets, then summarize results in a report form and write a summary paragraph.
4 Mixed Unknowns	Students are given 4 virtual unknowns with accompanying test results and a characteristic key to work through to the likely identity of the virtual bacteria using their lab book and flashcards.
Exam Summaries & Flashcards	Exam summary tables are provided in the lab book for students to fill out in preparation for exam studying. Some flashcards are provided, and others recommended with templates for how to build them.

UNIVERSITY POLICIES AND ADDITIONAL INFORMATION THAT MUST APPEAR IN EACH COURSE SYLLABUS

UT Tyler Honor Code

Every member of the UT Tyler community joins together to embrace: Honor and integrity that will not allow me to lie, cheat, or steal, nor to accept the actions of those who do.

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/rightsresponsibilities.php>

- **Withdrawing from Class** - Students you are allowed to [withdrawLinks to an external site.](#) (drop) from this course through the University's [Withdrawal PortalLinks to an external site.](#) Texas law prohibits students 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 other 2-year or 4-year Texas public colleges and universities. Make sure to consider the impact withdrawing from this class has on your academic progress as well as the financial implications. We encourage you to consult your advisor(s) and financial aid for additional guidance. CAUTION #1: Withdrawing before census day does not mean you get a full refund. Please see the [Tuition and Fee Refund ScheduleLinks to an external site.](#) CAUTION #2: All international students must check with the [Office of International ProgramsLinks to an external site.](#) before withdrawing. All international students are required to enroll full-time for fall and spring terms.
- **Final Exam Policy:** Final examinations are administered as scheduled. If unusual circumstances require that special arrangements be made for an individual student or class, the dean of the appropriate college, after consultation with the faculty member involved, may authorize an exception to the schedule. Faculty members are required to maintain student final examination papers for a minimum of three months following the examination date.
- **Incomplete Grade Policy:** If a student, because of extenuating circumstances, is unable to complete all of the requirements for a course by the end of the semester, then the instructor may recommend an Incomplete (I) for the course. The "I" may be assigned in lieu of a grade only when all of the following conditions are met: (a) the student has been making satisfactory progress in the course; (b) the student is unable to complete all course work or final exam due to unusual circumstances that are beyond personal control and are acceptable to the instructor; and (c) the student presents these reasons prior to the time that the final grade roster is due. The semester credit hours for an Incomplete will not be used to calculate the grade point average for a student.
The student and the instructor must submit an Incomplete Form detailing the work required and the time by which the work must be completed to their respective department chair or college dean for approval. The time limit established must not exceed one year. Should the student fail to complete all of the work for the course within the time limit, then the instructor may assign zeros to the unfinished work, compute the course average for the student, and assign the appropriate grade. If a grade has not been assigned within one year, then the Incomplete will be changed to an F, or to NC if the course was originally taken under the CR/NC grading basis.
- **Grade Appeal Policy:** - UT Tyler's Grade Appeal policy requires the completion of a Grade Appeal form for this action to take place. The grade appeal begins with the instructor

of your course. If you do not agree with the decision of the instructor, you may then move your appeal to the department chair/school director for that course. If you are still dissatisfied with the decision of the chair/director, you may move the appeal to the Dean of the College offering that course who has the final decision. Grade appeals must be initiated within sixty (60) days from the date of receiving the final course grade. The Grade Appeal form is found on the [Registrar's Form Library](#). [Links to an external site.](#)

- **Disability/Accessibility Services:** The University of Texas at Tyler has a continuing commitment to providing reasonable accommodations for students with documented disabilities. Students with disabilities who may need accommodation(s) in order to fully participate in this class are urged to contact the Student Accessibility and Resources Office (SAR) as soon as possible to explore what arrangements need to be made to ensure access. If you have a disability, you are encouraged to visit the [SAR Portal](#) [Links to an external site.](#) (<https://hood.accessiblelearning.com/UTTyler/> [Links to an external site.](#)) and complete the New Student Application. For more information, please visit the [SAR webpage](#) [Links to an external site.](#) or call 903.566.7079.
- **Military Affiliated Students:** UT Tyler honors the service and sacrifices of our military affiliated students. If you are a student who is a veteran, on active duty, in the reserves or National Guard, or a military spouse or dependent, please stay in contact with me if any aspect of your present or prior service or family situation makes it difficult for you to fulfill the requirements of a course or creates disruption in your academic progress. It is important to make me aware of any complications as far in advance as possible. I am willing to work with you and, if needed, put you in contact with university staff who are trained to assist you. Campus resources for military affiliated students are in the [Military and Veterans Success Center \(MVSC\)](#) [Links to an external site.](#). The MVSC can be reached at MVSC@uttyler.edu, or via phone at 903.565.5972.
- **Academic Honesty and Academic Misconduct:** The UT Tyler community comes together to pledge that "Honor and integrity will not allow me to lie, cheat, or steal, nor to accept the actions of those who do." Therefore, we enforce the [Student Conduct and Discipline policy](#) [Links to an external site.](#) in the Student Manual Of Operating Procedures (Section 8).
- **FERPA** - UT Tyler follows the Family Educational Rights and Privacy Act (FERPA) as noted in [University Policy 5.2.3](#) [Links to an external site.](#). The course instructor will follow all requirements in protecting your confidential information.
- **COVID Guidance**
 - *Information for Classrooms and Laboratories:* It is important to take the necessary precautions to ensure a healthy and successful year. UT Tyler continues to urge you to protect yourselves against the flu, COVID and any new threats that may be developing. Be diligent about preventive measures such as washing hands, covering sneezes/coughs, social distancing and vaccinations, which have proven to be successful in slowing the spread of viruses. Encourage those who don't feel well to stay home, and if they show symptoms, ask them to get tested for the flu or COVID. Self-isolation is important to reduce exposure ([CDC quarantine/isolation guidelines](#) [Links to an external site.](#)). Please work with your faculty members to maintain coursework and please consult existing campus resources for support. [Links to an external site.](#)
 - *Recording of Class Sessions:* Class sessions may be recorded by the instructor for use by students enrolled in this course. Recordings that contain personally

identifiable information or other information subject to FERPA shall not be shared with individuals not enrolled in this course unless appropriate consent is obtained from all relevant students. Class recordings are reserved only for the use of students enrolled in the course and only for educational purposes. Course recordings should not be shared outside of the course in any form without express permission.

- **Absence for Official University Events or Activities:** This course follows the practices related to approved absences as noted by the Student Manual of Operating Procedures ([Sec. 1 -501](#)[Links to an external site.](#)).
- **Absence for Religious Holidays:** Students who anticipate being absent from class due to a religious holiday are requested to inform the instructor by the second class meeting of the semester.
- **Campus Carry:** We respect the right and privacy of students who are duly licensed to carry concealed weapons in this class. License holders are expected to behave responsibly and keep a handgun secure and concealed. More information is available at <http://www.uttyler.edu/about/campus-carry/index.php>.

Resources to assist you in this course

- [UT Tyler Student Accessibility and Resource \(SAR\) Office \(Links to an external site.\)](#) (provides needed accommodations to students with document needs related to access and learning)
- [UT Tyler Writing Center \(Links to an external site.\)](#)
- [The Mathematics Learning Center \(Links to an external site.\)](#)
- [UT Tyler PASS Tutoring Center \(Links to an external site.\)](#)
- [UT Tyler Supplemental Instruction \(Links to an external site.\)](#)
- [Upswing \(24/7 online tutoring\) - covers nearly all undergraduate course areas \(Links to an external site.\)](#)
- [Robert Muntz Library \(Links to an external site.\)](#) and [Library Liaison \(Links to an external site.\)](#)
- [Canvas 101 \(Links to an external site.\)](#) (learn to use Canvas, proctoring, Unicheck, and other software)
- Digital Support Toolkit (for supported courses only. Students are automatically enrolled in the toolkit for supported courses)
- LIB 422 -- Computer Lab where students can take a proctored exam
- [The Career Success Center \(Links to an external site.\)](#)
- [UT Tyler Testing Center \(Links to an external site.\)](#)
- [Office of Research & Scholarship Design and Data Analysis Lab \(Links to an external site.\)](#)

Resources available to UT Tyler Students

- [UT Tyler Counseling Center \(Links to an external site.\)](#)(available to all students)
- [TAO Online Support Center \(Links to an external site.\)](#)(online self-help modules related to mental & emotional health)
- [Military and Veterans Success Center \(Links to an external site.\)](#)(supports for all of our military affiliated students)

- [UT Tyler Patriot Food Pantry \(Links to an external site.\)](#)
- [UT Tyler Financial Aid and Scholarships \(Links to an external site.\)](#)
- [UT Tyler Registrar's Office \(Links to an external site.\)](#)
- [Office of International Programs \(Links to an external site.\)](#)
- [Title IX Reporting \(Links to an external site.\)](#)
- [Patriots Engage \(Links to an external site.\)](#) (available to all students. Get engaged at UT Tyler.)