Biology 1320 Fall 2024

Biology of Disease: Zombie Outbreak

Last day to withdraw: November 4, 2024

Materials: Zombie ~~Human~~Biology, Kendall Hunt Press, S. Fischer, A Wojtyna, C. Green. ISBN: 9798765792797. 3rd edition (older editions will work. Just book needed, no homework portal needed. Ebooks fine).

Professor: Dr. Stephanie Daugherty
sdaugherty@uttyler.edu
Office: BEP 107 phone: 903-566-7013
Office Hours: In person: T & Th 8-9:00, MW 11:30-2, & as arranged

Scheduled meeting times: T and Th 9:30-10:50am
See printed calendar for plan

Some classes will occur in a microbiology laboratory (see calendar for those dates). This is to allow for some experiments on antibiotic resistance. Safety rules will be covered before the first bacterial lab experiment.

This course will introduce non-science majors to fundamental biology concepts using the model of zombie outbreaks {enzymes, cells, systems, pathogens, immune systems, epidemiology, and genetics}

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

Objectives:

1. Students will learn the difference between correlation and causation in scientific research, and understand how researchers and physicians design scientific experiments to elucidate the difference between correlation & causation. ("What's making zombies?")
2. Students will learn how cellular metabolism, energy requirements, and enzyme activity govern living cells & organisms. ("Dead vs. Alive")
3. Students will learn some basics about how neurons function, how brain regions control different parts of the sensory and motor systems, and discuss the complexity of disease processes affecting specific brain functions ("Brainssss….")
4. Students will learn how genes control protein function, and how hereditary disease occurs and can be treated ("Are they mutant zombies?")
5. Students will learn how the environment plays a role in human health, and how stewardship of the environment protects human health ("Are they toxic zombies?")
6. Students will learn about pathogens and how we treat the diseases they cause. They will learn the difference between bacteria and viruses, and how we treat them. They will also learn about natural selection and antibiotic resistance ("Are they contagious zombies?")
7. Students will learn how the specific immune system works in general terms, and how vaccines work to protect individuals and populations ("Fighting zombies!")
8. Students will synthesize what they have learned through guided experiments in the laboratory into a lab experiment of their own design and present a poster on the outcome.
9. Students will build a final project, a BETTER ZOMBIE STORY, that is more scientifically accurate than Hollywood versions, based upon the topics covered in the course.

Class Policies in short:

Attendance at lecture activities is required

Follow all safety rules, especially during lab component

Respect your colleagues & instructors

Zero-Tolerance for Cheating & Plagiarism

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%

No unexcused absences for exams or activities.

Expectations of Students:

Students are expected to follow rules & wear PPE as determined by the instructor.
Students are expected to participate; keep track of, and complete assignments by due date, and attend required classes/activities (send documentation of excused absences ahead of class to instructor). Students submitting activity pages or lab reports while not attending corresponding labs without permission from professor will receive grade of zero, and be reported to the Office of Judicial Affairs for plagiarism.
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 professor during the first week of class to check in.

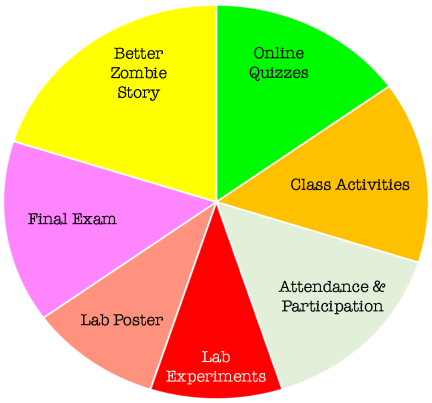
Materials:

Required: textbook: Zombie ~~Human~~Biology, Kendall Hunt Press, S. Fischer and C. Green. ISBN: 978-1-5249-0364-0. 3rd edition (older editions will work ok, no subscription to homework portal needed, just book). One copy of the textbook is on hold at the UTT Library.

Online systems: Canvas (provided through University); Jupiter (provided through instructor as a free system we can use as a clicker/online quiz/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.



Online Quizzes: one a week, based on chapter readings and supplemental slides/lectures in class. (15% of grade)

Class Activities: designed to emphasize and explain major concepts (15% of final grade).

Attendance & Participation: attendance in lectures, in lab experiments, and class activities count towards final grade, as well as full participation in activities & experiments (15% of final grade)

Lab Experiments: a few classes over the semester will occur in the micro lab and will involve a few experiments. There will be results pages turned in to document student experiment & learning (results don't matter as much as that you can accurately talk about experiment objective) (10% of final grade)

Lab Poster: students will work in pairs or individually to build a lab poster (given an example and help of professor) explaining results of one experiment (10% of grade)

Final Exam: will cover chapter reading & topics, review quizzes to study (15% of final grade)

Better Zombie Story: use science you have learned to write/design/describe a better zombie story, graded by rubric (20% 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 reword copied-and-pasted text to "avoid plagiarism"; turning in another person's work as one's own, no matter where it was obtained; copying another student's work; 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 room or in lab.

Absence Policies:

Students are expected to attend required activity classes in person (or required zooms during Covid-19 online class if needed for safety, as designated by professor). These are posted on the calendar students receive at the beginning of the semester, and students are expected to make arrangements to attend required classes. Having to work is not an excused absence.

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 Activities: 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 activity online within one week of the absence, which may or may not be in the same format as the scheduled activity (at the instructor's discretion). If a student misses a class or activity without contacting the instructor ahead of the start of the class or exam, no make-up activity or assignment need be offered.

Late Work & Make-Up Work: A single missed assignment may be made up by any student for full credit by submitting a 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 2 days. Subsequent late assignments will earn 0%. 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.

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. Attendance boost may be applied to students within 0.5% of next letter grade, if students attended all scheduled in person classes/activities.

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, and the amount of time elapsed since material was missed. Missing assignments 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 zoom meetings, 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.

Artificial Intelligence Policy: *UT Tyler is committed to exploring and using artificial intelligence (AI) tools as appropriate for the discipline and task undertaken. We encourage discussing AI tools' ethical, societal, philosophical, and disciplinary implications. All uses of AI should be acknowledged as this aligns with our commitment to honor and integrity, as noted in UT Tyler's Honor Code. Faculty and students must not use protected information, data, or copyrighted materials when using any AI tool. Additionally, users should be aware that AI tools rely on predictive models to generate content that may appear correct but is sometimes shown to be incomplete, inaccurate, taken without attribution from other sources, and/or biased. Consequently, an AI tool should not be considered a substitute for traditional approaches to research. You are ultimately responsible for the quality and content of the information you submit. Misusing AI tools that violate the guidelines specified for this course (see below) is considered a breach of academic integrity. The student will be subject to disciplinary actions as outlined in UT Tyler's Academic Integrity Policy.*

For this course, the work submitted by students in this course will be generated by themselves. This includes all process work, drafts, brainstorming artifacts, editing, and final products. This extends to group assignments where students must collaboratively create the project or answer activity questions. Any instance of the following constitutes a violation of UT Tyler's Honor Code: a student has another person/entity do any portion of a graded assignment, which includes purchasing work from a company, hiring a person or company to complete an assignment or exam, using a previously submitted assignment and/or using AI tools (such as ChatGPT).

Best Practices & Hints:

- Attend all courses that are scheduled for attendance, as class activities and participation are graded.

- Complete Textbook readings when recommended over the weekend, and review before finalizing answers to Online Quizzes.
- Download slides for lecture videos before watching from the "Materials" section, where there is a dropbox folder with copies of slides to take notes on. You can print them on paper or leave them electronic and take notes on them.
- Online 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).
- BEGIN planning your zombie scenario as we work through chapters on pathogens and mutations, and develop your ideas each week by refining what will work and not work with your planned project.

READING IS NOT ENOUGH. PRACTICE TESTING IS CRITICAL. Our Review Materials are specifically designed to make self-testing or study-groups extremely easy. WE WILL PRACTICE LONG ANSWERS for exams together in the activities, so be sure and pay attention to those!

INTERESTED IN MORE?
Real Life Zombies, by Scientific American: https://www.scientificamerican.com/article/real-life-zombies/
Biology books simplified: Biozone Biology https://www.thebiozone.com
The Great Influenza, by John M Barry.

Lecture Objectives	**Student Learning Goals**
Scientific Method & Reliable Information	Student will learn about reliable vs unreliable sources and the scientific method (compared to diagnostic thinking). Students will learn about the presentation of information graphically and some statistical analysis terms
Dead or Alive?	Characteristics of living things will be explored, as well as some basic chemistry and molecular interaction
Metabolism	Enzymes and Metabolism will be covered, including lysis, synthesis, and ATP formation. ATP production will be related to living things in Dead or Alive.
Brains	Basic anatomy and function of brains and neurons will be introduced. Neurotransmitters and neuron function will be related to some known differences and previous zombie stories.
Radiation & Mutation	Genetics and Protein Synthesis will be covered, including the function of DNA, RNA, and proteins. Genetic diseases will be introduced, including sickle-cell anemia as a type of genetic disease. Radiation zombie stories will be covered and the history of radiation fears will be related to the understanding of DNA function and mutation.
Pathogens	Pathogens will be introduced including bacterial pathogens, viral pathogens, and eukaryotic pathogens, with special emphasis on pathogens that affect

	behavior and brains. Zombie stories that include pathogens will be used to discuss realistic and non-realistic pathogen-based zombies.
Epidemiology	Disease and Disease spread will be introduced, including a recap of correlation vs causation, virulence, dose of inoculation, incubation times, and fatality rates. The R-naught factor will be introduced to compare pathogen spread, and epi-curves will be introduced. Emphasis will be placed on the need for data before conclusions can be drawn, and the expected change in understanding that occurs during an active outbreak using the scientific method. Disease transmission and controls will be explored.
Immune Systems	The immune system is introduced, beginning with first line defenses. Second line defenses are introduced and the process of eliciting a fever response are learned as though students must explain them to a patient. Emphasis is placed on fever being beneficial up to 104 degrees, and why. Inflammation is introduced, but detailed mechanism not explored. 3rd line of defense (adaptive immune response) is introduced, from antigen presentation to humoral and cytotoxic response. Effects of suppressor T cells and memory cells discussed.
Treatments: Antibiotics, Antivirals, and Antibodies.	Antibiotics are drugs which are used to selectively inhibit the growth of bacteria. There are multiple possible targets and mechanisms of action. Antibiotic resistance occurs when a bacterial cell is able to circumvent the activity of antibiotics, either through an enzyme that stops antibiotic action, or a mutation that alters the target of an antibiotic. Resistance can be caused by random mutation or by selection. Education of patients as to why following instructions when prescribed antibiotics is critical is emphasized. Antivirals are discussed in terms of their action and their severe limitations. Comparison is drawn between antibiotic resistance and selection for antiviral resistant strains
Modern Pandemics	Modern Pandemics have included Influenza Pandemics, which shaped much of our public health policies. Pandemics arise from mutations in previous pathogens. These mutations sometimes occur in animal hosts (zoonotic pathogens) and sometimes in humans. Coronaviruses have been another cause of modern pandemics. SARS was the first recognized Coronavirus pandemic in 2003. Covid-19 is the second. Some of our public health shortcomings with the Covid-19 pandemic occurred because we were planning for influenza pandemics, and the viruses have different characteristics. Public Health measures for pandemics include reducing peaks to reduce the load on healthcare services, sewage treatment and garbage collection, and hopefully establishing herd immunity with rapidly developed vaccines. Vaccines can have the added effect of reducing the severity of symptoms in the infected. Treatments are usually highly specific for the pathogen, and may not slow pathogen spread enough to stop pandemics.
Preparation & PPE	Pandemic preparation and PPE such as masks, bleach, and disinfectants will be introduced.
BUILD A BETTER ZOMBIE STORY	The final project consists of students (individually or in groups up to 3) composing a better zombie story and turning it in. The rubric requirements for the zombie story include using scientifically accurate models for zombies (with science as learned in course topics: Dead or Alive, Metabolism, Brains,

	Radiation or Mutation, Pathogens, Epidemiology, Immune Systems, Treatments, Preparation & PPE). Students may compose their story in different modalities, including writing a narrative, composing an art project, podcast, news broadcast, composing a comic, writing a song, etc. (examples will be shown in class).
Lab Experiment Objectives:	
Molecular Interaction	A wet activity without pathogens to explore the effects of charge, hydrophobicity, and shape on molecular interaction within cells. Effectively demonstrates how DNA bases pair up, & how enzymes bind to substrates.
Brain Dissection & Autonomic Nervous System	Students will observe mammalian brains, and have the opportunity to dissect brains to observe gross anatomy. A demonstration on autonomic nervous system activity will be performed.
Streak for Isolation and Streak a Lawn from environmental samples	Students will perform a streak for isolation technique (microbiology technique) with a BSL-1 level bacterium (non pathogenic) and then a sample and streak a lawn technique from environmental samples in the micro lab. Safety requirements will be covered before this lab, and PPE including gloves, lab coats, and safety glasses will be provided.
Streak a Lawn & perform Antibiotic Sensitivity test	Students will streak a lawn with a BSL-1 level bacterium (non-pathogenic) and perform an antibiotic sensitivity test with an antibiotic, and then a substance from a pool of choices with potential anti-bacterial action. Students will get results from this experiment and build a lab poster of their results with guidance from the professor, illustrating scientific methodology.

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

Student Resources Link: https://uttyler.instructure.com/courses/39397/pages/student-resources

University Policies & Information Link:
https://uttyler.instructure.com/courses/39397/pages/university-policies-and-information